Top Posters

2024 ASIPP Abstract and Poster Winners

Overall Winners Physician Attending

Intraosseous Basivertebral Nerve Ablation: 4-Year Outcomes
– Joshua A .Hirsch, MD
&
Controlled Trial of SI-6603 (Condoliase) in Patients With Radicular Leg Pain Associated With Lumbar Disc Herniation
– Kenneth Candido, MD

Overall Winner Trainee

Opioid Reductions After Enhanced Surgical Recovery Care in the Post-Operative Head and Neck Cancer Population
– Alice L. Ye, MD

Overall Winner Medical Student

Melatonin as a Potential Therapeutic Intervention for Lower Back Pain
–Christopher File, BSA

Intraosseous Basivertebral Nerve Ablation: 4-Year Outcomes
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Introduction
Intraosseous basivertebral nerve ablation (BVNA) is FDA-cleared for the treatment of anterior column vertebrogenic low back pain. Vertebrogenic pain, or vertebral endplate pain, is a subset of chronic low back pain caused by damage to the vertebral endplates.[1,2] Pain is transmitted through the basivertebral nerve, which originates from the sinuvertebral nerve.[3,4] Vertebral endplate damage is visible as bone marrow lesions (Modic changes) on magnetic resonance imaging (MRI).[5] The safety and effectiveness of intraosseous BVNA has been demonstrated in randomized controlled trials, meta-analyses, single-arm studies and systematic reviews.
Methods
Four-year pooled results are reported for: 1) A prospective, open-label, single-arm sub-study of the treatment arm of the randomized controlled trial of BVNA versus standard care conducted in 20 U.S. sites with follow-up at 3, 6, 9, 12, 24, 36, 48, and 60 months; and 2) A prospective, open-label, single-arm follow-up study of BVNA-treated patients in two U.S. sites with follow-up at 3, 6, 9, 12, 36, 48, and 60 months. Inclusion/exclusion criteria, study endpoints, visit schedules, and protocol requirements were similar for the two studies. Patient-reported Oswestry disability index (ODI) and numeric pain scores (NPS) at 4-years were compared to baseline (paired datasets) using a two-sided paired t-test with a 0.05 level of significance.
Results
N=94 patients (83% of participants) who received BVNA completed 4-year study visits. Reported mean age was 48.3 ± 9.47 years; 54.3% of participants were female and 45.7% were male.
Baseline: Patients reported a mean NPS of 6.7 ± 1.2 and mean ODI of 46.2 ± 10.8, with 70% having reported back pain for ≥ 5 years.
4-Years: Reduction in mean NPS of 3.9 ± 2.6 points (95% CI 3.4, 4.5; p<0.0001) and in mean ODI of 30.8 ± 15.9 (95% CI 27.5, 34.0; p<0.0001) from baseline.
Responder rates: (MCID of ≥ 15-points for ODI and ≥ 50% reduction in NPS) were 80.9% and 61.7%, respectively; 23.4% of patients reported being pain-free at four years.
Patient satisfaction and activity: 75.5% of patients reported their condition as "improved" and 71% reported resuming the same level of activity they had enjoyed prior to the onset of low back pain.
Healthcare utilization: 66.7% decrease in the number of patients actively taking opioids compared to baseline; only 4.3% of patients had therapeutic injections post-ablation that were adjudicated as treating the same pain etiology per independent physician reviewers.
Mean ODI: Baseline to 4-Years
61.7% of patients reported a ≥ 50% reduction in VAS at 4-years post-BVNA (p= 0.0233)
Results Continued
Safety: No serious device or device-procedure related adverse events reported through 4 years.
Conclusions
Basivertebral nerve ablation is a safe, effective, and durable treatment of vertebrogenic pain.
Improvements in pain and function were clinically and statistically significant out to 4-years post-ablation.
Results are consistent across multiple studies
References
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A Phase 3, Randomized, Double-Blind, Sham-Controlled Trial of SI-6603 (Condoliase) in Patients With Radicular Leg Pain Associated With Lumbar Disc Herniation

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BACKGROUND

- Lumbar disc herniation (LDH), the displacement of disc material (nucleus pulposus) beyond the intervertebral disc space, is a leading cause of radicular leg pain (ie, sciatica)[1]
- There is a gap in the treatment landscape for LDH between conservative care and surgery[2]
- SI-6603 (condoliase, chondroitin sulfate ABC endolysase) is a novel nonprotein, high-purity enzyme with high substrate specificity for glycosaminoglycans in the nucleus pulposus, and is thought to reduce disc pressure and alleviate nerve root impingement[3]
- Condoliase was approved in Japan in 2018 based on positive results from phase 2/3 and phase 3 clinical trials[4-6]
- The Discovery 6603 study (NCT03967938) is a phase 3, randomized, double-blind, sham-controlled trial to evaluate the efficacy and safety of a single intradiscal injection of condoliase for radicular leg pain in individuals with LDH in the United States (US)

Figure 1. Study Design

STUDY DESIGN AND PARTICIPANTS

- Participants were randomized 1:1 to a single intradiscal injection of condoliase (1.25 units) or sham injection (**Figure 1**)
- Inclusion criteria: Adults aged 30 to 70 years with confirmed posterolateral LDH, chief complaint of unilateral radicular leg pain, and <6 weeks of conservative treatment
- Among 512 randomized participants, 341 constituted the modified intention-to-treat (mITT) population (assigned treatment: condoliase 169; sham: 172; **Table 1**) and the safety population (treatment received: condoliase: 162; sham: 124)
- Primary endpoint: Change from baseline (CFB) to Week 13 in worst leg pain score during the past 24 hours averaged over the previous 7 days, as assessed by 100-mm visual analogue scale (VAS)
- Key secondary endpoints: CFB in average worst leg pain at Week 52, herniation volume at Week 13, and Oswestry Disability Index (ODI) score at Week 13
- Primary and key secondary endpoints were analyzed mixed model for repeated measures (MMRM)
  - A serial gatekeeping algorithm was used, wherein if the primary endpoint was significant at one-sided, Week 52 worst leg pain would be evaluated, followed by Week 13 herniation volume, then Week 13 ODI score
  - If an endpoint failed to meet significance, then the algorithm was halted, and all remaining tests were declared nonsignificant
- A protocol-specified sensitivity analysis using multiple imputation (MI) was conducted for the CFB in worst leg pain at Week 13 and Week 52

KEY TAKEAWAYS

1. **Condoliase significantly improved radicular leg pain at Week 13 (vs sham) in participants with LDH**
2. **Condoliase was safe and well tolerated, with no treatment-related serious AEs**
3. **Post-treatment surgery for LDH was less frequent in the condoliase group vs sham**
4. **Condoliase has the potential to provide a minimally invasive treatment option for patients with LDH**

RESULTS

Figure 2. LSM CFB in Average Worst Leg Pain

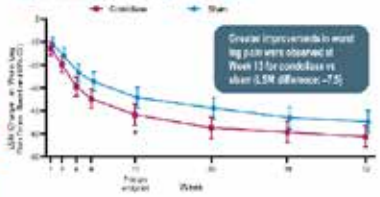

Figure 3. LSM CFB in Herniation Volume

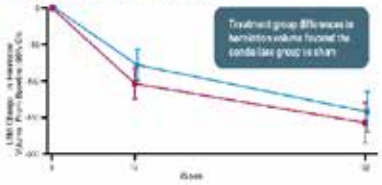

Figure 4. LSM CFB in ODI Score

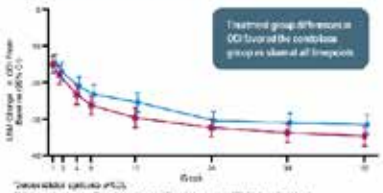

Table 1. Baseline Participant Characteristics

	Condoliase (n=169)	Sham (n=172)
Age, mean (SD), years	45.8 (12.0)	46.0 (12.9)
Sex, n (%)		
Male	96 (56.8)	89 (51.7)
Female	73 (43.2)	83 (48.3)
Race, n (%)		
White	137 (81.1)	142 (82.6)
Black/African American	13 (7.7)	11 (6.4)
Asian	5 (3.0)	3 (1.7)
Other	14 (8.3)	16 (9.3)
Screening BMI, mean (SD), kg/m²	29.0 (5.0)	29.1 (5.0)
Smoking status, n (%)		
Never smoked	103 (61.0)	100 (58.1)
Past smoker	34 (20.1)	36 (20.9)
Current smoker	32 (17.2)	36 (20.9)
Occupation, n (%)		
Light labor	120 (71.0)	122 (71.0)
Heavy labor	49 (29.0)	50 (29.0)
Worst leg pain, mean (SD), VAS	77.89 (9.09)	77.82 (9.73)
ODI score, mean (SD)	46.2 (15.27)	45.1 (17.03)
Modic classification, n (%)[a]	n=107	n=103
Type 0	105 (65.6)	101 (68.0)
Type 1	44 (28.0)	36 (24.3)
Type 2	23 (14.6)	27 (18.2)
Type 3	5	4

[a]Safety population.
Other = a person, Fully professional with 1 or 2 college degrees or more.
BMI, body mass index; CFB, Oswestry Disability Index; ODI, Oswestry Disability Index; SD, standard deviation; VAS, Visual analog scale.

- Condoliase showed significantly greater improvement in worst leg pain at Week 13 (LSM CFB: −41.7) vs sham (−34.2; p=0.0262; **Figure 2**)
- The treatment group difference in CFB in worst leg pain at Week 52 favored condoliase but did not achieve significance (p=0.0568)
- Re-running key secondary endpoints of CFB in herniation volume (p=0.0522; **Figure 3**) and ODI score (p=0.0305; **Figure 4**) at Week 13 were considered not significant regardless of their p values
- Multivariate analysis of basic treatment group differences in CFB in average worst leg pain at Week 13 (p=0.0223) and Week 52 (p=0.0433) in favor of condoliase
- Post-treatment surgery for LDH at the same level or higher was numerically more frequent in the sham group (8.4%; n=11) vs the condoliase group (3.6%; n=6)

Table 2. Summary of Adverse Events

n (%)	Condoliase (n=169)	Sham (n=172)
Any TEAE	109 (71.0)	100 (65.5)
Mild	76 (45.5)	69 (37.4)
Moderate	31 (18.5)	28 (16.7)
Severe	2 (1.2)	3 (1.8)
Any treatment-related TEAE	47 (28.1)	31 (18.5)
Any SAE	1 (0.6)	4 (2.4)
Treatment-related SAE	0	0
AEs leading to study discontinuation	1 (0.6)	4 (2.3)
TEAEs in ≥5% of participants		
Nasopharyngitis/URTI	47 (28.1)	50 (29.1)
Back pain	22 (13.2)	25 (14.5)
Injury & accidents	20 (12.0)	19 (11.0)
Nasopharyngitis/flu-like	10 (6.0)	7 (4.1)
COVID-19	7 (4.2)	17 (9.9)
Headache, posture and muscle	10 (6.0)	8 (4.7)
Hypertension	7 (4.2)	8 (4.7)
Any ADRs	47 (28.1)	31 (18.0)

Safety population; classified according to MedDRA version 24.0.
AE, adverse event; ADR, adverse event/suspected reaction; COVID-19, coronavirus disease 2019; MedDRA, Medical Dictionary for Regulatory Activities; SAE, serious adverse event; TEAE, treatment-emergent adverse event.

Most TEAEs in each treatment group were mild in severity

- No adverse events (AEs) leading to study discontinuation or serious adverse events (SAEs) were considered treatment-related (**Table 2**)
- No deaths were treatment-related (1 death in the condoliase group after study completion due to motorcycle accident)
- Changes in imaging findings occurred more frequently in the condoliase group vs sham, but these changes were not associated with leg or back pain (**Table 3**)

Table 3. Summary of Imaging Findings

	Week 52		Week 52	
n (%)	Condoliase (n=169)	Sham (n=172)	Condoliase (n=169)	Sham (n=172)
Modic classification[a]				
Type 0	48 (34.3)	102 (65.6)	56 (42.2)	71 (53.3)
Type 1	31 (26.0)	35 (22.5)	34 (25.6)	34 (25.6)
Type 2	21 (17.6)	23 (14.8)	21 (15.8)	19 (14.3)
Type 3	4	4	3	4
Type 4	5 (4.2)	0	3 (2.3)	0
Decrease in disc height ≥20%	21 (12.4)	3	14 (8.3)	1 (0.6)
Vertebral body slips				
Normal, by Meyerding grade	1	2 (1.2)	2 (1.2)	1 (0.6)

[a]Modic classification was evaluated with 1.5 T MRI by 3 qualified readers and Modic type was determined by majority. Sensitivity analysis was performed by applying the Modic type determined by each reader.

References

1. Fardon DF, et al. Spine J. 2014;14(12):2525-2545.
2. Schoenfeld AJ, Weiner BK. J Bone Joint Surg Am. 2010;92(7):1693-1705.
3. Matsuyama Y, et al. J Neurosurg Spine. 2018;28(4):405-411.
4. Chiba K, et al. Spine. 2018;43(15):1059-1065.

Acknowledgements & Disclosures

This study was sponsored by Seikagaku Corporation. Medical writing support was provided by Bob Cheatham, Dorothy Hawkins, and Brooke Buchanan of Ashfield MedComms.

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Presented at the American Society of Interventional Pain Physicians (ASIPP) 26th Annual Meeting | April 4-6, 2024 | Dallas, Texas

Opioid Reductions After Enhanced Surgical Recovery Care in the Post-Operative Head and Neck Cancer Population

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THE UNIVERSITY OF TEXAS MD Anderson Cancer Center
Making Cancer History®

Background

- Pain is the **most common symptom** among head and neck cancer (HNCa) patients
  - **40-84%** have pain at time of diagnosis
  - **60%** have pain after cancer treatment
- As a result, many patients are on pre-operative opioids and persist in opioid use after surgery
- Prior studies report that **48-82%** HNCa patients having persistent opioid use after resection & reconstruction
- **Enhanced surgical recovery has led to 45% decrease** in opioid prescriptions in our post-surgical pancreatic cancer patient population
- *Can similar findings be seen for HNCa?*

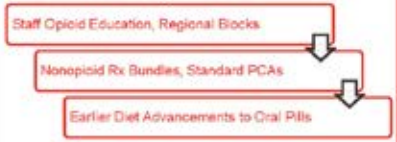


Figure 1. Enhanced Recovery Program QI Model

Methods

Prospective study enrolling HNCa adult patients undergoing free flap reconstruction from 3/2019 to 9/2021. Data on demographics, symptoms, and opioids collected at pre-surgery, discharge, 2–3-week follow-up, and 12-13-week follow-up. Opioid prescriptions were converted into morphine equivalent daily doses (MEDD). Confidence intervals (CIs) were set at 95% and α was set at 0.05. A ps0.05 does not mean alternate hypothesis is true nor does it indicate strength of effect size. Standard inferential statistical analysis was completed via GraphPad Prism 10.0.2.

Results

While only 55/129 enrolled patients had complete data for all timepoints, 71 patients had complete data for 3 of the 4 timepoints. We present updated findings that allow for subgroup analysis.

Figure 2. Opioid Prescriptions for Individuals Across Timepoints.

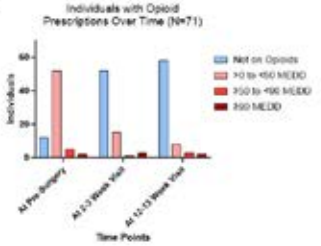


Table 1. Demographics at Pre-Surgical Evaluation

n (%) unless otherwise specified	Completers (N = 71)	Noncompleters (N = 30)
Age, mean (SD, range)	64 (12, 26-87)	57 (14, 22-84)*
Male Sex	53 (59%)	23 (77%)
White or Caucasian	61 (86%)	25 (83%)
Married	54 (76%)	18 (48%)**
Any smoking history	33 (46%)	17 (57%)
Any alcohol use	37 (52%)	19 (63%)
MDASI Score, median (IQR)	13 (2-26)	9 (0-19.3)
Worst Pain Subscore, median (IQR)	*2 (0-6)*	*1.5 (0-5)*
CAGE-AID ≥2	2 (3%)	1 (3%)*
SOAPP Score ≥7	6 (8%)	4 (13%)*
Pain related to cancer condition	28 (39%)	10 (33%)*
Daily pain medicine use	22 (31%)	8 (27%)*
Chart reported opioid prescription	58 (83%)	22 (73%)
MEDD, mean (SD, range)	84mg (87, 10-120)	49mg (97, 10-400)*

SD = standard deviation; MDASI = MD Anderson Symptom Inventory; MEDD = morphine equivalent daily dose; SOAPP = Screener and Opioid Assessment for Patients with Pain; IQR = interquartile range. *13% missing data; **17% missing data; *p-value between completer vs. noncompleter is <0.05.

Figure 3a. MEDD Dosage Change Across Visits (N=71) grouped by pre-surgical opioid prescription status.

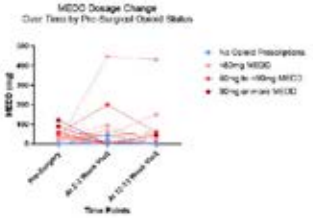
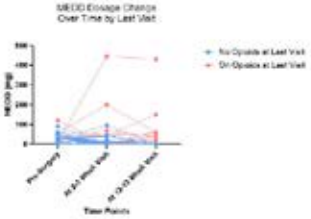


Figure 3b. MEDD Dosage Change Across Visits (N=71) grouped by last visit opioid prescription status.



Overall Findings

- **18% (13/71) HNCa patients had persistent opioid use by 12-13-week follow-up** after participating in enhanced recovery care program.
- No correlation between opioid dose, symptom burden, and pain intensity levels.
- Compared to persistent opioid users at 12-13-week follow-up, patients successfully off opioids had lower pre-surgical pain score, lower daily medication use, lower follow-up symptom burden and pain scores ($p<0.05$).

Conclusions / Limitations

1. In our cohort, persistent opioid use was seen in **only 18% of the patients.** Enhanced surgical recovery decreased opioid use from 83% pre-surgically to 18% post-surgically (a 65% decrease) by 12-13-week follow-up.

2. Completers and non-completers were not significantly different patient populations, meaning these results are likely generalizable.

3. SOAPP was not helpful as a predictive factor. Rather, high pre-surgical pain levels and daily pain medication use predicts persistent opioid use. Earlier interventions are needed for these patients.

4. Great promise for decreasing persistent opioid use through improving physician/provider care practices as seen in this Enhanced Recovery Program.

Acknowledgements

Thank you to our great team of research coordinators and administrators: Rose Erfe, Abram Escobedo, Raven Bailey, Juliana Heatter, and Tariq Syed.

References

1. Kotlińska-Lemieszek A, Zylicz Z. Less Well-Known Consequences of the Long-Term Use of Opioid Analgesics: A Comprehensive Literature Review. Drug Des Devel Ther. 2022;16:251-264. doi:10.2147/DDDT.S342409
2Van Cleave J, Brooks C, Zahriah E, et al. Pain Prevalence in Head and Neck Cancer. The Journal of Pain. 2022;23(5, Supplement):29. doi:10.1016/j.jpain.2022.03.114
3. Hinther A, Rasool A, Nakoneshny SC, et al. Chronic opioid use following surgery for head and neck cancer patients undergoing free flap reconstruction. Journal of Otolaryngology - Head & Neck Surgery. 2021;50(1):28. doi:10.1186/s40463-021-00508-y
4. Saraswathula A, Chen MM, Mudumbai SC, Whittemore AS, Divi V. Persistent Postoperative Opioid Use in Older Head and Neck Cancer Patients. Otolaryngol Head Neck Surg. 2019;160(3):380-387. doi:10.1177/0194599818778276
5. Boyev A, Jain AJ, Newhook TE, et al. Opioid-Free Discharge After Pancreatic Resection Through a Learning Health System Paradigm. JAMA Surgery. 2023;158(11):e234154. doi:10.1001/jamasurg.2023.4154

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MELATONIN AND THE INTERVERTEBRAL DISC: A POTENTIAL INTERVENTION FOR LOWER BACK PAIN?

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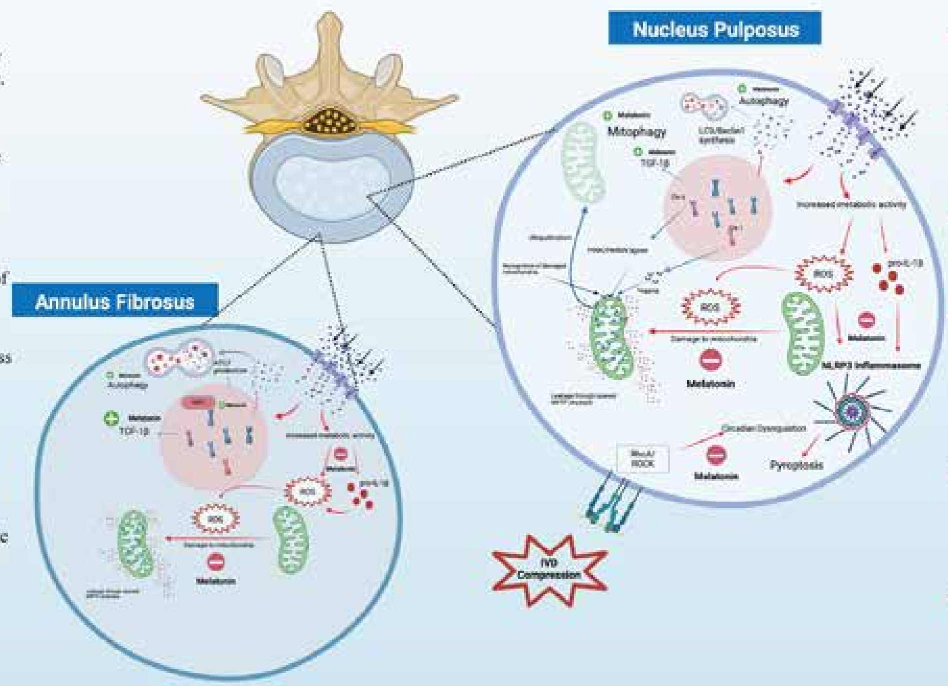
Introduction

- Lower back pain is a common disability associated with aging that continues to carry a huge economic and health burden globally.
- Importantly, lower back pain is strongly associated with diseases involving intervertebral discs (IVDs), and many of the treatment options for the repair and maintenance of the IVDs are insufficient.[1,2]
- Being a well-tolerated and endogenously produced molecule, melatonin is a serious candidate for the treatment and prevention of a wide variety of skeletal conditions.
- We evaluate current updates regarding melatonin's activities in the IVDs and discuss mechanisms related to its effects on inflammation, oxidative stress, and senescence.

Methods

- A comprehensive literature review was conducted on existing databases including PubMed, MEDLINE, EMBASE, and Google Scholar. Keywords included "melatonin" in combination with "nucleus pulposus," "annulus fibrosus," and "chondrocyte."
- A total of 103 papers were included for synthesis



Works Cited

Future Directions

- There is a need for clinical studies on the effects of melatonin on the cartilaginous end plate and annulus fibrosus.
- Melatonin when saturated onto sodium alginate hydrogels, has shown promise in restoring IVDs following implantation into mice.[8]
- Historically, TGF-β1 upregulation has been shown to suppress negative regulators of the circadian clock; this is another avenue of melatonin regulating the IVD.[11]
- Melatonin is known to suppress angiogenesis via the inhibition of VEGF; it is important to note that the nucleus pulposus is avascular.

Conclusions

- The IVD is a highly dynamic structure that is markedly altered by an inflammatory environment, resulting in degenerative changes. Degeneration of the IVD is a common cause of lower back pain
- The available data suggests it has potential, especially in the aged population where melatonin levels are greatly diminished, to preserve a more youthful spinal function.
- Further studies we involve establishing a baseline of melatonin and inflammatory markers in the IVD using metabolomics. This information can be used to track the safety and efficacy of melatonin supplementation in older patients.

12 Month US RCT Outcomes: DTM™ Spinal Cord Stimulation for Indicated Chronic Back Pain Patients Ineligible for Spine Surgery

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INTRODUCTION

- DTM SCS has been shown to be superior for the treatment of neuropathic chronic low back pain (CLBP) in patients with persistent spinal pain syndrome type 2 (PSPS-T2).[1]
- In contrast, options for the treatment of CLBP in PSPS-T1 not eligible for spine surgery, with degenerative disc disease, herniated disc, or radiculopathy are limited.
- A European RCT (ISRCTN10663814) studying the effect of DTM SCS vs conventional medical management (CMM) in the treatment of CLBP in these patients reported primary endpoint results that were consistent with those reported in the RCT for PSPS-T2 patients.[2]
- The current work presents a RCT that evaluated, for the first time, the efficacy of DTM SCS versus Conventional SCS on PSPS-T1 patients with CLBP who are not candidates for spine surgery across the USA.

MATERIALS & METHODS

Design

Prospective Post-Market, Multi Center, Randomized Controlled

- On label subjects indicated for SCS*, CLBP and Leg Pain
- Randomized (1:1) across 20 US Sites
- DTM™ SCS vs Conventional SCS
- Option to crossover at 6-months (2-way crossover)

Primary endpoint: Responder rate (≥ 50% CLBP relief) at 3-months

Analysis population

- mITT: subjects completing Trial Phase (counted even if failed trial)
- PP: subjects implanted completing visits

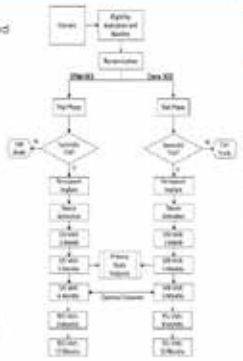


Table 1. Key Inclusion & Exclusion Criteria

Inclusion
Adult subjects Non-eligible for spine surgery ≥ 6 cm BP VAS with or without leg pain SCS candidate per approved labeling* Stable pain medications regimen
Exclusion
Previous lumbar spine surgery Contra-indications for SCS Mechanical spine instability

* Indications including degenerative disc disease or herniated disc refractory to conservative and surgical interventions in patients with radicular pain syndrome.

This study has been sponsored by SGX NOVA (acquired by Medtronic).

RESULTS

Table 2. Baseline Demographics (mITT)

	DTM SCS (N=51)	Conv SCS (N=54)
Age (SD)	57.8 (11.5)	59.6 (12.1)
Sex	52.9% F	61.1% F
Years in pain (SD)	9.5 (8.6)	9.4 (8.4)
Years in CLBP (SD)	7.8 (7.6)	8.0 (7.7)
Zung's Index (SD)	47 (7.7)	48 (7.6)

Table 3. Enrolled Subject Pain Etiologies (mITT)

Pain Etiology n (%)	DTM SCS (N=51)	Conv SCS (N=54)
Radiculopathy	28 (56.2%)	44 (81.5%)
Degenerative Disc Disease	19 (34.5%)	42 (77.8%)
Discogenic	35 (68.6%)	42 (78.1%)
Mild/Moderate Spinal Stenosis	27 (52.9%)	33 (61.2%)
Lumbar facet-mediated pain	17 (29.4%)	11 (20.4%)
Sacroiliac dysfunction	9 (17.6%)	6 (11.1%)
Visceral (i.e. thoracic) pain	8 (15.7%)	7 (13.0%)
Spondylolisthesis	3 (5.8%)	3 (5.3%)
Other chronic pain	12 (23.5%)	23 (42.7%)

13/105 randomized subjects failed trial (11/54 with Conventional SCS, 2/51 with DTM SCS)

Statistically superior CLBP responder rate with DTM SCS compared to Conventional SCS at all timepoints (p < 0.0001). Reductions in CLBP and leg pain VAS with DTM SCS.

Figure 1. CLBP Responder Rates (mITT)*

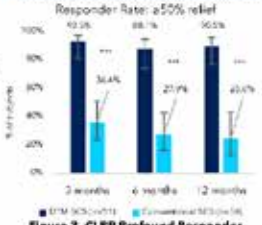


Figure 2. CLBP VAS Scores (mITT)**

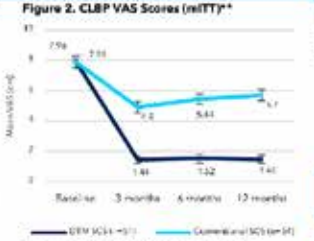


Figure 3. CLBP Profound Responder Rate by subject at 12-months (mITT)

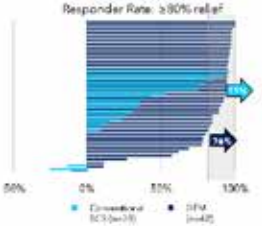
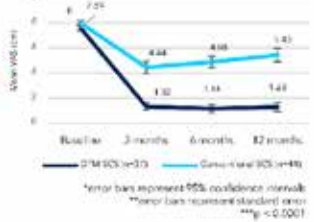


Figure 4. Leg Pain VAS Scores (mITT)**



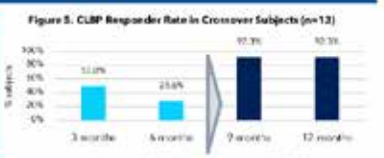
*error bars represent 95% confidence intervals
**error bars represent standard error
***p < 0.0001

RESULTS

Crossover Option:

- No subjects crossed over from DTM SCS to Conv SCS. 14 out of 30 Conv SCS subjects crossed over to DTM SCS.
- **12 out of 13 were responders at the 9- and 12-month visits.**

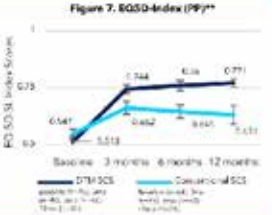
Figure 5. CLBP Responder Rate in Crossover Subjects (n=13)



Improvements in disability and quality of life through 12-months with DTM SCS. ODI reduction of ~24 points (>2X the MCID) from baseline.

Figure 6. ODI Scores (mITT)

Figure 7. EQ5D-Index (PP)**



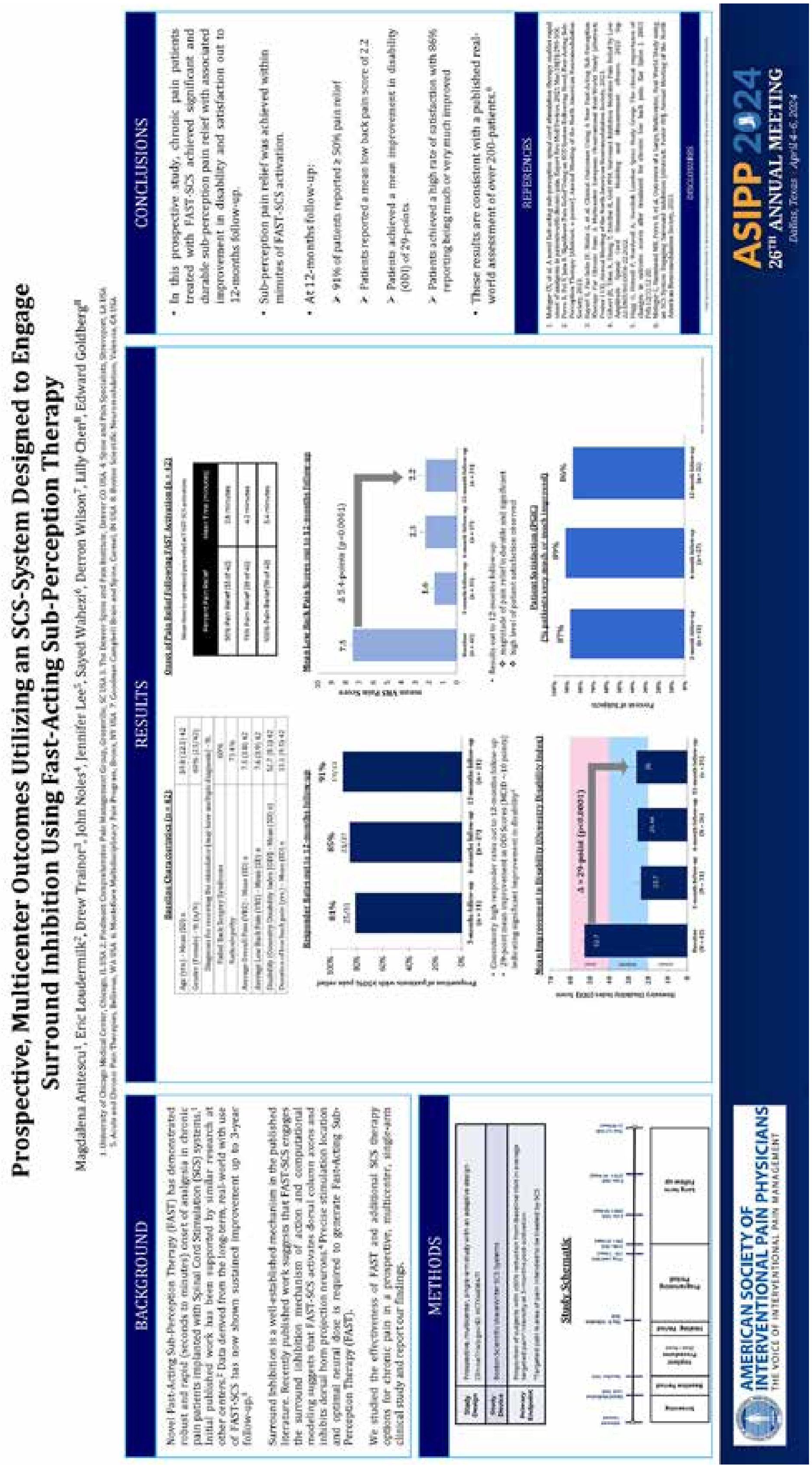
93% subjects reported being satisfied or very satisfied with DTM SCS at 12 months

DISCUSSION

- This RCT demonstrated the long-term superior efficacy of DTM SCS relative to Conv SCS for treating neuropathic CLBP in PSPS-T1 patients who were not eligible for spine surgery.
- Significant clinical improvements in functional disability and quality of life provided by DTM SCS were sustained over the study period.
- The results of this RCT indicate that DTM SCS provides significant benefits on the management of PSPS-T1 patients who are not eligible for spine surgery, including those who were not treated satisfactorily by Conventional SCS.

AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT

1. Falowski SM, Celestin J, Pope JE, Deer TR. Clinical Outcomes of Dorsal Root Ganglion Stimulation for Chronic Pain: A Systematic Review. Pain Pract. 2021 Nov;21(8):912-923.
2. Vallejo R, Gekht G, Van Buyten JP, Smet I, Mendoza A, Perez J, et al. NANS Annual Meeting. 18-21 Jan 2024. Las Vegas, NV, USA.


Prospective, Multicenter Outcomes Utilizing an SCS-System Designed to Engage Surround Inhibition Using Fast-Acting Sub-Perception Therapy
Magdalena Anitescu1, Eric Loudermilk2, Drew Trainor3, John Noles4, Jennifer Lee5, Sayed Wahezi6, Derron Wilson7, Lilly Chen8, Edward Goldberg8
BACKGROUND
Novel Fast-Acting Sub-Perception Therapy (FAST) has demonstrated robust and rapid (seconds to minutes) onset of analgesia in chronic pain patients implanted with Spinal Cord Stimulation (SCS) systems.1 Initial published work has been supported by similar research at other centers.2 Data derived from the long-term, real-world with use of FAST-SCS has now shown sustained improvement up to 3-year follow-up.3
Surround Inhibition is a well-established mechanism in the published literature. Recently published work suggests that FAST-SCS engages the surround inhibition mechanism of action and computational modeling suggests that FAST-SCS activates dorsal column axons and inhibits dorsal horn projection neurons.4 Precise stimulation location and optimal neural dose is required to generate Fast-Acting Sub-Perception Therapy (FAST).
We studied the effectiveness of FAST and additional SCS therapy options for chronic pain in a prospective, multicenter, single-arm clinical study and report our findings.
METHODS
Study Schematic
RESULTS
Baseline Characteristics (n = 42)
Onset of Pain Relief Following FAST Activation (n = 42)
Responder Rates out to 12-months follow-up
81%
85%
91%
3-month follow-up
6-month follow-up
12-month follow-up
Mean Low Back Pain Scores out to 12-months follow-up
7.5
Δ 5.4-points (p<0.0001)
1.6
2.3
2.2
Mean Improvement in Disability (Oswestry Disability Index)
Δ = 29-point (p<0.0001)
Patient Satisfaction (PGIC)
(% patients very much or much improved)
87%
89%
86%
CONCLUSIONS
In this prospective study, chronic pain patients treated with FAST-SCS achieved significant and durable sub-perception pain relief with associated improvement in disability and satisfaction out to 12-months follow-up.
Sub-perception pain relief was achieved within minutes of FAST-SCS activation.
At 12-months follow-up:
91% of patients reported ≥ 50% pain relief
Patients reported a mean low back pain score of 2.2
Patients achieved a mean improvement in disability (ODI) of 29-points
Patients achieved a high rate of satisfaction with 86% reporting being much or very much improved
These results are consistent with a published real-world assessment of over 200-patients.6
REFERENCES
DISCLOSURES
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas · April 4-6, 2024

Real-World Treatment Patterns and Gaps in Clinical Management of Lumbar Disc Herniation in the United States

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FERRING PHARMACEUTICALS

INTRODUCTION

- Lumbar disc herniation (LDH) is a common chronic condition frequently affecting lower back and legs and causing debilitating pain
- LDH affects approximately 1-3% of the population annually, primarily affecting individuals between 30 and 50 years of age[1]
- Conservative treatments are the first line treatments for most newly diagnosed LDH patients
- While conservative treatments are usually effective for initial symptomatic relief, many patients will require epidural steroid injection (ESI) and some may require surgeries[2]
- ESI has no confirmed long-term benefits and carries the risk of neurological complications;[3,4] surgery carries the risk of complications, risk relating to general anesthesia, along with a chance of re-herniation[5]

OBJECTIVE

- This study seeks to describe current treatment patterns and inform gaps in clinical management of patients with newly diagnosed LDH

METHODS

Study Design and Sample Selection

- A retrospective study using IQVIA PharMetrics® Plus database (01/01/2018 to 03/31/2023)
- The selection of LDH sample was described in **Table 1**

Table 1. Sample selection

Selection step	Description	N of patients
Step 1	≥1 inpatient diagnosis or ≥2 outpatient diagnosis codes of LDH between 01 January 2018 to 31 March 2022	2,595,743
Step 2	≥18 years old at the index date *(Index date was defined as first available diagnosis of LDH)*	2,560,704
Step 3	≥6 months of continuous enrollment in an insurance plan prior to and ≥12 months following the index date	1,253,562
Step 4	No ESI or LDH surgical procedures prior to the index date	1,244,758
Step 5	30-70 years old at the index date	1,086,552

Statistical Analysis

- Demographic and clinical characteristics during the 6-month baseline period were summarized and compared across subgroups defined based on treatments received. Continuous variables were compared using Wilcoxon Rank Sum Test and categorical variables were compared using Chi-squared Test
- Treatment patterns (including conservative treatments, ESI, and LDH surgery) were described over a three-year follow-up period. Conservative treatments included nonopioid analgesics (including NSAID, acetaminophen, etc.), opioids, systemic glucocorticoids, benzodiazepines and antispasmodic agents, physical/massage therapy, spinal manipulation, and acupuncture
- Time from first ESI to second ESI were described during the follow-up period among ESI-treated patients, using Kaplan-Meier (KM) analysis

KEY TAKEAWAYS

1. Around one quarter of newly diagnosed LDH patients received ESIs and/or surgeries after conservative treatment
2. Half of the patients who received ESI needed additional ESIs within one year, indicating potential lack of effectiveness
3. Close to one-fifth of ESI-treated patients underwent surgery including repeated surgeries
4. Among surgery-treated patients, close to half directly received surgery without ESI
5. Unmet needs exist in the current treatment options for LDH patients, highlighting the need for new effective treatment options to reduce the need for surgeries and ESIs

RESULTS

Demographic and Baseline Characteristics

Table 2. Summary of baseline patient characteristics

	Overall LDH Patients N = 1,086,552	LDH subgroups: Conservative Only/ No treatment N = 836,811	One ESI without Surgery N = 84,151	Multi ESIs without Surgery N = 87,533	Surgery treated N = 78,057
Demographics					
Age (years) at the index date, Mean ± SD	50.8 ± 10.0	50.4 ± 10.1	51.9 ± 9.7*	52.6 ± 9.3*	52.1 ± 9.8*
Female, n (%)	585,050 (53.8)	460,825 (55.1)	43,826 (52.1)*	45,910 (52.5)*	34,489 (44.2)*
Duration of follow-up, in months, Mean ± SD	27.1 ± 8.5	27.0 ± 8.5	26.7 ± 8.5	27.8 ± 8.3	27.8 ± 8.2
Prior conservative treatment, n (%)	720,578 (66.3)	529,162 (63.2)	63,705 (75.7)*	69,147 (79.0)*	58,564 (75.0)*
CCI score, Mean ± SD	1.2 ± 1.8	1.1 ± 1.7	1.3 ± 1.9*	1.4 ± 1.9*	1.3 ± 1.9*
Comorbidities, n (%)					
Hypertension	306,367 (28.2)	222,482 (26.6)	27,011 (32.1)*	30,983 (35.4)*	25,891 (33.2)*
Chronic pulmonary disease	281,785 (25.9)	209,369 (25.0)	23,768 (28.2)*	26,558 (30.3)*	22,090 (28.3)*
Diabetes	215,015 (19.8)	157,297 (18.8)	18,607 (22.1)*	21,035 (24.0)*	18,076 (23.2)*
Mild liver disease	157,740 (14.5)	117,147 (14.0)	13,566 (16.1)*	14,995 (17.1)*	12,032 (15.4)*
Osteoarthritis	117,649 (10.8)	81,310 (9.7)	12,059 (14.3)*	14,228 (16.3)*	10,052 (12.9)*
Obesity	115,802 (10.7)	86,708 (10.4)	9,773 (11.6)*	11,377 (13.0)*	7,944 (10.2)

Abbreviations:
CCI: Charlson Comorbidity Index; SD: standard deviation.
* Indicates p value < 0.001. Characteristics in each of the ESI- or surgery-treated group were compared with those in the conservative only/no treatment group.

- A total of 1,086,552 LDH patients were included for analyses with a mean age of 50.8 years and a mean Charlson Comorbidity Index (CCI) score of 1.2. Patients on average had more than two years of follow-up data (27.1 ± 8.5 months)
- The most common comorbidities included hypertension (28.2%), chronic pulmonary disease (25.9%), and diabetes (19.8%)

Treatment Patterns and Sequences

- Almost all patients (98.4%) were treated with conservative treatment during the follow-up period and 23.0% of patients required ESI and/or surgery to manage their LDH
- The group of patients who received ESI and/or surgery were on average 1-2 years older and had a slightly lower percentage of female patients compared to patients who received conservative treatments only (**Table 2**)

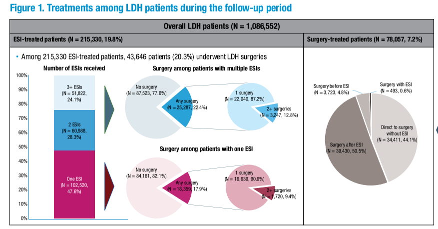
Utilization of ESI

- Overall, 19.8% of LDH patients received at least one ESI with or without surgery; more than half of ESI-treated patients (52.4%) received multiple ESIs (**Figure 1**)
- Among ESI-treated patients, the average duration from LDH diagnosis to first ESI was 6.2 months, with 53.4% and 82.3% received first ESI within 3 months and one year, respectively
- 50.0% of the patients who received first ESI also received second ESI within 1 year (**Figure 3**)

Utilization of surgery

- Overall, 7.2% of LDH patients underwent LDH surgeries with or without ESI; one in ten surgery-treated patients (9.6%) received multiple surgeries
- Among surgery-treated patients, the average duration from LDH diagnosis to first surgery was 8.4 months, with 53.5% and 74.7% received first surgery within 6 months and one year, respectively

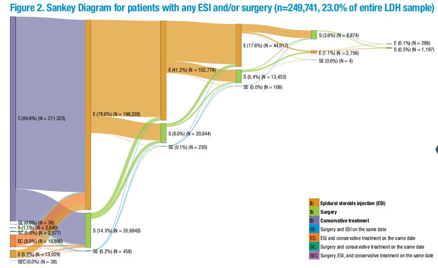
Figure 1. Treatments among LDH patients during the follow-up period



Abbreviations:
ESI: Epidural steroid injection; LDH: lumbar disc herniation.

- Close to half of surgery-treated patients (44.1%) directly received surgery without ESI
- Patients treated by multiple ESIs were more likely to undergo LDH surgeries (22.4% vs. 17.9%) and even repeated surgeries (12.8% vs. 9.4%) compared to those who received only one ESI

Figure 2. Sankey Diagram for patients with any ESI and/or surgery (n=249,741, 23.0% of entire LDH sample)



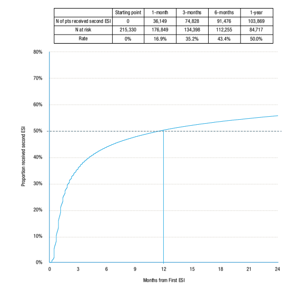
Note: After ESI/surgery, patients could receive post-procedure recovery conservative treatment, which was not further populated in the figure.

- Among patients who received ESI and/or surgery, most received ESI as the 2nd (78.6%) and/or 3rd (41.2%) treatment

Table 3. Common treatment sequences (n=249,741, 23.0% of entire LDH sample)

Common treatment sequences	N (%)
ESI	
Conservative treatments followed by one ESI	71,454 (28.6%)
Conservative treatments followed by two ESIs	40,331 (16.1%)
Conservative treatments followed by three or more ESIs	32,683 (13.1%)
Surgery	
Conservative treatments followed by one LDH surgery directly	27,391 (11.0%)
ESI and surgery	
Conservative treatments followed by one ESI and one LDH surgery	12,774 (5.1%)
Conservative treatment followed by two ESIs and one LDH surgery	8,442 (3.4%)

Figure 3. Time from first ESI to second ESI among ESI-treated patients



	Starting point	1-month	3-months	6-months	1-year
N of pts received second ESI	0	36,149	74,828	91,476	103,869
N at risk	215,330	176,849	134,398	112,255	84,717
Rate	0%	16.9%	35.2%	43.4%	50.0%

Abbreviations: ESI: Epidural steroid injection; LDH: lumbar disc herniation; pts: patients.

Acknowledgments

This study was funded by Ferring Pharmaceuticals.

Disclosures

AB: consultant for 4WEB Medical, Corelink/Zavation, and Ferring Pharmaceuticals; KC, AG: employees of Ferring Pharmaceuticals; MY, QL, YG, JL, SL: employees of Analysis Group, Inc., which received payment from Ferring Pharmaceuticals for participating in this research.

References

1. Zhang AS et al. *Am J Med.* 2023 Jul;136(7):645-651.
2. Gibson JN et al. *Cochrane Database Syst Rev. 2007* Jan 24;(1):CD001350.
3. Manchikanti L et al. *Pain Physician* 2022:25: E889-E916.
4. Cohen et al. *The Clinical journal of pain.* 2921 Sep; 37(9): 707-717.
5. Shriver MF et al. *Neurosurg Focus* 2015:39: E6.

Presented at ASIPP 2024, April 4 – 6, 2024, Dallas, Texas

Restorative Neurostimulation Provides Meaningful and Durable Outcomes: 5-Year Longitudinal Follow-up of ReActiv8-B Clinical Trial

Christopher Gilligan, MD* on behalf of the ReActiv8-B Study investigators
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BACKGROUND

- **Mechanical chronic low back pain (mCLBP)** involves chronic muscle inhibition and impaired neuromuscular control with poor spine stabilization
- **Stimulating bilateral L2 dorsal rami medial branch nerves** to elicit multifidus muscle contractions via **implantable restorative neurostimulation systems** can override chronic inhibitory processes
- **ReActiv8-B randomized sham-controlled pivotal trial** (clinicaltrials.gov #NCT02577354) provided restorative neurostimulation safety, effectiveness and durability evidence[1,2]
- Prospective neuromodulation trial outcomes beyond two years are rare
- **Aim: Report 5-year trial results**

[1]Gilligan, et al. (2021); [2]Gilligan, et al. (2023)

METHODS

Eligibility criteria included:
- mCLBP Visual Analog Scale (VAS) ≥ 6cm
- Oswestry Disability Index (ODI) ≥ 21 points
- Failed optimal medical management
- Positive Prone Instability Test (PIT)
- No indications for spine surgery
- No leg pain > back pain (i.e., neuropathic genesis)

Participants at Baseline (*Fig 1*)
- N = 204; age = 47±9 yrs; mCLBP = 14±11 years; VAS = 7.3±0.05 cm; ODI = 39±0.7; EQ-5D (quality of life) = 0.585±0.012 points
- Pain present 97±8% of days of the pre-enrollment year
- 100% failed physical therapy (avg. 31 visits) and pain medications →**37% on opioids at baseline**
- **52% failed interventional pain therapies**

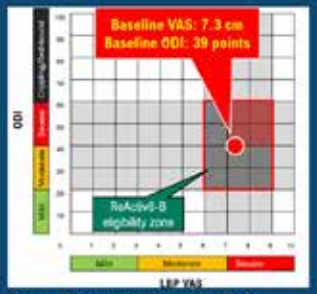

Fig 1. Baseline ODI and VAS of patients in ReActiv8-B trial

5-YEAR RESULTS

- Reduced average VAS: 2.4 ± 0.2 cm (*Fig 2*)
- Improved average ODI: 16 ± 1.3 (*Fig 3*)
- Improved average EQ-5D: 0.807 ± 0.015 (*Fig 4*)
- 78% with ≥50% VAS and/or ODI improvement
- 88% "Definitely satisfied"
- 69% of patients taking opioids at baseline eliminated (46%) or reduced (23%) opioid consumption

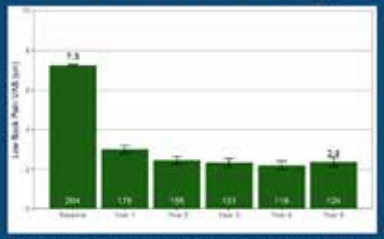

Fig 2. Visual Analog Scale outcomes per year

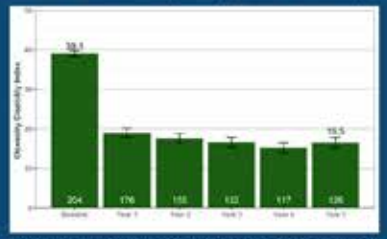

Fig 3. Oswestry Disability Index outcomes per year

5-Year Patient Accountability
- 92% of patients accounted for (n=188/204)
- 62% reported outcomes at 5 years (n=126/204)
- **9% explanted for resolution of pain** (n=18)
- 13% explanted for inadequate response (n=16)

5-Year Safety Data
- Serious Adverse Events (SAE) low
- **No lead migrations reported**
- < 5% revision rate

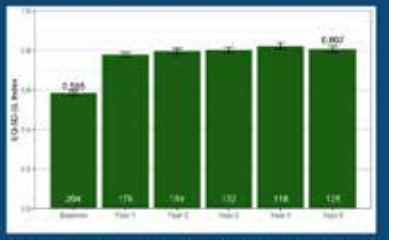

Fig 4. EQ-5D (quality of life) outcomes per year

CONCLUSION

Restorative neurostimulation proved effective, durable, and safe for patients with retractable mechanical CLBP at 5-year follow-up of ReActiv8-B clinical trial

SCS for CRPS: A Review of Cost-Effectiveness Models

Baylor College of Medicine | H. BEN TAUB DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION

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Baylor College of Medicine | H. BEN TAUB DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION

Background

Complex regional pain syndrome (CRPS) is a debilitating chronic pain condition with treatment options ranging from conventional medical management (CMM) to dorsal column spinal cord stimulation (SCS) and dorsal root ganglion stimulation (DRG-s). Though the mechanism of pain relief by SCS is not entirely understood, SCS is known to effectively reduce pain and improve health-related quality of life for patients suffering from CRPS[1]. Previous studies have suggested that SCS is a relatively cost-effective treatment for failed back surgery syndrome (FBSS)[2], but the cost-effectiveness of SCS for the treatment of CRPS remains unclear. Cost-effectiveness analyses specific to CRPS are needed as policymakers and payers require cost-effectiveness evidence to inform treatment funding decisions.

Objective

To evaluate the cost-effectiveness of SCS plus conventional medical management (CMM) versus CMM alone for the general population of adults with CRPS over a period of at least ten years.

Methods

A November 2023 literature search was conducted in Embase, Cochrane, and Web of Science databases for the terminology *(cost effectiveness)* AND *(spinal cord stimulation)*. Studies were included if they were written in English and included an adult population, cost effectiveness analysis, and novel modeling, with reported outcomes of quality-adjusted life years (QALY) and incremental cost effectiveness ratio (ICER). Review studies and cost-benefit and cost-minimization analyses were excluded.

Results

Four studies met criteria for inclusion[3-6]. All studies concluded SCS is cost effective with varying added QALY ranging from 1.0 to 2.12 and ICER ranging from $2,321 to $22,084/QALY. The selected studies were qualitatively analyzed based on their strengths/weaknesses (i.e., data quality, model costs/assumptions, time horizon) and assigned an American Academy of Neurology (AAN) Class rating.

All four of the studies were individually evaluated to be AAN Class III and could not individually support the conclusion that SCS is cost-effective in CRPS treatment, mainly due to insufficient strength of data underlying the models and industry sponsorship or author financial interest. Together, these studies yield an AAN Class C rating for SCS in the treatment of CRPS.

Author	Outcomes	Strengths	Limitations	AAN Rating
Kemler et al., 2010	QALY +1.96 Incremental Cost £3,562/QALY	- Healthcare utilization costs from large, multinational RCT - Sensitivity analysis	- Direct industry sponsorship - Low cost assigned to device implant - Outcomes data from a limited duration and single-center trial - Healthcare utilization data based on SCS for FBSS - Assuming no complications for CMM group	Class III
Kumar & Rizvi, 2013	QALY +2.12 Incremental Cost $11,256/QALY	- Direct chart access for capture of healthcare utilization costs and patient outcomes	- 50% authors with relevant disclosures - Single-center study - Limited description of inclusion/exclusion criteria and data collection process - Assuming no complications for CMM group	Class III
Mekhail et al., 2021	QALY +1.0 Incremental Cost $22,084/QALY	- Outcomes data from multicenter RCT - Insurance claims data for capture of healthcare utilization costs - Sensitivity analysis	- 80% authors with relevant disclosures - 10 year outcomes projected from 12 month follow-up	Class III
Deloitte, 2015	QALY +1.2 Incremental Cost $2,321(AUD)/QALY	- Comprehensive model, detailed explanation of inputs - Utilized multiple prior studies for different components of the model	- Direct industry sponsorship - Many underlying assumptions built on low quality evidence - Assuming no complications for CMM group	Class III

Conclusion

All four studies offer weak support for spinal cord stimulation as a cost-effective means of treating CRPS. There exists significant variability in the models, each with identifiable strengths and weaknesses. Weak evidence supports the utilization of SCS as a cost-effective means of treating CRPS, and less invasive treatment options remain first-line. Further research is needed to evaluate outcomes and costs of therapeutic treatment options for CRPS.

References

1. Kemler MA, Barendse GA, van Kleef M, et al. Spinal cord stimulation in patients with chronic reflex sympathetic dystrophy. N Engl J Med. 2000 Aug 31;343(9):618-24. doi: 10.1056/NEJM200008313430904. PMID: 10965008.
2. Provenzano DA, Heller JA. Daring discourse: economics of neuromodulation for the treatment of persistent spinal pain syndrome and complex regional pain syndrome. *Reg Anesth Pain Med.* 2023 Jun;48(6):288-295. doi: 10.1136/rapm-2022-103887. PMID: 37080579.
3. Kemler MA, Raphael JH, Bentley A, Taylor RS. The cost-effectiveness of spinal cord stimulation for complex regional pain syndrome. Value Health. 2010;13(6):735-742.
4. Kumar K, Rizvi S. Cost-effectiveness of spinal cord stimulation therapy in management of chronic pain. Pain Med. 2013;14(11):1631-1649.
5. Mekhail N, Deer TR, Poree L, et al. Cost-Effectiveness of Dorsal Root Ganglion Stimulation or Spinal Cord Stimulation for Complex Regional Pain Syndrome. Neuromodulation. 2021;24(4):708-718.
6. Deloitte Access Economics DA. Cost Effectiveness of Pain Devices – Neuromodulation Society of Australia and New Zealand; 2015.

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American Society of Interventional Pain Physicians 26[th] Annual Meeting

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Prevalence of Abnormal Urine Drug Test During COVID-19 Pandemic in the Cancer Patient Population: Retrospective Study

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HIGHLIGHTS

- Cancer patients often have untreated pain, exacerbated by opioid concerns and the pandemic.
- Study to assess abnormal urine drug test (UDT) prevalence in cancer-pain patients during the pandemic.
- Reviewed records of 550 cancer patients with pain, aiming for ±5% margin of error.
- 40% had abnormal UDT during the pandemic, with 2.9% positive for illegal substances.
- Factors like smoking and benzodiazepine use correlated with abnormal UDT.
- UDT is crucial in monitoring cancer patients during the pandemic.
- Stressors may have contributed to higher abnormal UDT prevalence.
- Recommendations support UDT use in chronic cancer-pain management during the pandemic, urging individualized care.

There are no financial or other relationships to disclose.

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BACKGROUND

- Patients with cancer frequently experience pain, with up to 66.4% facing moderate to severe pain in advanced stages.
- Opioids are recommended for pain relief, but amid the U.S. opioid epidemic, undertreatment persists due to physician concerns and patient reluctance.
- The COVID-19 pandemic added complexity to chronic cancer-pain management, leading to increased opioid prescriptions; however, its impact on opioid misuse in patients remains understudied.

OBJECTIVE

- This retrospective study aimed to investigate abnormal urine drug test (UDT) prevalence in patients with cancer-pain during the pandemic.
- Secondarily, the study identified the prevalent substances and associated clinical factors in the abnormal UDTs and contrasted them with pre-pandemic data reported by Leap et al.

Characteristics	Patients (n=550)
Gender	
Male	204 (48%)
Female	346 (62%)
Race	
White	440 (80%)
Asian	39 (7%)
African American	66 (12%)
Other	5 (1%)
Ethnicity	
Non-Hispanic	446 (80%)
Hispanic	104 (19%)
Other	5 (1%)
Smoking Status	
Former smoker	226 (41%)
Current smoker	82 (15%)
Never smoker	95 (18%)
Unknown	147 (26%)
Cancer Status	
Active cancer	380 (69%)
No evidence of disease	170 (31%)

Table 1 Demographics of Cancer Pain Patients with Urine Drug Test

Abnormal Outcomes	Patients (n=550)
ILL	16 (2.9%)
DNP	137 (25%)
PND	22 (4%)
THC	45 (8.1%)
Number of abnormal outcomes per patient	
0	300 (60%)
1	102 (35%)
2	17 (3%)
>3	11 (2%)

Table 2: Outcomes for abnormal urine drug test results

ILL = illicit substances. DNP = did not prescribe. PND = prescribed not detected. THC = tetrahydrocannabinol

METHODS

- The study involved a retrospective chart review of 550 cancer patients identified through the EPIC electronic medical system, meeting criteria such as an ICD-10 code for cancer-pain and at least one UDT.
- Data collected during the in-depth chart review encompassed demographics, cancer treatment, narcotic use, UDT results, and other relevant clinical factors.
- Sample size justification for 550 patients aimed at an approximate ± 5% margin of error for estimating abnormal UDT prevalence.

Gender				
Race				
Ethnicity				
Smoking Status				
Cancer Status				
Benzodiazepine use**				
No				
Yes				

Table 3: Multivariable models for abnormal urine drug results for primary outcomes – illicit substances and detected not prescribed

RESULTS

- During the COVID-19 pandemic period from May 2020 to May 2022, a comprehensive analysis of 550 clinical encounters revealed a balanced gender distribution (48% male, 52% female) and a predominantly white population (80%).
- Among the patients, 69% had active cancer, and 82% were not using any concomitant benzodiazepines. Of the 550 patients, 40% had abnormal UDT, with only 2.9% testing positive for illegal substances within this sub-population.
- The study focused on illicit substances (ILL) and substances not prescribed (DNP).
- Significant factors associated with abnormal UDT outcomes included smoking status, active cancer, and concomitant benzodiazepine use, with smokers having a higher risk of testing positive for ILL and DNP.
- Notably, patients with active cancer were less likely to test positive for ILL or DNP.

CONCLUSION

- UDT is crucial for monitoring medication adherence and detecting unauthorized substance use in cancer patients and supported by guidelines from the CDC and oncology organizations advocating its use.
- During the COVID-19 pandemic, our study found a 40% prevalence of abnormal UDT among cancer patients, higher than pre-pandemic rates reported by Leap et al. of 34%, possibly due to the pandemic stressors.
- Notably, 62% of the sample population with abnormal UDT tested positive for DNP, while 7% were positive for ILL.
- Patients with active cancer showed a lower likelihood of testing positive for abnormal UDT, emphasizing the importance of ongoing monitoring and targeted interventions for at-risk groups.
- This study underscores the complexities of evaluating demographic risk factors, especially during unprecedented times.
- Limitations for this study include but are not limited to selection bias, discrepancies in data entry and collection and higher prevalence of telemedicine use post-pandemic compared to pre-pandemic.
- This study supports existing recommendations on utilization of UDTs, emphasizing its role in enhancing medication adherence in chronic cancer-pain management during the pandemic.
- Physicians should remain vigilant, considering pandemic-related stressors, and continue to individualize their approach to chronic cancer-pain and individual risk factors in patient care.

Neuromodulation Device Explant Rate Among Cancer Patients: A Retrospective Review

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Introduction

- Explant of implanted neuromodulation devices is associated with significant consequences including increased morbidity, mortality, and expanding healthcare costs.[1,2]
- There is a dearth of current literature on the rate of spinal cord stimulator (SCS) and dorsal root ganglion stimulator (DRGS) explant among patients with cancer.
- This retrospective review of patients aims to assess rates and reasons for neuromodulation device removal within the oncologic population.

Methods

- Retrospective chart review of oncology patients who underwent explant of permanent SCS or DRGS at a large comprehensive cancer center between March 2016 and May 2023.
- Primary objective was to identify the rate of SCS and DRG explant among the cancer population.
- Secondary objectives were to assess the etiology of neuromodulation device explant (e.g. infection, pain improvement, loss of efficacy, device malfunction, or need for magnetic resonance imaging [MRI]), and ratio of neuromodulation trials to permanent implants.

Figure 1. Categorization of indications for SCS or DRG implantation

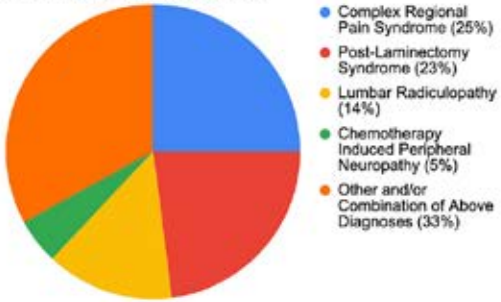
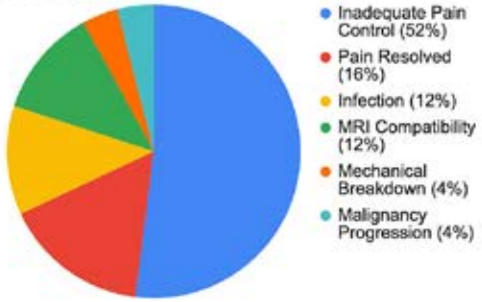


Figure 2. Outline of etiologies for SCS and DRG explantation



Results

- 106 patients reviewed; 98 included in final analysis (84 from our institution and 14 from outside hospital)
- **82/94 patients trialed at our hospital had an implant (91%)**
- Of the 98 included patients (88 SCS and 10 DRG) who had an implant, 25% had complex regional pain syndrome, 23% had post-laminectomy syndrome, 14% had lumbar radiculopathy, 5% had chemotherapy induced peripheral neuropathy, and the remainder had a mixture of other diagnoses (Figure 1).
- Of the patients with permanent implant, **25/98 (26%) had their devices explanted.** The causes for explant included inadequate pain control (52%), pain resolution (16%), infection (12%), need for MRI (12%), device malfunction (4%), and malignancy progression (4%) (Figure 2).
- For patients implanted at our institution, the **median time from implant to explant was 313 days** (IQR 184-711).

Conclusion

- The SCS/DRGS explant rate within this group of cancer patients is comparable to prior reported device removal rates for the general population.[3]
- Despite a relatively high trial to permanent implant ratio,[4] the majority of explants in this analysis were due to inadequate pain control.
- Identification of risk factors for device removal, such as chronicity of malignancy, progression of disease, infection control, and MRI compatibility offer areas to optimize neuromodulation retention for oncologic patients.

References

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Efficacy of Nerve Blocks in the Management of Post-Traumatic Headaches

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Introduction

- Headaches, including migraines and cervicogenic headaches, often cause significant disability and diminished quality of life.[1]
- Acute treatment can include a combination of nerve blocks to relieve pain.[1,2]
- The efficacy of nerve blocks, particularly in treating post-traumatic headaches, remains under-documented and poorly understood.[3]
- This retrospective study aims to evaluate the efficacy of combined nerve blocks in treating cases of post-traumatic headaches.

Objective

To characterize the efficacy of Greater Occipital, Third Occipital, Lesser Occipital, Supraorbital, and Supratrochlear nerve blocks on relief of persistent post-traumatic headaches.

Methods

- Patients who fulfilled the International Headache Society Criteria of post-traumatic headache (i.e., new onset headache developing within the first week following head trauma) and were refractory to a variety of treatments were included.[4]
- A combination of greater and lesser occipital nerve blocks, third occipital nerve, supraorbital, and supratrochlear nerve blocks were used.
- Percentage of pain improvement was used to assess the response to the blocks and categorized as follows; minimal (<50%), moderate (50-75%), and significant (>75%) pain relief.

Results

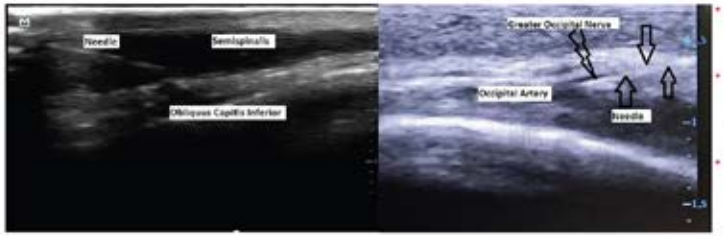

Figure 1a & 1b. Ultrasound imaging of needle insertion. Left- Image obtained with a high frequency US probe showing "in-plane" needle insertion between the Semispinalis and Obliquus Capitis Inferior muscles. **Right-** "In-plane" needle insertion with the tip resting adjacent to the occipital artery.

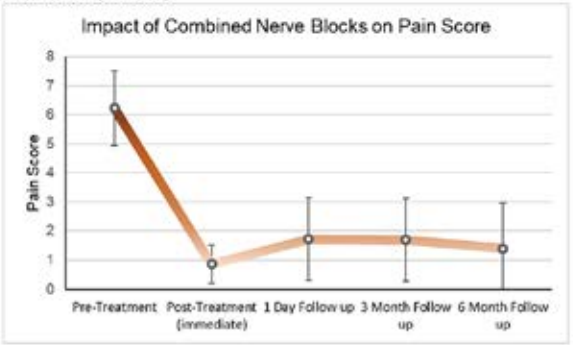

Figure 2. Impact of Combined Nerve Blocks on Pain Score. Average pain scores among patients receiving combined nerve blocks at different time points before and after treatment.

Results

- Immediately Following Injection: 33 patients reported significant pain reduction, with an average pain relief of 88%. This included 21 patients with >90% improvement.
- One-Day Follow-Up: 31 Patients reported an average headache improvement of 73%, with 19 patients experiencing significant pain reduction from baseline, including 12 with >90% pain reduction.
- Three-Month Follow-Up: 27 patients showed an average headache improvement of 68%, with 15 patients seeing significant improvement and 12 of these patients seeing >90% improvement.
- Six-Month Follow-Up: 19 patients reported an average improvement of 78%, with all 12 patients noting significant improvement >90% in pain reduction.
- Some patients saw a decrease in effectiveness and then complete headache resolution on 3-6 month follow-up, illustrating the importance of breaking the headache "pain cycle".

Conclusions

- Despite a patient population of medically-refractory headaches, we observed great and lasting pain relief following nerve blocks.
- Our finding from this retrospective review provide preliminary yet compelling evidence that nerve blocks can be a highly effective treatment for patients suffering from post-traumatic headaches.
- Patients were concurrently started on amitriptyline for refractory headaches, which may affect longitudinal pain scores.
- These results advocate or a reassessment of current treatment protocols, potentially leading to improved patient outcomes for post-traumatic headaches.

A Case of Successful Relief of Non-Operable Supracondylar Fracture Elbow Pain with Brachial Plexus Blockade
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BACKGROUND
Elbow pain is a prevalent orthopedic condition that can have varying degrees of pain and chronicity depending on location and etiology. Supracondylar (distal humerus above the elbow) fracture is the most common type of elbow fracture, accounting for 60% of all elbow fractures [1]. Pain arising from a distal humerus fracture, especially in patients whose conditions are deemed non-operable, can be challenging. If left untreated, the pain can have negative neurological and psychological consequences, significantly affecting quality of life.
CASE PRESENTATION
A 62-year-old female with history of juvenile rheumatoid arthritis (JIA), multi-site fractures, including bilateral distal humerus fracture, in the setting of chronic steroid use, presented with several months of bilateral elbow pain. The patient had undergone multiple orthopedic procedures with repeated revisions. Despite this her pain persisted and eventually she was deemed ineligible for further surgical management of her fractures.
OBJECTIVE
To suggest a role of brachial plexus blockade in addressing chronic elbow pain secondary to non-operable distal humerus fracture.
SUPRACONDYLAR FRACTURE
Accounts for 60% of all elbow fractures
Most often from FOOSH
In the setting of long-term steroid use
Surgically treated with percutaneous pinning
METHODS
Despite conservative post-operative management with celecoxib, gabapentin, methocarbamol, and physical therapy for over two months, the patient continued to suffer from recalcitrant bilateral elbow pain, interfering with her ability to carry out activities of daily living (ADLs) due to hand weakness. Additionally, due to the long-term pain arising from multiple orthopedic issues, most prominently in her ribs and elbows, she endorsed the use of chronic opioids, including methadone and morphine, though with minimal relief. To address her persistent elbow pain, the patient underwent a brachial plexus blockade with 5 mL of 0.25% bupivacaine.
CLINICAL COURSE
Initial Injury
bilateral distal humerus fracture; history of JIA
Surgical Intervention
multiple orthopaedic procedures with repeated revisions
Post-Operative Medical Management
celecoxib, gabapentin, methocarbamol, and physical therapy
Chronic Opioid Use
a long-term methadone and morphine use with minimal relief of pain
Brachial Plexus Blockade
with 5 mL of 0.25 % bupivacaine
Follow-Up
at four weeks post blockade; a near complete resolution of pain was achieved
RESULTS
After four weeks, the patient reported a near complete resolution of pain (80% reduction in pain). In addition, she started to regain function of her hand and was able to perform her ADLs. This case demonstrates that a blockade of brachial plexus with bupivacaine even without corticosteroid may produce significant pain reduction for an extended period, which suggests the role of brachial plexus blockade in addressing chronic non-operable elbow fracture pain, unresponsive to other non-surgical modalities.
CONCLUSION
Brachial plexus blockade may be an effective solution to providing a permanent relief of chronic elbow pain, especially in the setting of distal humerus fracture. As the above case is limited to one, further studies are warranted to delineate the generalizable efficacy of blockade of brachial plexus in recalcitrant chronic elbow pain.
REFERENCE
1. Saeed W, Waseem M. Elbow Fractures Overview. 2023 Aug 7. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan–. PMID: 28723005.
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas • April 4–6, 2024

A Study of Alcohol Use Patterns Among Pain Management Patients

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Introduction

It has been previously reported that substance use is associated with physical pain relief and reduction of emotional distress caused by pain.[1] Patients with chronic pain often face complex challenges, including multi-substance use and misuse.[2] Importantly, the dangers of concomitant use of substances such as alcohol together with prescribed opioids include subpar pain relief leading to greater opioid intake, sedation, coma, respiratory arrest, and possibly death.[3] Determining patterns of alcohol use in a population undergoing pain management allows for developing more effective strategies to detect alcohol use disorder and prevent dangerous adverse events in this patient population.

Objective

The purpose of this study was to determine the prevalence and patterns of alcohol use among patients undergoing pain management.

Methodology

We randomly surveyed 184 patients who visited our pain management clinic locations in Wesley Chapel and Zephyrhills, FL, between December 2023 and January 2024. The total patient population was 2200 persons. This study was approved by the LECOM IRB. Answers were self-reported and anonymized. The AUDIT instrument was used for alcohol use disorder risk scoring and stratification.[4]

Results

1. The mean age of the surveyed patients was 60.83 ± 14.94. Most participants were females (60%), identified themselves as White (84.78%), and of non-Hispanic origin (75%) (Table 1).
2. Alcohol use was prevalent with 46.82% of respondents having at least one drink in the past 30 days (Table 2). More than 40% of those consuming alcohol demonstrated problematic alcohol use (Risky, Harmful, or Severe AUDIT scores).
3. Most patients self-reported taking prescribed opioids (58.93%); about 5% reported use of non-prescribed opioids (Table 3). Oxycodone (30.43%) and Oxycodone/Acetaminophen (28.99%) were the most frequently taken opioids.
4. 27.16% of patients who had at least one drink in the past 30 days were also taking prescribed opioids. More than 80% of those patients demonstrated problematic alcohol consumption with 9.52% showing a severe alcohol use disorder risk (Table 4).

Table 1. Descriptive statistics of the surveyed patient sample

Descriptive Statistics	Value	n
Age (Mean ± SD)	60.83 ± 14.94	179
Females (%)	60	105
Males (%)	40	70
White (%)	84.78	156
African Americans (%)	7.07	13
Another race (%)	4.89	9
Undisclosed race (%)	3.26	6
Of Non-Hispanic origin (%)	75	138
Of Hispanic origin (%)	11.41	21
Undisclosed ethnicity (%)	13.59	25

Table 2. AUDIT scoring categories for patients who had a drink in the past 30 days

Category	% of patients	n
Alcohol used in the past 30 days	46.82	81
Low risk AUDIT score (0-7)	59.26	48
Risky AUDIT score (8-15)	34.57	28
Harmful AUDIT score (16-19)	1.23	1
Severe AUDIT score (≥20)	4.94	4

Table 3. Opioid use in the surveyed patient sample

Category	% of patients	n
Prescribed opioids	58.93	99
Non-prescribed opioids	5.03	8
Oxycodone	30.43	21
Oxycodone/Acetaminophen	28.99	20
Tramadol	20.29	14
Hydrocodone	15.94	11
Hydrocodone/Acetaminophen	15.94	11
Morphine	7.25	5

Table 4. AUDIT scoring categories for patients who had a drink in the past 30 days and are taking prescribed opioids

AUDIT scoring categories	% of patients	n (total 22)
Low risk score	19.05	4
Risky score	66.67	14
Harmful score	4.76	1
Severe score	9.52	2

Conclusions

Alcohol use was prevalent in the surveyed pain management patients.
Our results also show that most patients who were both taking a prescribed opioid medication and consumed alcohol at least once in the past month displayed high-risk alcohol use behavior.
Importantly, every patient receiving opioid treatment in the practice is routinely screened for alcohol use and abuse.
Possibly, due to the anonymous nature of the study, patients were more likely to reveal information such as illegal use of opioids as well as risky alcohol tendencies than when inquired by a healthcare professional involved in their pain management.

References

1. Karimi R, Mallah N, Nedjat S, Beasley MJ, Takkouche B. Association between alcohol consumption and chronic pain: a systematic review and meta-analysis. Br J Anaesth. 2022 Sep;129(3):355-365.

2. Witkiewitz K, Vowles KE. Alcohol and Opioid Use, Co-Use, and Chronic Pain in the Context of the Opioid Epidemic: A Critical Review. *Alcohol Clin Exp Res.* 2018;42(3):478-488.

3. Singh AK. Alcohol Interaction with Cocaine, Methamphetamine, Opioids, Nicotine, Cannabis, and γ-Hydroxybutyric Acid. *Biomedicines.* 2019;7(1):16.

4. Babor TF and Grant MG. From clinical research to secondary prevention: International collaboration in the development of the Alcohol Use Disorders Identification Test (AUDIT). *Alcohol Health & Research World.* (1989); 13:371-374.

Systematic Review on Hydro-Dissection for Myofascial Pain Syndrome

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1. Louisiana State University Health Shreveport, 2. Mayo Clinic Jacksonville, FL , 3. Siloam Hospital Indonesia, 4. Harvard Medical school Boston, 5. Piedmont Columbus Regional

Introduction

Traditional treatment modalities for occipital neuralgia include nerve blocks, medications, and surgical interventions. However, a novel approach, occipital nerve hydro-dissection, has gained attention for managing occipital neuralgia. We aimed to evaluate the role of occipital nerve hydro-dissection in the pain management of occipital neuralgia.

Methods

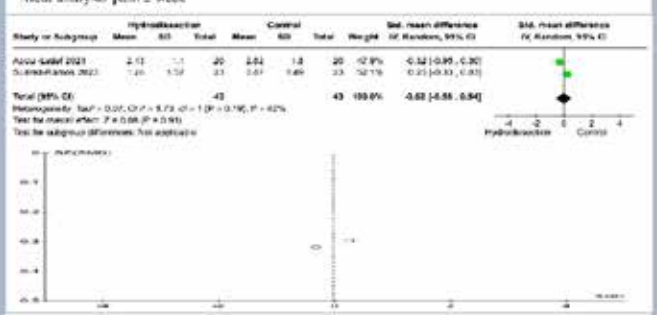
On January 3, 2023, a systematic search employing MeSH terms related to occipital nerve, hydrodissection, and occipital neuralgia was conducted on PubMed and EuroPMC. The primary focus of interest in the current review was the assessment of pain reduction in patients undergoing occipital nerve hydro-dissection, gauged through various pain scales. Quality evaluation of randomized controlled trials (RCTs) and non-RCT was carried out utilizing the Cochrane Risk of Bias version 2.0 (RoB v2) and ROBINS-I tool.

Results

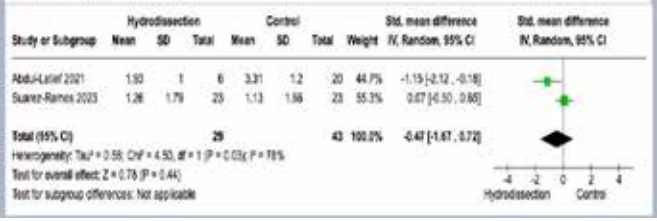
Three studies were included in the analysis, with two of them being RCTs, encompassing a total of 111 patients, of which 59 were female. The meta-analysis conducted revealed a reduction in pain at both the 2-week and 4-week marks, with standardized mean differences (SMD) of -0.02 (95% CI -0.58 to 0.54; p = 0.93) and -0.47 (95% CI -1.57 to 0.72; p = 0.03), respectively. The potential for long-term pain reduction in patients undergoing hydro-dissection appears promising. Evaluation using the Cochrane RoB v2 and ROBINS-I tool suggests minimal publication bias in the included studies.

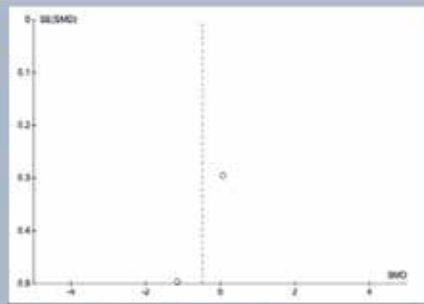
Study ID	Study design	Total cohort	Female
Suarez-Ramos 2023	RCT	46	31
Modi 2023	Retrospective	25	11
Abdul-Latief 2021	RCT	40	17

Meta analysis pain 2 week



Meta analysis pain 4 week





Discussion and Conclusion

While the current evidence suggests the safety and efficacy of occipital nerve hydro-dissection in the treatment of occipital neuralgia, the limited number of studies warrant additional studies in the future.

References

1.Suarez-Ramos C, Gonzalez-Suarez C, Gomez IN, Gonzalez MK, Co PH, Llamas JA. Effectiveness of ultrasound guided interfascial hydrodissection with the use of saline anesthetic solution for myofascial pain syndrome of the upper trapezius: a single blind randomized controlled trial. Front Rehabil Sci. 2023 Dec 11;4:1281813. doi: 10.3389/fresc.2023.1281813. PMID: 38149112; PMCID: PMC10750391.

Analgesic Effect of Electroconvulsive Therapy in Complex Regional Pain Syndrome

Denny Cha, MD, Myung Sung Yang, MD, Steven Richeimer, MD

Background

- Complex regional pain syndrome (CRPS) is a challenging chronic pain condition that typically develops after trauma with or without nerve injury.
- Budapest criteria for CRPS include continuing pain that is disproportionate to any inciting event with symptoms present in the following four categories: sensory, vasomotor, sudomotor, and motor.
- A multimodal pain approach involving patient education, physical and occupational therapy, pharmacotherapy, and interventional procedure are practiced managing CRPS.
- However, there are a number of CRPS patients who poorly respond to any of the treatment options.

Objective

- To present a case in which the complex regional pain syndrome (CRPS) patient with depression experienced significant pain relief after receiving electroconvulsive therapy, which was performed for management of her depression.

Acknowledgement

- I would like to thank Dr. Yang and Dr. Richeimer for their guidance and support in preparation for this case presentation.

Case Description

- A 58-year-old female with a history of depression, anxiety, and complex regional pain syndrome (CRPS) in her right foot after an ankle fracture status post surgical fixation presented with recurrent pain flares in her right foot.
- The patient had undergone right lumbar sympathetic blocks in the past, which helped manage her pain for past 10 years. Her right foot pain came back after the patient sprained her ankle and dealing with social stressors. The patient reported allodynia to light touch, skin color change, and swelling, and limited range of motion meeting the diagnosis of CRPS.
- Although the original plan was to repeat the right lumbar sympathetic block to control her CRPS pain, the patient missed the procedure appointment due to her hospitalization secondary to exacerbation of her depression.
- During her hospitalization, the patient underwent electroconvulsive therapy (ECT) to manage her depression.
- Two months after the ECT, the patient reported 95% pain relief of her right foot CRPS pain during her follow up visit at pain clinic.

Possible Mechanisms of ECT

- ECT may activate inhibitory pathways via the activation of serotonergic, noradrenergic, and dopamine neurotransmissions in the brain.
- ECT may affect cerebral blood flow to the thalamus, an organ involved in spinothalamic tract.
- Effective treatment of underlying depression may result in diminishing or resolving chronic pain.

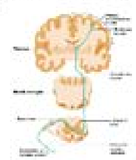


Figure A: The spinothalamic tract pathway

Discussion & Conclusion

- There have been a small number of case reports in literature mentioning pain relief experienced among complex regional pain syndrome (CRPS) patients after undergoing electroconvulsive therapy (ECT).
- Currently, there is no clear mechanism that can explain this interesting phenomenon.
- Neuroimaging studies contribute the analgesic effect of ECT to increased cerebral blood flow to the thalamus, the vital structure in processing pain transmission. Increased blood flow may be associated with activation of the inhibitory neurotransmission pathway, thereby possibly resulting in pain reduction.
- More studies need to be performed to better understand the analgesic effect of ECT in management of CRPS.
- This case report demonstrates that ECT could be considered as an alternative treatment option for CRPS patients who do not respond to any of the standard multimodal treatment regimen.

References

1. Fukui, S., Shigemori, S. & Nosaka, S. Beneficial effects of electroconvulsive therapy on clinical features and thalamic blood flows in a CRPS type 1 patient. J Anesth 16, 249–250 (2002).
2. Harden RN, McCabe CS, Goebel A, Massey M, Suvar T, Grieve S, Bruehl S. Complex Regional Pain Syndrome: Practical Diagnostic and Treatment Guidelines, 5th Edition. Pain Med. 2022 Jun 10;23(Suppl 1):S1-S53. doi: 10.1093/pm/pnac046. PMID: 35687369; PMCID: PMC9186375.
3. Suzuki K, [illegible]. Repeated electroconvulsive therapy courses improved chronic regional pain with depression caused by failed back syndrome. Med Sci Monit. 2009 Apr;15(4):CS77-9. PMID: 19333208.
4. Wolanin MW, Gulevski V, Schwartzman RJ. Treatment of CRPS with ECT. Pain Physician. 2007 Jul;10(4):573-8. PMID: 17660856.
5. Yoon IA, Galanes... D. Chronic pain outcomes of patients receiving electroconvulsive therapy: A systematic review and case series. Pain Pract. 2023 Nov;23(8):942-955. doi: 10.1111/papr.13268. Epub 2023 Jul 11. PMID: 37434485.
6. What is the structure and function of the spinothalamic pathways? (2019). Brain Stuff. https://[illegible]/blog/structure-and-function-of-the-spinothalamic-pathways

Keck Medicine of USC

Anaphylactic Reaction to Chlorhexidine After Plantar Fasciitis Injection

LSU Health NEW ORLEANS

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VA U.S. Department of Veterans Affairs

Introduction

The use of substances for wound disinfection dates back to ancient civilizations, however, their use was predicated more on tradition than scientific fact. Modern day antiseptic use was made possible by Louis Pasteur's research on germ theory which then inspired Joseph Lister to use carbolic acid and phenol as an antiseptic in surgical procedures.[1] Lister's pioneering work significantly reduced surgical site infections and marked the birth of modern antiseptic surgery. Afterwards we saw the development of various antiseptic solutions and techniques, including the use of iodine, hydrogen peroxide, and chlorine compounds which ultimately led to a wide range of antiseptic agents, including alcohol-based hand sanitizers, povidone-iodine, chlorhexidine, and more.

Chlorhexidine was initially developed in the 1950s by researchers at Imperial Chemical Industries (ICI) in the United Kingdom. It was quickly recognized for its effectiveness in reducing the risk of surgical site infections and other healthcare-associated infections.[2] Chlorapreo, the combination of chlorhexidine gluconate and isopropyl alcohol, was developed as an antiseptic solution for skin preparation in the 1990s and eventually received approval from the U.S. Food and Drug Administration (FDA) in 2000. Since then, chlorohexidine with alcohol has become widely adopted in healthcare facilities around the world as a preoperative skin preparation solution.[2] However, despite its superior antimicrobial properties, chlorhexidine is a potentially allergenic substance. The following is a case of life-threatening anaphylactic shock due to chlorhexidine in a patient occurring after an injection.

Case

We performed a chart review and patient interview. A 48-year-old male presented to his podiatrist's clinic for a therapeutic injection into his foot to manage plantar fasciitis. The patient had no known allergies to medications or topical agents and had no history of adverse reactions during previous medical procedures. Prior to injection, chlorohexidine with alcohol was used at the injection site as part of routine preparation. A mixture containing triamcinolone, Lidocaine and Marcaine was then injected. A few minutes after the injection, the patient experienced an abrupt onset of severe symptoms, including diaphoresis, acute dyspnea, chest tightness, and altered mental status. The medical team immediately called for an emergency response, and he was subsequentially transferred to a nearby hospital where he required intubation and circulatory support with intravenous fluids, epinephrine, corticosteroids, and antihistamines resulting in the patient's stabilization. He was later discharged well.

Afterwards, the patient followed up with an allergist and had negative skin tests, negative drug challenges and undetectable specific IgE to triamcinolone, lidocaine and bupivacaine. The testing facility at New Orleans VA Medical Center was unable to test chlorohexidine specific IgE but given the lack of response to the other drugs and no other materials used, it was deduced that chlorhexidine was the likely culprit. The patient has subsequently had injections with triamcinolone, lidocaine, and bupivacaine without issue. Chlorhexidine has been avoided.

Discussion

Anaphylactic reactions to chlorhexidine are rare, and their true incidence is unknown. The first case of anaphylaxis to chlorhexidine was reported in 1984 in Japan.[3] Although anaphylaxis is rare, allergy to chlorhexidine is relatively common as seen in areas that test for it. Allergic reactions to chlorhexidine are often preceded by milder reactions such as localized or generalized urticaria. Such incidents were not found in this patient but may have been overlooked. Undervaluation of previous chlorhexidine reactions increases the risk of a possibly fatal outcome for the patient after re-exposure in future medical-surgical procedures.[4,5]

While chlorhexidine is probably the best disinfectant available and the benefits are unquestionable, it is important to be aware of its allergenic potential and to use it only when necessary. Given the potential risk, it is imperative that healthcare providers question patients regarding allergies specifically to cleaning solutions, such as chlorhexidine, in addition to medications. It is also imperative to only use chlorhexidine only when needed to limit allergic sensitization.[5]

References

1. Michaleas SN, Laios K, Charalabopoulos A, Samonis G, Karamanou M. Joseph Lister (1827-1912): A Pioneer of Antiseptic Surgery. Cureus. 2022 Dec 21;14(12):e32777. doi: 10.7759/cureus.32777. PMID: [illegible]; PMCID: [illegible].
2. Privitera GP, Costa AL, Brusaferro S, Chirletti P, Crosasso P, Massimetti G, Nespoli A, Petrosillo N, Pittiruti M, Scoppettuolo G, Tumietto F, Viale P. Skin antisepsis with chlorhexidine versus iodine for the prevention of surgical site infection: A systematic review and meta-analysis. Am J Infect Control. 2017 Feb 1;45(2):180-189. doi: 10.1016/j.ajic.2016.09.017. Epub 2016 Nov 5. PMID: [illegible].
3. Odedra KM, Farooque S. Chlorhexidine: an unrecognised cause of anaphylaxis. Postgrad Med J. 2014;90:709–714.
4. Fernandes M, Lourenço T, Lopes A, Spínola Santos A, Pereira Santos MC, Pereira Barbosa M. Chlorhexidine: a hidden life-threatening allergen. Asia Pac Allergy. 2019 Aug 1;9(4):e29. doi: 10.5415/apallergy.2019.9.e29. PMID: [illegible]; PMCID: [illegible].
5. Rohall S, Sharma S, Garvey LH, [illegible] V. Anaphylaxis after disinfection with 2% chlorhexidine wand applicator. BMJ Case Rep. 2017 Aug 8;2017:bcr2017219794. doi: 10.1136/bcr-2017-219794. PMID: [illegible]; PMCID: [illegible].

Botulinum Toxin Denervation Improves Refractory Pelvic and Anorectal Dysfunction: A Case Series

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INTRODUCTION:

- Functional anorectal pain is a disabling, under-recognized, and under-treated condition characterized by anorectal pain and dysfunctional pelvic floor muscles.
- Pelvic floor dyssynergia may result in obstructive defecation syndrome characterized by tenesmus, prolonged straining, or feeling of incomplete evacuation.[1]
- Patients may have hypertonia of the anal sphincter and/or the levator ani muscle.
- Current treatment is limited, with standard pelvic floor therapy often ineffective for many of these patients. For patients that fail conservative management, chemodenervation with botulinum toxin may be pursued.
- This case series describes the use of botulinum toxin in patients with functional anorectal pain and spasticity of the anal sphincter and/or levator ani muscle.

METHODS:

- A retrospective chart review was conducted for four patients with functional anorectal pain associated with increased tone of the anal sphincter and/or levator ani muscle who received chemodenervation with botulinum toxin.
- The Pain Catastrophizing Scale (PCS) with a score range of 0-52 was obtained at the pre and post injection visits.
- The presence of obstructive symptoms, concurrent mood symptoms, as well as medication history were reviewed for each patient.

This case series reports positive results in four patients who received botulinum toxin therapy for functional anorectal pain with associated hypertonia of the anal sphincter and/or levator ani muscle.

RESULTS:

- All patients were males with age ranging from 32 to 46 years.
- The duration of anorectal pain varied from eight months to two years and pain was uncontrolled with pelvic floor physical therapy as well as medications such as baclofen and diazepam suppositories.
- Two patients endorsed obstructive symptoms and all patients reported a history of anxiety secondary to uncontrolled symptoms.
- Two patients received injection of 80 units of botulinum toxin into the anal sphincter. One patient received injections (200 units total) into both the anal sphincter and levator ani muscles while another patient received injections (200 units total) into the levator ani and bulbospongiosus muscles.
- All four patients reported subjective improvements in pain severity and a mean reduction of 7.6 points in the PCS score was noted at the post injection visit conducted within two months of the injection.
- No procedure related complications were reported.

DISCUSSION:

- We report positive results in four patients who received botulinum toxin therapy for functional anorectal pain with associated hypertonia of the anal sphincter and/or levator ani muscle.
- Pelvic floor dyssynergia can result in anorectal pain but can also result from pathologies causing anorectal pain indicating a bidirectional relationship.
- Untreated anorectal pain can have detrimental effects on a patient's mental wellbeing and up to 80% of patients may suffer from concurrent mood disorders such as depression and anxiety.[2]
- Successful use of botulinum toxin has been described in the treatment of anal fissures; however further information is needed regarding its use for functional causes of anorectal pain.
- A recent retrospective study which included 113 patients with chronic functional anorectal pain reported a sustained cure in 47% of patients.[3]
- However, further information is needed regarding dosing, as well as number and location of injection sites to help optimize results.

References:
1. Podzemny V, Pescatori LC, Pescatori M. Management of obstructed defecation. World J Gastroenterol. 2015;21(4):1053-1060.
2. Byrnes KG, Sahebally SM, McCawley N, Burke JP. Optimal management of functional anorectal pain: a systematic review and network meta-analysis. Eur J Gastroenterol Hepatol. 2022;34(3):249-259.
3. Ooijevaar RE, Felt-Bersma RJF, Han-Geurts IJ, van Reijn D, Vollebregt PF, Molenaar CBH. Botox treatment in patients with chronic functional anorectal pain: experiences of a tertiary referral proctology clinic. Tech Coloproctol. 2019;23(3):239-244.

Bridging Oncologic Pain with Peripheral Nerve Stimulation in Pediatric Patients

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BACKGROUND

- Approx 70% of pediatric cancer patients experience severe pain during their illness and more than half report undertreated pain (1-2).
- Greater sedative psychotropic properties and higher treatment response variability in pediatric population (3).
- Interventional pain treatments are not used as often in pediatric population
- Peripheral nerve stimulation may be crucial given its non-invasiveness and convenience

CASES

CASE 1:

- 16-year-old female with obesity, TIIDM and newly diagnosed Ewing Sarcoma of left proximal humerus with severe left upper arm pain
- Failed medication therapy
- Suboptimal steroid nerve block candidate due to uncontrolled diabetes
- Underwent left suprascapular PNS with 60% relief (NRS 10 to 4), with continued relief at the 3-month follow-up post lead removal.

CASE 2:

- 17-year-old male with right humerus osteosarcoma with progressive cancer-related right arm pain despite decreased tumor burden after treatment
- Failed medication therapy including multiple classes of opioids
- Underwent right suprascapular nerve block with 10cc of 0.25% bupivacaine with 80% relief for two days
- Underwent right suprascapular PNS with approximately 60% pain relief (NRS 8 to 3), with continued relief at the 3-month follow-up post lead removal

TECHNIQUE

- Linear transducer placed parallel to spine of the scapula
- After creating an anesthetized track medial to the transducer using lidocaine 1%, a 12.5 cm, 20G needle with a preloaded lead was inserted and advanced towards the supra scapular notch.
- Once stimulation confirmed, the needle was carefully withdrawn over the lead to deploy the anchor
- After re-confirming stimulation after needle remove, the exit site was dressed with Dermabond and sterile dressing

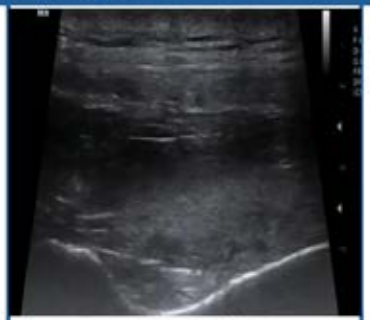

Figure 1. ultrasound image of PNS placement at the suprascapular notch

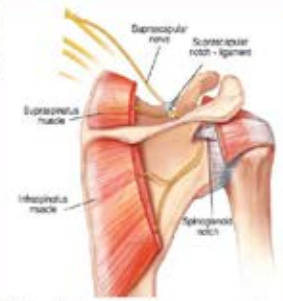

Figure 2. Anatomy of the suprascapular notch (image from Kiel 2023)

DISCUSSION

- These two cases represent successful management of pediatric cancer pain using temporary, percutaneous PNS
- Pediatric pain is historically treated with conservative measures and important to consider interventional techniques
- Consider potential complications, including infection, leed migration, and lead fracture along with MRI incompatibility

REFERENCES

[illegible]

BurstDR Spinal Cord Stimulation for Chronic Neuropathic Pain due to Castleman's Disease: A Case Report

Eben Alexander IV, DO; Kirk Sheplay, MD; Nestor Tomycz, MD

Background

BurstDR spinal cord stimulation (SCS) is a type of waveform of SCS that has shown improved pain relief as compared to traditional tonic SCS in multiple pain syndromes. Castleman's disease is a rare lymphoproliferative disease that can cause neuropathy, organomegaly, B-symptoms, dyspnea, renal disease, and sclerotic bone lesions.

Case

In this case, a 32 year-old GoPo female with a history of chronic pelvic pain due to endometriosis since age 18 status-post resection of endometriosis (ages 18, 29, and 30) was found to have unicentric Castleman's Disease (CD) upon CT of her abdomen and pelvis at age 29 as a possible cause for her "double sickening" of her chronic pelvic and abdominal pain. She underwent resection retroperitoneal mass but it only worsened her symptoms. Her chronic neuropathic pain was refractory to gabapentin and pregabalin, so she underwent thoracic paddle lead stimulator implantation after a successful percutaneous trial. She is currently reporting 80% pain relief using burstDR waveform SCS and was able to completely wean off her pregabalin 100mg nightly.

Objective

The objective of this case report was to highlight the versatility of the therapeutic reach of SCS.

Methods

Data was collected by one of the Pain Medicine fellows with access to the electronic health record. Google scholar and pubmed were used by the PM&R resident to perform a literature review on spinal cord stimulators and Castleman's Disease.

Results

The Patient obtained 80% relief of her pain in the affected area and was able to discontinue taking neuropathic pain medications (pregabalin).

Conclusions

Although the pain was likely multifactorial with neuropathic, immunologic, and surgical components, this case demonstrates an unusual disease for which SCS may provide significant pain benefit. This case suggests that refractory pain from the rare lymphoproliferative disorder, Castleman's disease, may respond to burstDR spinal cord stimulation.

Pain Physician: May/June 2024: 27:E347-E455

TCU BURNETT SCHOOL of MEDICINE

Butterfly Vertebra: Incidental Finding in Chronic Pain

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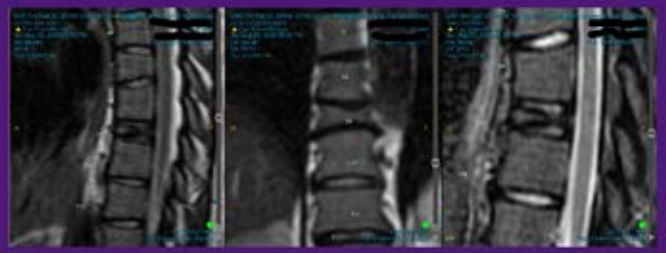
BACKGROUND

- Butterfly vertebra often presents asymptomatically and is usually identified incidentally on imaging performed for unrelated issues.
- When clinically significant, chronically altered spinal biomechanics due to disc changes, vertebral asymmetry, and scoliosis can lead to muscle spasms and chronic low back pain in patients with butterfly vertebra.
- The imaging appearance of a butterfly vertebra can be misinterpreted as indicative of compression, burst, or wedge fracture.

CASE PRESENTATION

- A 36-year-old woman with a long history of chronic dull pain found little relief from lumbar medial branch blocks (MBB) and physical therapy.
- During follow-up, she reported increased pain in the lower thoracic and upper lumbar regions, worsened by extension and mechanical loading. Examination confirmed thoracolumbar facet syndrome, but she achieved only 30% relief from a second thoracolumbar MBB, ruling out radiofrequency thermocoagulation as a viable treatment option.
- Subsequent MRI identified mild thoracic spondylosis and a congenital butterfly vertebral body at T9, neither of which were deemed responsible for her chronic pain. The plan included continuing a home exercise program focused on core and pelvic stabilization, with no immediate surgical or invasive interventions indicated.

Butterfly vertebrae are rarely the etiology of chronic pain and should avoid being interpreted as vertebral compressive, burst, or wedge fractures; documentation is necessary in the event of future symptomatic change.



DISCUSSION

- Butterfly vertebrae is a rare congenital spinal deformity where the vertebra resembles butterfly wings on radiographs, often found in the upper thoracic region if present.
- Severe cases may result in spinal canal narrowing and neural foraminal stenosis.
- Associated with various congenital syndromes such as Alagille, Jarcho-Levin, Crouzon, and Pfeiffer's syndrome. Such cases often suggest a syndromic presence, warranting further assessment for additional malformations.
- A comprehensive, noninvasive evaluation including ultrasound of the cardiac and genitourinary systems is recommended when butterfly vertebrae are identified, especially if multiple are present or if there is a suspicion of syndromic involvement.
- This patient's thoracolumbar pain is unlikely to be related to this deformity. Nonetheless, documentation and monitoring for future symptomatic changes are essential.

References

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Case Series of Refractory Lumbar Foraminal Stenosis Treated with Percutaneous Neuroplasty using Reference Spinal Needle Guidance

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Background

Lumbar foraminal stenosis (LFS) is a common cause of chronic lower back pain and radiculopathy significantly affecting the quality of life of those affected.1,2 Percutaneous neuroplasty (PNP), also known as epidural adhesiolysis, may be an alternative to transforaminal epidural steroid injections (TFESI) that have otherwise failed.3 PNP is achieved with the combination of mechanical release with a reinforced catheter and through injection of substances for hydrodissection, and subsequently depositing the medications to the target area. One of the key targets when performing PNP is the peridural membrane (PM), a thin, well-innervated structure between dura mater and the wall of the spinal canal.4,5 This case series is unique in its use of a reference spinal needle to guide Tuohy needle placement, and facilitate the neuroplasty catheter advancement towards stenosed foramen and lateral recess areas, between the nerve root and the intervertebral disc.

Objective

To review percutaneous neuroplasty technique using a reference spinal needle for refractory lumbar foraminal stenosis with normal imaging findings.

Case Presentations

We present two cases with chronic lumbar spinal stenosis, refractory to TFESIs, where PNP was performed using reference spinal needles with both patients achieving sustained > 50-75% pain relief.

Case 1
Patient is a 55-year-old man with a history of chronic lower back pain with lumbar radiculopathy in the L4-L5 distribution for 2 years, status post L4-L5 discectomy. The patient reported a visual analog scale (VAS) pain score of 8/10. Physical exam demonstrated positive left straight leg raise. Moreover, patient failed conservative medical management with buprenorphine patch, gabapentin, pregabalin, and tramadol.

Case 2
Patient is a 65-year-old woman with a history of L4-5 spondylolisthesis and chronic axial lower back pain axial with lumbar radiculopathy for several years. The patient reported a VAS pain score of 8/10, and minimal efficacy with conservative management including pregabalin and tramadol.

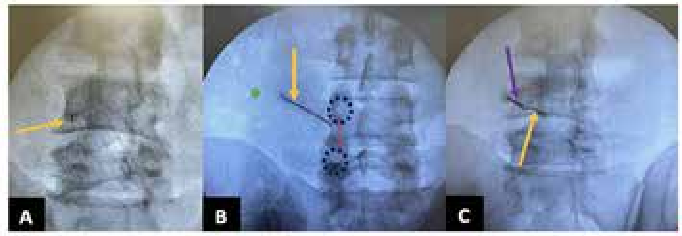

Figure 1. Anteroposterior radiographs of initial foraminal access. A. Initial foraminal access with the reference spinal needle in tunnel view (yellow arrow). B. Neuroplasty epidural needle entry point (green dot), previously placed reference needle (yellow arrow), pedicles (dotted circles), and 6 o'clock limit at the foraminal level (dotted red line). C. Epidural neuroplasty needle (purple arrow) heading toward the reference needle (yellow arrow).

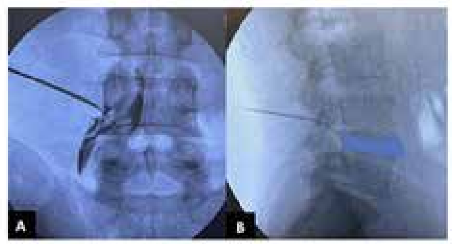

Figure 2. Anteroposterior and lateral radiographs of neuroplasty catheter placement in the PNP procedure. A. Neuroplasty catheter placement via foraminal access (AP view). 2B Neuroplasty catheter posterior to the disc and anterior to the nerve root (lateral view).

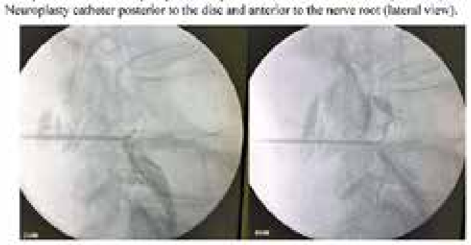

Figure 3. Epidurograms in lateral view before (A) and after accessing (B) the foramen with a neuroplasty catheter observing the correct filling of the filling defect.

Methods

For case 1, after placement of a reference spinal needle, a Touhy needle was inserted approximately 4 to 5 cm lateral and 1.5-2 cm superior to the guide needle and the foramen was accessed. An epidurogram was performed which demonstrated correct lateral recess distribution, adhesions were mechanically released using a neuroplasty catheter, and an injectate consisting of 4 mL 0.9% saline, 8 mg dexamethasone and 2 mL 1% lidocaine was deposited. For case 2, under fluoroscopy, a filling defect was noted at the left L4-5 foramen and lateral recess, and PNP foraminal neuroplasty was performed in a similar fashion.

Results

After procedure, both patients reported sustained > 50-75% pain relief at 1, 3 and 6 months. One patient also had a reduction in his pregabalin and tramadol dosages. Additionally, there were no complications with the procedure.

Conclusions:

In patients with chronic radicular pain due to epidural/foraminal adhesions or fibrosis, PNP offers an alternative, safe treatment with sustained results.6 Fibrosis of the PM can be a possible cause of low back pain when other causes of facetogenic or discogenic pain have been ruled out. Guidance using a reference spinal needle provides an additional depth dimension to improve the precision and success of foraminal PNP.

References:

1. Choi YK. Lumbar foraminal neuropathy: an update on non-surgical management. Korean J Pain. 2019;32(3):147-159.
2. Hasegawa T, An HS, Haughton VM, Nowicki BH. Lumbar foraminal stenosis: critical heights of the intervertebral discs and foramina. A cryomicrotome study in cadavera. J Bone Joint Surg Am. 1995;77(1):32-8.
3. Manchikanti L, Abdi S, Atluri S, Benyamin RM, et al. An update of comprehensive evidence-based guidelines for interventional techniques in chronic spinal pain. Part II: guidance and recommendations. Pain Physician. 2013;16(2 Suppl):S49-283.
4. Boescher HA, Heavner JE, Grozdanov P, Warnick IA, et al. The Peridural Membrane of the Human Spine is Well Innervated. Anat Rec (Hoboken). 2016;299(4):484-91.
5. Amari S, Heavner JE, McConnell DJ, Azari H, Boescher HA. The Peridural Membrane of the Spinal Canal: A Critical Review. Pain Practice. 2012;12:315-325.
6. Park CH, Lee SH. Effectiveness of percutaneous transforaminal adhesiolysis in patients with lumbar neuroforaminal spinal stenosis. Pain Physician. 2013;16(1):E37-43.

Case Series: Safety and Effectiveness of 3-Level Lumbar Percutaneous Decompression with an Interspinous Spacer

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In this case series, we review 4 patients who had 3 levels of lumbar spinal stenosis treated with Vertiflex at the Veterans Affairs Medical Center of New Orleans. All patients did not benefit from medications, therapy, or injections/RFA. All patients were seen by neurosurgery and opted out of laminectomy +/- fusion.

Patient A was an 80-year-old male with L2-3 severe, L3-4 mild, and L4-5 moderate stenosis and pain for 25 years. 4-months post-operatively, the patient would not recommend this procedure for a fellow veteran with the same symptomatology, reporting he experienced zero relief from his pain which was still rated as a 10/10. It should be noted that post-operatively he stated his pain was always predominantly in the back and not the legs; this description is different from the chart.

Patient B was a 72-year-old male with L2-3 severe, L3-4 severe, L4-5 severe stenosis with pain for more than 10 years. 2-months post-operatively, he states that he would recommend this procedure for a fellow veteran with the same symptoms as his leg pain was decreased by 50% from a 10/10 to a 5/10. Additionally, his distance of ambulation post-operatively was increased from 2.5 blocks to 3.5 blocks.

Patient C was a 77-year-old male with L2-3 moderate, L3-4 severe, L4-5 severe stenosis with pain for 20 years. One-month post-operatively, he stated he would recommend this procedure for a fellow veteran with the same symptoms as it decreased his left leg pain from a 9/10 to a 1/10 and his right leg pain from a 9/10 to a 6/10. He also stated he had doubled his walking distance from 75 feet to 150 feet.

Patient D was a 77-year-old male with L2-3 severe, L3-4 severe, and L4-5 severe stenosis with pain for 10 years. 10-day post-operatively, he would recommend this procedure to a fellow veteran with the same symptoms and reports his pain was decreased from a 10/10 to a 4/10 post-operatively. He also states his ambulation distance was doubled, from 0.5 block to 1 block post-operatively.

Results: 3-level IPD has been shown to increase ambulation distance and decrease leg pain in 3 out of 4 veterans with lumbar spinal central stenosis with neurogenic claudication. There were no complications noted in these four patients.

Conclusion: In a select population, 3-level percutaneous lumbar decompression appears to be safe and effective.

Celiac Plexus Block Performed in A Medically Complex Elderly Patient with Intrathecal Pump on Aspirin

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UT Southwestern Medical Center

Background

- 70-80% of pancreatic cancer patients suffer from substantial pain.
- Celiac plexus block may be indicated for abdominal pain refractory to other analgesic modalities, targeting afferent visceral nociceptive fibers from various organs.
- Celiac plexus blocks are classified by the American Society of Regional Anesthesia (ASRA) as an intermediate-risk procedure for serious bleeding; however, in select situations, this block would be considered high-risk (Table 1).
- Celiac plexus block can decrease patient-reported pain and total opioid consumption.

Celiac Plexus Block	Intermediate-Risk Procedure
Celiac Plexus Block + Patients Meeting Any of the Below Criteria:	High-Risk Procedure
Old age	
History of bleeding tendency	
Concurrent use of other anticoagulants/antiplatelets	
Liver cirrhosis or advanced liver disease	
Advanced renal disease	

Table 1: ASRA Guidelines for Classification According to Potential Risk of Serious Bleeding in Patients undergoing Celiac Plexus Block While Taking Aspirin

Case Report

An 82-year-old male with chronic obstructive pulmonary disease, deep venous thrombosis, coronary artery disease on dual antiplatelet therapy, chronic back pain with intrathecal pump, and pancreatic cancer was admitted for one week of abdominal pain. There was hematemesis accompanied by hemodynamic instability with a significant hemoglobin drop. Esophagogastroduodenoscopy was performed with clipping of two duodenal ulcers and gastroduodenal artery embolization. The post-operative course was complicated by abdominal pain with increased sedation and delirium associated with oral and intravenous pain medications. Clopidogrel had already been held 7 days prior to consultation given gastrointestinal bleed, but aspirin continued given the thrombosis history. Celiac plexus block was considered for visceral cancer pain in this medically-complex elderly patient with recent gastrointestinal bleed on aspirin. Risks and benefits were discussed with the patient.

Methods

Fluoroscopically-guided retrocrural celiac plexus block was planned. CT of the abdomen/pelvis showed no notable organs, pleura, vascular abnormalities in the proposed needle trajectory. The intrathecal pump catheter would enter the spinal canal at approximately the L1-L2 interspace, which was lower than the planned needle insertion at the lateral aspects of L1.

Fluoroscopy identified the L1 vertebral body. Utilizing oblique and lateral views, spinal needles were advanced on either side until the anterior border of L1, taking caution to avoid L1 nerve roots. Contrast injection showed appropriate cephalad and caudal spread. After negative aspiration of CSF or blood, a solution containing triamcinolone and bupivacaine was incrementally injected evenly through each needle (Figure 1).

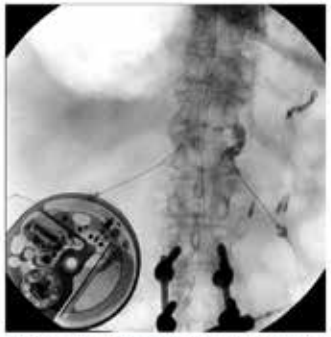


Figure 1: Radiographic image of fluoroscopically-guided retrocrural celiac plexus block

Results

The following day, pain reduced from 8/10 to 5/10 without adverse effects including diarrhea, dizziness, or lower extremity weakness. Hemoglobin remained stable, from 8.6-10.1, without necessitating blood transfusions. Patient was satisfied with pain relief and transferred to an inpatient rehabilitation center, with a pain regimen only supplemented by acetaminophen and menthol rub.

Conclusions

We report a successful celiac plexus block for unrelenting abdominal pain related to pancreatic cancer and intolerance to multiple pharmacologic agents. ASRA guidelines categorize celiac plexus block as an intermediate-risk procedure for serious bleeding, however, this case was escalated to a high-risk classification due to age, recent gastrointestinal bleed, and continued aspirin use. Celiac plexus block can be utilized in high-risk cases after risk stratification and discussion with patients.

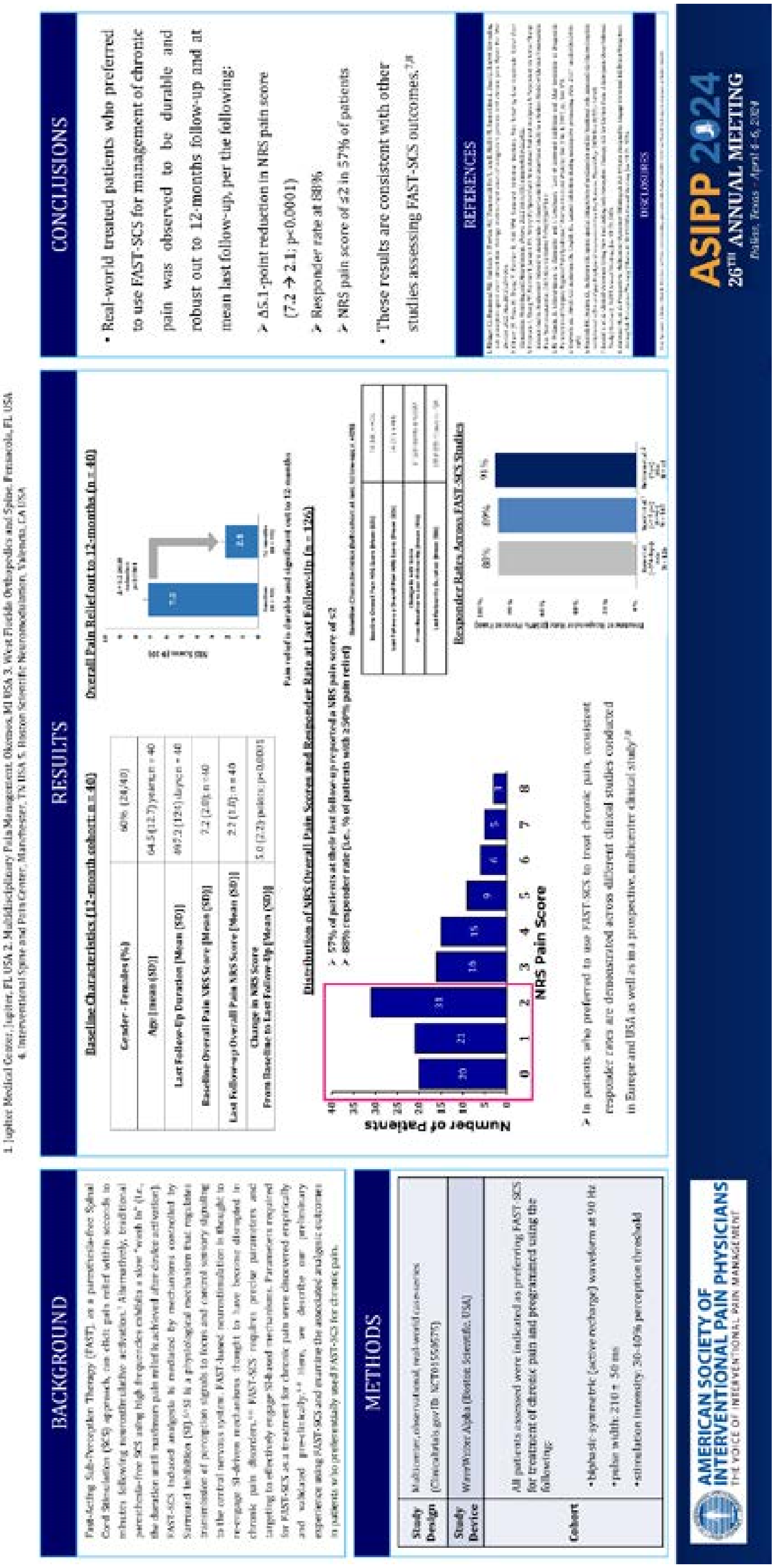
References

Urits I, Jones MR, Orhurhu V, et al. A Comprehensive Review of the Celiac Plexus Block for the Management of Chronic Abdominal Pain. Curr Pain Headache Rep. 2020;24:42. https://doi.org/10.1007/s11916-020-00870-4

John RS, Dixon B, Steinbaum R. Celiac Plexus Block. [Updated 2022 May 11]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK559088/

Warner MS, Moeschler SM, Warner MA, Hoelzer BC, Eldrige JS, Bendel MA, Mauck WD, Watson JC, Gazelka HM, Lanier TJ, Ko DJ, Hooten WM. Bleeding Complications in Patients Undergoing Celiac Plexus Block. Reg Anesth Pain Med. 2016;41(4):488-93. doi: 10.1097/AAP.0000000000000406. PMID: 27203385

Narouze S, Benzon HT, Provenzano D, Buvanendran A, De Andres J, Deer T, Rauck R, Huntoon MA. Interventional Spine and Pain Procedures in Patients on Antiplatelet and Anticoagulant Medications (Second Edition): Regional Anesthesia and Pain Medicine. 2018;43(3). Available from: https://rapm.bmj.com/content/rapm/43/3/225.full.pdf


Clinical Outcomes Using FAST-SCS: Results of a Multicenter, Observational Real-World Study in the United States
Louis J. Raso[1], Richard Ferro[2], Clark S. Metzger[3], Blake Hammond[3], William Newton[4], Yu Pei[5], Edward Goldberg[5]
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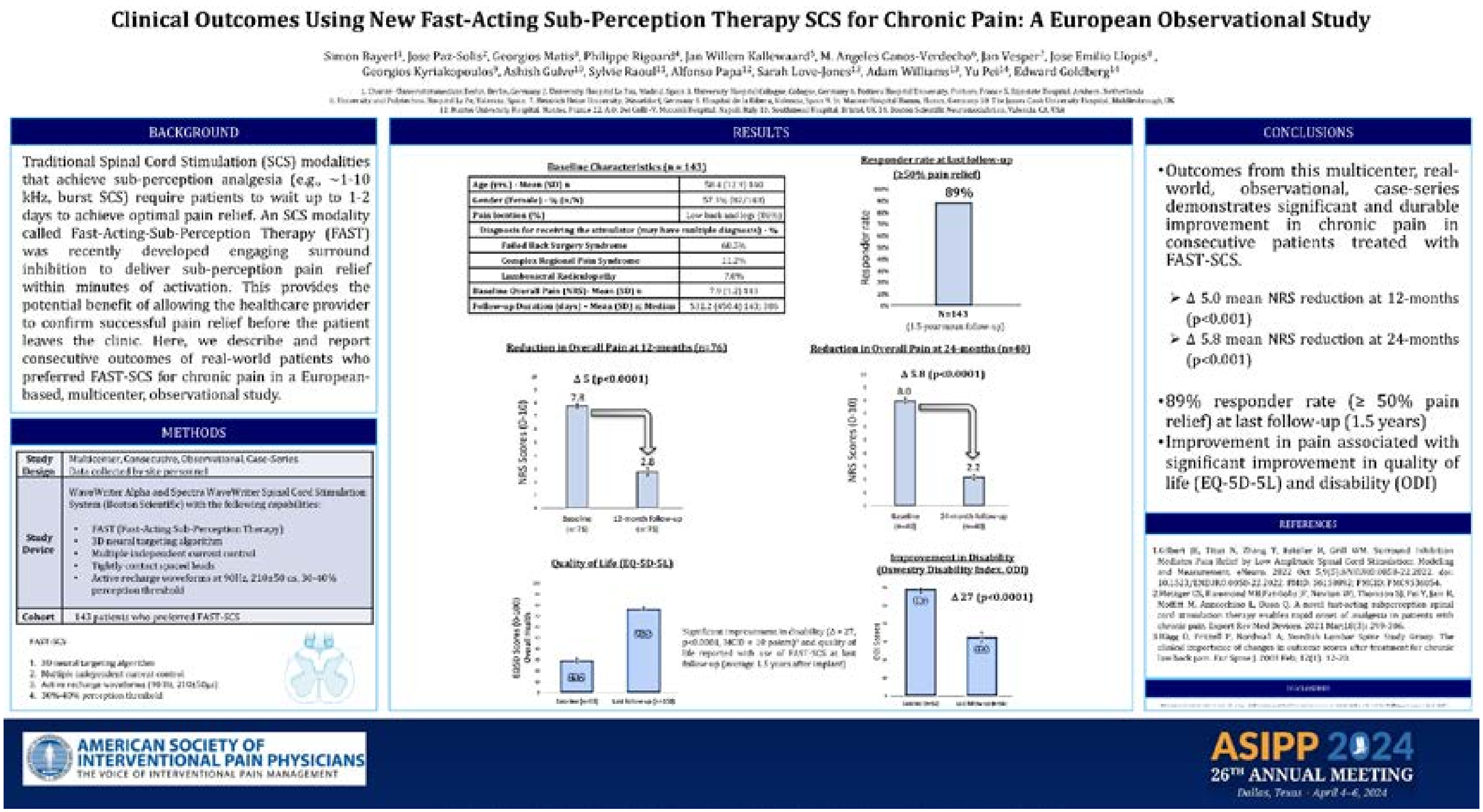
BACKGROUND
METHODS
Study Design
Study Device
Cohort
All patients assessed were indicated as preferring FAST-SCS for treatment of chronic pain and programmed using the following:
•stimulation intensity: 30-40% perception threshold
RESULTS
Baseline Characteristics (12-month cohort: n = 40)
Gender - Females (%)
60% (24/40)
Age [mean (SD)]
64.5 (12.7) years; n = 40
Last Follow-Up Duration [Mean (SD)]
497.2 (124) days; n = 40
Baseline Overall Pain NRS Score [Mean (SD)]
7.2 (2.0); n = 40
Last Follow-up Overall Pain NRS Score [Mean (SD)]
2.2 (1.8); n = 40
Change in NRS Score From Baseline to Last Follow-Up [Mean (SD)]
5.0 (2.2) points; p<0.0001
Overall Pain Relief out to 12-months (n = 40)
7.2
2.1
Pain relief is durable and significant out to 12 months
Distribution of NRS Overall Pain Scores and Responder Rate at Last Follow-Up (n = 126)
➢ 57% of patients at their last follow-up reported a NRS pain score of ≤2
➢ 88% responder rate (i.e., % of patients with ≥50% pain relief)
Number of Patients
NRS Pain Score
0
1
2
3
4
5
6
7
8
20
21
31
16
15
9
6
5
3
➢ In patients who preferred to use FAST-SCS to treat chronic pain, consistent responder rates are demonstrated across different clinical studies conducted in Europe and USA as well as in a prospective, multicenter clinical study[7,8]
Responder Rates Across FAST-SCS Studies
88%
89%
91%
CONCLUSIONS
• Real-world treated patients who preferred to use FAST-SCS for management of chronic pain was observed to be durable and robust out to 12-months follow-up and at mean last follow-up, per the following:
➢ Δ5.1-point reduction in NRS pain score (7.2 → 2.1; p<0.0001)
➢ Responder rate at 88%
➢ NRS pain score of ≤2 in 57% of patients
• These results are consistent with other studies assessing FAST-SCS outcomes.[7,8]
REFERENCES
DISCLOSURES
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT
ASIPP 2024
26TH ANNUAL MEETING


Clinical Outcomes Using New Fast-Acting Sub-Perception Therapy SCS for Chronic Pain: A European Observational Study
BACKGROUND
Traditional Spinal Cord Stimulation (SCS) modalities that achieve sub-perception analgesia (e.g., ~1-10 kHz, burst SCS) require patients to wait up to 1-2 days to achieve optimal pain relief. An SCS modality called Fast-Acting-Sub-Perception Therapy (FAST) was recently developed engaging surround inhibition to deliver sub-perception pain relief within minutes of activation. This provides the potential benefit of allowing the healthcare provider to confirm successful pain relief before the patient leaves the clinic. Here, we describe and report consecutive outcomes of real-world patients who preferred FAST-SCS for chronic pain in a European-based, multicenter, observational study.
METHODS
RESULTS
Responder rate at last follow-up
(≥50% pain relief)
89%
N=143
Reduction in Overall Pain at 12-months (n=76)
Δ 5 (p<0.0001)
7.8
2.8
Reduction in Overall Pain at 24-months (n=40)
Δ 5.8 (p<0.0001)
8.0
2.2
Quality of Life (EQ-5D-5L)
Improvement in Disability
(Oswestry Disability Index, ODI)
Δ 27 (p<0.0001)
CONCLUSIONS
•Outcomes from this multicenter, real-world, observational, case-series demonstrates significant and durable improvement in chronic pain in consecutive patients treated with FAST-SCS.
➢ Δ 5.0 mean NRS reduction at 12-months (p<0.001)
➢ Δ 5.8 mean NRS reduction at 24-months (p<0.001)
•89% responder rate (≥ 50% pain relief) at last follow-up (1.5 years)
•Improvement in pain associated with significant improvement in quality of life (EQ-5D-5L) and disability (ODI)
REFERENCES
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas · April 4-6, 2024

Closed Loop SCS as a Novel Approach to Chronic Pelvic Pain

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Baylor College of Medicine — H. BEN TAUB DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION

UTHealth Houston

Background

Chronic pelvic pain (CPP) is a debilitating disease affecting 25% of the world's female population.[1] Limited literature details the use of traditional open-loop spinal cord stimulation (OLSCS) for refractory chronic pelvic pain, though prior reports are encouraging. No prior literature details the use of closed-loop spinal cord stimulation (CLSCS) for this condition.

Methods

The patient provided verbal consent to report this case for educational purposes.

Case Presentation

A 73-year-old woman presented for evaluation of severe CPP after failing prior topical and oral medical therapies as well as lumbosacral epidural injection. Following approximately 1.5 years of debilitating symptoms, she underwent placement of CLSCS system with lead placement at T10.

Preoperatively:

- Medication regimen:
  - Gabapentin 800 mg three times daily
  - Duloxetine 60 mg daily
  - Amantadine 100 mg twice daily
  - As-needed oral acetaminophen and transdermal lidocaine
- Symptoms had caused her to stop working, stop her 5x weekly exercise program, and stop attending community events including religious services

Results

Seven weeks postoperatively:

- Pelvic pain entirely resolved
- Medication regimen:
  - Gabapentin 600 mg three times daily
  - Duloxetine 60 mg daily
  - As-needed transdermal lidocaine and nightly tramadol 12.5 mg - 25mg for pulse generator site soreness
- Full return to community activity including religious services, with gentle resumption of exercise program
- Mood subjectively improved, described as "floating on a cloud"

Nine months postoperatively:

- Pelvic pain remains entirely resolved with device in use
  - At 7-8 months postoperatively and due to patient curiosity alone, she underwent trial with device turned off: experienced 25 days pain free prior to gentle return of CPP symptoms
- Medication regimen:
  - Gabapentin 800 mg once nightly
  - Duloxetine 60 mg daily
  - As needed transdermal lidocaine for battery site
- Attending regular community events, able to serve as caregiver for sick family member, exercising at least twice weekly
- Continues to work following return at 8 weeks postop

Reference

1. Latthe P, Latthe M, Say L, Gülmezoglu M, Khan KS. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. BMC Public Health. 2006 Jul 6;6:177.

Discussion

CLSCS, as opposed to OLSCS, is a newer form of treatment that measures neural output in the form of evoked compound action potentials (ECAPs) to moderate electrical input from a single device, thus creating a closed loop of stimulation. This system allows for precise, real-time self-modulation of electrical activation without external input from a remote control or device adjustment. In this patient, for whom multiple oral and topical medications, as well as an epidural corticosteroid injection, failed to provide relief of her chronic pelvic pain, CLSCS has managed to alleviate the CPP and its associated symptoms. Consistent with prior OLSCS studies, this patient has realized both an improvement in pain and in quality of life. To the authors' knowledge, this was the first reported case of CLSCS for the treatment of CPP.

Conclusion

Closed-loop spinal cord stimulation, including its effects following device discontinuation, merits further investigation as a treatment option for refractory chronic pelvic pain.

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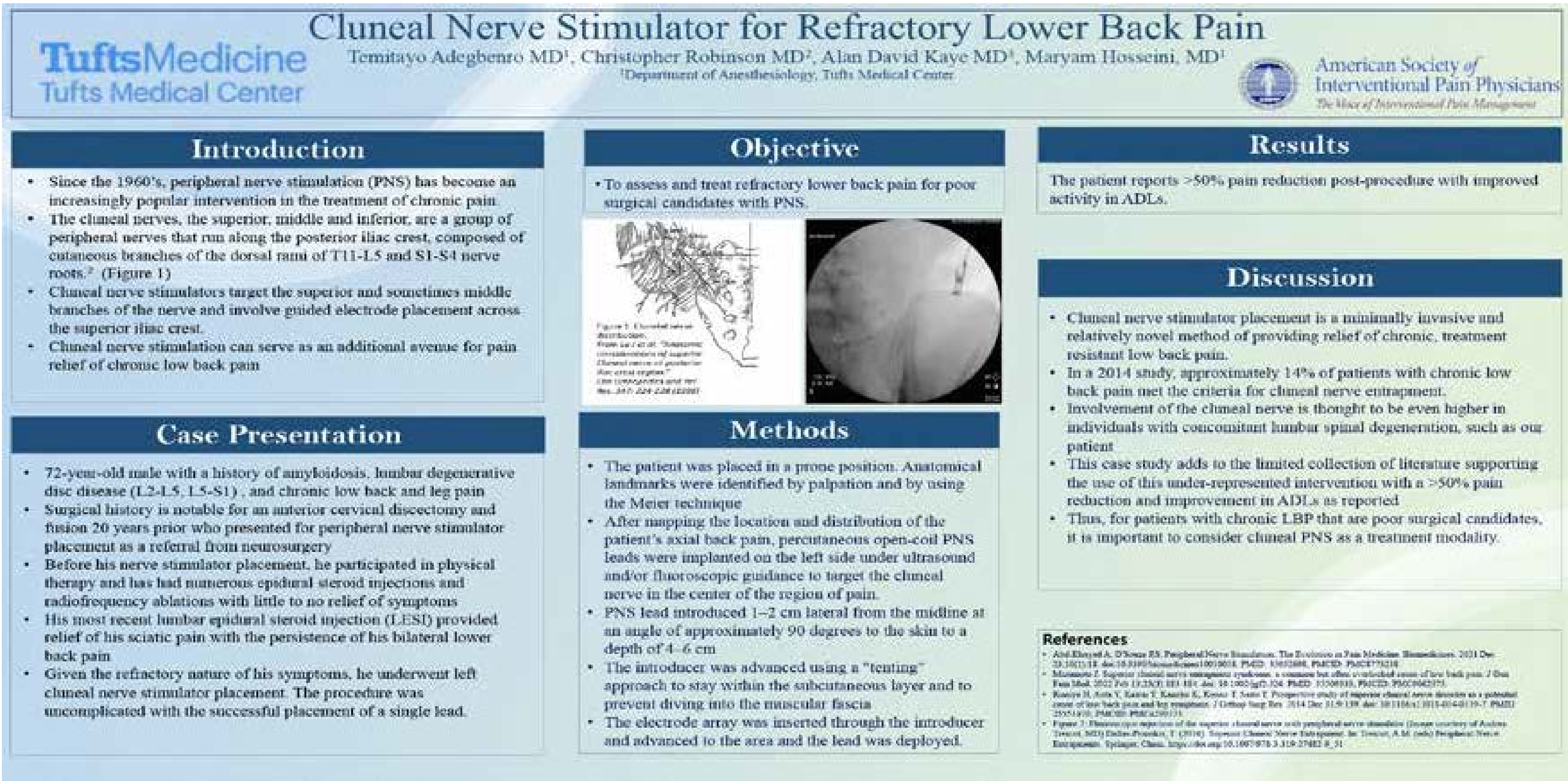
American Society of Interventional Pain Physicians 26th Annual Meeting



Cluneal Nerve Stimulator for Refractory Lower Back Pain
TuftsMedicine
Tufts Medical Center
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American Society of Interventional Pain Physicians
The Voice of Interventional Pain Management
Introduction
• Since the 1960's, peripheral nerve stimulation (PNS) has become an increasingly popular intervention in the treatment of chronic pain.
• The cluneal nerves, the superior, middle and inferior, are a group of peripheral nerves that run along the posterior iliac crest, composed of cutaneous branches of the dorsal rami of T11-L5 and S1-S4 nerve roots.[2] (Figure 1)
• Cluneal nerve stimulators target the superior and sometimes middle branches of the nerve and involve guided electrode placement across the superior iliac crest.
• Cluneal nerve stimulation can serve as an additional avenue for pain relief of chronic low back pain
Case Presentation
• 72-year-old male with a history of amyloidosis, lumbar degenerative disc disease (L2-L5, L5-S1) , and chronic low back and leg pain
• Surgical history is notable for an anterior cervical discectomy and fusion 20 years prior who presented for peripheral nerve stimulator placement as a referral from neurosurgery
• Before his nerve stimulator placement, he participated in physical therapy and has had numerous epidural steroid injections and radiofrequency ablations with little to no relief of symptoms
• His most recent lumbar epidural steroid injection (LESI) provided relief of his sciatic pain with the persistence of his bilateral lower back pain
• Given the refractory nature of his symptoms, he underwent left cluneal nerve stimulator placement. The procedure was uncomplicated with the successful placement of a single lead.
Objective
• To assess and treat refractory lower back pain for poor surgical candidates with PNS.
Figure 1. Cluneal nerve distribution.
Methods
• The patient was placed in a prone position. Anatomical landmarks were identified by palpation and by using the Meier technique
• After mapping the location and distribution of the patient's axial back pain, percutaneous open-coil PNS leads were implanted on the left side under ultrasound and/or fluoroscopic guidance to target the cluneal nerve in the center of the region of pain.
• PNS lead introduced 1–2 cm lateral from the midline at an angle of approximately 90 degrees to the skin to a depth of 4–6 cm
• The introducer was advanced using a "tenting" approach to stay within the subcutaneous layer and to prevent diving into the muscular fascia
• The electrode array was inserted through the introducer and advanced to the area and the lead was deployed.
Results
The patient reports >50% pain reduction post-procedure with improved activity in ADLs.
Discussion
• Cluneal nerve stimulator placement is a minimally invasive and relatively novel method of providing relief of chronic, treatment resistant low back pain.
• In a 2014 study, approximately 14% of patients with chronic low back pain met the criteria for cluneal nerve entrapment.
• Involvement of the cluneal nerve is thought to be even higher in individuals with concomitant lumbar spinal degeneration, such as our patient
• This case study adds to the limited collection of literature supporting the use of this under-represented intervention with a >50% pain reduction and improvement in ADLs as reported
• Thus, for patients with chronic LBP that are poor surgical candidates, it is important to consider cluneal PNS as a treatment modality.
References

Continuous Ultrasound Coupled Diclofenac Treatment Assessment

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INTRODUCTION

Low-intensity continuous ultrasound (LICUS) effectively treats chronic and acute pain. While topical diclofenac sodium is a commonly used NSAID in pain management, its efficacy is hindered by limited skin penetration[1]. The FDA-approved Sustain Acoustic Medicine (SAM) device enhances localized drug delivery by increasing skin porosity through mechanical and thermal stimuli[illegible]. SAM therapy provides non-invasive therapy to increase blood flow, reduce inflammation, and improve tissue regeneration[illegible]. Previous studies have shown that combining topical diclofenac with a SAM device improves pain management and enhances patients' quality of life in osteoarthritis patients. This study aims to evaluate the efficacy of a 2.5% diclofenac ultrasound gel coupled with a SAM device for pain relief and quality of life.

METHODS

Ex Vivo Testing

- Bovine tissue: Impedance Testing
- Bovine tissue: Diathermy measurements

Clinical Study

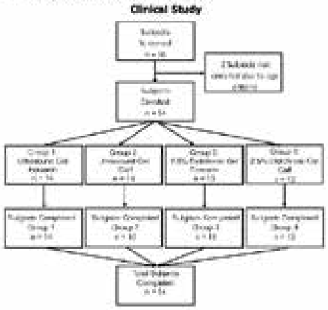

Figure 1: PRISMA flow diagrams for screening, enrollment, group assignment, and completion (100%) for participants in a clinical study.

Statistical Analyses

- T-tests and one-ANOVA with Sidak's post-hoc (SPSS) were used to determine statistical difference.

LICUS – Role in Pain Management

Figure 2: LICUS effects on tissue regeneration, remodeling and sonophoresis[illegible]

SAM and Diclofenac in Knee Osteoarthritis[illegible]

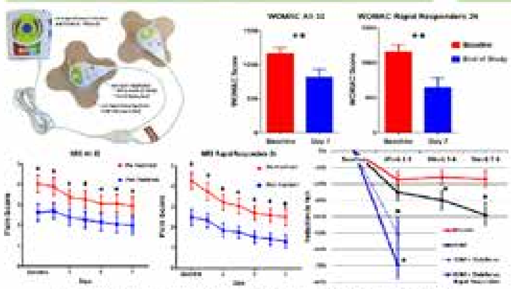

Figure 3: Synergistic efficacy of SAM therapy in conjunction with topical diclofenac[illegible]

Diathermic Analysis in Bovine Tissue[illegible]

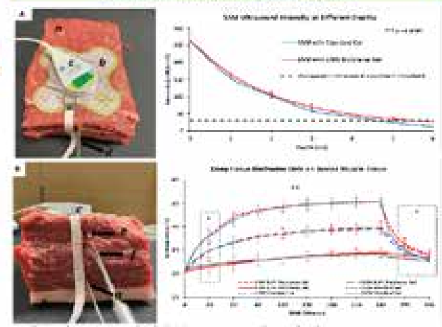

Figure 3A: Top view of LICUS in Bovine tissue. **Figure 3B:** Probe insertion site. [illegible]

Diathermic Analysis in Human Tissue[illegible]

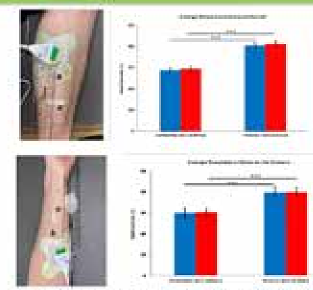

Figure 4: Diathermic differences in human subjects at different anatomic sites. [illegible]

KEY FINDINGS

- 2.5% diclofenac sodium addition increased gel acoustic impedance and coupling to the tissue.
- 2.5% diclofenac sodium provided longer sustained tissue heating relative to traditional ultrasound gel.
- Adding diclofenac did not alter the diathermic profile of SAM treatment.
- Combining diclofenac with SAM treatment has a synergistic effect on alleviating pain without any adverse effects.
- Future multicenter studies will focus on efficacy and safety of SAM + 2.5% Diclofenac Therapy System.

DISCUSSION

Ultrasound requires an aqueous medium for efficient long-distance transmission without significant energy loss. The density of the coupling medium influences ultrasound's thermodynamics and therapeutic effects. The coupling medium must be sufficiently liquid to bridge the gap between the vibrating source and the target surface. Diclofenac, an NSAID, effectively reduces inflammation and pain but can cause gastrointestinal issues due to COX-1 inhibition during systemic use. Topical diclofenac application is limited by skin penetration variability. Studies have demonstrated enhanced diclofenac penetration through skin with ultrasound stimulation, leading to improved pain relief and reduced swelling. Addition of 2.5% diclofenac to ultrasound gel enhances acoustic penetration into deeper tissue without compromising diathermic properties, suggesting potential for prolonged therapeutic use. Bovine tissue experiments indicate promising results; further research on human tissue or larger animal models is warranted for comprehensive assessment.

REFERENCES & ACKNOWLEDGEMENTS

[1] [illegible] J Orthop Res. 2020;[illegible]
[2] [illegible] Curr Med Res Opin. Jul 2012;28(7):[illegible]
[3] [illegible] et al., Ther Deliv. Jun 2020;11(6):[illegible]
[4] [illegible] et al., J Clin Med. Jun 28 2021;10(12)
[5] [illegible] et al. Open Orthop J. 2020; [illegible]
[6] [illegible] et al., Int J Phys Med Rehabil. 2023; 11(6): 679.

This study was supported by the National Institute of Health (NIH) for the support and funding of this research Grant [illegible]

Cedars Sinai

COVID-19 Nasopharyngeal Swab Test Induced Headache

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SUNCT: Short-Lasting Unilateral Neuralgiform Headache

Case Description

COVID-19's impact reaches beyond those solely infected with the virus. A middle-aged healthcare professional was unable to complete her covid vaccine-series due to an allergic reaction of whole-body rash, facial and hand swelling, chest tightness, and profound diarrhea after the first dose. She has a past medical history of migraines, resected pheochromocytoma, side effects to the flu vaccine in 1976, and multiple allergies, including to medications, latex, and shellfish. Beginning August 2021, she underwent bi-weekly covid nasopharyngeal swab tests in accordance with hospital guidelines for the non-vaccinated. She first noticed unilateral sharp pain above her eyebrow after the tenth nasal swab. The pain continued to worsen after subsequent tests even requiring her to switch testing centers. It was not until week 15 when she began experiencing severe symptoms of rhinorrhea, conjunctivitis, and nasal congestion almost instantaneously after each testing with concurrent unilateral stabbing pain above her eyebrow within minutes. A four-hour headache would follow until all symptoms gradually dissipated. Patient became symptom free after employee health approved the switch to mid-turbinate covid swabs. She was diagnosed with short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT).

Treatment Considerations

Abortive treatments are lacking due to the short duration of these attacks. All treatment modalities have the potential for side effects.

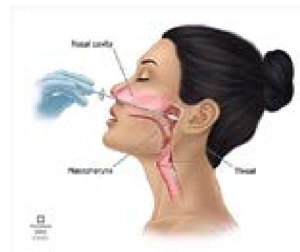
Preventative medical therapies[3]:
- Lamotrigine (1st line treatment)
- Topiramate
- Gabapentin
- Carbamazepine, however 66.7% of patients showed no effectiveness when used as a single agent
- Botox, for those unresponsive to oral medications.

Intermediate Therapies[3]:
- Corticosteroids: results showed 3 patients taking PO for 3-6 weeks were advantageous in diminishing SUNCT attacks

Procedural Options[3]:
- Greater Occipital Nerve Block
- Trigeminal Nerve Ablations
- Microvascular decompression of trigeminal nerve

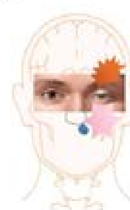
Neurostimulation[3]:
- Occipital nerve stimulation: reserved for those refractory to medication, 66% of patients with ≥ 80% pain free

Nasopharyngeal Swab for COVID[4]



SUNCT Symptoms[5]

SUNCT clinical signs of parasympathetic activation
Unilateral neuralgiform pain
Conjunctival injection (redness of eye)
Tearing
Facial flushing over the cheek
Nasal congestion
Ptosis (eyelid drooping)
Rhinorrhoea



SUNCT is often wrongly diagnosed as Trigeminal neuralgia

Discussion

SUNCT is classified as a trigeminal autonomic cephalgia that is triggered by a stimulus to the trigeminal nerve, including touch, chewing, coughing, or even blowing one's nose. To classify as such, a person must have unilateral pain with at least one autonomic symptom such as rhinorrhea, conjunctival injection, sweating of the head, miosis or ptosis, or ear pain. They are less common in females and usually begin around 50 years old. This headache can occur up to hundreds of times a day and last from seconds to minutes. This patient's symptoms resolved after switching to mid-turbinate covid swabs, however those without symptom resolution should seek further treatment.

COVID-related headaches are quite common. A study surveying almost 3500 people out of Istanbul, Turkey in which 7.5% of participants had COVID, revealed that COVID19-related headaches were more likely to last 72 hours, resistant to analgesics, bilateral in nature, associated with anosmia and ageusia, and pain related to pressure, pulsation, and stabbing[1]. In a retrospective survey of healthcare workers at the University Hospital Marqués de Valdecilla in Spain, 37% of those who developed a migraine after a nasopharyngeal swab had a history of migraine[2].

References
1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

Differential Target Multiplexed™ SCS for Intractable Upper Limb Pain: Results from a 12-Month Prospective Study

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INTRODUCTION

- Radicular upper limb pain (ULP) is a common chronic condition.
- Although conventional paresthesia-based spinal cord stimulation (SCS) could be a suitable treatment when conventional medical management of ULP fails, its clinical implementation has been limited due to the possible occurrence of uncomfortable paresthesia triggered by neck motion.
- Differential target multiplexed SCS (DTM™ SCS) has proven successful for the treatment of low back and lower limb pain.
- This study evaluated, during a 12-month follow up period, the safety and efficacy of DTM SCS in subjects with chronic ULP.

MATERIALS & METHODS

Design

Post-market, prospective, cohort, multicenter study. On-label subjects indicated for SCS*: Upper Limb Pain (ULP)

- Single arm at 11 US Sites
- Follow up to 12-month

Primary endpoint: Responder rate (≥ 50% ULP relief) at 3-months

Other Outcomes: ULP and neck pain VAS, pain disability index (PDI), PGIC, satisfaction, frequency of study-related AEs

Analysis populations

- TPC: Trial Phase completers
- PP: subjects implanted who completed visits

Table 1. Key Inclusion & Exclusion Criteria

Inclusion
Adult (≥18 y/o) ULP level ≥5 cm VAS-10 Candidate for SCS as per indication* Stable pain medication
Exclusion
Contraindications for SCS system Conditions that could interfere with evaluation of treatment Active implanted device Cervical stenosis, Facet spondylosis Mechanical instability as primary indication and reason for SCS therapy Previous posterior laminectomy

*For example: Radicular pain syndrome or radiculopathies resulting in pain secondary to surgery or herniated disk.

This study has been sponsored by SGX PROCURA (acquired by Medtronic).

RESULTS

Table 2. Baseline Demographics (TPC)

	TPC (N=52)
Age (SD)	55.9 (11.3)
Sex	71.2% F
Years w/ ULP (SD)	9.7 (8.1)
ULP (Bil or Bilateral) (#/%)	16 (30.8%) / 36 (69.2%)
Baseline ULP VAS (SD)	7.3 (1.2)

Table 3. Enrolled Subject Pain Etiologies (TPC)*

Pain Etiology N (%)	TPC (N=52)
Radiculopathy	45 (86.5%)
Degenerative Disc Disease	32 (61.5%)
Spondylosis	32 (61.5%)
Cervicalgia	27 (51.9%)
Mild/Moderate Spinal Stenosis	22 (42.3%)
Spondylolisthesis	6 (11.5%)
Internal disc disruption / Annular tear	1 (1.9%)
Other neuropathic pain	6 (11.5%)
Radiculopathy	45 (86.5%)

86% ULP responder rate (≥50% ULP relief) and 78% reduction in ULP and neck pain VAS at 12 months.

Figure 1. ULP Responder Rates (TPC)**

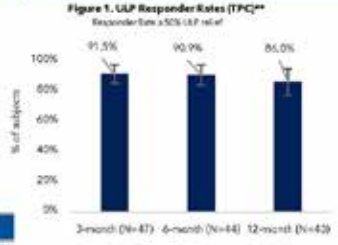


Figure 2. ULP VAS Scores (TPC)***

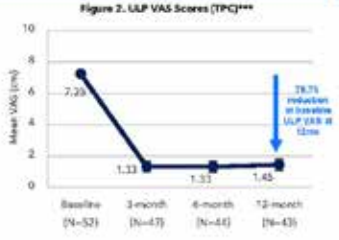
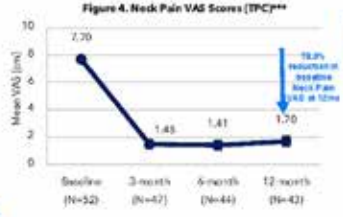


Figure 3. Profound ULP Responder Rate by Subject at 12-Months (TPC, n=43)

7 out of 10 patients were profound responders with DTM SCS at 12 months

Figure 4. Neck Pain VAS Scores (TPC)***

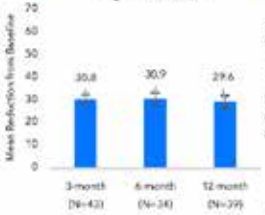


*pain etiologies in medical history, not necessarily primary indication for SCS
**error bars represent 95% confidence intervals
***error bars represent standard error

RESULTS

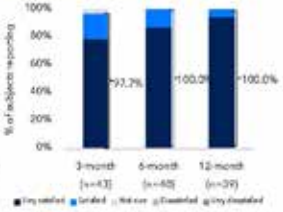
29.6-point reduction in Pain Disability Index (PDI) scores from a baseline value of 44.1 at 12-months with DTM SCS.

Figure 5. PDI (PP)**



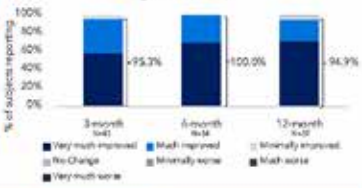
100% of subjects reported being satisfied or very satisfied with DTM SCS at 12 months.

Figure 6. Subject Satisfaction (PP)



94.9% of subjects reported feeling much improved or very much improved with DTM SCS at 12-months.

Figure 7. PGIC (PP)



DISCUSSION

- DTM SCS provided sustained ULP responder rates ≥ 86%.
- DTM SCS also provided pain relief above 78%.
- Pain outcomes corresponded to improvement in disability of ~ 30 points (PDI), as well as >90% of patients feeling improved and satisfied with DTM SCS.
- Results imply that DTM SCS is a safe, feasible and sustainable treatment for chronic intractable ULP and suggests the potential benefit of DTM SCS for neck pain.

AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT

Dual V2 and V3 Peripheral Pulsed Radiofrequency Ablation for Successful Trigeminal Neuralgia Treatment: A Case Report

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UTRGV McAllen Family Medicine Residency, *South Texas Health System Clinics Pain Medicine

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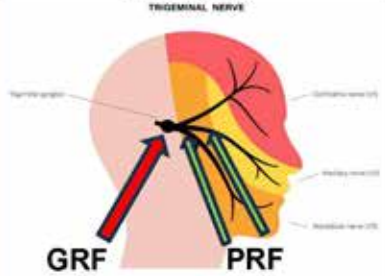
SOUTH TEXAS HEALTH SYSTEM McALLEN

Backgrounds

Management options of trigeminal neuralgia	
Medical management	Carbamazepine, Levetiracetam, topiramate, phenytoin, gabapentin
Surgical and Interventional management	Microvascular decompression, **Radiofrequency ablation**, Percutaneous balloon decompression, Gamma-knife surgery Glyceol injection



- **Radiofrequency ablation** is a common treatment for trigeminal neuralgia when medical treatment has failed
- It has been shown to be comparably effective to surgery with a better complication profile[1].
- The elderly population, who are at a high risk for surgery, is a good candidate for this treatment.
- Currently, **semilunar ganglion radiofrequency ablation (GRF)** is the widely used approach[2]
- Recently, **peripheral radiofrequency ablation (PRF)** of the V2 and V3 branches has been reported with comparable results[3]

Patient Presentation

- A 70-year-old female presented with chronic right facial pain for 8 years, with a constant sharp pain VAS score of 8-10/10. Imaging studies revealed no pathological findings, and there were no known conditions for secondary trigeminal neuralgia.
- She was not on anticoagulation and did not have any coagulation defects. The pain did not respond well to carbamazepine, opioids, SNRI, GABAergic agent, and benzodiazepine.
- Her sleep and mood were significantly affected.
- Cervical MBB and ESI had no effect.
- She declined surgical options based on her preferance.
- Initially, the patient complained of pain in the V2 distribution, but after a V2 block, the pain on the V3 distribution worsened.

Intervention and Outcome

- Pulsed radiofrequency ablation was done on V3 first after a nerve block trial on V3.
- Then, V2 pulsed radiofrequency ablation was done 4 weeks later.
- Pulsed RFA was done for 2.5 minutes at 42°C with 20msec pulses every 0.5s.
- The procedures had no complications.
- **VAS score of 0-2/10 without any pain medications 1 month postoperatively.**

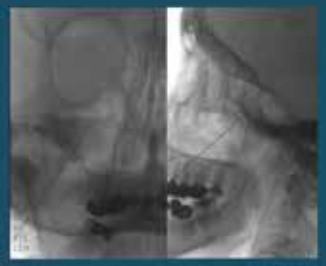


Figure 1. Fluoroscopic finding indicates proper placement of radiofrequency needle on foramen rotundum for V2 branch

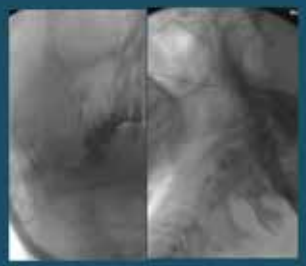


Figure 2. Fluoroscopic finding indicates proper placement of radiofrequency needle on foramen ovale for V3 branch

Discussion

- Radiofrequency ablation is gaining popularity as a treatment option for trigeminal neuralgia - minimally invasive, effective, and repeatable[2]
- With ***pulsed*** radiofrequency ablation, pain relief can be obtained without concerns about heat-related complications[4]
- GRF has been preferred due to its high success rate and ability to confirm needle placement by reproducing pain.
- PRF
  - Advantageous in safety (No entry into the cranium)
    - No risk of optic nerve injury and intracranial hemorrhage[5].
  - PRF's effectiveness has also been validated in RCTs[6].
  - **Staged procedures** for each branch of trigeminal neuralgia provide a better understanding of the main pathologic location and are better tolerated in elderly patients
  - PRF usually does not provoke severe pain compared to GRF[6].
  - PRF has a **higher recurrence rate[3] but reproducible**

Conclusion

Peripheral radiofrequency ablation (PRF) of the V2 and V3 branches is a safe and repeatable treatment option in the treatment of refractory trigeminal neuralgia

References

1. Xu R, Xie ME, Jackson CM. Trigeminal neuralgia: Current approaches and emerging interventions. Journal of pain research. 2021;14:3457-3469. doi: 10.2147/JPR.S331096.

2. Eskandar E, Kumar H, Boini A, et al. The role of radiofrequency ablation in the treatment of trigeminal neuralgia: A narrative review. Cureus. 2023;15(3):e36199. doi: 10.7759/cureus.36199.

3. Chua NH, Halim W, Beems T, Vissers KC. Pulsed radiofrequency treatment for trigeminal neuralgia. Anesthesiology and Pain Medicine. 2012;1(4):257-261. doi: 10.5812/aapm.3469.

4. Byrd D, Mackey S. Pulsed radiofrequency for chronic pain. Current Science Inc. 2008;12(1):37-41. doi: 10.1007/s11916-008-0008-3.

5. Abdelhamid AS, Alomari MS, Ghaddaf AA, et al. Radiofrequency thermoablation of the peripheral branches of trigeminal nerve versus the gasserian ganglion for treating idiopathic trigeminal neuralgia: A systematic review and meta-analysis. Journal of clinical neuroscience. 2022;104:42-47. doi: 10.1016/j.jocn.2022.08.005.

6. Zeng F, Zhu M, Wan Q, Yan Y, Li C, Zhang Y. The treatment of V2 + V3 idiopathic trigeminal neuralgia using peripheral nerve radiofrequency thermocoagulation via the foramen rotundum and foramen ovale compared with semilunar ganglion radiofrequency thermocoagulation. Clinical neurology and neurosurgery. 2020;196:106025.

The UTRGV IRB has determined this case report as "not research"

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ASIPP 2024 20TH ANNUAL MEETING

UAMS

Early Efficacy of Closed-Loop Spinal Cord Stimulation in Bilateral Upper Limb Complex Regional Pain Syndrome Type I: a case report

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OBJECTIVE

To explore the efficacy of Closed-Loop Spinal Cord Stimulator on Complex Regional Pain Syndrome of bilateral upper limbs.

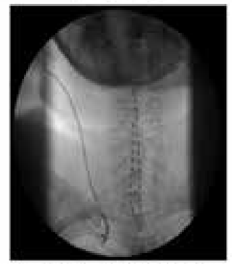
BACKGROUND

Complex Regional Pain Syndrome (CRPS) is a debilitating condition that can manifest following a noxious stimulus, immobilization or direct nerve injury. Patients who develop CRPS in one extremity are at higher risk for developing it in other limbs as well. The complex pathophysiology of CRPS continues to be enigmatic in nature, making treatment difficult. Medications, therapies, interventions and neuromodulation are means of treating CRPS via a multidisciplinary, multimodal approach. Increasing evidence has shown neuromodulation as an effective treatment for patients who have experienced suboptimal treatment. Spinal cord stimulation (SCS) remains an innovative treatment of CRPS, but limited to a fixed outflow system via open-loop SCS (OL-SCS). OL-SCS offers different waveforms (conventional/tonic, high-frequency, burst, and differential target multiplexed) and evolved from paresthesia-induced to paresthesia-free pain relief. Despite multiple OL-SCS waveforms, long term success rate was only 47-74% (Lam). Furthermore, dorsal root ganglion (DRG) stimulators have been approved but geared towards lower limb CRPS (Deer). Recently, a closed-looped SCS (CL-SCS) was developed, utilizing a closed feedback loop via real-time evoked compound action potentials (ECAP) from dorsal column fibers and provides a similar amplitude stimulation for adaptive pain relief (Brooker). However, limited literature is available on CL-SCS in CRPS patients, specifically in bilateral upper limbs.

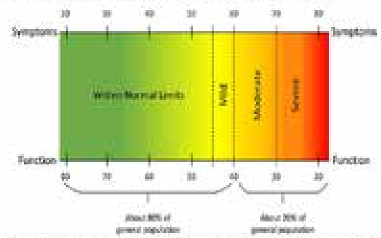
CASE

The patient is a 54-year-old African-American female with HTN, GERD, right lateral epicondylitis s/p debridement, who presented with allodynia of left wrist. She previously had a left carpal tunnel release (CTR) 3 months prior and presented with palmar allodynia, dorsal hand hyperesthesia, hyperhidrosis, discoloration, and swelling spreading from distal wrist proximally to shoulder, consistent with Budapest Criteria for CRPS Type I. She started conservative treatments - occupational therapy, pregabalin, and subsequently, left stellate ganglion nerve blocks, which provided 60-100% pain relief. She then developed CRPS Type I of her RUE after another CTR surgery, with contiguous spread from distal wrist to proximal shoulder. Her initial treatment involved bilateral stellate ganglion blocks, providing 100% pain relief, but with diminished therapeutic effect with time. She was deemed appropriate for the CL-SCS trial for treatment of bilateral upper limb CRPS. Pain reduced from 8/10 to 4/10 post-trial, and she was able to functionally use her hands for activities of daily living (ADLs).

METHODS



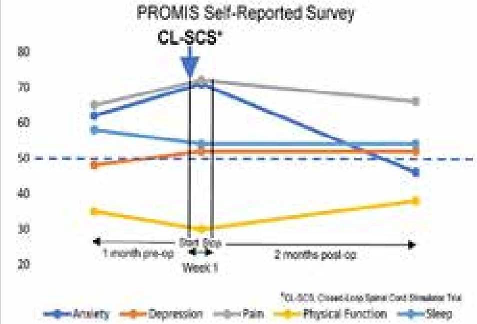
A. Procedure: Positioned CL-SCS percutaneous epidural electrodes with top of the left midline lead at the top of C4 overlying the vertebral body of C4-C5 and the right midline lead at the top of C2 overlying C2-C3. The left lead was attempted to thread upwards of C2 but had anterior facing direction with advancement past C4.



B. Patient-Reported Outcomes Measurement Information System (PROMIS) T-Score Heatmap. General population is a mean of 50, with a standard deviation (SD) of 10. A higher score means patient reports more of that symptom or function. 0.5-1.0 SD = mild, 1.0-2.0 SD = moderate, 2.0 or more SD = severe (HealthMeasures)

RESULTS

	Pre-Procedure	Post-Procedure (1 week)
Visual Analog Pain Scale (VAS)	8/10	4/10
CRPS Severity Scale (CSS)	13/17	9/17



CONCLUSION

CRPS in bilateral upper limbs is debilitating, painful, and limits functional ability. CL-SCS provides a modality that can adapt to the complex nature of CRPS, providing early clinical evidence for adequate relief to chronic pain refractory to conventional treatments. CL-SCS allowed for improved functional bilateral hand use by the end of the trial period.

REFERENCES

Stanton-Hicks M. Complex regional pain syndrome. Anesthesiol Clin North Am. 2003 Dec;21(4):733-44. doi: 10.1016/s0889-8537(03)00084-1. PMID: 14719716.
Elsamadicy AA, Yang S, Sergesketter AR, Ashraf B, Charalambous L, Kemeny H, Ejikeme T, Ren X, Pagadala P, Parente B, Xie J, Lad SP. Prevalence and Cost Analysis of Complex Regional Pain Syndrome (CRPS): A Role for Neuromodulation. Neuromodulation. 2018 Jul;21(5):423-430. doi: 10.1111/ner.12691. Epub 2017 Sep 29. PMID: 28961359; PMCID: PMC5876058.
Lam CM, Latif U, Sack A, Govindan S, Sanderson M, Vu DT, Smith G, Sayed D, Khan T. Advances in Spinal Cord Stimulation. Bioengineering (Basel). 2023 Feb 1;10(2):185. doi: 10.3390/bioengineering10020185. PMID: 36829678; PMCID: PMC9951983.
Kumar K, Rizvi S, Nguyen R, Abbas M, Bishop S, Murthy V. Impact of wait times on spinal cord stimulation therapy outcomes. Pain Pract. 2014 Nov;14(8):709-20. doi: 10.1111/papr.12126. Epub 2013 Oct 25. PMID: 24165206.
Deer TR, Pope JE. Dorsal root ganglion stimulation approval by the Food and Drug Administration: advice on evolving the process. Expert Rev Neurother. 2016 Oct;16(10):1123-5. doi: 10.1080/14737175.2016.1206817. Epub 2016 Jul 25. PMID: 27454059.
Brooker C, Russo M, Cousins MJ, Taylor N, Holford L, Martin R, Boesel T, Sullivan R, Hanson E, Gmel GE, Shariati NH, Poree L, Parker J. ECAP-Controlled Closed-Loop Spinal Cord Stimulation Efficacy and Opioid Reduction Over 24-Months: Final Results of the Prospective, Multicenter, Open-Label Avalon Study. Pain Pract. 2021 Jul;21(6):680-691. doi: 10.1111/papr.13008. Epub 2021 May 2. PMID: 33768664; PMCID: PMC8359972.
HealthMeasures. PROMIS Heatmap. Adapted from https://www.healthmeasures.net/score-and-interpret/interpret-scores/neuro-qol/neuro-qol-score-cut-points.

Early Outcomes from an Ongoing Randomized Clinical Trial for Peripheral Nerve Stimulation (COMFORT 2 Study)

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Introduction

Peripheral nerve stimulation (PNS) is a well-established method for the treatment of chronic intractable pain. We are reporting the early results from a second ongoing Randomized Control Trial documenting the effectiveness of a battery-free system with a micro-implantable pulse generator (micro-IPG; Nalu Medical, Inc. Carlsbad, CA). The objective of this ongoing study is to document the comparative effectiveness and safety of peripheral nerve stimulation (PNS) plus conventional medical management (CMM) versus CMM alone in the treatment of chronic, intractable peripheral neuralgia.

Methods

The COMFORT 2 RCT[1] is a post-market, open-label, multicenter study designed to align with standard of care procedures for PNS. Subjects who are eligible, consented, and prescribed PNS therapy to treat chronic pain in the shoulder, knee, low back, or foot/ankle will be considered for study participation. One hundred (100) subjects will be randomized to the active (PNS+CMM) and control (CMM only) arms in a 2:1 ratio. Subjects who complete a successful trial (≥ 50% pain relief from baseline) will be implanted with the permanent device. Subjects in both arms will be followed at 1, 3, 6, 9 and 12 months from device activation and randomization, respectively, with subjects in the control arm eligible to cross-over at 3-months. Outcomes related to pain relief (NRS 0-10 scale), functional outcomes and safety will be collected and reported. IRB approval was received prior to commencement of study activities.

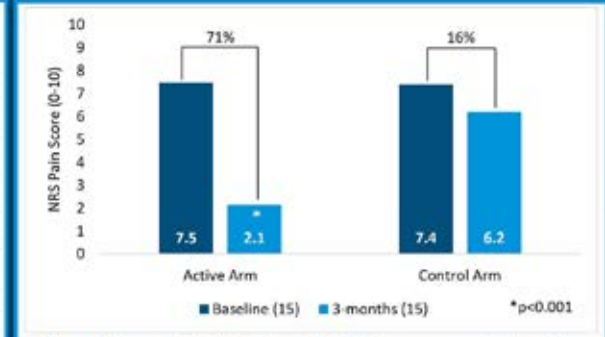

Figure 1. *shows statistically significant (p<0.001) average percent reduction in NRS pain scores (0=no pain;10=worst pain imaginable), from baseline to 3-months in the Active Arm compared to the Control Arm.*

Results

To date, 89 subjects have been randomized in this ongoing study, 61 in the Active arm and 28 in the Control arm, with subjects in various stages of follow up. Complete 3-month data is available on 30 subjects, 15 Active and 15 Control subjects. The Active arm responder rate (those achieving ≥50% pain reduction) was 87%, with an average pain reduction of 71% vs the Control arm responder rate was 13% with an average pain reduction of 16% (p<0.001). Patient Global Impression of Change (PGIC) data shows that 100% of subjects in the Active arm reported improved PGIC vs 14% in Control arm; 73% of Control arms subjects reported no change over time vs 0% of Active arm subjects. There have been no serious adverse device effects and no reports of pocket pain.

Conclusions

Early results from this ongoing study demonstrate that patients receiving PNS therapy with this micro-IPG along with conventional medical management (CMM) realize significantly better pain relief and functional improvement than patients with CMM alone. In addition, early results from this study are consistent with the COMFORT study[2]. We look forward to reporting additional data as the study progresses.

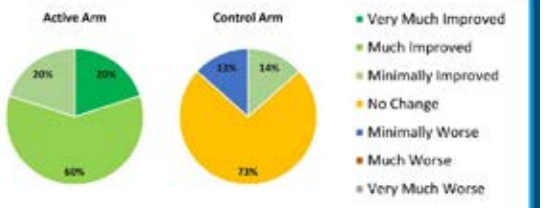

Figure 2. *shows 100% of subjects in the Active arm reported improvement on PGIC. Majority (73%) of Control Arm subjects reported no change at all at 3-months.*

References

1. Registered on www.clinicaltrials.gov; NCT05870124.
2. P. Martin, MJ Desai et al, Interim updates on the 3-month outcomes from the COMFORT PNS RCT; NYNJSIPP Annual Meeting, 2023.

Efficacy of Peripheral Nerve Stimulation in Refractory Post-Amputation Pain: A Preliminary Review

American Society of Interventional Pain Physicians
The Voice of Interventional Pain Management

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INTRODUCTION

- 2.5+ million in the U.S. have an amputated limb, with projections doubling by 2050.[1]
- 60-90% will experience post-amputation pain - residual limb pain (RLP) and/or phantom limb pain (PLP).[2]
- 10% of patients will experience chronic refractory post-amputation pain, despite adequate medical, rehabilitative, and minimally invasive interventional management.[2-4]
- Peripheral nerve stimulation (PNS) may be a potential alternative post-amputation agent.[5]

METHODS

- A comprehensive literature review of MEDLINE via PubMed, EMBASE, and Cochrane Library for PNS in the treatment of post-amputation PLP or RLP was conducted.
- Inclusion criteria:
  - Publication must discuss PNS, PLP, and RLP
  - Interventional and observational studies were included
- The initial search yielded a total of 115 references.
- After duplicates were removed and the remainder analyzed for inclusion criteria, 3 studies were included

RESULTS

Author	Study Type	Patient Population	Intervention	Device	Primary Outcomes	Secondary Outcomes	Evidence Class
Rauck et al., 2014[6]	Single center, prospective cohort	16 lower-extremity amputees	2 weeks PNS trial + 4 weeks f/u	Rehabilicare NT2000	- 8/9 (89%) with ≥30% BPI relief at week 2 PNS - 7/9 (78%) with ≥30% BPI relief at week 4 f/u	Week 4 f/u (avg): - Improved PDI (56%) - Improved BDI-II (42%)	4
Gilmore et al., 2019[7]	Prospective, randomized, sham-controlled, crossover	28 lower-extremity amputees	Group I (14): 8 weeks PNS + 10 months f/u Group II (14): 4 weeks placebo, 4 weeks PNS + 10 months f/u	SPRINT PNS System	- Group 1 reported ≥50% reductions in average weekly BPI pain at 12 months (67%, 6/9) - Group 2 (16%, 1/6) after 1 crossover	12 month f/u (avg): - Improved PDI (56%) in Group 1 compared to Group 2 (18%) - Improved Group 1 BDI-II (55%)	2
Albright-Trainer et al., 2022[8]	Single center, prospective, randomized, controlled pilot study	16 lower-extremity amputees	- Group I (8): 8 weeks PNS on + standard medical therapy + 3 months f/u - Group 2 (8): 8 weeks PNS off + standard medical therapy + 3 months f/u	SPRINT PNS System	- Group 1 had greater reduction BPI pain scores for RLP and PLP compared to Group 2 despite higher baseline pain scores	Week 12 f/u (avg): Group 1 had higher reduction of opioid usage (75% to 20%) compared to Group 2 (88% to 38%)	2

Table 1. Peripheral nerve stimulation outcomes for residual limb pain and phantom limb pain. (BPI: Brief Pain Inventory; PDI: Pain Disability Index; BDI: Beck Depression Inventory)

DISCUSSION

- At best, PNS for refractory RLP and PLP currently has low to moderate support based on the current literature.
- Level of Evidence: B
- Future studies:
  - Length of the treatment period
  - Length of follow-up period
  - Larger sample size
  - Comparative and observational studies

REFERENCES

Effectiveness of Scrambler Therapy for Alleviating Phantom Limb Pain: A Case Report

Peter D. Vu[1]; Salahadin Abdi[2]

1. UTHealth Houston; 2. The University of Texas MD Anderson Cancer Center

American Society of Interventional Pain Physicians — The Voice of Interventional Pain Management

UTHealth Houston McGovern Medical School

The University of Texas MD Anderson Cancer Center

INTRODUCTION

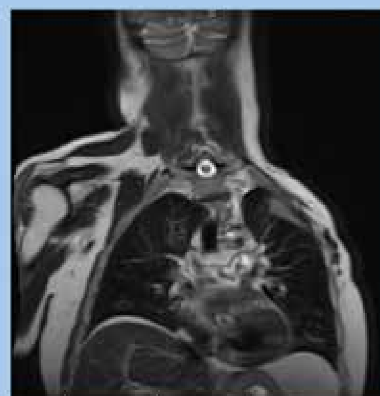
- Approximately two million individuals in the United States currently live with an amputated limb, with projections estimating that number to double by 2050.
- Of these amputees, 60-90% will experience phantom limb pain (PLP).
- In recent years, advancements in technology with alternative noninvasive neural modulation techniques have been employed for treating chronic pain conditions.
- One example is scrambler therapy (ST), which has demonstrated effectiveness in addressing various chronic pain syndromes across diverse patient populations. In terms of PLP, however, cases have been limited.

METHODS

- Over 5 consecutive days, the patient underwent ST.
- 6 electrodes through 3 channels were placed around painful areas (Figure 1b).
- The areas were stimulated for 45 minutes.
- Post procedure, all the electrodes were removed, and the patient was discharged to home in stable condition.

KEY TAKEAWAYS

Scrambler therapy is a possible long-term treatment in refractory **phantom limb pain.**



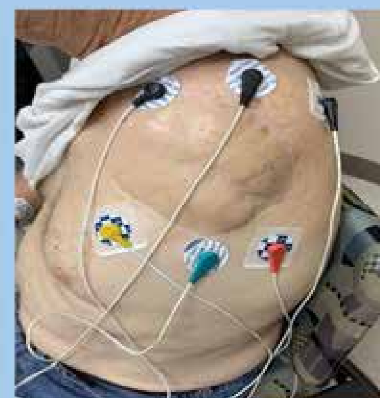


Figure 1a. CT chest showcasing left fore quarter amputation.
Figure 1b. Well healed flap without areas of dehiscence. Healed and dry drain sites inferiorly. Area of scrambler electrode placement.

THE CASE

- 72-year-old male with a history of liposarcoma of the left brachial plexus with chemotherapy and left-upper extremity forequarter amputation with ST 5 years prior presents for follow-up.
- Before ST, the patient had persistent neuropathic and nociceptive pain despite a pain regimen and physical treatments.
- After ST over 5 consecutive treatment days, the patient reported immediate improvements in his pain.
- Over the next 2-3 years, he reported improved pain with less frequent attacks and reduction in his medication regimen.
- By year 5, the patient reported no further PLP and complete cessation of his medication regimen.

REFERENCES

1. [illegible]
2. [illegible]
3. [illegible]
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6. [illegible]
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Application of SPECT-CT Imaging in Diagnosing Axial Gout

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BACKGROUND

Gout is an inflammatory arthritis associated with deposition of monosodium urate crystals in tissue, commonly affecting peripheral joints including the feet and hands. Axial gout is a rarer form of disease and can present as acute back pain with radicular signs. Imaging technologies include ultrasonography, magnetic resonance imaging (MRI), computerized tomography (CT), and nuclear medicine modalities including single-photon emission computed tomography (SPECT) can be utilized to evaluate for extent of disease process and assist with diagnosis.

CASE PRESENTATION

A 68-year-old male with a past medical history of gout presented to the hospital with severe lower back pain with radiation to the hips and shoulders, which began after bending over to pick up his bag. Pain described to be sharp, worse with deep inspiration and movement. On examination, there was tenderness to palpation of the thoracic and lumbar paraspinal muscles. CXR demonstrated a widened mediastinum. CT chest angiography showed no evidence of aortic dissection or pulmonary embolism. Hospital course was complicated by new left knee and right ankle pain with associated swelling. Rheumatology was consulted and patient was started on solumedrol 250 IV one-time dose and started on colchicine 0.6 mg daily. MRI lumbar spine demonstrated degenerative changes, moderate to severe thecal sac narrowing at L3-L4 and L4-L5 with pronounced neural foraminal narrowing from L3-L4 through L5-S1, and edema and enhancement within the dorsal lumbar paravertebral musculature. Back pain worsened and new pain arose in the right knee, wrist, and hands. He received three high doses of steroids with minimal improvement in swelling/pain. He was then started on IL-1 therapy with Anakinra 100mg daily for 5 days. A bone scan with SPECT/CT was performed to evaluate for acute inflammation and extent of gout disease process and back pain involvement and demonstrated foci of increased radiotracer uptake along the lower lumbar spine corresponding to left L3-L4, and bilateral L5-S1 facet joint arthropathy in addition to foci of increased radiotracer uptake involving the bilateral wrists, bilateral hands, and left greater than right shoulder, bilateral knees and feet. Interventional radiology was consulted for guided biopsy at right facet joint level L5-S1 to confirm diagnosis of gout but aspiration was unsuccessful. By the last dose of Anakinra, the patient reported significant improvement in back pain and peripheral joint pains.

Figure 1. SPECT-CT spine in sagittal plane view. Arrow indicates site of increased radiotracer uptake at L5/S1 level.

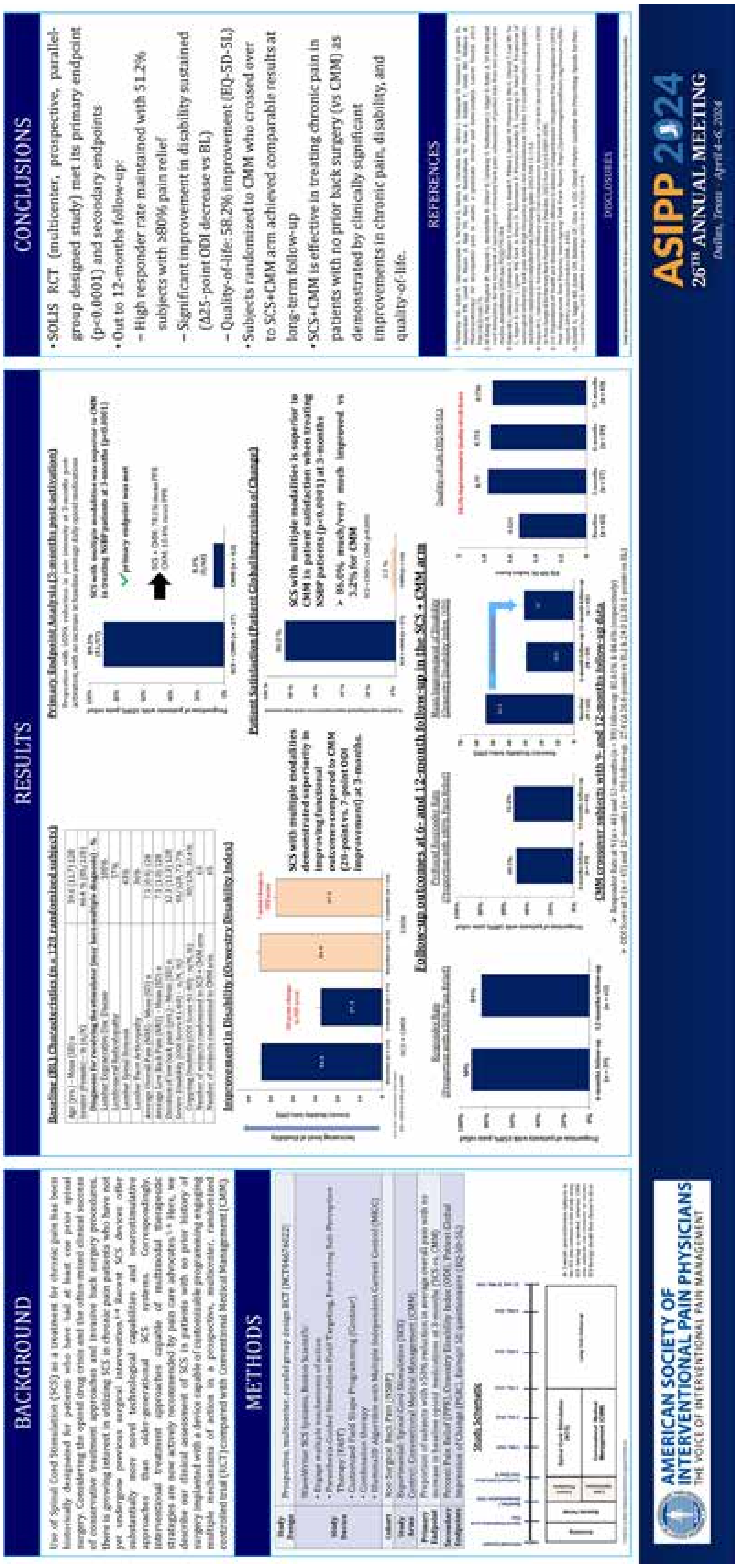
Figure 2. SPECT-CT spine in transverse plane view at L5/S1 level. Arrows indicate sites of increased radiotracer uptake at bilateral L5-S1 joints.

CONCLUSION

Axial or spinal gout is a rare disease manifestation with symptoms of back or radicular pain, which may not be accompanied by deposition of monosodium urate crystals in common small joint locations like the first metatarsophalangeal joint. Although joint aspiration with synovial analysis for crystal visualization is indicated for diagnosing gout, sometimes this is not possible due to insufficient fluid or difficult to aspirate small joints, like facet joints. In these cases, a thorough history and physical exam in addition to imaging can support a diagnosis of gout. Image fusion of SPECT and CT combines functional information of radiotracer uptake with precise localization, which is crucial in providing correlated diagnostic information in rare cases of axial gout.

REFERENCES

- Chowalloor, Priya Varghese et al. "Imaging in gout: A review of the recent developments." *Therapeutic advances in musculoskeletal disease* vol. 6,4 (2014): 131-43. doi:10.1177/1759720X14529960
- Hasegawa, Eduardo Massato et al. "Gout in the spine." *Revista Brasileira de reumatologia* vol. 53,3 (2013): 296-302.
- Hospodar, Bhaskar Rao et al. "SPECT/CT in the Evaluation of Suspected Skeletal Pathology." *Tomography* vol. 7,4 (2021): 587-605. doi:10.3390/tomography7040050



Evaluating SCS and Medical Management for Chronic Pain without Prior Surgery: 1-Year Outcomes (SOLIS RCT)
James North1, Julie Paez2, Aaron Calodney3, Eric Loudermilk4, Zachary McCormick5, Drew Trainor6, John Noles7, Michael Yang8, Gregory Phillips9, Derron Wilson10, Steven Rosen11, Maged Guirguis12, Magdalena Anitescu13, John Chatas14, Daniel Pak15, Joseph Atallah16, Binit Shah17, Tim Leier18, Anne Christopher19, Daniel Kloster20, Jeffrey Peacock21, Suneil Jolly22, Mitchell Engle23, Lilly Chen24, and Edward Goldberg24
BACKGROUND
METHODS
Study Schematic
RESULTS
Baseline (BL) Characteristics (n = 128 randomized subjects)
Primary Endpoint Analysis (3-months post-activation)
Improvement in Disability (Oswestry Disability Index)
Patient Satisfaction (Patient Global Impression of Change)
SCS with multiple modalities demonstrated superiority in improving functional outcomes compared to CMM (20-point vs. 7-point ODI improvement) at 3-months.
SCS with multiple modalities is superior to CMM in patient satisfaction when treating NSBP patients (p<0.0001) at 3-months
Follow-up outcomes at 6- and 12-month follow-up in the SCS + CMM arm
CMM crossover subjects with 9- and 12-months follow-up data
CONCLUSIONS
• SOLIS RCT (multicenter, prospective, parallel-group designed study) met its primary endpoint (p<0.0001) and secondary endpoints
• Out to 12-months follow-up:
– High responder rate maintained with 51.2% subjects with ≥80% pain relief
– Significant improvement in disability sustained (Δ25-point ODI decrease vs BL)
– Quality-of-life: 58.2% improvement (EQ-5D-5L)
• Subjects randomized to CMM who crossed over to SCS+CMM arm achieved comparable results at long-term follow-up
• SCS+CMM is effective in treating chronic pain in patients with no prior back surgery (vs CMM) as demonstrated by clinically significant improvements in chronic pain, disability, and quality-of-life.
REFERENCES
DISCLOSURES
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas · April 4–6, 2024

Exudative Cutaneous Eruption as a Manifestation of Deep Tissue Infection Following an Early Intrathecal Pump Refill in a Patient on Chronic Steroid, a Case Report

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Background

Intrathecal pump infection rates ranges from 2% to 15.7%.[1,2] Central nervous system involvement is often suspected in patients who present with a fever, meningeal signs, and altered mental status.[3] Skin and soft tissue infections (SSTIs) associated with pump implants often manifest as tissue erythema, edema, and skin erosion, and deep tissue involvement is often linked to wound dehiscence, purulent discharge and systemic inflammatory signs.[4] However, the clinical presentation for deep tissue infection from an early pump refill in a newly implanted device has not been described.

Case Presentation

A 74-year-old female with a history of rheumatoid arthritis, adrenal insufficiency on hydrocortisone, chronic radicular lower back pain managed with an intrathecal pump (ITP) required a pump revision due to pump failure caused by a damaged catheter. Upon resumption of her previously stable pain regimen with the new pump, she became over sedated and experienced respiratory depression. Thus, the newly implanted pump was turned off, and it was re-accessed 7 days later to be refilled with a more diluted solution. Initial follow up revealed normal wound healing (Figure 1). However, the patient represented to the emergency department 5 weeks later with an exudative rash around the incisional site, which was initially thought be secondary to contact dermatitis (Figure 2). Initially, there was low suspicion for deep tissue involvement because there was no wound dehiscence, no signs of systemic infection, and her inflammatory markers were only mildly elevated (ESR 26 and CRP 11.5). When the Pain Service evaluated her, a 6cm x 6cm fluid collection behind the pump was found (Figure 3). The patient was admitted for IV antibiotics (vancomycin and cefepime). Her pump was explanted, and significant pus was found during washout. Bacterial culture of the sample grew mixed skin flora consisting of Staphylococcus haemolyticus, Staphylococcus hominis, and Staphylococcus epidermidis.

Figure 1

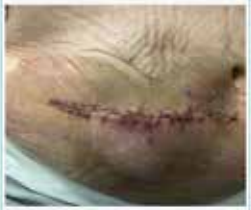


Figure 2

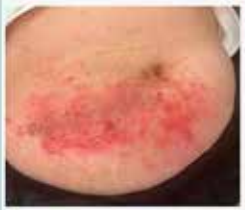
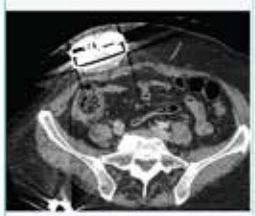


Figure 3



Clinical Course

Discussion

This case report showcases the infectious complications that could result due to early pump access. The infection may have originated from the initial pump replacement, but skin flora could have also been introduced when the side port distal to the incisional wound was accessed during pump refill. We suspect that the hematoma that formed in the pump pocket during placement may have promoted bacterial growth as a result of dissection of the Dacron pouch from the old pump. This deep tissue infection later presented as an exudative rash on the surface of this skin sparing the integrity of the original wound. We suspect that the lack of systemic inflammatory signs is attributed to the patient's chronic immune suppression from steroid use.

Conclusion

Exudative cutaneous eruption without evidence of wound dehiscence could be a sign of deep tissue infection following an early intrathecal pump refill.

References

1. Engle, Mitchell P. Infectious Complications Related to Intrathecal Drug Delivery System and Spinal Cord Stimulator System Implantations at a Comprehensive Cancer Pain Center, Pain Physician. 2013;16:251-257.
2. Goel, Vasudha. Adverse Events and Complications Associated With Intrathecal Drug Delivery Systems: Insights From the Manufacturer and User Facility Device Experience (MAUDE) Database.
3. Rovlias, Aristedis. Intrathecal Baclofen Pump Infection Treated by Adjunct Intrareservoir Teicoplanin Instillation. Surg Neuro Int. 2017;8:38.
4. Joseph, A. Infected Intrathecal Pump Exchange with Preservation of Original Catheter in a Cancer Patient. Pain Medicine. 2022;23:1915-1920.

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First known use of dorsal root stimulation using a micro-IPG device using a percutaneous type approach via the L5-S1 intervertebral neuroforamen

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Objectives

Dorsal root ganglion stimulation (DRG-S) is a well-accepted therapy for the targeted treatment of chronic neuropathic pain. reporting the first known use of a transforaminal approach to DRG-S using a micro-implantable pulse generator (micro-IPG, Inc., Carlsbad, CA).

Methods

A 78-year-old female suffering from chronic neuropathic left low back, hip and lower extremity pain associated with post laminectomy syndrome following a multilevel lumbar laminectomy with partial facetectomy and foraminotomy surgery four years prior. She had undergone extensive postsurgical conservative treatment including physical/manual therapy as well as injection therapy including multiple epidural steroid injections. She had also been on various pharmacotherapy combinations including opioids, tricyclic antidepressants, and anticonvulsants. All of these efforts failed to provide adequate pain relief. The patient underwent diagnostic left L5-S1 transforaminal epidural steroid/local anesthetic injections which afforded her dramatic temporary pain relief.

Following a successful percutaneous trial, the patient underwent implantation of a permanent micro-IPG device. A single quadripolar peripheral nerve stimulating electrode with anchor tines was placed under fluoroscopic guidance utilizing a percutaneous style approach via the superior ventral aspect of the left L5-S1 neural foramen (Figure 1). The patient underwent neurostimulator programming at the first postoperative visit. Her postoperative course was uneventful with routine wound healing.

Results

Following activation of the device, the patient reported over 80% pain relief. She was able to resume her routine activities within 1 week of the postoperative period. The patient also reported improvement in overall function and quality of life. The patient's opioid and tricyclic antidepressant medications were discontinued. She remains on a modest dose of an anti-seizure medication (gabapentin) for restless leg syndrome, a longstanding condition present prior to micro-IPG neurostimulator implantation.

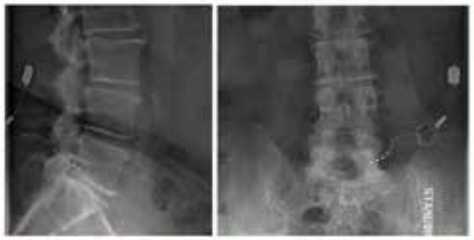

Figure 1: Fluoroscopic images of PNS leads placed via the transforaminal approach

Conclusion

This is the first reported use of a micro-IPG neurostimulator utilizing a transforaminal approach for DRG-S in the treatment of chronic neuropathic pain. This approach can be beneficial for patients where traditional approaches for DRG-S are not viable. Additionally, we found this approach along with use of the micro-IPG can be more efficient than the traditional DRG procedure; this can reduce anesthesia time thereby decreasing the risk to the patient. The form factor of the micro-IPG device allowed for optimal placement of the implant. Advanced programming (higher energy, layered and scheduled programs, etc.) were used to optimize the patient's response to therapy. We continue to use this technique in our practice and look forward to reporting additional data as it becomes available.

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Fluoroscopy Dose and Time during Vertebral Augmentation Procedures for Spine Pain due to Pathologic Fracture in Malignancy
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Baylor College of Medicine
Baylor College of Medicine
BACKGROUND
OBJECTIVE
MATERIAL METHODS
Result
CONCLUSION

Freedom® PNS with HF-EMC Technology at the Posterior Tibial Nerve for the Treatment of Chronic Pain in the Foot

Ryan Pollina, MD[1]· Gabriela Betanzos[1] | [1]Advanced Spine and Pain Center

Background

The posterior tibial nerve is among the three primary nerves in the ankle and foot region. Direct trauma or pressure on the nerve for extended periods may result in posterior tibial nerve injuries. Externally powered peripheral nerve stimulator (PNS) systems have proven to be the optimal choice when considering peripheral nerve stimulation for treating chronic pain.

Setting

The purpose of this study was to observe the efficacy of stimulation on overall pain relief as reported in a cohort of 15 patients treated with the Freedom Peripheral Nerve Stimulator (PNS) System at the posterior tibial nerve for foot pain. Subjects presented with chronic, intractable foot pain refractory to standard medical treatment. Stimulators were placed at the posterior tibial nerve. A retrospective chart review was conducted to assess baseline. One additional visit occurred at least 12 months post-implant to assess the outcome.

Methods

Informed consent was obtained from all patients. Patients were taken to the operating room and appropriately positioned on the table. The implant site was cleaned with chlorhexidine and covered with sterile drapes. The electrode array was placed on the skin, with the distal electrode at the target nerve. The needle entry point and pathway were planned using palpation and fluoroscopy. The skin and deeper tissues were anesthetized using a local anesthetic. The initial introducer path was also infiltrated with a local anesthetic.

A first incision was made with an 11-blade scalpel, and the 13-gauge introducer needle was passed through the incision and advanced subcutaneously in the fascial plane to the target nerve under imaging guidance using small amounts of local anesthetic. 1 or 2 four-contact electrode array(s) with tines were inserted through the cannula(s) and advanced to the posterior tibial nerve.

The steering stylet(s) were removed, and separate receiver(s) were connected to the electrode array(s). A receiver pocket was created using a second incision, and the neurostimulators were tunneled beneath the skin from the first incisions to the receiver pocket. A knot was tied to connect the separate receivers and electrode arrays permanently. The neurostimulators were coiled, and the coils were sutured to the fascia and secured within the pocket. The receiver pocket was closed in 3 layers of suturing.

Demographics

Fifteen subjects were enrolled. All subjects were diagnosed with peripheral neuropathy of the posterior tibial nerve. The mean age was 65±9.3 years; 8 subjects (53%) were males, and 7 (47%) were females. Nine patients were diagnosed with idiopathic neuropathy, 5 with diabetic neuropathy, and one with alcoholic neuropathy of the posterior tibial nerve. Twelve subjects preferred stimulation pulse rates of 1499 Hz, two preferred 1000 Hz, and one preferred 500 Hz. Amplitudes were programmed between 0.5 and 4 mA. Clinically, we have found sub-threshold stimulation with pulse rates between 500 and 1499 Hz to be most effective in the treatment of chronic pain of peripheral nerve origin.

Results

Mean pain scores with the VRS were 3± 1.8 at >12 months compared to 8.6± 1.2 at baseline, a reduction of 65% ($p < 0.001$) (table 1). Median satisfaction with the Patient Global Impression of Change (PGIC) at >12 months was 7 out of 7, with most subjects reporting a 6 (better) or a 7 (a great deal better). Subjects reported a considerable improvement in mobility and quality of life. Nine out of 15 subjects were still taking pain medication at the time of the report. Only one subject in 15 reported a complication since being implanted with a permanent PNS system. The subject experienced erosion and required a single revision.

Table 1: Demographics and Pain Score

Age	Gender	VRS at Baseline	VRS at 12 months
55	Female	10	0
72	Male	8.5	3
77	Male	8	2
51	Male	7	0
68	Male	8	2
53	Male	7.5	5
73	Female	8	5
72	Female	10	6
67	Male	10	4.5
52	Female	10	4
69	Male	7	3
58	Female	8	1
56	Male	10	2
63	Female	7.5	3
65	Female	9	5

Conclusions

Our study showed that sub-threshold peripheral nerve stimulation at the posterior tibial nerve was successful for this series of patients suffering from chronic, debilitating pain in the foot due to peripheral neuropathy.

System Components

The Freedom® PNS System uses high-frequency electromagnetic coupling (HF-EMC) technology. The Freedom PNS System includes an implanted electrode array (with 4 or 8 contacts), a separate implanted receiver as well as an external transmitter assembly and wearable accessory. The Freedom PNS System is comprised of a two-component implant that the physician connects during the procedure (Fig. 1). The physician is also required to create a pocket.

Fig. 1: System Components

Freedom® PNS with HF-EMC Technology at the Posterior in Treating Pain Targets/Neuralgias: A Retrospective Study

Robert Moghim, MD[1] | [1]Colorado Pain Care

Background

Among adults, chronic pain is one of the most common and difficult-to-treat musculoskeletal diseases. It is also a major source of disability. Despite its side effects, the use of opioids for chronic pain has skyrocketed. Due to its increase of usage, there's also been a correlating increase of opioid misuse. Due to its risks and complications, surgery is usually the last resort in the management of chronic, refractory pain. With all of these, chronic pain remains to be a challenge, both in diagnosis and management, in the healthcare industry. For decades, peripheral nerve stimulation has been used in the treatment of chronic pain. With the advent of innovative devices that enable percutaneous lead implantation, and use of externally powered systems, peripheral nerve stimulation has progressed substantially.

Setting and Demographics

This retrospective review included a total of 57 patients (44 females and 13 males) who received PNS for the treatment of chronic pain in various sites with different durations of follow-up. The average age of patients was 66.6 ± 11 years) Target nerves included genicular nerves for treating chronic knee pain (N= 19), posterior tibial nerve ± sural nerve for treating ankle pain (N= 14), Superior cluneal nerves for treating chronic low back pain (N= 15), middle cluneal nerves for treating sacroiliac joint pain (N= 7), radial and ulnar nerves for treating hand pain (N=1) and right common peroneal nerve for treating foot pain (N=1).

Methods

The skin was marked over the needle entry location proximally and anesthetized. A PNS introducer needle was passed through the subcutaneous tissues toward the target nerve through a first incision.

The needle was advanced subcutaneously and subsequently the electrode array was inserted through the needle cannula and placed at the nerve. The steering stylet was removed and a separate receiver connected to the electrode array. A Receiver pocket was created using a second incision, and the electrode array was tunneled beneath the skin from the first incision to the receiver pocket. A knot was tied to permanently connect the separate receiver and electrode array. The distal portion of the neurostimulators, were coiled, sutured to itself while eliminating any sharp ends, and then the coil sutured to the fascia within the pockets to prevent migration. The pockets were then closed with subcutaneous, and subcuticular sutures and tegaderm was placed over the incision and the wound was closed.

Results

In the one-month follow-up group, mean pain score was reduced from 7.44±1.48 pre-procedure to 1.6±1.49, from 7.42±1.5 pre-procedure to 1.6±1.5 7.42 at 3 months, from 7.52±1.5 to 1.72±1.57 at 6 months, from 7.41±1.53 to 1.7±1.55 at 9 months, from 7.41±1.58 to 1.76±1.63 at 12 months, from 7.38±1.59 to 1.69±1.56 at 15 months and from 7.5±1.7 to 1.45±1.57 at 24 months. (fig. 1) The reduction in pain scores as reported by the patients was statistically significant at all durations of follow up (p≤ 0.001). Only 2 patients got an explant. There were no complications during or after the procedure aside from lead migration in 1 patient. Patients reported more than 70% improvement in pain at all follow ups.

Conclusions

Sub-threshold peripheral nerve stimulation with an externally powered system is a successful treatment option for chronic pain.

Fig. 1 Pain Scores

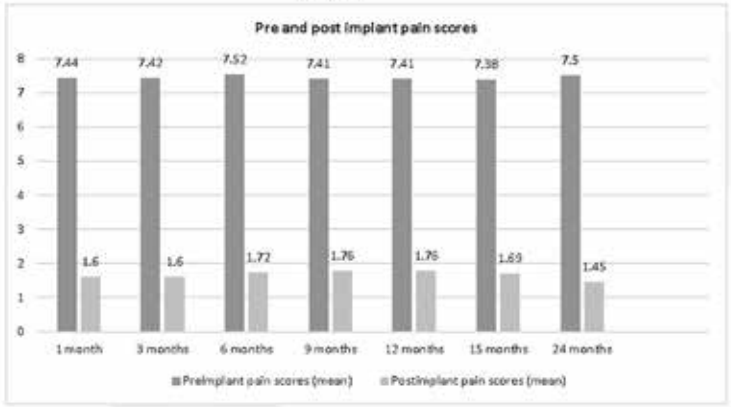
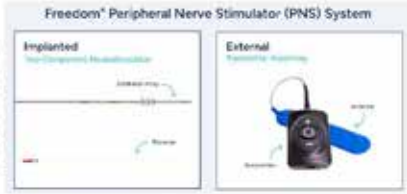


Fig. 2: System Components

System Components

The Freedom® PNS System uses high-frequency electromagnetic coupling (HF-EMC) technology. The Freedom PNS System includes an implanted electrode array (with 4 or 8 contacts), a separate implanted receiver as well as an external transmitter assembly and wearable accessory. The Freedom PNS System is comprised of a two-component implant that the physician connects during the procedure (Fig. 2). The physician is also required to create a pocket.



Freedom® PNS with HF-EMC Technology for the Treatment of Peripheral Neuropathic Pain: A Retrospective Study

Ellen Lin, MD[1], Jose Misael Garcia, MD[1], Sofia Sued MD[1] | [1]Advanced Spine and Pain Center

Background

Peripheral neuropathy is estimated to be prevalent in up to 12% of the population, increasing to 30% in older demographics. This makes peripheral neuropathy one of the most common neurological diseases in the United States. Current treatment of peripheral neuropathy consists primarily of pharmaceutical interventions. An alternative treatment modality that has emerged is peripheral nerve stimulation (PNS). PNS has received significant research attention in the last five years thanks to the development of PNS-specific technology that replaced prior SCS technology adapted for peripheral use.

Setting

63 consecutive patients underwent Peripheral Nerve Stimulation (PNS) therapy to treat chronic pain related or due to peripheral neuropathy from various peripheral nerve origins. Patients presented chronic pain symptoms originating from the shoulder, hip, knee, ankle, and groin. Our retrospective study aims to report the effect of PNS on the treatment of peripheral neuropathy.

Methods

Informed consent was obtained from all patients. Patients were taken to the operating room and appropriately positioned on the table. The implant site was cleaned with chlorhexidine and covered with sterile drapes. The electrode array was placed on the skin, with the distal electrode at the target nerve. The needle entry point and pathway were planned using palpation and fluoroscopy. The skin and deeper tissues were anesthetized using a local anesthetic. The initial introducer path was also infiltrated with a local anesthetic.

A first incision was made with an 11-blade scalpel, and the 13-gauge introducer needle was passed through the incision and advanced subcutaneously in the fascial plane to the target nerve under imaging guidance using small amounts of local anesthetic. 1 or 2 four-contact electrode array(s) with tines were inserted through the cannula(s) and advanced to the target nerve.

The steering stylet(s) were removed, and separate receiver(s) were connected to the electrode array(s). A receiver pocket was created using a second incision, and the neurostimulators were tunneled beneath the skin from the first incisions to the receiver pocket. A knot was tied to connect the separate receivers and electrode arrays permanently. The neurostimulators were coiled, and the coils were sutured to the fascia and secured within the pocket. The receiver pocket was closed in 3 layers of suturing.

Demographics

63 consecutive patients underwent PNS therapy to treat peripheral neuropathy and agreed to participate in this study. There were 30 males and 33 females (mean age: 75 years). Patients presented chronic pain symptoms originating from the shoulder, hip, knee, ankle, and groin. The PNS systems were implanted to stimulate the following nerves: suprascapular (n=21), cluneal (n=9), femoral/obturator (n=2), genicular (n=23), and sural/deep peroneal (n=8). At the long-term follow-up, 39 patients were lost for various reasons. Including explant (n=1), lost to follow-up (n=14), no permanent implant (n=15), not actively using PNS (n=4), different doctor (n=1), deceased (n=2), or opted for joint replacement (n=2). The remaining 24 patients completed the long-term follow-up.

Out of the 14 subjects lost to follow-up, 12/14 (86%) reported >50% pain relief at their last recorded visit. For the subjects that did not receive a permanent implant at the time of the study, 7/15 (47%) reported a successful trial with >50% pain relief but did not receive a permanent implant as of yet due to various reasons.

Results

The average NRS score of 63 patients before PNS was 7.24 (SD: 1.80). At 2-3 weeks post-implantation, the average NRS score decreased to 3.43 (SD: 2.38; p<0.001). 53 out of the 63 patients reported a reduction in NRS scores at the 2-3 week follow-up.

Twenty-four patients completed the long-term follow-up. The mean follow-up time was 763.13 days (SD: 428.42), and all patients had their systems permanently implanted for at least eight months (range: 255-1592 days). 19 out of the 24 patients experienced at least a 50% improvement in pain, with 13 patients reporting at least a 70% improvement. The average NRS score decreased to 3.92 (SD: 2.48; p<0.001). With regard to sleep quality, 18 patients reported their sleep to be "better" or "much better," while the remaining experienced no change. 19/24 patients reported at least 50% satisfaction. No complications were reported.

Conclusion

Sub-threshold peripheral nerve stimulation with an externally powered system is a successful treatment option for patients suffering from chronic, debilitating pain.

System Components

The Freedom® PNS System uses high-frequency electromagnetic coupling (HF-EMC) technology. The Freedom PNS System includes an implanted electrode array (with 4 or 8 contacts), a separate implanted receiver as well as an external transmitter assembly and wearable accessory. The Freedom PNS System is comprised of a two-component implant that the physician connects during the procedure (Fig. 1). The physician is also required to create a pocket.

Fig. 1: System Components

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The Curonix Clinical team participated in writing, data analysis and technical editing of the underlying study summarized in this poster and preparation of this poster.

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Freedom® PNS with HF-EMC Technology to Power an Implanted Neurostimulator with a Separate Receiver for the Treatment of Chronic Knee Pain

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Background

Chronic knee pain is highly prevalent in the United States, especially within the older population. The condition negatively impacts overall quality of life and can be a substantial financial burden. Current conservative and surgical interventions are not always effective in managing chronic knee pain. Peripheral nerve stimulation can be an alternative to current management strategies.

Setting

Data was retrospectively extracted from the electronic medical records of patients who received a permanent externally powered PNS System for treating chronic knee pain. Systems were implanted for at least one month. Outcomes of interest included pain levels and occurrences of adverse events.

Methods

Informed consent was obtained from all patients. After a positive trial, patients received a permanent system. Patients were taken to the operating room and appropriately positioned on the table. The implant site was cleaned and covered with sterile drapes. The electrode array was placed on the skin, with the distal electrode at the target nerve. The needle entry point and pathway were planned using palpation and fluoroscopy. The skin and deeper tissues were anesthetized using a local anesthetic. The initial introducer path was also infiltrated with a local anesthetic.

A first small incision was made with an 11-blade scalpel, and the 13-gauge introducer needle was passed through the incision and advanced subcutaneously in the fascial plane to the target nerve under imaging guidance using small amounts of local anesthetic. A four-contact electrode array with tines was inserted through the cannula(s) and advanced to the target nerve. Using the same technique, one patient received a secondary electrode array at a different nerve target.

The steering stylet(s) were removed, and separate receiver(s) were connected to the electrode array(s). A receiver pocket was created using a second incision, and the neurostimulators were tunneled beneath the skin from the first incisions to the receiver pocket. A knot was tied to connect the separate receiver(s) and electrode array(s) permanently. The neurostimulators were coiled, and the coils were sutured to the fascia and secured within the pocket. The receiver pockets were closed in 2-3 layers of suturing.

Demographics

Data was collected for seven subjects. All subjects were diagnosed with CRPS type 2 and infrapatellar saphenous neuralgia, or osteoarthritis causing chronic knee pain. Three out of 7 subjects presented with chronic knee pain after TKA. Four subjects were not considered for TKA due to medical restrictions. Six subjects (86%) received one neurostimulator with one subject (14%) receiving two.

The mean age was 74±7.8 years; 5 subjects (71%) were females, and 2 (29%) were males.

Results

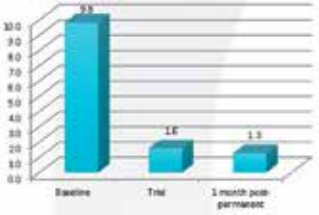
Primary Outcome Responder Rate

At the end of the trial visit, all 7 (100%) subjects reported more than 50% pain relief, with mean pain scores reducing from 9.8 ± 0.3 to 1.6 ± 1.5 (84%; p<0.001).

Permanent Implant Follow Up

Seven patients completed a one-month post-permanent implant follow-up. All patients had their PNS systems permanently implanted for one month. All subjects experienced at least a 50% improvement in pain. The average VRS score decreased to 1.3 ± 0.8 (87%; p<0.001) (Fig.1). No complications were reported.

Fig. 1: Mean Pain Scores



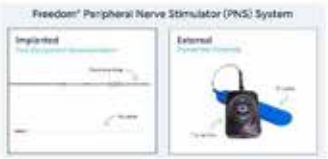
Conclusions

Peripheral nerve stimulation using an externally powered PNS System is an effective and safe therapy for treating chronic knee pain as a result of CRPS, neuralgia and osteoarthritis before or after TKA.

System Components

The Freedom® PNS System uses high-frequency electromagnetic coupling (HF-EMC) technology. The Freedom PNS System includes an implanted electrode array (with 4 or 8 contacts), a separate implanted receiver as well as an external transmitter assembly and wearable accessory. The Freedom PNS System is comprised of a two-component implant that the physician connects during the procedure (Fig. 2). The physician is also required to create a pocket.

Fig. 2: System Components




UTRGV
School of Medicine
Generator Displacement and Battery Depletion
in Postpartum Spinal Cord Stimulator Patient
Changho Yi, MD, Suanand Kallumadanda MD, Justin Faye MD*
UTRGV McAllen Family Medicine Residency, *South Texas Health System Clinics Pain Medicine
SOUTH TEXAS HEALTH SYSTEM
McALLEN
Background
Spinal cord stimulator for chronic pain management, reduces medication dependency.
Pregnancy's impact on stimulator use needs investigation for maternal and fetal safety.
Spinal cord stimulator complications can be presented during and after pregnancy.
Presenting a unique case of postpartum patient with generator displacement and battery depletion.
Case Presentation
33-year-old female, 2 months postpartum, worsening back pain.
History: Spinal cord stimulator implanted 5 years ago for failed back syndrome.
During pregnancy:
Significant weight fluctuations.
Successful vaginal delivery.
Post-pregnancy: Charging failure, pain at battery site.
Imaging showed no lead or generator positioning issues.
Comprehensive assessment: Battery anchor loss and subcutaneous tissue loosening.
Battery replacement and generator repositioning.
Six-week follow-up: Significant pain relief (0-2 on pain scale).
Conclusion
For optimal stimulator function during pregnancy, seek preconception counseling and monitor the device during pregnancy
The UTRGV IRB has determined this case report as "not research"
Contact address: changho.yi@utrgv.edu
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas · April 4–6, 2024
Discussion
Lack of definitive evidence on spinal cord stimulator safety during pregnancy.
Recent data: Pregnancy not significantly increasing risk to mother or fetus.
Approximately 70% of patients continue stimulation during pregnancy.
Pregnancy-related body changes can lead to generator displacement and battery depletion.
Recommendations: Preconception counseling for potential risks and regular generator monitoring if stimulation continues during pregnancy.
References

Genicular Nerve Cryoneurolysis for Knee Osteoarthritis Pain

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OBJECTIVE

To provide analgesia after a scheduled total knee arthroplasty (TKA) by targeting the deep genicular nerve via fluoroscopically guided cryoneurolysis

CONCLUSIONS

1. Cryoneurolysis is a steroid-free, non-opioid option for pain management after TKA that preserves tissue compared with thermal ablation techniques
2. In a case report of a patient with severe tricompartmental osteoarthritis, cryoneurolysis of the deep genicular nerve enabled rapid recovery after TKA, with no opioid use beyond the first week and prompt return to physical activities

INTRODUCTION

- Patients with knee osteoarthritis may undergo TKA, and postsurgical pain often necessitates the use of opioids[1]
- Radiofrequency ablation (RFA) of the genicular nerve prior to TKA has been used to reduce postoperative opioid usage, but this can lead to tissue destruction[2,3]
- Cryoneurolysis is an alternative to RFA that uses cold temperatures to cause Wallerian degeneration of the targeted nerve, allowing for nerve regrowth (Figure 1)[4]
- Pilot studies have indicated that preoperative cryoneurolysis of the genicular nerve administered using anatomic landmarks can reduce pain and opioid use after TKA[5]

Figure 1. Schematic demonstrating cryoneurolysis lesion formations using a handheld cryoneurolysis system.

METHODS

CRYONEUROLYSIS TECHNIQUE

- Description and images of the cryoneurolysis technique are shown in Figures 2 and 3

Figure 2. Overview of the cryoneurolysis technique targeting the deep genicular nerves.

1. Cryoneurolysis of the 3 deep genicular nerves was performed under fluoroscopic guidance on a free-standing ambulatory surgical center 12 days prior to TKA
2. Superficial areas above the nerves were anesthetized using local anesthetic, and skin wheals were raised under fluoroscopic guidance for placement of introducer needles
   - Skin wheals were raised just above the medial and lateral fascial condyles along the medial and lateral borders of the distal femur
   - Another skin wheal was raised just below the proximal tibial bony ridge along the medial border of the tibia
3. Introducer needles were advanced through the skin wheals under fluoroscopic guidance until bone was contacted, and correct tactile lateral view confirmed that the needle tip was mid-shaft or both the femur and tibia
4. Following needle placement and aspiration, a mixture of 4 mL of 0.25% bupivacaine and 4 mL of 1.06% lidocaine was injected for local anesthesia
5. Cryoneurolysis was performed sequentially for 1 minute and 45 seconds at all 3 genicular nerve sites

TKA, total knee arthroplasty

Figure 3. Application of cryoneurolysis treatment using a handheld device (A) guided by fluoroscopic identification of the deep genicular nerves (B).

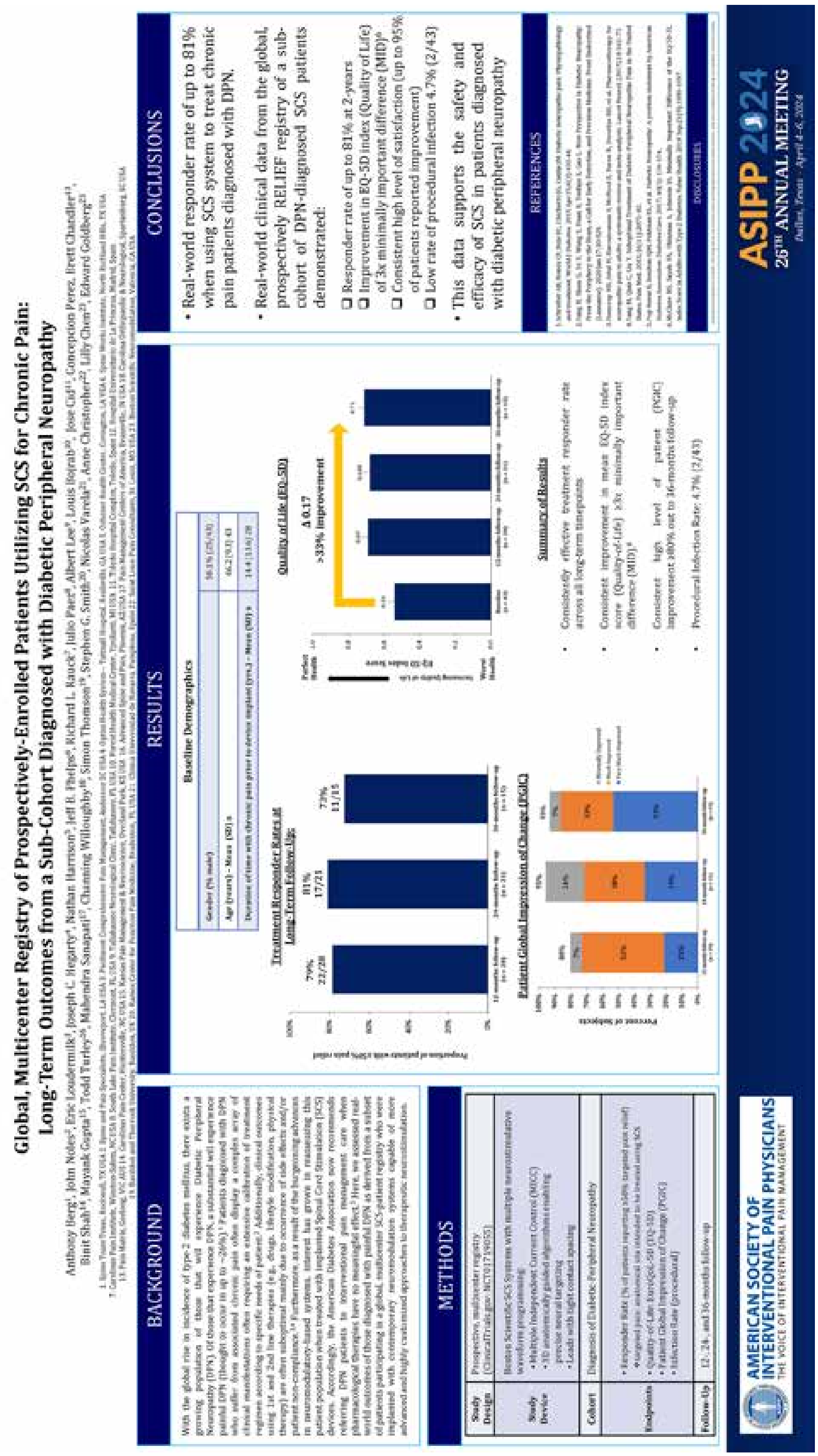
RESULTS

CASE PRESENTATION

- A 77-year-old male presented with severe bone-on-bone pain (rated as 10/10) in the right knee and was assistive-device dependent
- Magnetic resonance imaging revealed severe tricompartmental osteoarthritis and end-stage osteoarthritis in the medial compartment
  - Depression of the medial tibial plateau suggested old fracture, chronic remodeling due to osteoarthritis, or insufficiency fracture
  - Other observations included extensive complex tear of the medial meniscus, possible nondisplaced lateral meniscal tear, hypertensive signals in the anterior cruciate ligament suggestive of mucoid degeneration, and large joint effusion with synovitis
- Prior treatment history included previous joint operation in the patient's twenties and injections with viscosupplementation since 2016
  - Viscosupplementation provided the initial benefit of >50% pain control, pain had regressed over 6 years of repeat treatment
  - Viscosupplementation (Monovisc) 3 weeks later by a genicular nerve block initially resulted in "virtually no pain," but subsequent genicular nerve block resulted in an only 25% improvement in pain
- An orthopedic surgeon recommended TKA for bone-on-bone presentation; preoperative cryoneurolysis was used to provide postoperative analgesia

FOLLOW-UP AFTER CRYONEUROLYSIS PROCEDURE

- After cryoneurolysis and before TKA, the patient rated his pain as 8 to 9 (of 10) and reported consistent use of over-the-counter pain medication for analgesia
- Immediately following TKA, he took 1 opioid pill (hydrocodone 5 mg/acetaminophen 325 mg) per day for 1 week to aid with pain during bedtime and required no opioids thereafter
- The patient reported using a walker for 2 days after TKA and was walking unassisted by the ~1-month follow-up, with a knee range of motion of 5 to 95 degrees
- He was able to drive within 1 week and was driving long distances by ~7 weeks after the TKA
- At the ~3-month follow-up, knee range of motion was 5 to 110 degrees
- The patient reported golfing daily by ~9 weeks after TKA


Global, Multicenter Registry of Prospectively-Enrolled Patients Utilizing SCS for Chronic Pain:
Long-Term Outcomes from a Sub-Cohort Diagnosed with Diabetic Peripheral Neuropathy
BACKGROUND
METHODS
Study Design
Prospective, multicenter registry (ClinicalTrials.gov: NCT01719055)
Study Device
Cohort
Diagnosis of Diabetic Peripheral Neuropathy
Endpoints
Follow-Up
12-, 24-, and 36-months follow-up
RESULTS
Baseline Demographics
Treatment Responder Rates at Long-Term Follow-Up:
79% 22/28
81% 17/21
73% 11/15
Patient Global Impression of Change (PGIC)
Quality of Life (EQ-5D)
Δ 0.17
>33% improvement
Summary of Results
Consistently effective treatment responder rate across all long-term timepoints
Consistent improvement in mean EQ-5D index score (Quality-of-Life) ≥3x minimally important difference (MID)
Consistent high level of patient (PGIC) improvement ≥80% out to 36-months follow-up
Procedural Infection Rate: 4.7% (2/43)
CONCLUSIONS
Real-world responder rate of up to 81% when using SCS system to treat chronic pain patients diagnosed with DPN.
Real-world clinical data from the global, prospectively RELIEF registry of a sub-cohort of DPN-diagnosed SCS patients demonstrated:
Responder rate of up to 81% at 2-years
Improvement in EQ-5D index (Quality of Life) of 3x minimally important difference (MID)
Consistent high level of satisfaction (up to 95% of patients reported improvement)
Low rate of procedural infection 4.7% (2/43)
This data supports the safety and efficacy of SCS in patients diagnosed with diabetic peripheral neuropathy
REFERENCES
DISCLOSURES
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas · April 4-6, 2024

Iatrogenic Cushing Syndrome Secondary to Arthritis Supplement Ingestion: A Case Report

UTHealth Houston McGovern Medical School

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INTRODUCTION:

- Cushing Syndrome describes a set of clinical manifestations that result from prolonged exposure to excess glucocorticoids.
- Characteristic features include moon facies, dorsocervical fat pad enlargement, truncal obesity, and easy bruising (Figure 1).[1]
- The most common etiology is exogenous hypercortisolism secondary to prolonged use of prescription corticosteroids for the management of autoimmune or inflammatory disorders.[1]
- We present a case of a patient with chronic back pain who developed Iatrogenic Cushing Syndrome following use of Artri King, an arthritis supplement produced in Mexico.

CASE PRESENTATION:

- A 36-year-old Hispanic male presented with complaints of facial swelling and 25-pound weight gain over the previous three months.
- He reported a yearlong history of low back pain for which he began taking Artri King supplements five months prior to presentation. Since then, he had developed progressive bilateral hip pain with groin radiation, resulting in impaired ambulation.
- On examination, he displayed several Cushingoid features including proximal muscle weakness, moon facies, enlargement of the dorsocervical fat pad, and abdominal striae.
- Initial labs showed a hemoglobin A1c of 7.3%. Hip X-rays revealed bilateral femoral head avascular necrosis. MRI spine showed endplate osteophytes at multiple levels and epidural lipomatosis in the lower lumbar spine.
- Due to concern for secondary adrenal insufficiency, he began stress doses of hydrocortisone and then transitioned to physiologic dosing.
- Hydrocortisone was discontinued when low dose ACTH stimulation testing achieved a normal response (peak cortisol greater than 18 mcg/dL).
- He continued outpatient physical therapy with plans to follow up with orthopedic surgery for bilateral hip arthroplasty following sufficient weigh reduction.

Ingestion of Arti King, an arthritis supplement containing unknown amounts of dexamethasone, can result in Iatrogenic Cushing Syndrome. This case highlights the importance of obtaining a thorough medical history inclusive of complementary and alternative medications.

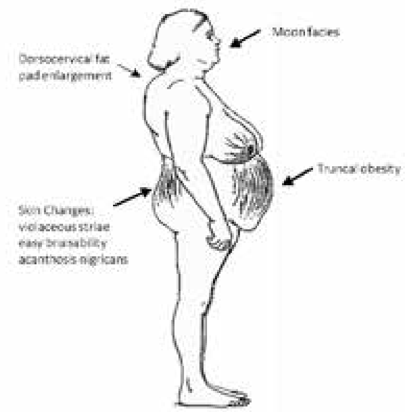

Figure 1. Characteristic features of Cushing Syndrome

DISCUSSION:

- Iatrogenic Cushing Syndrome has been reported secondary to ingestion of Arti King, a supplement marketed for joint pain.[2,3]
- The FDA issued a public warning in April 2022 regarding hidden drug ingredients including dexamethasone and diclofenac in unknown quantities.
- Prolonged corticosteroid exposure causes suppression of the hypothalamic-pituitary-adrenal axis resulting in secondary adrenal insufficiency, which necessitates glucocorticoid replacement.
- The above patient's care was complicated by several complications seen in Cushing Syndrome, including development of diabetes, avascular necrosis of the bilateral femoral heads, and spinal epidural lipomatosis characterized by excess fat in the epidural space.[4]

References:
1. Savas M, Mehta S, Agrawal N, Van Rossum EFC, Feelders RA. Approach to the Patient: Diagnosis of Cushing Syndrome. J Clin Endocrinol Metab. 2022;107(11):3162. doi:10.1210/CLINEM/DGAC492
2. Dunn C, Amaya J, Green P. A Case of Iatrogenic Cushing's Syndrome following Use of an Over-the-Counter Arthritis Supplement. Case Rep Endocrinol. 2023;2023. doi:10.1155/2023/4769258
3. Berg EA, Dan L, Yu R, Hurtado C, Berg E. Artri King induced Hypothalamic-pituitary-adrenal Axis Disruption: A Report of 3 Cases. Published online 2023. doi:10.1210/jcemcr/luad154
4. Motta F, Timilsina S, Gershwin ME, Selmi C. Steroid-induced osteonecrosis. J Transl Autoimmun. 2022;5:100168. doi:10.1016/j.jtauto.2022.100168

Improving Patient Experience Through Video Education

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Introduction

Modern medicine has allowed for amazing treatment results, often by cutting-edge minimally invasive surgeries and procedures. Unfortunately, these are not without risk of complication. This can lead to patient displeasure and open the physician or hospital to a lawsuit. The patient may complain that the physician did not spend enough time detailing every possible complication or what side effects to expect from a procedure, the patient may not understand the procedure and all that it entails, or simply the patient may not remember a portion of the procedural consent.

Case Presentation

A literature review has shown that multi-media enhanced procedural consent improves patient satisfaction and increases willingness to undergo a procedure. Additionally, video information and consents yield improved understanding and reduced anxiety. The use of video-based consent with procedure explanations as a supplement to traditional physician-performed consents was studied.

OBJECTIVE

A literature review of prior studies that covered information on using video consent and teaching for procedures was performed. This was summarized in our poster as well as information taken from a small study performed in our clinic that evaluated how a video teaching and consent improved patient experience

METHODS

Literature review of prior studies and a 10-question pre- and post- video survey was performed.

RESULTS

In a 200-patient study on anxiety with coronary angiography, patients were less anxious after watching video consent and had higher satisfaction[1]. Anxiety reduction was greater for those with higher baseline anxiety[1]. Another study of 102 patients having Moh's surgery, showed increased patient knowledge, satisfaction, and understanding following a video consent[2]. A reduction of face-to-face clinician time was also noted. 80 patients undergoing interventional radiology procedures reported improved procedure comprehension in a quality improvement study[3]. 20 patients who were undergoing spinal surgery showed that 80% of them reported that the video consent tool helped to address their preoperative concerns[4].
In a reproductive medicine study, 3097 patients were surveyed after they viewed a multimedia platform before IVF and OI-IUI[5]. Of these, 88% agreed or strongly agreed it better prepared them to consent, 77% noted increased comfort in pursuing treatment, and 83% reported increased satisfaction with their care[5].
In our clinic-based survey, 60% of patients were more likely to proceed with the procedure after viewing a video consent. 60% of respondents felt less anxious after watching the consent video. All patients found the video reinforced expectations for after the procedure and 100% agreed or strongly agreed that the video informed them of the risks and benefits and adequately explained the procedure.

CONCLUSION

Video consent has been shown in multiple studies to improve patient education, anxiety, and the overall patient experience before a procedure. While more studies are needed to assess the best methods and lengths of video consents and how much information is needed, it is a reasonable step forward in helping a patient to navigate a procedure and the informed consent process.

REFERENCES

1. Philippe F, Meney M, Larrazet F, et al. Intérêt d'un film d'informations pour les patients avant coronarographie [Effects of video information in patients undergoing coronary angiography]. Arch Mal Coeur Vaiss. 2006;99(2):95-101.
2. Miao Y, Venning VL, Mallitt KA, et al. A randomized controlled trial comparing video-assisted informed consent with standard consent for Mohs micrographic surgery. JAAD Int. 2020;1(1):13-20. Published 2020 May 11. doi:10.1016/j.jdin.2020.03.005
3. Martin JG, Shekhani H, Becker L, et al. Quality Improvement Project to Increase Patients' Knowledge About Their Impending Procedures During the Consent Process. J Am Coll Radiol. 2018;15(4):652-654. doi:10.1016/j.jacr.2017.10.033
4. Mawhinney G, Thakar C, Williamson V, Rothenfluh DA, Reynolds J. Oxford Video Informed Consent Tool (OxVIC): a pilot study of informed video consent in spinal surgery and preoperative patient satisfaction. BMJ Open. 2019;9(7):e027712. Published 2019 Jul 24. doi:10.1136/bmjopen-2018-027712
5. Madeira JL, Rehbein J, Christianson MS, et al. Using the EngagedMD multimedia platform to improve informed consent for ovulation induction, intrauterine insemination, and in vitro fertilization. Fertil Steril. 2018;110(7):1338-1346. doi:10.1016/j.fertnstert.2018.08.045

Baylor College of Medicine

H. BEN TAUB DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION

Innovative Approach to Pain Management: S2-S3 Dorsal Root Ganglion Stimulation Trial in an Adult Patient with Atypical Peyronie's Disease

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ABSTRACT

Background: Peyronie's disease, affecting 3.2% to 7.1% of the US population, causes penile fibrous scar tissue, resulting in curvature, pain, and erectile dysfunction. Treatment options include oral medications, injectables, traction devices, and surgery, with Dorsal Root Ganglion (DRG) stimulation showing promise.
Case Presentation: Presented is a case of a 25 year old with persistent groin pain stemming from penile trauma. MRI showed no pathology, and various treatments provided temporary relief until a recent flare-up. A left pudendal nerve block offered partial relief, prompting bilateral S2-S3 DRG stimulation.
Results: Follow-up showed 50-70% pain relief, discontinuation of NSAIDs and opiates, improved mood, and increased daily activity.
Conclusions: This case highlights DRG stimulation's potential in managing chronic pelvic pain from Peyronie's disease, suggesting further research to elucidate its role in comprehensive management.

CONTACT

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INTRODUCTION

- Peyronie's disease is characterized by the development of fibrous scar tissue within the penis, leading to symptoms such as curvature, pain, and erectile dysfunction. Individuals with Peyronie's disease (which is estimated to be between 3.2% and 7.1% of the US population) may also endure emotional distress, significantly impacting their overall quality of life (1). Fortunately, a range of treatment options exists to address Peyronie's disease and its consequences, including oral medications, injectable therapies, traction devices, and surgery. One promising therapeutic avenue involves DRG (figure 1).

OBJECTIVE

To explore DRG stimulation's role in treating chronic pelvic pain secondary to atypical Peyronie's disease

CASE PRESENTATION

A 25-year-old with a history of atypical Peyronie's disease, presents with persistent groin pain of two years. The pain, stemming from penile trauma 3-4 years ago, radiates to the base and ventral shaft of the penis, anal region, and bilateral gluteal regions. Rated 7/10 on the VAS. Alleviating medications include duloxetine and various non-steroidal anti-inflammatory drugs. MRI of the lumbar spine and pelvis showed no pathology. Subsequently, the patient started gabapentin and pelvic floor therapy, providing good pain relief until a recent flare-up. The decision was made to discontinue gabapentin, opting for a left pudendal nerve block with 70-80% pain relief. Subsequently, a decision was made to pursue DRG stimulation at the bilateral S2-S3 level.

RESULTS

The study, conducted at a tertiary care academic medical center, obtained informed consent. The patient underwent a left pudendal nerve block and subsequently chose DRG stimulation at the bilateral S2-S3 level. Follow-up revealed 50-70% pain relief, discontinued NSAIDs and opiates, improved mood, and increased participation in daily activities.

Patient later had DRG stimulation implantation and is pending follow-up regarding this procedure. Most recent lumbosacral imaging showed appropriate lead placement

CONCLUSIONS & DISCUSSION

The presented case underscores the potential of DRGstimulation as a promising therapeutic approach in managing chronic pelvic pain secondary to atypical Peyronie's disease. The patient's journey, marked by persistent groin pain and subsequent treatments, portrays the challenges faced by individuals with this condition. The reported improvements in pain relief, discontinuation of NSAIDs and opiates, enhanced cognition, and increased engagement in daily activities provide encouraging insights into the potential efficacy of DRG stimulation. Further research and exploration of DRG stimulation in a larger cohort could enhance our understanding and establish its place in the comprehensive management of this challenging condition.

REFERENCES

1. Al-Thakafi S, Al-Hathal N. Peyronie's disease: a literature review on epidemiology, genetics, pathophysiology, diagnosis and work-up. Transl Androl Urol. 2016 Jun;5(3):280-9

Keck School of Medicine of USC

Intrathecal Baclofen Pump in Pregnancy Case Report, Literature Review, and Management Considerations

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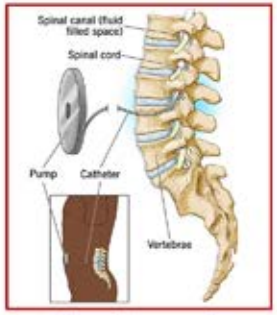
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT

Background

- Baclofen: $GABA_B$ receptor agonist used to treat spasticity
- Severe spasticity may be treated by baclofen via intrathecal pump
- Currently, only 13 reported cases on the use of intrathecal baclofen during pregnancy and childbirth
- We describe a female patient with a history of lower extremity idiopathic spasticity controlled with intrathecal baclofen pump who became pregnant at age 38 and delivered a healthy infant
- We describe our case alongside existing literature on intrathecal baclofen during pregnancy and propose management considerations



Intrathecal baclofen pump
Cleveland Clinic (© 2021)

Case Description

- 38-year-old female; no spasticity at birth and no history of cerebral palsy
- At age 9, developed idiopathic abnormal gait due to spasticity of the lower extremities
- Never had motor function problems with her upper extremities
- Underwent intrathecal (ITB) pump implantation in adolescence
- Was stable on an ITB dose of 92-93 micrograms (mcg)/day in preconception
- On pregnancy, ITB dose decreased to 83 mcg/day to minimize fetal exposure
- In prepartum period, required multiple increases in ITB dose due to severe, uncontrolled spasticity, as documented in Table 1
- Symptoms well-controlled at maximum dose (Nov 7)
- No acute illness or complications prepartum
- C-section delivery in January 2023 under general anesthesia
- No neonatal complications; motor function was intact and no evidence of baclofen toxicity
- In April 2023, patient felt that her muscles were excessively loose
- ITB dose subsequently reduced (Table 1)

Date	Presenting Dose (mcg/day)	New Dose (mcg/day)	% Increase
6 Oct 2022	83	88	6%
11 Oct 2022	88	96.2	9.3%
18 Oct 2022	96.2	105.8	10%
25 Oct 2022	105.8	116.4	10%
7 Nov 2022	116.4	122.1	5%
27 Apr 2023 (postpartum)	122.1	110	-10%

Table 1: Timeline of our patient's ITB dose increases

Literature Review

- There is limited existing literature reporting on the use of ITB during pregnancy
- Our review of the literature (https://pubmed.ncbi.nlm.nih.gov) uncovered 9 articles which report a total of 13 cases of ITB pumps in pregnancy (Table 2)
- One article failed to specify intrathecal baclofen dose and pregnancy outcome and was not included
- A second article discussed intrathecal baclofen administered by bolus via external catheter, not implantable pump, and was not included

Selected Data from Literature Review

Case	Maternal age at delivery	ITB dose upon pregnancy (mcg/day)	ITB at delivery (mcg/day)	ITB dose increased in pregnancy?	Neonatal complications
1	30	260	440	Yes	None reported
2	30	200	200	No	None reported
3	34	213	640	Yes	Polyhydramnios
4	27	200	200	No	None reported
5a	21	200	200	No	Monitoring for suspected sepsis due to GBS+, jaundice
5b	23	400	430	Yes	Tight nuchal and body cord ×1, O2 per mask, naloxone IV, prematurity, jaundice
6	35	785	795	Yes	Oxygen with nasal continuous positive airway pressure ventilation (NCPAP), prematurity
7	18	375	440	Yes	None reported
8	38	201.6	201.6	No	None reported
9	23	150	500	Yes	None reported
10a	37	140	140	No	None reported
10b	38	140	140	No	None reported
11	29	1000	1400	Yes	None reported
12	38	83	122.1	Yes	None reported

Table 2: Our review of the literature uncovered 9 articles which report a total of 13 cases of ITB pumps in pregnancy.

Conclusions

- Intrathecal baclofen therapy in pregnancy likely poses a low risk of infant teratogenicity and seizures
- Existing literature suggests that the breast milk of mothers on intrathecal baclofen therapy contains baclofen levels subtoxic to infants
- Patients may require dose increases of ITB during pregnancy to maintain therapeutic effect

ASIPP 2024
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THE UNIVERSITY OF TEXAS
MD Anderson Cancer Center
Making Cancer History®
Intrathecal Pump for Malignancy-related Groin and Thigh Pain in an Elderly Male: A Case Study
Ashlyn Brown MD MBA MS[1], Peter Vu MD[2], Sanjeet Narang MD[3], Matthew Chung MD[4]
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Baylor College of Medicine
H. BEN TAUB DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION
UTHealth
HIGHLIGHTS
IT pumps: Effective for severe cancer pain management
Smith et al. study: Demonstrated superior analgesia, fewer opioid-related side effects
WHO guidelines: Recommend considering epidural or IT infusion for refractory cancer pain
Case study: 81-year-old male with metastatic pelvic cancer and unyielding pain
Intervention: Ganglion impar neurolysis provided insufficient and temporizing relief
IT trial and subsequent implant provided significantly greater pain reduction
Discontinuation of all pain medications, including methadone and morphine IR
Improved quality of life: Enhanced cognitive clarity, mood, sleep, and functionality
Disease progression: Adjustments made in pump settings to manage increasing pain
Transition to home hospice care: Well-controlled pain maintained with coordinated pump refills and monitoring
There are no financial or other relationships to disclose.
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BACKGROUND
The use of intrathecal drug delivery (ITDD) presents a promising approach for managing severe, intractable pain in oncologic patients, offering superior analgesia, reduced opioid-related side effects, and an extended life expectancy, as demonstrated by Smith et al (1).
These positive outcomes align with recommendations for considering epidural or intrathecal infusion in refractory cancer pain cases, according to WHO guidelines (2).
OBJECTIVE
Our case study demonstrates the efficacy of ITDD in managing unyielding pelvic pain in an 81-year-old male with metastatic pelvic cancer, showcasing a significant reduction in pain levels and an improved quality of life following ganglion impar neurolysis and IT drug implantation.
Figure 1: Lateral fluoroscopic view with tip of catheter demonstrated at L5/S1
CASE PRESENTATION
81-year-old male with a history of prostate cancer and pelvic sarcoma initially presented with rectal discomfort, leading to gastrointestinal investigations and the discovery of a pelvic sarcoma causing organ compression.
A CT biopsy revealed a 10.5 x 9 cm mass, identified as a high-grade sarcomatoid/spindle cell neoplasm, contributing to the pelvic sarcoma diagnosis. Despite a previous diverting colostomy, he experienced persistent bilateral right greater than left groin and thigh pain, managing it initially with morphine and later with acetaminophen and muscle relaxants.
With minimal relief, interventions were considered.
INTERVENTION
Ganglion impar neurolysis provided insufficient and temporizing relief, reducing pain from 9/10 to 0/10; a PET scan demonstrated disease progression with a larger pelvic sarcoma.
An intrathecal injection trial with 1mL of hydromorphone PF 0.5mg/mL and 1mL of bupivacaine 0.5mg/mL led to decreased pain, resulting in pump implantation with same initial concentration as the trial from 8/10 to 2/10, allowing the patient to discontinue all pain medications, including methadone and MSIR.
In a retrograde approach, with initial entry at L2/3, catheter tip was placed intrathecally and guided to L5/S1
Subsequent MRI identified lumbar spine discogenic disease and new pulmonary nodules, indicating notable disease progression.
Figure 2: Fluoroscopic view of Intrathecal Pump Reservoir
Figure 3: Anterior-Posterior fluoroscopic view, depicting retrograde approach of intrathecal needle introducer, with accession at L2-3 interspace
RESPONSE TO TREATMENT
Following the IT trial, the patient experienced significant (>80%) pain improvement.
Following IT implant patient was able to have complete discontinuation of methadone and morphine IR.
This resulted in improved clarity of thought, a transition from brief to meaningful conversations, enhanced mood with reduced irritability, improved sleep, and increased functionality.
Within a month of implantation, he had a notable progression of the disease (~50% mass increase).
After considering his Patient Therapy Manager (PTM) usage, basal rate, and clinic monitored boluses he subsequently had a 30% increase in his basal rate alongside his PTMs that were available up to 6 times daily from the time of his original implantation
Given his progression of disease he proceeded into home with hospice, with his pain well controlled and coordinated home pump refills.
Figure 4: Lateral fluoroscopic view of contrast outlining anterior border of sacral-coccygeal region during ganglion impar neurolysis
DISCUSSION
The use of ITDD in oncologic pain management, as highlighted in studies like Ghaffoor et al., shows promise in mitigating pain associated with various malignancies through targeted drug delivery (3).
Hydromorphone and bupivacaine via IT pumps enable localized action, reducing systemic side effects (4).
Despite positive outcomes, challenges such as persistent discomfort and complications like rectal pain and constipation emphasize the need for meticulous monitoring and multidisciplinary collaboration, highlighting the ongoing necessity for careful consideration of individual patient factors and potential challenges in ITDD for comprehensive pain control (5–8).

Kyphoplasty and Thermoablation as Treatment of Spinal Leiomyosarcoma

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Background

Leiomyosarcoma (LMS) is a rare soft tissue malignancy accounting for less than 1% of all adult cancers. Osseous metastatic lesions to the spine are very rare and associated with a poorer prognosis. Treatment varies but generally consists of some combination of chemotherapy, radiation, and surgery. Percutaneous kyphoplasty has been used to treat symptomatic metastasis to the spine but has not been well-documented specifically with LMS.

Case Description

In 2021, a 61-year-old female with a history of metastatic LMS was diagnosed with back pain due to a L2 pathologic compression fracture. She underwent radiation therapy followed by kyphoplasty of L2 with improvement in pain. In 2023, she presented with a 6-week history of back pain radiating to the right anterior thigh. She had associated numbness in the right anterior thigh without other neurologic deficits. MRI demonstrated progression of L2 pathologic fracture with epidural extension of tumor markedly effacing the right lateral recess and impinging the L3 nerve root. Patient was evaluated by neurosurgery and advised to undergo corpectomy of L2 and T12 – L4 fusion.

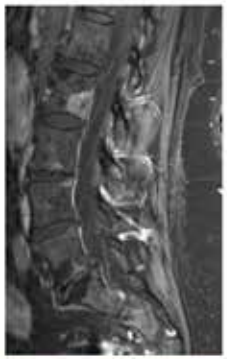

Image 1: MRI lumbar spine, T1 Dixon sagittal sequence, showing L2 osseous metastasis prior to kyphoplasty in 2021

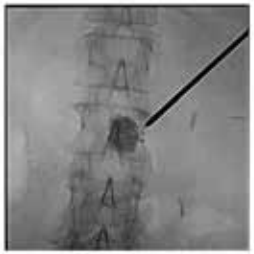

Image 2: IR guided kyphoplasty of L2 in 2021

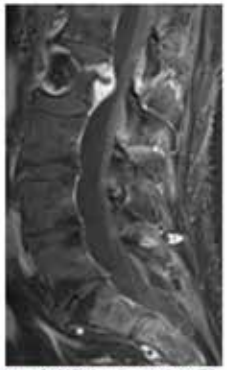

Image 3: MRI lumbar spine, T1 Dixon sagittal sequence, showing progression of L2 osseous metastasis in 2023

Results and Conclusion

This case presents a rare presentation of LMS metastasizing to the spine. Less than 100 cases of spinal LMS are documented in the literature. They can be challenging to treat due to size, resistance to current therapies and destructive nature of the tumor. Treatment is non-standardized and consists of various methods including stereotactic radiosurgery, total en bloc resection, total piecemeal resection, debulking procedures, chemotherapy, and radiation therapy. Kyphoplasty is rarely documented as part of the treatment regimen for spinal LMS. In this case, the patient's disease did progress 2 years after initial treatment, however kyphoplasty was effective in treating her pain.

Element of SINS	Score
Location	
Junctional (occiput-C2, C7-T2, T11-L1, L5-S1)	3
Mobile spine (C3-C6, L2-L4)	2
Semi-rigid (T3-T10)	1
Rigid (S2-S5)	0
Pain relief with recumbency and/or pain with movement/loading of the spine	
Yes	3
No, but occasional pain but not mechanical	1
Pain free lesion	0
Bone lesion	
Lytic	2
Mixed (lytic/blastic)	1
Blastic	0
Radiographic spinal alignment	
Subluxation/translation present	4
De novo deformity (kyphosis/scoliosis)	2
Normal alignment	0
Vertebral body collapse	
>50% collapse	3
<50% collapse	2
No collapse with >50% body involved	1
None of the above	0
Posterolateral involvement of the spinal elements (facet, pedicle or CV joint fracture or replacement with tumor)	
Bilateral	3
Unilateral	1
None of the above	0

Image 4: Spinal Instability Neoplastic Score [13]

In addition to kyphoplasty, thermoablation has been showed to have an additive benefit in preventing local tumor recurrence with various metastatic cancers, including sarcomas (7,12). The spinal instability neoplastic score (SINS) has been used in the literature to determine vertebral column stability in setting of neoplasm. This patients SINS score was 6, indicating stable vertebrae. Based on a decision algorithm developed by Meyer et. Al (6), patients with projected survival over 6 months and SINS score less than 6, kyphoplasty with thermoablation is the recommended treatment. This patient did not have thermoablation as part of her treatment algorithm.

LMS is a rare cancer than infrequently metastasizes to spinal column. In cases of spinal LMS, kyphoplasty may be a beneficial treatment for symptomatic compression fractures, however there also may be benefit in performing adjuvant radiofrequency ablation to reduce chance of local tumor recurrence. More studies are needed to evaluate the optimal treatment of pain and metastatic disease in this patient population.

LSU Health SHREVEPORT

Left Genicular Peripheral Nerve Stimulation Alleviates Pain in Refractory Post-Total Knee Replacement Pain

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Introduction

Total knee replacement surgery is the most common surgery performed to relieve pain caused by osteoarthritis or rheumatoid arthritis[1]. Post total knee replacement pain can be managed with opioid or non-opioid medications, peripheral nerve blocks, physical therapy, surgical intervention, or implanted peripheral nerve stimulators (PNS), which has been used for decades to offer pain relief for various chronic pain conditions such as refractory post-total knee replacement pain [2].

Objective

To utilize PNS to provide pain relief for refractory left knee post-total knee replacement pain.

Background

Our patient is a 61-year-old woman with a past medical history of chronic osteoarthritic knee pain status post left and right total knee replacement in 2016 and 2019, respectively, who presents with refractory post-total knee replacement pain. Following the surgeries, she was unable to walk, stand, or work without significant 10/10 pain. In 2021, she underwent left total knee revision for aseptic loosening of hardware followed by physical therapy for 4 months which did not aid in pain relief. With the persistence of her pain and no further orthopedic interventions offered, she was ultimately referred to pain management. Since the patient failed conservative medical management, a bilateral genicular nerve block was performed providing pain relief in the right but not left knee. A second left genicular nerve block was performed but failed to ameliorate her pain. Finally, a peripheral nerve stimulator (PNS) trial was performed targeting her left inferomedial genicular nerve resulting in >70% pain relief, and a permanent PNS was later implanted.

Methods

Intermittent fluoroscopy was used to guide a Quincke needle to the tibial flair midshaft where Coude' needle was then inserted. A PNS was then placed through the Coude' needle and advanced until the leads were flush with the tibial flair (Figure 1). Coude' needle was removed, and the stimulator remained in place. The leads were tested with a generator and patient response to stimulation was confirmed.

Results

One-week after placement of the permanent PNS, the patient reported significant relief of the left knee pain and the ability to walk, stand, extend, and flex her knee after many years of 10/10 pain that limited her daily activities and range of motion.

Figure 1. Intra-operative fluoroscopic image of the peripheral nerve stimulator secured along the midshaft of the left tibia, adjacent to the tibial flair.

Discussion and Conclusion

Following total knee replacement surgery, some patients may have chronic unrelenting pain refractory to conservative measures. Alternative treatment using PNS, has been shown to relieve pain. In accordance with recent studies, a significant improvement in immediate pain relief, quality of life, and satisfaction has been demonstrated when using PNS to treat neuropathic post-surgical pain[2,3]. Other data from a randomized double-blind, multicenter study demonstrated long term pain relief as a result of PNS implantation[4]. Neuromodulation is a safe and efficacious treatment option for post-surgical pain relief that can be used by physicians when medication and surgical interventions have failed.

Literature Cited

1. Li J, Ma Y, Xiao L. Postoperative Pain Management in Total Knee Arthroplasty. *Orthop Surg*. 2019;11(5):755-761. 2. Char S, Jin MY, Francio VT, et al. Implantable Peripheral Nerve Stimulation for Peripheral Neuropathic Pain: A Systematic Review of Prospective Studies. *Biomedicines*. 2022;10(10):2606. 3. Gilmore C, Ilfeld B, Rosenow J, et al. Percutaneous peripheral nerve stimulation for the treatment of chronic neuropathic postamputation pain: a multicenter, randomized, placebo-controlled trial. *Reg Anesth Pain Med*. 2019;44(6):637-645. 4. Deer T, Pope J, Benyamin R, et al. Prospective, Multicenter, Randomized, Double-Blinded, Partial Crossover Study to Assess the Safety and Efficacy of the Novel Neuromodulation System in the Treatment of Patients With Chronic Pain of Peripheral Nerve Origin. *Neuromodulation J Int Neuromodulation Soc*. 2016;19(1):91-100.

Low Dose Naltrexone for Medically and Surgically Refractive Post-traumatic Trigeminal Neuralgia: A Case Report

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BACKGROUND

-Trigeminal Neuralgia (TN) is a facial pain syndrome characterized by severe, sudden onset, unilateral, recurrent, stabbing episodes of pain.

-TM is a clinical diagnosis.

-Antiepileptic drugs are the mainstay of treatment.

-Nerve blocks, radiosurgery, rhizotomy, and decompression surgery can all be used in refractory cases.

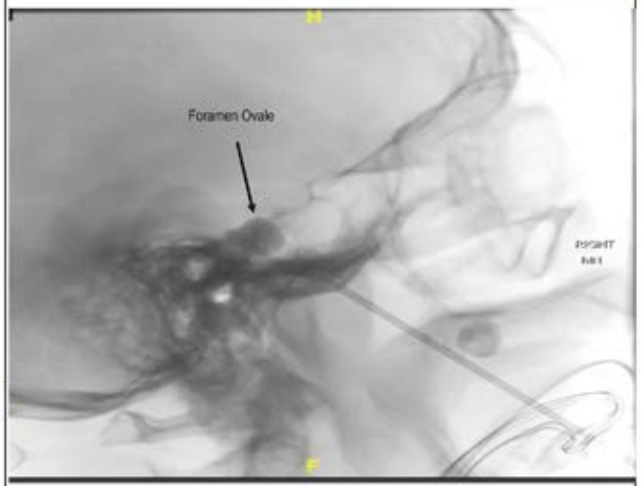
-Post-traumatic trigeminal neuralgia (PTTN) is a devastating condition with limited research and treatment options.

-Here we present a case of PTTN in a patient with facial trauma who successfully achieved pain relief from Low Dose Naltrexone (LDN) after being deemed treatment resistant with multiple interventional procedures and common oral pain medications.

CASE

-53-year-old female presented s/p ground level fall after tripping and hitting her left temple region on a rock.
-She sustained a superficial injury with no facial fractures noted on imaging.
-2 years after the incident she continued to experience severe, intermittent, sharp shooting/stabbing pain around her left cheekbone described as electric-like which worsened and led to headaches and muscle spasms. She had a significant impact on her quality of life. --She was seen by our Pain Management and Oral and Maxillofacial Surgery teams for continued pain control. She attempted lidocaine patches, tizanidine, and left inferior orbital nerve blocks which were all ineffective. She was not able to tolerate any tricyclic anti-depressants, gabapentinoids, or carbamazepine due to side effects.
-She finally underwent a left zygomaticotemporal and zygomaticofacial blocks which were successful and ultimately underwent a zygomaticofacial and zygomaticotemporal nerve ablation which were temporarily curative.
-Her pain eventually returned after 5 months, and she underwent a left V2 trigeminal nerve block under CT guidance and her pain resolved for 3 months but again reverted.
-She was started on LDN for the treatment of resistant PTTN and is currently 1 year pain free.

IMAGING



DISCUSSION

-TN is a painful syndrome and needs prompt treatment acutely.

-TN has an incidence of about 4 out of 100,000 and is typically higher in women as well as those over the age of 50.

-Pain with TN is often due to lesions associated with the peripheral branches of the trigeminal nerve.
-There are many treatment modalities available from medications to interventional treatments such as stereotactic radiosurgery, glycerol injections, microvascular decompression, surgical rhizotomy, or Balloon Compression Rhizotomy.
-Here we discussed a case of PTTN that was refractory to many commonly prescribed medications as well as interventional procedures but responded well to LDN long term.
-We advocate for the trial of LDN in treatment refractory cases of TN.

REFERENCES

-Ahuja, V. (2015). Management of refractory trigeminal neuralgia using extended duration pulsed radiofrequency application. *Pain Physician May 2015, 3:18(2.5)*.
-Lambru, G., Zakrzewska, J., & Matharu, M. (2021). Trigeminal neuralgia: A practical guide. *Practical Neurology, 21(5)*, 392–402.
-Park, S.-S., Lee, M.-K., Kim, J.-W., Jung, J.-Y., Kim, I.-S., & Chang, C.-G. (2008). Percutaneous balloon compression of trigeminal ganglion for the treatment of idiopathic trigeminal neuralgia : Experience in 50 patients. *Journal of Korean Neurosurgical Society, 43(4)*, 186.

Low Dose Naltrexone Therapy for Cancer Related Pain: A Retrospective Study

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Background

- Cancer related pain may occur due to direct or metastatic infiltration of cancer cells and/or develop secondary to cancer-related therapies including chemotherapy, radiation, and surgery.[1]
- Immunotherapy is increasingly being utilized to manage a variety of cancer types and is associated with the development of musculoskeletal pain.[2]
- Cancer related pain unresponsive to conservative management may require initiation of opioids.
- Low dose naltrexone may help manage chronic pain in cancer patients and lead to decreased opioid dependency.

Methods

- A retrospective chart review was conducted for 27 patients with history of cancer.
- For each patient, the primary cancer diagnosis and primary pain complaint were noted.
- The etiology of the primary pain complaint was categorized as being cancer related, therapy related, or due to other causes.
- The primary pain complaint was categorized as neuropathic or nociceptive based on pathophysiology.
- All patients had been started on the lowest dose of naltrexone (1.5 mg) followed by dose up titration in 1.5 mg increments up to a maximum of 4.5 mg daily until achievement of a stable dose, the dose at which pain relief was optimized with minimal adverse effects.
- The dose and clinical effectiveness of naltrexone was evaluated at the first clinic follow up following initiation of therapy.
- Patients reporting significant improvement in their pain symptoms were categorized as responders.
- Any reported side effects of naltrexone were noted.

Results

- Among the 27 included patients, the mean (SD) age was 63 (13) years, 78% were females, and the most frequently encountered cancer diagnosis was breast cancer (33%) (Table 1).
- There were 7 patients (26%) with cancer related pain, 7 patients (26%) with therapy related pain, and 13 patients (48%) with other diagnoses which included osteoarthritis, lumbar radiculopathy, fibromyalgia, and multiple sclerosis.
- There were 15 patients (56%) with neuropathic pain and 12 patients (44%) with nociceptive pain.
- The first follow up visit was conducted a mean (SD) of 12 (11) weeks following initiation of naltrexone therapy.
- At the first follow up visit, the most common dose of naltrexone was 3.0 mg daily (n=11) followed by 1.5 mg daily (n=9) and 4.5 mg daily (n=2). Five patients had discontinued naltrexone (2 due to unclear reasons, 2 due to inadequate pain relief, and 1 due to abdominal cramps).
- A total of three patients reported transient adverse effects (nausea, sleep disturbance, sedation).

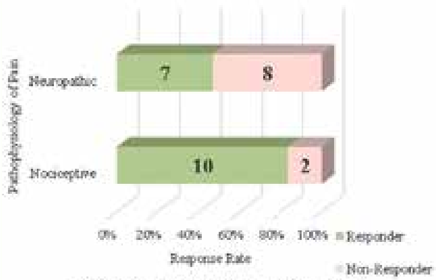

Figure 1. Response rate for cases of neuropathic (n=15) and nociceptive (n=12) pain

Table 1. Patient and Pain Characteristics (n=27)

Variables	
Age, years, mean (SD)	63 (13)
Sex, n (%)	
Male	6 (22%)
Female	21 (78%)
Race, n (%)	
Caucasian	20 (74%)
African American	6 (22%)
Asian	1 (4%)
Cancer Type, n (%)	
Breast	9 (33%)
Multiple	4 (15%)
Genitourinary	3 (11%)
Gastrointestinal	2 (7%)
Hematologic	2 (7%)
Central Nervous System	2 (7%)
Oropharyngeal	1 (4%)
Skin	1 (4%)
Lung	1 (4%)
Other	1 (4%)
Etiology of Pain, n (%)	
Cancer-Related	7 (26%)
Therapy Related	7 (26%)
Other	13 (48%)
Pathophysiology of Pain, n (%)	
Neuropathic	15 (56%)
Nociceptive	12 (44%)
Concomitant Medications, n (%)	
Gabapentinoid	18 (67%)
SNRI	8 (30%)
Muscle Relaxant	8 (30%)
Opioid	7 (26%)
Tramadol	5 (19%)
Interventional Procedures, n (%)	
Yes	17 (63%)
No	10 (37%)
Chronic Opioid Therapy, n (%)	
Yes	7 (26%)
No	20 (74%)

Results continued

- A positive response rate of 63% (17/27) was noted among the total sample of 27 patients.
- Among the 15 patients with neuropathic pain, a positive response rate of 47% (7/15) was noted and among the 12 patients with nociceptive pain, a positive response rate of 83% (10/12) was noted (Figure 1).

Discussion

- Up to 70% of cancers patients with active disease suffer from chronic pain resulting in reduced quality of life.
- There is a continued need to develop opioid sparing treatment strategies for this patient population.[3]
- Naltrexone in a daily dose ranging from 50-100 mg is FDA approved for medical assisted treatment of alcoholism or opioid use disorder. Low dose naltrexone (1-5 mg daily) has shown benefit in a variety of neuroinflammatory conditions including fibromyalgia, multiple sclerosis, complex regional pain syndrome, and post COVID-19 syndrome via modulation of opioid and anti-inflammatory signaling; however further information is needed regarding its use for cancer related pain.[4]
- Our results indicate low dose naltrexone may offer a safe, cost-effective treatment option to optimize management of neuropathic and nociceptive pain conditions in cancer patients.

References
1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

Lower Extremity CRPS Treated with Lumbar Radiofrequency Sympathectomy

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Background

Complex regional pain syndrome (CRPS) has many traditional, pharmacologic, topical, therapy-based, and interventional treatments used to decrease pain, often providing inadequate or nondurable pain relief. There have been limited case reports/series, and no definitive evidence at this juncture suggesting that lumbar radiofrequency sympathectomy may provide longer-term pain relief in these patients. Previously, lumbar sympathetic plexus neurolysis with ethanol or phenol has been reported to provide pain relief. Radiofrequency ablation may provide similar duration of pain relief, while avoiding complications that can arise from unpredictable ethanol or phenol injectate dispersion.

Objective

Assess the safety and efficacy of bilateral lumbar radiofrequency sympathectomy in a patient with CRPS type 1 of the bilateral lower extremities.

Case Presentation

39-year-old female with past medical history of depression and multiple sclerosis (MS) presented to the pain clinic with CRPS type 1 of the bilateral lower extremities, three months after developing symptoms secondary to sepsis complicated by multiple abscesses in the extremities. She initially developed otitis media that caused systemic infection due to her immunocompromised status with comorbid MS on biologic therapy. After failing to achieve adequate, durable pain relief with physical therapy, desensitization therapy, topical agents, anti-neuropathic medications, and low dose opioids, she concomitantly underwent lumbar sympathetic blockade. The initial injection provided 100% pain relief for 5-6 hours. Her second injection provided 80% relief for approximately 3 weeks. After offering both therapies, the patient elected to undergo bilateral lumbar radiofrequency sympathectomy prior to spinal cord stimulation trial.

Technique: This was performed by placing two 150mm tined radiofrequency needles anterolaterally on either side of the L2 and L3 vertebral bodies, approximately 6-8mm apart from one another. A bipolar lesion was created at 90 degrees Celsius for 120 seconds.

Results

The patient experienced no significant side effects. She reported 80% ongoing pain relief with improved function 2 months after the procedure at the time of this submission.

Conclusions

While more research is warranted, this case supports the idea that bilateral lumbar radiofrequency sympathectomy may be a safe, effective, and durable treatment option for patients with CRPS of the lower extremity.

References

1. Djuric V. (2014). Pulsed radiofrequency treatment of complex regional pain syndrome: a case series. Pain research & management, 19(4), 186–190.
2. Tinnirello , A., Ambrosini, L., & Barbieri, S. (2020). Lumbar Sympathetic Plexus Radiofrequency Ablation for Chronic Non-Cancer Pain: A Brief Review and Two Case Reports. American Society of Interventional Pain Physicians, 4(3), 85–91.
3. Zacharias, N. A., Karri, J., Garcia, C., Lachman, L. K., & Abd-Elsayed, A. (2021). Interventional Radiofrequency Treatment for the Sympathetic Nervous System: A Review Article. Pain and therapy, 10(1), 115–141.

Lumbar Medial Branch Blocks Performed in the Lateral Decubitus Position

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Background

- Lumbar medial branch block (MBB) is commonly performed as a diagnostic and therapeutic way to treat axial back pain due to facet pathology, and progression from MBB to radiofrequency ablation (RFA) is topic debated throughout the literature related to number of blocks and amount of pain relief.[1-3]
- Lumbar MBB is commonly performed under fluoroscopic guidance with the patient in the prone position. **Standard prone positioning for lumbar MBB and RFA may be prohibitive for patients with comorbidities such as obesity, respiratory compromise, weakness, or pain from previous injury or stroke.**
- Caudal epidural steroid injections can be performed in the lateral decubitus position to improve unilateral symptoms due to gravity-dependent effects on medication dispersion.[4-5]

Case Presentation

- 57 yo M w/ PMH of chronic low back pain, morbid obesity, wheelchair dependence, and multiple strokes with resultant left-sided spasticity who initially presented to clinic over 2 years prior for medication management of his back pain.
- After failing conservative therapy and multiple medications, bilateral L4-S1 medial branch blocks were chosen to treat his axial back pain.
- Given his obesity and left sided weakness, the patient was unable to position himself prone for the medial branch blocks. He was placed in the left lateral decubitus position.
- Patient tolerated the procedure and reported improvement in his symptoms at his 4-week follow up. Repeat procedure is upcoming, follow up ongoing.

References

1. Cohen SP, Bhaskar A, Bhatia A, et al. Consensus practice guidelines on interventions for lumbar facet joint pain from a multispecialty, international working group. *Reg Anesth Pain Med.* 2020;45(6):424-467. doi:10.1136/rapm-2019-101243
2. Provenzano DA, Leech JE, Kilgore JS, Sugden LA. Evaluation of lumbar medial branch blocks: how does the second block influence progression to radiofrequency ablation? *Reg Anesth Pain Med.* 2022;47(12):719-721. doi:10.1136/rapm-2022-103794
3. Du R, Xu G, Bai X, Li Z. Facet Joint Syndrome: Pathophysiology, Diagnosis, and Treatment. *J Pain Res.* 2022;15:3689-3710. doi:10.2147/JPR.S389602
4. Makki D, Nawabi DH, Francis R, Hamed AR, Hussein AA. Is the outcome of caudal epidural injections affected by patient positioning? *Spine.* 2010;35(15):E687-690. doi:10.1097/BRS.0b013e3181d41545
5. Altun I, Yuksel KZ. Impact of Position on Efficacy of Caudal Epidural Injection for Low Back Pain and Radicular Leg Pain Due to Central Spinal Stenosis and Lumbar Disc Hernia. J Korean Neurosurg Soc 2017;60(2):205–10.

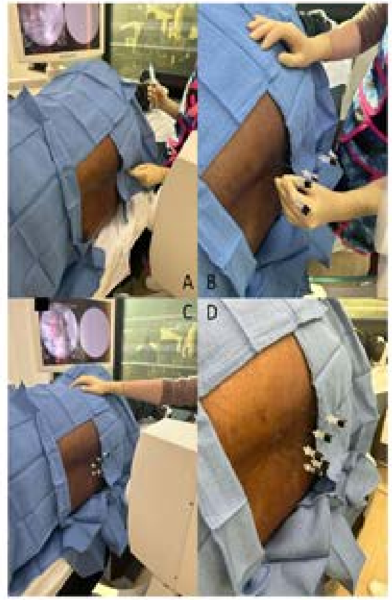

Figure 1: Procedure images. A) Site identification B) Needle introduction C) Placement confirmation D) Final needle placement

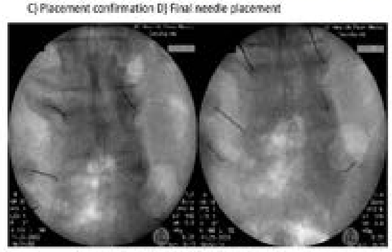

Figure 2: Fluoroscopic images of needle placement.

Objective

To demonstrate viability of lateral decubitus positioning for lumbar MBB and to discuss considerations and measures taken to perform procedure.

Methods

- Once positioned in the left lateral decubitus position, the patient was stabilized by providers while performing the procedure.
- Additional technical difficulty was presented via posterior-to-anterior fluoroscopic guidance due to room set-up.
- Sterility and procedure time were not compromised by positioning.

Discussion

- Procedure was tolerated and patient benefitted from the lumbar MBB. Repeat procedure is upcoming.
- Patient was placed on his weak side to allow strong side for stabilization. Providers also stabilized the patient on the table. Straps could also be used.
- Imaging reversal due to room set up could have been mitigated if this were a planned procedure with this positioning.
- Although the procedure time is relatively short in MBB and RFA, patient discomfort should not be ignored.
- **Patients with obesity, weakness, respiratory compromise, or other reasons for pain and discomfort in the prone position should be considered for alternative positioning.**

Conclusions

- **Lateral decubitus positioning for lumbar medial branch blocks is safe and effective and may allow more patients to tolerate the procedure.**
- Technical difficulties presented by lateral decubitus positioning exist but are easily mitigated with proper preparation.
- **Alternative positioning for medial branch blocks can serve to treat are wider breadth of patients with certain comorbidities.**

MIS SI Joint fusion using a lateral transfixing procedure: Early outcomes from the prospective, multicenter STACI study

Daniel Kloster[1], Jack Smith[2], Timothy Davis[3], and the STACI Investigators

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INTRODUCTION

Patients suffering from sacroiliac joint dysfunction experience high levels of pain and disability with poor quality of life at baseline. Minimally invasive sacroiliac joint (SIJ) fusion using metallic implants in a lateral transiliac trajectory is strongly supported by evidence, consistently leading to significant improvements in quality-of-life parameters, with rare procedure-related adverse events and low rates of revision.

Interventional pain management physicians have not yet published any data on lateral transfixing SIJ fusion. This gap has prompted the initiation of the STACI (iFuse TORQ for the treatment of sacroiliac joint dysfunction) (NCT 05870488) study. This prospective, multicenter study will enroll 110 subjects across 15 sites in the US and will follow them for 2 years.

Primary Endpoint: The change from baseline in SIJ pain on NRS

Secondary Endpoints: Changes in pain, function, quality of life, device or procedure-related adverse events, and evidence of fusion as observed on a CT scan obtained at 2 years.

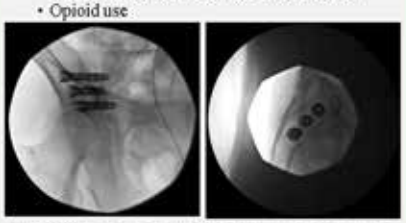
METHODS

Herein we present an interim analysis of STACI. Brief eligibility criteria include:

- Confirmed diagnosis of SIJD refractory to 6 months of conservative care
- Baseline ODI > 30% and SIJ pain score >5 on a 10 pt scale.
- Not currently receiving or seeking worker's compensation or disability
- No previous SIJ surgeries on index side or recent history of pelvic trauma.

The following data are collected at 1, 3, 6, 12, and 24 months after surgery:

- NRS, ODI, PROMIS-29
- Device or procedure related adverse events
- Opioid use



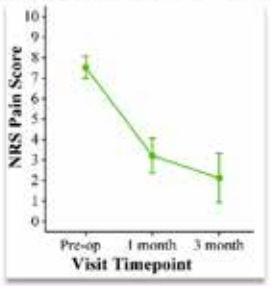
Fluoroscopy images of metal implants placed using a lateral transiliac trajectory

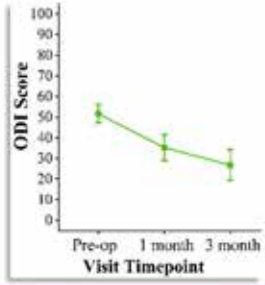
RESULTS

To date, 63 subjects have been enrolled and 46 have undergone SIJF. Mean (SD, range) age is 63.5 (14.4, 25-89), BMI is 29.3 (5.0), 75% were female, 46% had prior lumbar or lumbosacral spine fusion, and 38% were on opioids at baseline.

Procedural Metrics	
Mean OR time (SD)	51.6 min (19.4)
Est. blood loss (SD)	16.5 cc (15.9)
Operative facility (n)	56.5% (26) ASC 43.5% (20) HOPD
Device-related AE	0

At 3 months, mean (SD) SIJ pain decreased from 7.5 (1.6) at baseline to 2.1 (2.4). Average ODI decreased from 51.8 (13.8) to 26.8 (15.3).





CONCLUSION

The interim results of this prospective trial support the safety and efficacy of lateral SI joint fusion using a threaded implant when performed by interventional pain management physicians. Full results of this multicenter trial are expected at the end of 2024.

Pain Physician: May/June 2024: 27:E347-E455

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RWJ Robert Wood Johnson University Hospital

RUTGERS Robert Wood Johnson Medical School

Multi-Step Approach to Managing Acute Pain in a New Diagnosis of Metastatic Lung Cancer

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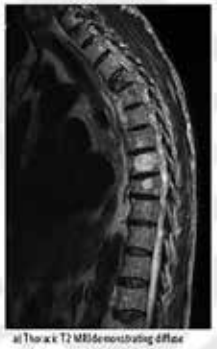
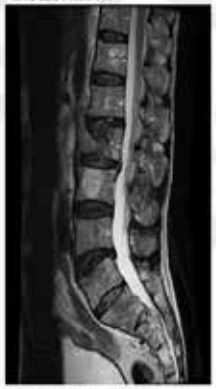
Department of Anesthesiology, Rutgers-Robert Wood Johnson Medical School, New Brunswick, New Jersey



a) Thoracic T2 MRI demonstrating diffuse osseous metastatic disease with severe pathologic compression fracture of T4 with ventral epidural tumor, mild cord flattening, moderate central canal narrowing. No abnormal signal within the thoracic cord. Mild to moderate kyphotic compression fracture T9



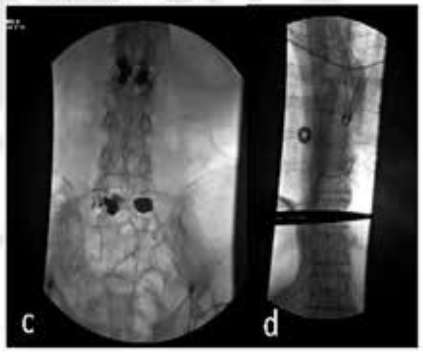
b) Lumbar T2 MRI demonstrating moderate to severe pathologic compression fracture L2 with large midline and left paravertebral extraosseous tumor as well as a mild pathologic compression fracture of L5.

Background: Approximately 25% of all cancer-related deaths in the United States result from lung cancer. Between 6-25% of patients report bone pain as the presenting symptom [1,2] suggesting metastasis. While chemotherapy and radiation therapy may be offered, the focus of patient care is shifted towards palliation and comfort if the prognosis is terminal. Offering these patients excellent pain control and comfort while minimizing risks and adverse events is key.

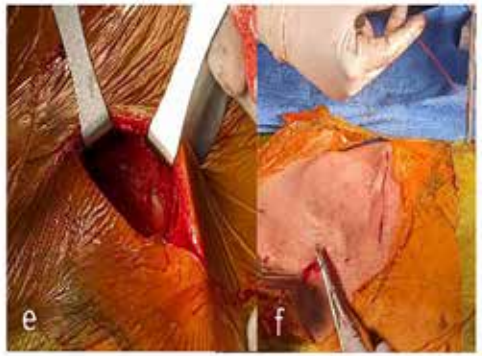
Case Presentation: Here we present a case of a 65-year-old male who presented to the Emergency Department with severe low back pain. Initial imaging revealed bony lesions in the vertebral bodies of spine as well as L2 and L5 compression fractures and a right superior lung mass. Liver biopsy showed poorly differentiated neuroendocrine tumor, suspected to be pulmonary in origin. Acute Pain Management was consulted for pain control. Initially, patient was taking acetaminophen 650mg, oxycodone 10mg every 12 hours, and hydromorphone 1.5mg IV every 3 hours as needed for severe pain. Medical management of his pain was limited by respiratory depression and somnolence. After extensive discussion with the patient and their healthcare proxy, decision was made to proceed with simultaneous two-level kyphoplasty and intrathecal pump implantation.

Methods: A bilateral two level L2 and L5 kyphoplasty was performed followed by intrathecal catheter and pump placement pre-filled with 0.25% bupivacaine and started at a rate of 400mcg/24hours.

Results: Patient successfully underwent bilateral two level L2 and L5 kyphoplasty with simultaneous intrathecal catheter and pump implantation under single general anesthetic. Patient tolerated the procedure well and was extubated afterwards. In the PACU, the patient was short of breath and placed on BiPAP therapy without improvement. They were subsequently re-intubated and underwent bronchoscopy which revealed mucus plug that was suctioned. The patient's oxygenation improved, and he was extubated without complication. The patient endorsed pain rating improved to 3/10 from 10/10 pre-operatively. He then underwent endobronchial tumor debulking 48 hours later. His pain was controlled to a 5/10 using his intrathecal pump and a combination of oral hydromorphone, pregabalin, oxycodone, and lidocaine patch. The patient endorsed feeling comfortable with his pain management plan and was discharged to Hospice.



c) AP Fluoroscopy demonstrating bilateral L2, L5 kyphoplasty. d) AP Fluoroscopy of intrathecal pump catheter



e) Creation of intrathecal pump pocket with retraction of skin, subcutaneous fat, and scarpa's fascia allowing for proper positioning and fit. f) Closure of pump pocket. The sites were then aggressively irrigated with sterile saline with vancomycin. Incision sites were closed utilizing a single layer of 2-0 Vicryl interrupted sutures followed by 1 layer of 3-0 Vicryl interrupted sutures and a final subcuticular layer of 4-0 Monocryl suture applied in a running fashion. The incision was then dressed with Dermabond dermal adhesive. This was followed by placement of folded gauze bandages over the Dermabond adhesive and secured in place by Tegaderm occlusive dressing.

Conclusion: The case presented here highlights the role for a step-wise ladder approach to treatment of cancer-related pain in terminal patients. Optimizing medical management is the simplest and often most effective form of pain control. However, as doses increase, side effects of respiratory depression, somnolence, constipation become treatment-limiting. Addressing the patient's underlying causes for pain using minimally invasive procedures are promising and are usually done sequentially to assess their efficacy. Given the risk associated with repeated anesthetics, we decided to proceed with a combined kyphoplasty and intrathecal pump to address his pain generators as well as provide the patient with long-term comfort as they deal with their disease. Close attention to sterility, infection-control, and incision closure are paramount to minimizing infections in the post-operative period and improving quality of life.

References

1) https://cancer.org/cancer/types/lung-cancer/about/key-statistics.html#:~:text=The%20American%20Cancer%20Society%20estimates,men%20and%20105%2C180%20in%20women

2) Ost DE, Jim Yeung SC, Tanoue LT, Gould MK. Clinical and organizational factors in the initial evaluation of patients with lung cancer: diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. Chest. 2013 May;143(5 Suppl):e121S-e141S. doi: 10.1378/chest.12-2352. PMID: 23649435; PMCID: PMC4694609.

Emerging Neuroablative Techniques for Cancer-Related Sacroiliac Joint Pain: A Narrative Review

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Schwab Rehabilitation Hospital

UChicago Medicine
Anesthesia & Critical Care

Background

SI joint pain in patients undergoing palliative care for end stage cancer can be difficult to treat and control. Whether it be primary bone tumors, metastases to the spine, or regional cancer spread in the pelvis, low back pain becomes a common complaint for many of these patients. Pain medications, radiation, chemo, pumps are just a few of the ways to treat SI joint pain. When palliation becomes the goal, neuroablative interventions should be considered as palliative care option for cancer-related SI joint pain.

Objective

Our study will review the current literature for neuroablative intervention of SIJ pain with a discussion on advantages unique to cancer-related pain

Methodology

A digital search was performed utilizing PubMed for publications within the past ten years focused on the etiology, clinical features, diagnosis, and treatment options for cancer-related SI joint pain with an emphasis on alternative to traditional RFA. Key words "SIJ pain," "RFA," and "cancer palliation" were used. A total of 21 research papers were analyzed from 2014 to 2023.

Results

Cooled RFA
Water circulation regulates temperature of a probe to allow for larger lesioning and more complete ablation of target nerve fibers.
-avoids limitation of desiccation and overheating as seen with traditional RFA

Endoscopic RFA
Endoscope allows for visualization of sensory nerve fibers with smaller diameters
-creates more precise targeting especially when obscured by tumor burden

Cryoneurolysis
Cryoprobe is used and inserted lateral to posterior sacral foramina
-2 freezing cycles that create pain relief'
-1 single entry point

MRI guided high intensity focused ultrasound (MR-HIFU)
Ultrasound uses thermal energy under MRI to ablate nerves within target sites
-Non-invasive
-Non-ionizing

Conclusion

Though RFA has been a treatment option for SIJ pain since 2001, there are new emerging techniques with notable advantages for cancer-related pain. These interventional techniques vary in target visualization method, lesioning technique used, and target sites. This permits an individualized approach to treatment of SI joint pain, which is paramount in cancer-related pain when considering variance in tumor burden, anatomical abnormalities, and patient preference. Because RFA is a localized procedure at the site of pain, unwarranted systemic side effects are less common compared to oral medication treatment options. Though more research needs to be conducted, radiofrequency ablation and interventions similar to RFA should be further considered when palliatively treating SI-joint related pain.

References

Acknowledgements

Neurological Odyssey: Navigating Trigeminal Trophic Syndrome Post-Herpes Zoster

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1-Department of Neurology, Creighton University, Omaha, NE, USA.
2-Livewell Hospital, Ahmedabad, Gujarat, India.

BACKGROUND:

Trigeminal trophic syndrome (TTS), an uncommon syndrome characterized by persistent and non-healing lesions, presents significant challenges in diagnosis and treatment This case report explores alternative management strategies Management of TTS after herpes zoster infection.

OBJECTIVE:

The objective of this case report is to elucidate the clinical presentation, diagnostic challenges, and the successful implementation of innovative interventional strategies in managing Trigeminal Trophic Syndrome (TTS) in a post-herpes zoster patient. Through a detailed exploration of the patient's journey, this case aims to contribute valuable insights into the effective interdisciplinary management of TTS, shedding light on the potential of diagnostic interventions such as sphenopalatine ganglion block and pulsed radiofrequency ablation in improving patient outcomes.

CASE REPORT:

A 60-year-old woman, presented with a six-month-old lump on her left nostril, which developed after acquiring herpes eyeballs and persisted with symptoms despite intervention of several types and routine wound care. Clinical examination revealed solid lesions with surrounding hypoesthesia. Routine checkups and an unforgettable MRI eventually led to the diagnosis of TTS. The intervention included a diagnostic procedure known as sphenopalatine ganglion block, which provided immediate relief and served to confirm the pathology and potential therapeutic benefit followed by pulsed radiofrequency releases the V1 trigeminal canal compartment, resulting in long-term analgesia and significant pain relief After the procedure, patient was given wound care and a short dose of oral gabapentin, which healed the wound and improved her whole life.

CONCLUSION:

This article highlights the potential impact of TTS on patient well-being and highlights the importance of a granular approach to its implementation. The combination of diagnostic modalities such as sphenopalatine ganglion block and pulsed radiofrequency ablation is critical for effective treatment of TTS.

REFERENCES:

Sadeghi P, Papay FA, Vidimos AT. Trigeminal trophic syndrome--report of four cases and review of the literature. Dermatol Surg. 2004 May;30(5):807-12; discussion 812. doi: 10.1111/j.1524-4725.2004.30220.x. PMID: 15099331.

KARNOSH, L. J., & SCHERB, R. F. (1940). Trophic lesions in the distribution of the trigeminal nerve. Journal of the American Medical Association, 115(25), 2144-2148. doi:10.1001/jama.1940.02810510020006

Kautz G, Bruckner-Tuderman L, Müller ML, Schempp CM. Trigeminal trophic syndrome with extensive ulceration following herpes zoster. Eur J Dermatol. 2009 Jan-Feb;19(1):61-3. doi: 10.1684/ejd.2008.0564. Epub 2008 Dec 5. PMID: 19059825.

Weintraub E, Soltani K, Hekmatpanah J, Lorincz AL. Trigeminal trophic syndrome. A case and review. J Am Acad Dermatol. 1982 Jan;6(1):52-7. doi: 10.1016/s0190-9622(82)80200-4. PMID: 7065956.

Dolohanty LB, Richardson SJ, Herrmann DN, Markman J, Mercurio MG. Trigeminal trophic syndrome with histopathologic correlation. Cutis. 2015 Mar;95(3):E22-5. PMID: 25844791.

Nguyen, M. and Wilkes, D. (2010), Pulsed Radiofrequency V2 Treatment and Intranasal Sphenopalatine Ganglion Block: A Combination Therapy for Atypical Trigeminal Neuralgia. Pain Practice, 10: 370-374. https://doi.org/10.1111/j.1533-2500.2010.00382.x

Khan AU, Khachemoune A. Trigeminal trophic syndrome: an updated review. Int J Dermatol. 2019 May;58(5):530-537. doi: 10.1111/ijd.14098. Epub 2018 Jun 21. PMID: 29931799.

DISCLOSURES:

The The authors declare no conflicts of interest, financial or otherwise, and affirm that all procedures were conducted with proper ethical considerations and patient consent.

Neuromodulation via Percutaneous Thoracic Intercostal Nerve Stimulation in Management of Post-Herpetic Neuralgia

Denny Cha, MD, Porus Mistry, MD, William Spalding, MD

Background

- Postherpetic neuralgia (PNH) is a chronic, debilitating pain condition that can arise from varicella-zoster virus infection. It refers to pain persisting for more than three months from the initial onset of the rash from acute herpes zoster.
- The pain associated with PHN can be stabbing, sharp, pruritic, or burning.
- The incidence of PHN is less than 2% in adults younger than 60-year-old, but the incidence dramatically increases to 6.9% or higher in adults older than 60-year-old.
- Cervical, thoracic, and trigeminal nerves are often affected in PNH.
- Even with the multimodal treatment, PNH can be challenging to treat.

Objective

- To present a case in which peripheral nerve stimulator placement on intercostal nerve can be a safe, appropriate intervention for PNH patients with multiple comorbidities and high risk of bleeding.

Acknowledgement

- I would like to thank Dr. Mistry and Dr. Spalding for their guidance and support in preparation for case presentation.

Case Description

- A 76-year-old male with history of end-staged renal disease status post renal transplantation, deep vein thrombosis/pulmonary embolism on Xarelto and Plavix, and squamous cell carcinoma of right parotid gland status post radiation and extensive surgical procedures including neck dissection, parotidectomy, maxillectomy, and sternocleidomastoid flap presented with severe post-herpetic neuralgia on his left abdomen and chest wall.
- The patient experienced constant, sharp pain deep in the muscles of left chest wall that affected his activity tolerance and quality of life.
- Initially, the patient made minimal improvement from multimodal medication regimen including pregabalin, nortriptyline, ketamine/ketoprofen/lidocaine compounded cream.
- With concern of polypharmacy interfering with cognition and falls, interventions such as left T9 erector spinae plane block, left T10-12 transforaminal epidural steroid injection, and ultrasound guided left T9-12 intercostal nerve block were performed.
- Based on significant pain relief from the intercostal nerve block, left T7-8 intercostal Sprint peripheral nerve stimulator (PNS) placement was performed.
- With left T7-8 PNS placement, the patient reported greater than 50% pain relief and was able to function better.
- Unfortunately, the pain came back soon after the removal of PNS.

Intervention Images

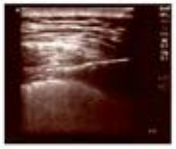

Image A

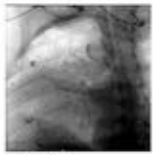

Image B

Image A: Ultrasound Image of the Intercostal Peripheral Nerve Stimulation (PNS) Needle

Image B: PA View of Fluoroscopy Image

- Intercostal PNS placement at left T7-8 in mid-clavicular line

Discussion & Conclusion

- Traditionally, peripheral nerve stimulation (PNS) is thought to work based on gate control theory, which explains that sending neurostimulation signals to non-nociceptive nerve fibers can inhibit the transmission of signals from the A-delta and C fibers to the brain. New study suggests that PNS may also contribute to recalibration of the nerve from constant stimulation at specific frequencies.
- Recalibration from PNS does not always happen in patients undergoing PNS treatment as seen in this case.
- It's worth noting that PNS placement is safer than placing more invasive and permanent devices like spinal cord stimulator and dorsal root ganglion stimulator on patients with multiple comorbidities and high risk of bleeding.
- Permanent PNS placement can be a possible long-term solution for patients who are not good candidates for spinal cord stimulator or dorsal root ganglion stimulator but had significant pain relief from temporary PNS placement.

References

1. Yaccarino V, Jin MY, Abd-Elsayed A, Kraemer JM, Sehgal N. Peripheral Nerve Stimulation in Painful Conditions of the Upper Extremity-An Overview. Biomedicines. 2022 Nov 1;10(11):2776. doi: 10.3390/biomedicines10112776. PMID: 36359295; PMCID: PMC9687108.
2. Huntoon MA, Slavin KV, Hagedorn JM, Crosby ND, Boggs JW. A Retrospective Review of Real-world Outcomes Following 60-day Peripheral Nerve Stimulation for the Treatment of Chronic Pain. Pain Physician. 2023 May;26(3):273-281. PMID: 37182232.
3. Billet B, Wynendaele R, Vanquathem NE. A Novel Minimally Invasive Wireless Technology for Neuromodulation via Percutaneous Intercostal Nerve Stimulation for Post-Herpetic Neuralgia: A Case Report with Short-Term Follow-up. Pain Pract. 2018 Mar;18(3):374-379. doi: 10.1111/papr.12627. Epub 2017 Nov 20. PMID: 28832962.
4. Kurklinsky S, Palmer SC, Arrollga MJ, Ghazi SM. Neuromodulation in Postherpetic Neuralgia: Case Reports and Review of the Literature. Pain Med. 2018 Jun 1;19(6):1237-1244. doi: 10.1093/pm/pnx175. PMID: 29016894.
5. Lee HJ, Park HS, Moon HI, Yoon SY. Effect of Ultrasound-Guided Intercostal Nerve Block Versus Fluoroscopy-Guided Epidural Nerve Block in Patients With Thoracic Herpes Zoster: A Comparative Study. J Ultrasound Med. 2019 Mar;38(3):725-731. doi: 10.1002/jum.14758. Epub 2018 Sep 23. PMID: 30244489.

Keck Medicine of USC

Novel Ultrasound-Guided Technique for Thoracic Medial Branch Block and Thoracic Cooled-Radiofrequency Ablation

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[1]Keck School of Medicine of the University of Southern California (USC), Los Angeles, United States
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Background

- Radiofrequency ablation (RFA): a procedure in which heat generated by radiofrequency is conducted via electrode probes to destroy nerves responsible for pain
- RFA must be preceded by diagnostic medial branch block (MBB) injections
- MBB and RFA traditionally performed under fluoroscopic guidance
- Thoracic medial branch nerves are located at the superolateral aspect of the transverse process (TP), often difficult to appreciate by fluoroscopy
- There are currently no documented cases of ultrasound guided MBB and RFA thoracic medial branch nerves
- We present a novel technique utilizing ultrasound in conjunction with fluoroscopy to perform MBB and RFA of the thoracic medial branch nerves

Radiofrequency ablation of thoracic median branch nerve.
The NeuroMedical Center

Case Description

- Age 68 obese male
- 17 years of constant left upper thoracic back pain
- Previously C3-C6 laminectomy and posterior cervical spinal fusion failed to alleviate pain
- We proceeded with MBB and cooled-RFA (C-RFA) at the level of T2-5 after patient failed conservative management

Diagnostic Medial Branch Block (MBB)

- The lateral aspect of the TP were difficult to visualize, possibly due to redundant soft tissue
- Using dynamic ultrasound, the transition from rib to TP was visualized by scanning from lateral to medial.
- On US, the rib appears as a deeper oval shape, which transitions to the more superficial characteristic "tombstone" appearance of the TP. This transition delineated the lateral border of the TP (Figure 1)
- Then, by scanning from cephalad and caudad, the superior aspects of the TP could be identified.
- Patient reported 100% pain relief for several days following bilateral T2-T5 MBB

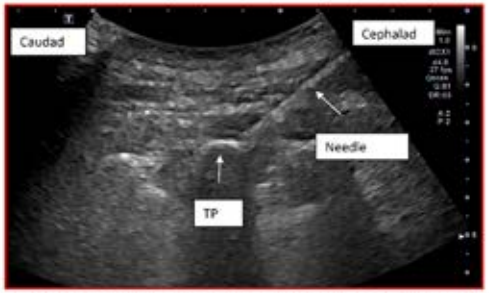

Figure 1: Ultrasound image demonstrating echogenic 22-gauge 80 mm needle advanced to the superior lateral aspect of the T2 transverse process (TP).

Case Description (continued)

Cooled Radiofrequency Ablation (C-RFA)

- Spinal needles first advanced under ultrasound guidance to the target superolateral aspect of the TP utilizing same technique and landmarks as prior MBB
- Those needles served to guide fluoroscopic placement of the C-RFA probes using fluoroscopy (Figure 2)
- Patient reported 100% pain relief and no complications following the procedures

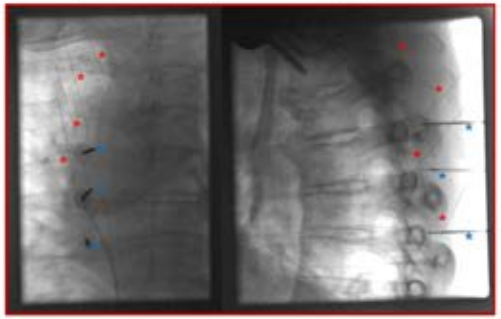

Figure 2: Anteroposterior (AP, left) and lateral view (right) fluoroscopy of the patient's thorax demonstrating placement of spinal needles and C-RFA probes at the superolateral aspects of the T2, T3, T4, and T5 transverse processes. Spinal needles are indicated by the red * symbols and C-RFA needles are indicated by blue * symbols. Only three C-RFA needles are depicted because our equipment only allows for three C-RFA probes to be placed at a time.

Conclusions

- Addition of ultrasound overcame the challenge of visualizing the superolateral aspect of thoracic transverse process under fluoroscopy alone
- Direct ultrasound visualization allowed for accurate and safe thoracic MBB and RFA in a patient with poor fluoroscopic anatomy
- This novel technique allows the provider to directly visualize the pleura, which may reduce the risk of severe pneumothorax associated with thoracic MBB and C-RFA

ASIPP 2024 26TH ANNUAL MEETING

Parsonage-Turner Syndrome (PTS) disguising as Cervical Radiculopathy

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The Ohio State University Wexner Medical Center Department of Neurology

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

Patient

A 50-year-old female presented with right neck and shoulder pain. She had a history of chronic neck pain but reported more severe pain followed by proximal arm weakness several weeks later.

Setting

Outpatient Neuromuscular Clinic

Case Description

MRI cervical spine demonstrated facet arthropathy with moderate to severe bilateral foraminal stenosis and impingement of the bilateral C5 nerve roots and right C6 nerve root. The physical exam showed movement against gravity but not against resistance in right shoulder abduction and elbow flexion. Surgical intervention was suggested but the patient opted for conservative management. Despite physical therapy, she didn't improve and was seen by neurology.

Assessment/ Results

Acute neck pain with arm weakness that was attributed to cervical radiculopathy, and MRI showed some reasonable explanation for cervical pathology. Electrodiagnostic testing showed findings consistent with the upper trunk of the brachial plexopathy.

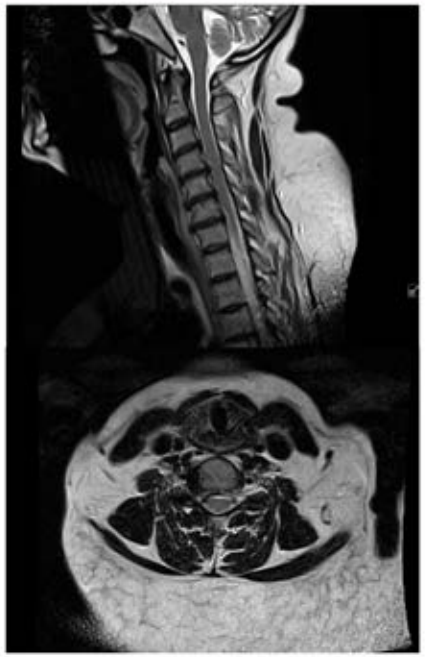

Figure 1: MRI Lumbar spine without contrast demonstrated luschka joint hypertrophy and facet arthropathy with moderate to osevere right foraminal stenosis with impingement of the right C6 nerve root.

Discussion

It is useful to assess scapular winging and external rotation of the shoulder, and flexion of the thumb and index fingers ("Okay sign") to check the involvement of suprascapular, long thoracic and anterior osseous nerves which are commonly affected in PTS. In our case, cervical radiculopathy was ruled out due to the pattern of weakness in muscles supplied by the upper trunk of the brachial plexus with sparring of the rhomboids and paraspinal muscles on EMG.

Conclusion

Appropriate workup and careful physical exam can allow for early recognition of PTS and treatment directed to alleviation of pain and therapies while preventing unnecessary and invasive interventions.

References

Milner CS, Kannan K, Iyer VG, Thirkannad SM. Parsonage-Turner Syndrome: Clinical and Epidemiological Features From a Hand Surgeon's Perspective. Hand (N Y). 2016 Jun;11(2):227-31. doi: 10.1177/1558944715627246. Epub 2016 Mar 8. PMID: 27390568; PMCID: PMC4920531.
The Importance of Differentiating Parsonage-Turner Syndrome From Cervical Radiculopathy

Committee of Interns and Residents
SEIU Healthcare
UHealth Jackson
Rehabilitation Care
Peripheral Nerve Stimulation (PNS) for Complex Regional Pain Syndrome (CRPS) Type 2 following Total Knee Arthroplasty.
Robin Mata, DO MPH; Shemar Crawford, MD; Mateusz Graca, MD; Dennis Patin, MD
Jackson Memorial Health System/University of Miami, Department of Physical Medicine & Rehabilitation, University of Miami Leonard M. Miller School of Medicine, Department of Anesthesiology, Perioperative Medicine, and Pain Management.
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas April 4-6, 2024
BACKGROUND
It is estimated that 25% of patients who undergo total knee arthroplasty (TKA) experience persistent pain. Permanent peripheral nerve stimulation (PNS) implants have been approved for the treatment of peripheral mononeuropathy. PNS is thought to activate central and peripheral nervous pathways to modulate pain like spinal cord stimulation (SCS) or dorsal root ganglion stimulation (DRGs) [1]. Several randomized controlled trials, retrospective reviews, case series, and case studies have shown promise for PNS in treating refractory pain of the lower extremity [1,2,4]. Current guidelines for PNS in CRPS recommend SCS and DRG as high-quality evidence for PNS in CRPS is limited [5].
CASE DESCRIPTION
A 62-year-old female with history of right TKA complicated by complex regional pain syndrome (CRPS) Type 2 presented to clinic for follow-up. She complained of 10/10 constant burning pain in the right knee. Previously she had failed multiple treatments including lumbar sympathetic block, right saphenous nerve block and saphenous radiofrequency ablation (RFA), L2-4 DRGs, SCS with both burst and high frequency at T9-T12, removal of right saphenous nerve neuroma, right genicular nerve block (specifically infrapatellar, superomedial, superolateral and inferomedial branches) and RFA, and conservative medication management with several drug classes including ketamine. Patient had 50% relief with genicular nerve RFA but due to financial barriers was unable to obtain repeat RFA. At the time of visit, patient was considering intrathecal pump for opioid delivery as a last resort option. Given the patient's response to right genicular nerve block and RFA she was offered a PNS trial.
IMAGING
Figure 1: Peripheral lead placement to superolateral and superomedial genicular nerves
REFERENCES
RESULTS
A PNS trial was carried out with implantation of 2 percutaneous leads targeting the superomedial and superolateral genicular nerves. Following her PNS trial of 7 days the patient reported 50% resolution of her pain and subsequently underwent permanent implantation.
At her first post-op she complained of swelling and allodynia over the implantable pulse generator (IPG) site, which resolved with a one-time Toradol injection. She continues to have 50% pain reduction with resolution of her pocket site pain at 5-months post-op.
Given the paucity of available literature and physicians with ability to implant PNS, it is very likely that PNS for post-TKA CRPS or other chronic pain is underutilized and its full benefit with optimal patient selection is not fully elucidated. A recent survey by Li et al. regarding practices and outcomes was administered to 40 PNS implanting physicians and determined a prevailing algorithm for treatment guidelines where patients with pain of 6-12 month duration are usually offered temporary or permanent PNS and multi-year pain patients are usually offered permanent PNS [3]. To date There has been only one completed industry sponsored randomized control trial (RCT) comparing sham to temporary PNS placement for femoral and sciatic nerves at time of TKA in patients with osteoarthritis, though no statistical analysis has been provided [1].
CONCLUSIONS
Our objective was to attempt to treat CRPS secondary to TKA with PNS. At present no data exists for PNS in patients with CRPS following TKA. Given a lack of evidence, there is much variation in the care that patients receive, timeframe for treatment, and algorithm on which nerves to target. Further research, including a pilot study to assess sham vs. permanent PNS implant for CRPS secondary to TKA is warranted and can help inform future treatment algorithms for these patients.

Peripheral Nerve Stimulation for Alleviating Chronic Low Back Pain: A Focus on the Superior Cluneal Nerves

American Society of Interventional Pain Physicians
The Voice of Interventional Pain Management

Peter D. Vu[1]; Christopher Robinson[2]; Grant Chen[1]; Alan Kaye[3]; Jamal Hasoon[1]
1. UTHealth Houston; 2. Beth Israel Deaconess; 3. Louisiana State University

UTHealth Houston
McGovern Medical School

INTRODUCTION

- Superior cluneal neuralgia (SCN) is often an underdiagnosed contributor of chronic low back pain (LBP).
- While conservative therapies are often first-line for LBP, the presence of SCN may necessitate surgical interventions.
- More recently, permanent peripheral nerve stimulation (PNS) has been considered.
- This case is unique with SCN treated via temporary 60-day PNS without the need for permanent implantation.

METHODS

- An injection 2 mL of 1% lidocaine provided local anesthesia a few centimeters medial and superior to the final needle placement site on each iliac crest.
- The stimulating needle electrodes were inserted and advanced onto the border of the iliac crest in the region of the superior cluneal nerves.
- Comfortable paresthesia in the low back and buttock region confirmed appropriate placement.
- Two leads were then deployed to provide bilateral coverage of the superior cluneal nerves (Figure 1).

KEY TAKEAWAYS

Temporary PNS provides another viable and efficacious therapeutic strategy for **SCN LBP management** that could **potentially be sustained** even after the removal of the device.

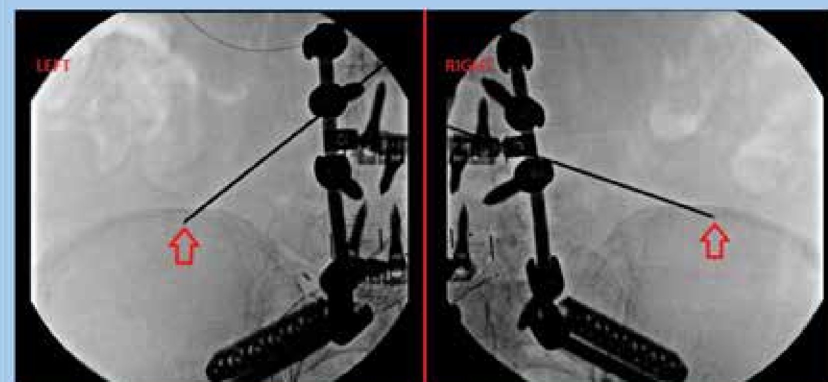

Figure 1: Superior cluneal nerve PNS placement. The arrows highlight the placement of the stimulating needles along the border of the iliac crest which is the target location for stimulation of the superior cluneal nerves.

THE CASE

- 76-year-old woman with a history of osteoarthritis and lumbar spinal stenosis presented with chronic LBP.
- She had undergone extensive back surgeries within the last two years, including transpedicular lumbosacral fixation, bilateral sacroiliac fixation, anterior lumbar spinal fixation and intervertebral disc cage placement, and bilateral hip replacements.
- Conservative therapies with medications, therapeutic modalities, and injections were ineffective.
- The patient decided to pursue PNS placement at the bilateral superior cluneal nerves utilizing a temporary 60-day PNS system.

REFERENCES

POST HERPETIC NEURALGIA: CURRENT AND UPCOMING TREATMENT MODALITIES

BY: DR. JESSICA BRUNETTE, D.O. AND DR. DONALD ERB, D.O.

Background:

Objective:

Results:

Case Presentation:

Methods:

Conclusion:

References

Post-Implant Negative Prone Instability Test Indicates Renewed Multifidus Muscle Motor Control After One Year in Patients with Restorative Neurostimulation

Meredith Langhorst, MD, *OrthoIndy Hospital, Indianapolis, IN, USA*

Introduction

- **Lumbar multifidus muscle (LMM)** contributes ~66% to lumbar stability, and when its dysfunctional, contributes to mechanical nociceptive chronic low back pain (**mCLBP**)[1]
- **Positive prone instability test (PIT)** identifies impaired LMM neuromuscular control (NMC) and subsequent dysfunction[2,3]
- PIT is used in patient selection for restorative neurostimulation to confirm LMM dysfunction in patients with mCLBP who failed > 90 days of conservative medical management[4]
- Aim: Evaluate real-world test-retest PIT clinical outcomes data 1-year post-implant with LMM restorative neurostimulation for emerging LMM neuromuscular control

Methods

Patient inclusion:

- Numeric pain rating scale (NRS) ≥ 6 or Visual analog scale (VAS) ≥ 6.0 cm
- Oswestry Disability Index (ODI) ≥ 21 points
- No spine surgical indications
- Demonstrates positive PIT (unstable NMC)

Retested with PIT, pain, and ODI at 1-year post-implant follow-up

Responder definition: Negative PIT test (meaning stabilizing NMC), ≥ 30% pain improvement and/or ≥ 20-point ODI improvement

Results

Complete patient data at 1 year: N=22, average (SD) baseline pain = 6.9 (±1.0), ODI of 43.4 (±11)

- 1-year pain improved by 39% (2.7±2.3)
- 1-year ODI improved by 40% (17.5±13.1)
- 77% of cohort (17/22) were Responders at 1 year

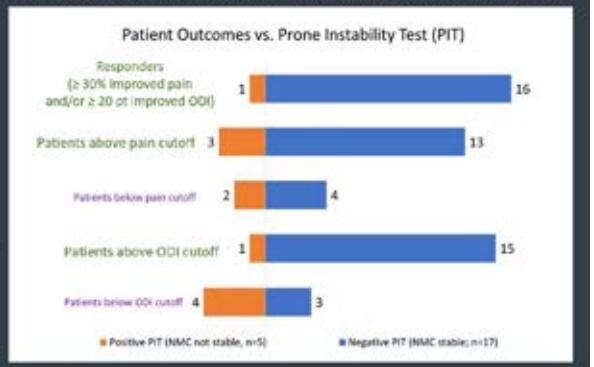

Fig 1. Patient Outcomes versus Prone Instability Test (PIT). Greater number of responders with negative PIT, meaning stable neuromuscular control (NMC), after 1 year with restorative neurostimulation. Positive PIT findings indicate ongoing recovery of NMC from LMM dysfunction.

Discussion

Interim analysis shows at 1-year post-multifidus neurostimulation, 77% of the patients with mCLBP had a negative PIT and improved outcomes. Ongoing LMM motor control restoration is occurring in the remainder of the cohort and may change at completion of study.

Conclusion

Restorative neurostimulation improves LMM motor control capabilities, improving both pain and function long-term in mCLBP

References:
[1]Wilke, et al. *Spine*. (1995); [2]Hicks, et al. *Arch PMR*. (2003); [3]Sung, et al. *JOSPT*. (2019); [4]Gilligan, et al. *Pain*. (2021)

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ASIPP 2024 26TH ANNUAL MEETING

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Pre-operative Use of NMDA Antagonists in Lower Extremity Amputation
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utmb Health
LARKIN COMMUNITY HOSPITAL
TriNetX
INTRODUCTION
Approximately 150,000 individuals experience lower extremity amputations in the US annually with most reporting Phantom Limb Pain (PLP).
The use of N-methyl-D-aspartate (NMDA) antagonists postoperatively to manage PLP is not well studied. Existing literature is limited by poor statistical power and have not investigated the efficacy of NMDA antagonists as pre-treatment prior to amputation.
NMDA antagonists can modulate pain signals and central sensitization by blocking NMDA receptors at both spinal cord and supraspinal levels, potentially offering therapeutic benefits for chronic post-amputation pain management.
The aim of this study is to evaluate the role of premedication with NMDA antagonists prior to non-traumatic lower extremity amputation (NTLEA).
METHODS
Propensity score matched case-control study using TriNetX, a federated open-source database housing de-identified patient data
Query: Incidence of PLP in LE amputation patients premedicated with NMDA antagonists within 3-months pre-op vs those treated with standard of care.
NMDA antagonist Medications: Memantine, Amantadine, or Dextromethorphan
RESULTS
Cohorts: 400 patients each; Patients receiving Standard of Care vs pre-treatment w/ NMDA Antagonists
PLP Risk Analysis - (Gross: 94, 25; 23.5% versus 6.25%, p < 0.0001), RR 3.76, 95% CI: (2.474, 5.715)
Acute Post-Operative Pain Risk Analysis - (Gross: 81, 26; 20.25% versus 6.5%, p < 0.0001)
Acute Post-Operative Nausea/Vomiting Risk Analysis - (Gross: 85, 31; 16.25% versus 7.75%, p = 0.0002), RR 2.097, 95% CI: (1.399,3.143)
Amputation Stump Hematoma Risk Analysis - (Gross: 109, 79; 27.25% versus 19.75%, p = 0.0124), RR 1.38, 95% CI: (1.07, 1.779)
No statistically significant differences between cohorts in the development of complex regional pain syndrome (CRPS), chronic amputation pain, one year mortality, or surgical site infection.
Premedication with NMDA antagonist medications such as memantine, amantadine, or dextromethorphan prior to lower extremity amputation was associated with decreased rates of phantom limb syndrome (66.7% Relative Risk Reduction) as well as decreased post-op nausea/vomiting (52.3% RRR), acute post-op pain (67.9% RRR) and development of amputation stump hematoma (27.5% RRR)
Dorsal Root
C-fiber
Residual Limb
Take a picture to view the full abstract
Measures of Association for Phantom Limb Pain
Baseline Patient Characteristics
References

Pyri-doxical Problem: A Case Report of Vitamin B6 Excess and its Impact on Painful Neuropathies

Gabriel Howard DO, Ranjeev Chabra MD, Andrew Reish MD

GOOD SHEPHERD REHABILITATION

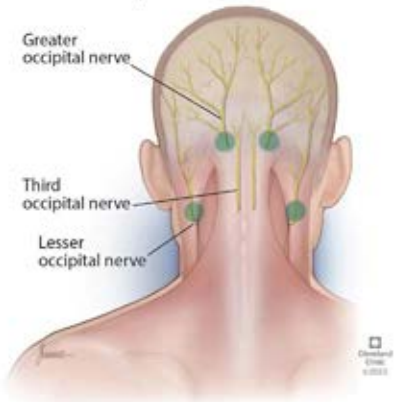
Introduction

- Pyridoxine, or Vitamin B6, is an essential nutrient for growth and maintenance of the immune and nervous systems.
- Vitamin B6 *deficiency* has primarily been the concern of most clinicians since its discovery in 1934[1], however, **modern vitamin supplementation is exceedingly cheap and widely utilized without counsel of a physician.**
- Overutilization, or Vitamin B6 toxicity, is dose-dependent and results in similar symptoms as vitamin B6 deficiency, such as peripheral neuropathy, ataxia, numbness, and fasciculations.[2]
- **Occipital neuralgia commonly occurs due to nerve entrapment syndromes or irritation** near the scalp and less commonly due to infectious, inflammatory, or autoimmune conditions.[3]

Case Description

- A male in his mid-70s presented to the outpatient clinic with intractable posterior scalp headaches.
- Relevant past medical history includes EMG confirmed mixed peripheral polyneuropathy, ataxia and associated hypervitaminosis B6.
- The patient reported **daily lancinating pain originating at the base of his scalp which radiated anterolaterally to his ears**, often triggered by neck movement or palpation.
- His headache symptoms began within months of being found to have **serum vitamin B concentrations in gross excess of normal limits** with concomitant progression of a known idiopathic polyneuropathy.
- After failing more conservative treatments, the patient elected to complete occipital nerve blockade.

Occipital Nerve Block



- **Pictural representation[4] of the courses of the Greater, Lesser, and Third occipital nerves. Light green highlighted areas represent target locations for injection blockades.**
- **As depicted, the Greater and Lesser occipital nerves are more commonly implicated in painful headache syndromes whereas the Third occipital nerve is rarely involved and thus rarely blocked.**

Results

- Our patient reported >50% relief of posterior headache symptoms at 1 week follow-up with reduced frequency of headaches to 1-2 per week.
- Upon 1 week follow up, he did report gradual return to his baseline pain levels.

Discussion

- Very little literature exists regarding vitamin B6 toxicity and its role in the development of painful neurologic syndromes.
- **Given its known neurotoxicity and ease of access as an "over the counter" supplement, there is reason to suspect that a higher incidence of vitamin B6 toxicity may develop in the coming years.**
- Although vitamin B6 and occipital neuralgia are not clearly linked, this case presentation illustrates a potential associated historical factor in this patient's symptoms, a suspected etiologic contribution, and a diagnostic intervention.
- Steroid injection of the affected nerve did not seem to provide lasting relief in our case and should be considered only in a case-by-case basis.

Conclusion

- Despite limited evidence of an association between occipital neuralgia and B6 excess, **continued research needs to be completed to better elucidate the role of vitamin B6 toxicity in the development of painful neuropathic syndromes.**

References

1. Irwin H. Rosenberg; A History of the Isolation and Identification of Vitamin B_6. *Ann Nutr Metab* 1 November 2012; 61 (3): 236–238. https://doi.org/10.1159/000343113
2. Hemminger A, Wills BK. Vitamin B6 Toxicity. [Updated 2023 Feb 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK554509/
3. Dougherty, C. Occipital Neuralgia. Curr Pain Headache Rep 18, 411 (2014). https://doi.org/10.1007/s11916-014-0411-x
4. Professional, C. C. medical. (n.d.). Occipital nerve blocks. Cleveland Clinic. https://my.clevelandclinic.org/health/treatments/24934-occipital-nerve-block

Description of Real-World Healthcare Resource Utilization and Costs Among Patients Receiving Long-Term Peripheral Nerve Stimulation Therapy From a micro-IPG System.

Authors: [1]Bishnu Thapa, PhD, [1]Becca Feldman, PhD, [2]Patrick Martin, BS, [1]Carl Marci, MD,

Affiliations: [1] OM1, Boston, MA; [2] n Nalu Medical, Inc, Carlsbad, CA

Introduction

There is a paucity of Health Care Resource Utilization (HCRU) evidence related to the current peripheral nerve stimulation (PNS) device which has hindered patient access to appropriate long-term treatment of chronic pain.

A real-world study was undertaken to characterize healthcare resource utilization (HCRU) and healthcare costs among those who received PNS therapy by a micro-Implantable Pulse Generator (micro-IPG) system (Nalu Medical, Carlsbad, CA).

Methods

This was a retrospective observational cohort study of patients who received the micro-IPG between September 2019 through 2023. Patients included were between 18 and 80 years of age and had medical claims data for the 12 months before and after micro-IPG implant. Patients with cancer, stroke or myocardial infarction were excluded. The research database included linked data from the manufacturer's patient database and a large (>300 million patient lives) real-world multi-source healthcare data base (OM1, Boston, MA). HCRU and cost estimates (proxied by charge amounts) were estimated in US Dollars.

Results

Data was available on 122 PNS patients (mean age = 68 years; females = 61%). The mean of total outpatient costs declined from $18,837 pre to $7379 post (-61%). The mean of additional services costs declined from $8,049 pre to $5,020 (-38%). The mean of total medical costs also decreased from $27,493 pre to $13,717 (-50%). While not the main focus of this study, patients using opioids decreased by 31%.

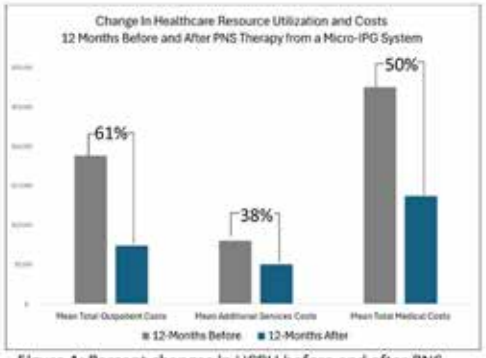


Figure 1: Percent changes in HCRU before and after PNS therapy using the micro-IPG system

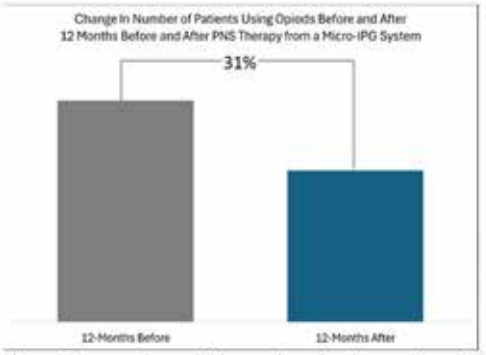


Figure 2: Percent change in the number of patients using opioids before and after PNS therapy using the micro-IPG system

Conclusions

This was the one of the first and the largest studies describing HCRU and costs associated with long-term PNS therapy. These data show a reduction in health care utilization and costs between the 12-months prior compared to the 12-months post implant of the micro-IPG. The study findings align directionally with prior research on neuromodulation [1, 2]. These positive findings warrant further investigation.

1 Rajkumar, S., et al, Health Care Resource Utilization of High-Frequency Spinal Cord Stimulation for Treatment of Chronic Refractory Low Back Pain. Neuromodulation, 2023.
2 Taylor, R. S., et al, Health care resource utilization and costs in patients with painful diabetic neuropathy treated with 10 kHz spinal cord stimulation therapy. Journal of Managed Care & Specialty Pharmacy, 2023.

Real-World Outcomes Using Thermal Radiofrequency Ablation for Chronic Pain of the Lumbosacral Region

Georgios Kyriakopoulos[1], Felice Occhigrossi[2], Fabrizio Cassini[3], Lilly Chen[4], Edward Goldberg[4]

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BACKGROUND

Conventional thermal radiofrequency (TRF) uses the application of heat (temperature) to thermo-coagulate spinal nerve roots and ablate (or lesion) neural tissue, thus interrupting pain signal transmission. This is carried out by transmitting alternating current through the body using a radiofrequency (RF) generator connected to a dispersion pad, resulting in the creation of an electric field that can be concentrated to the tip of a connected electrode placed adjacent or near the target nerve.

While various clinical studies have demonstrated the effectiveness of TRF in the context of various pain indications, periodic assessment of real-world patient data can contribute to the overall compendium of existing evidence as well as spur the initiation of new clinical studies.[1-4] As such, in this report, we describe our assessment of outcomes from a European case-series of patients who underwent a TRF procedure for the treatment of chronic pain.

METHODS

Study Design	Multi-center, Observational, Case-Series. Data collected by site personnel.
Study Device	Boston Scientific RF Systems
Patients	n = 104
Key Inclusion	Chronic Pain Patients (with no new onset pain at follow up) who underwent TRF Ablation

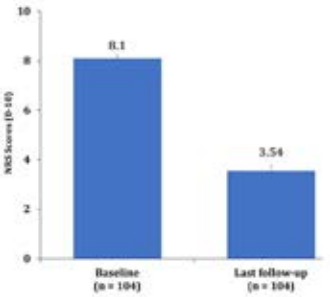
RESULTS

Baseline Characteristics (n = 104)

Gender - Females (%)	62.5% (65/104)
Age [Mean (SD)] n	70.24 (10.6) years, n = 102
Baseline NRS [Mean (SD)] n	8.1 (1.08), n = 104
Follow-up Duration[Mean (SD)] n	290 (283) days, n = 104

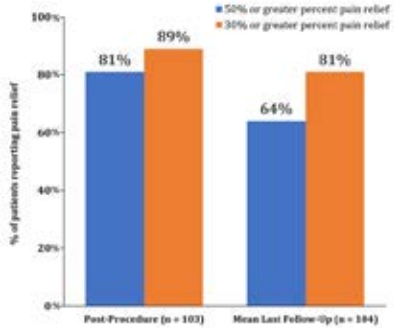
Pain Location (may have multiple locations)	Joints (10%)
	Back (71%)
	Hip (4%)

Overall Pain Scores Last Follow-Up (n = 104)



Significant improvement (4.6-points, p<0.0001) in overall pain was noted at last follow-up (mean = 290 days)

Responder Rate at Post-Procedure and Last Follow-Up (n = 104)



High responder rates (proportion of patients with >30% pain relief) post-procedure and at last follow-up (mean = 290 days)

CONCLUSIONS

- Preliminary data from this large, ongoing, European, multicenter, observational case-series of 84 chronic pain patients (no new onset of pain at follow up) who utilized thermal radiofrequency is presented.
- Results demonstrate significant improvement in chronic pain relief (4.6-points NRS score reduction, p<0.0001) at post-procedure and at last follow-up (mean = 290 days).
- High responder rates (proportion of patients with >50% and >30% pain relief) was reported at post-procedure and sustained up to last follow-up visit.

REFERENCES

1.Govind J, King W, Bailey B, Bogduk N. Radiofrequency neurotomy for the treatment of third occipital headache. J Neurol Neurosurg Psychiatry 2003;74:88–93.
2.Accola C, Grossman BC. Relief of intractable pain by percutaneous anterolateral radiofrequency cordotomy. Tex Med 1960;65:36–40.
3. Lord SM, McDonald GJ, Bogduk N. Percutaneous radiofrequency neurotomy of the cervical medial branches: A validated treatment for cervical zygapophysial joint pain. Neurosurg Q 1998;8: 288–306.
4.McDonald GJ, Lord SM, Bogduk N. Long-term follow-up of patients treated with radiofrequency neurotomy for chronic neck pain. Neurosurgery 1999;45:61–8

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RELIEF OF SCI ASSOCIATED TRANSITIONAL ZONE PAIN WITH INTERCOSTAL NERVE BLOCKS

Mubeen Tejani MD, Stephanie Jones MD

Introduction

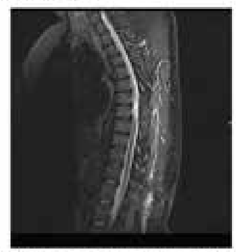
- Up to 65% of patients have chronic pain following a spinal cord injury. [1]
- Neuropathic pain can occur at the level of injury, called transitional or segmental pain. It is often associated with allodynia or hyperesthesia of the affected dermatomes. [2]
- When pharmacological or other noninvasive treatments fail to reduce pain, invasive options can be used. Dorsal Root Entry Zone (DREZ) procedures have been shown to be particularly efficacious in treating transitional zone pain. However, DREZ lesioning can be associated with notable adverse side effects including transient hemiparesis [3] or even permanent motor deficits.
- We present a case of transitional zone pain following an incomplete SCI that responded to less invasive intercostal nerve blocks. To our knowledge, there are no published reports of such a successful outcome.

History of Present Illness

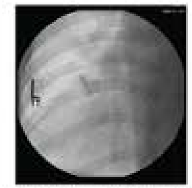
- A 42-year-old female with history of spinal cord injury associated with intradural extramedullary tumor s/p T7-T8 laminectomies one year ago presented for evaluation of 6 months of radiating left chest wall pain in the T7-T8 distribution
- She initially developed worsening lumbar spine pain after an MVA 2 years prior to presentation.
- She underwent treatment with spinal injections, with some improvement in pain, but then developed numbness and weakness in her lower extremities, and ultimately bowel/bladder dysfunction, which prompted further imaging.
- She was found to have a thoracic intradural mass with cord compression, for which she underwent surgery. She underwent physical therapy and regained her strength, but a few months later, she noticed burning pain and a sensory deficit in the left lower costal distribution from the posterior midline to the posterior axillary line.
- An updated thoracic MRI was performed which showed no spinal nerve root compression, but confirmed atrophy of the spinal cord at the T7-T8 level.

Results/Intervention

- The patient was referred to our pain clinic, and was started on duloxetine 20 mg initially for neuropathic pain.
- The following week, left T7, and T8 intercostal nerve blocks were performed under fluoroscopic-guidance, with 1.5 cc of a total solution of 2 cc 0.25% bupivacaine and 10 mg of dexamethasone injected at each level.
- At a follow-up 2 weeks later, the patient reported greater than 75% relief in left chest wall pain and had weaned completely off of duloxetine. A follow-up telephone call confirmed sustained relief at 6 weeks after the nerve blocks.
- 2 months from the procedure patient continues to report relief from nerve blocks and has not needed medication.



MRI, STIR images, showing atrophy of the cord at the T7/8 level



Injection of bupivicaine and dexamethasone at T7/T8

Conclusion

- SCI can present with transitional zone pain that can be confirmed by radiographic findings.
- DREZ, although effective in treating such central pain, is invasive with risk of hemiparesis, which would be especially detrimental in a patient who has regained strength and mobility.
- Though not entirely without risk, intercostal nerve blocks have a lower risk profile, and may be an option to treat transitional zone pain.

References

1. [illegible] Pain following Spinal Cord Injury. Spinal Cord [illegible]
2. [illegible] Post-Spinal Cord Injury pain states. Anesthesiology Clinics of North America [illegible]
3. [illegible]
4. [illegible] Neuropathic pain post spinal cord injury part 2: Systematic review of Dorsal Root Entry Zone procedure. Topics in Spinal Cord Injury Rehabilitation [illegible]

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RESOLVED CHRONIC NECK PAIN AFTER SHOULDER IMPINGEMENT SURGERY

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Shoulder impingement syndrome occurs as a result of structural changes and reduced space in the subacromial area, which classically presents as shoulder pain[1]. In some cases, it can present as chronic neck pain that is referred from the shoulders[2]. It commonly impacts those who frequently perform overhead activities, such as laborers, painters and athletes[3], with the incidence increasing with age, particularly in individuals in their sixties[4].

We report a case of **shoulder impingement syndrome presenting as chronic neck pain**; after a comprehensive evaluation of the neck and shoulders, the **patient underwent subacromial decompression surgery** of the shoulders, which resulted in **>95% of pain relief.**

Case Presentation

A 70-year-old man presented with chronic neck pain extending to both shoulders, particularly on the right. He complained of intermittent pain, with severe nighttime flares that disrupted his sleep despite taking combined acetaminophen and codeine. Over 15 years, he underwent multiple orthopedic evaluations. Cervical MRI revealed mild cervical spine stenosis and foramina narrowing at C6-C7, yet unlikely to be the source of the patient's symptoms. The patient opted for a second opinion, which prompted a comprehensive shoulder exam. Positive findings on Neer's test led to the clinical diagnosis of shoulder impingement syndrome. A shoulder MRI confirmed the diagnosis, revealing partially torn tendons due to chronic inflammation. The patient underwent subacromial decompression surgery for the right shoulder. A few months later, symptoms surfaced on the left side, and the MRI identified impingement and torn tendons of the left shoulder, leading to another successful decompression surgery.

Scan the QR code

Discussion:

Comprehensive evaluation for this patient's chronic neck pain unveiled shoulder impingement syndrome, initially masked by cervical symptoms. Accurate diagnosis of chronic neck pain can be challenging as neck and shoulder pain frequently overlap and co-occur[2]. Therefore, shoulder impingement syndrome should be considered in the differential diagnosis of chronic lower neck pain, especially since it can manifest as neck pain instead of typical shoulder pain. This underscores the critical need for thorough upper extremity examination in chronic neck pain cases and considering alternative aetiologies when re-evaluating patients to achieve accurate diagnosis and effective treatment plan.

References:

1. Creech, J. A. & Silver, S. Shoulder Impingement Syndrome. in StatPearls (StatPearls Publishing, 2023).
2. Gorski, J. M. & Schwartz, L. H. Shoulder impingement presenting as neck pain. J. Bone Joint Surg. Am. 85, 635-638 (2003).
3. DeBerardino, T. M. Shoulder Impingement Syndrome Clinical Presentation. Medscape https://emedicine.medscape.com/article/92974-clinical?form=fpf (2023).
4. Garving, C., Jakob, S., Bauer, I., Nadjar, R. & Brunner, U. H. Impingement Syndrome of the Shoulder. Dtsch. Arzteblatt Int. 114, 765-776 (2017).
5. Vandvik, P. O. et al. Subacromial decompression surgery for adults with shoulder pain: a clinical practice guideline. BMJ 364, l294 (2019).

Restorative Neurostimulation for Chronic Low Back Pain – A disease modifying pain medicine therapy

Kiran V. Patel, MD* *Northwell Lenox Hill Hospital, New York, NY, USA

Introduction

- **Chronic low back pain (CLBP)** afflicts considerable portions of the adult population
- Some with **mechanical CLBP** do not have adequate symptom relief from optimal management strategies
- **Restorative neurostimulation** has shown to be effective at mechanical CLBP arising from impaired multifidus function
- **Aim:** Evaluate clinical trial published data across multiple studies with restorative neurostimulation

Methods

- Data analyzed from patient-reported outcomes (PROs) from consented patients with restorative neurostimulation implantations in 3 major trials (ReActiv8-B (US, UK, EU, AUS), ReActiv8-C (Germany), ReActiv8-PMCF (UK))[1-3]
- Analyzed data at pre-op, 6-, 12-, and 24-months post-op
- PROs:
  - Numeric rating scale (NRS) or Visual Analog Scale (VAS) – recorded as response
  - Oswestry Disability Index (ODI)
  - EuroQol 5-Dimension 5-Level (EQ-5D-5L)

References:
[1]Gilligan C, et al. Pain. (2021); [2]Ardestani A, et al. World Neurosurg. (2022); [3]Thomson S, et al. British Journal of Pain. (2023)

Results

Complete patient data at 2 years: N=261/333; F51%; Age=49.1±0.7yrs; BMI=28.4±0.3kg/m²

- ODI improved from 41 to 21 (Fig 1)
- 60% improved ODI by >15-points
- EQ-5D-5L improved from 0.544 to 0.769 (Fig 2)
- 65% had >50% reduction in pain
- 60% classified as Remitters* (Fig 3)

*≤2.5 on VAS or ≤3 on NRS

Figure 1: Mean Change in ODI

Figure 2: Mean Change in EQ-5D

Figure 3: VAS/NRS Responder rates

Discussion

Evidence across multiple clinical studies showed positive changes from baseline in VAS/NRS, ODI, and EQ-5D-5L in patients with mechanical CLBP and multifidus dysfunction

Conclusion

Restorative neurostimulation, an additional option, provides sustained pain, function and quality of life improvements long-term for patients with multifidus dysfunction resulting from mechanical CLBP

Northwell Lenox Hill Hospital

ASIPP 2024 26TH ANNUAL MEETING

Retrograde Cervical Insertion of Spinal Cord Stimulator in Post-Laminectomy Syndrome in Patient with Fusion from Sacrum to T10

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Spinal cord stimulators (SCS) are approved by the U.S. Food and Drug Administration (FDA) for multiple pain syndromes, including post-laminectomy syndrome. Traditionally, SCS are placed in an anterograde cranial fashion with the catheter overlaying the spinal cord. However, a retrograde approach may be necessary in cases where cranial anterograde placement is either unfeasible, such as when targeting sacral nerves, or impeded, such as in the presence of spinal hardware or excessive scarring (1,2).

Case Presentation:

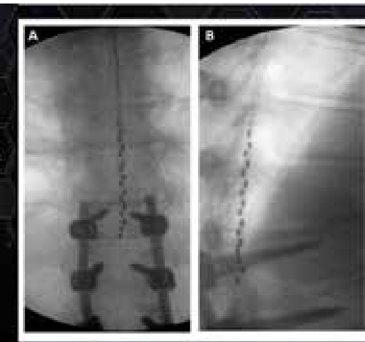
The patient is a 57-year-old male with a history of fibromyalgia, multiple sclerosis, and spinal fusion from T10 to the sacrum who presents with severe, refractory neck and back pain and bilateral radiculopathy due to post-laminectomy syndrome. His pain extends from his neck to his lower back, is described as 8-9/10 in intensity, and is exacerbated by carrying small amounts of weight. The patient's pain significantly interferes with his daily functions and has necessitated his placement on long-term disability.

He has found minor relief from physical therapy and conservative management with pregabalin and nortriptyline. He has trialed and failed management with nonsteroidal anti-inflammatory drugs, other medications for neuropathic pain (duloxetine), muscle relaxants (cyclobenzaprine), lidocaine patches, and oral opioids. An intrathecal pump with morphine had been placed in the past though was later explanted due to lack of pain relief.

On physical exam, the patient has 5/5 strength, reflexes are 2+, and sensation to light touch is intact throughout the lower extremities. An MRI was not obtained due to the presence of spinal hardware.

Methods:

SCS leads were placed in a retrograde fashion due to extensive spinal fusion and epidural scarring extending from S1 to T10 interfering with insertion. The leads were inserted at the C7-T1 level and threaded to the T10 level.



Anteroposterior (A) and lateral (B) view of the trial leads threaded in an retrograde fashion to T10 ▶

Results:

The patient initially noted over a 50% improvement of his back pain and bilateral radiculopathy. Permanent SCS leads were subsequently placed in a similar fashion, providing over a 50% of pain relief at 1 month follow-up.

Discussion:

Retrograde placement of SCS, though common for sacral access, is less documented for cranial approaches. The literature mainly reports SCS retrograde insertion in lumbar regions, with few reported cases of SCS retrograde cervical or higher thoracic insertion performed by neurosurgeons and only one permanent placement by non-neurosurgical interventional chronic pain physicians (3,4). This case represents a second instance in literature where the permanent placement of an SCS was performed with a retrograde cranial approach by a non-neurosurgical interventional chronic pain physician

While retrograde insertion can provide significant pain relief, it entails a higher risk of complications and a need for longer tunneling. Moreover, retrograde cervical placement demands specialized expertise. Further research is needed to develop standardized guidelines for this procedure.

References:
1. De Andres J, Perotti L, Villanueva-Perez VL, Asensio-Samper JM, Fabregat-Cid G. Role of lumbosacral retrograde neuromodulation in the treatment of painful disorders. Pain Physician. 2013 Mar-Apr;16(2):145-53.
2. Abd-Elsayed, A., Lee, S. & King, C. Retrograde placement of spinal cord stimulator leads for treating resistant pelvic pain. Saudi J Anaesth 11, 364 (2017).
3. Oosterbos, C. et al. Retrograde Placement of High Cervical Electrodes: A Technical Refinement and Case Series. Neuromodulation 21, 755-761 (2018).
4. Pespas, Y. Retrograde Spinal Cord Stimulator Lead Placement for Right L5 Radiculopathy. Pain Medicine 13, 733-734 (2012).

Artwork by: Sacha Moreau & Aleksy Orgenov

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Rise in Incidence of Avascular Necrosis of Joints following the COVID-19 Pandemic

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Introduction

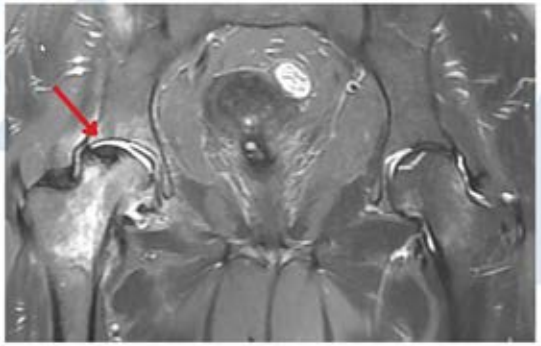
- Objective was to describe a clinical vignette in which a patient with no other comorbid risk factors developed avascular necrosis of the hip following COVID-19 infection.
- Association has not been extensively described in literature.
- Avascular necrosis is a potentailly life-threatening disease that predisposes patient's to severe joint pain, disability, fractures, joint collapse, and sepsis.

Vignette

- A 55 yo F with no significant past medical history presented for severe right-sided hip and lower back pain for 3 months refractory to pain medications; notably, she had a COVID-19 infection 3 months prior to onset of symptoms.
- Patient denied chronic tobacco, alcohol, or steroid use. Hip x-ray displaying minimal degenerative changes, and symptoms were attributed to greater trochanteric bursitis.

Results

- Patient underwent trochanteric bursa injections and physical therapy with no relief.
- Patient then received a pelvic MRI that displayed right-sided avascular necrosis of the hip joint.
- Patient underwent successful right hip replacement and resolution of her symptoms 2 months after.



Conclusion

- Avascular necrosis of the joints is a potential post-COVID-19 complication that all physicians must be aware of; MRI reamins the gold standard for diagnosis.

References

1. Lafforgue P. Pathophysiology and natural history of avascular necrosis of bone. Joint Bone Spine. 2006 Oct 1;73(5):500–7.
2. Shah KN, Racine J, Jones LC, Aaron RK. Pathophysiology and risk factors for osteonecrosis. Curr Rev Musculoskelet Med. 2015 Jul 5;8(3):201–9.
3. Greistorfer T, Jud P. Clinical characteristics of COVID-19 associated vasculopathic diseases. Thromb J. 2023 May 25;21(1):61.
4. Maronese CA, Zelin E, Avallone G, Moltrasio C, Romagnuolo M, Ribero S, et al. Cutaneous vasculitis and vasculopathy in the era of COVID-19 pandemic. Front Med. 2022 Aug 23;9:996288.
5. Becker RC. COVID-19-associated vasculitis and vasculopathy. J Thromb Thrombolysis. 2020 Oct;50(3):499-511.

Thomas Jefferson University

S1 Nerve Root Blocks Associated with Sacroiliac Joint Injections

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Abstract

Background: Sacroiliac (SI) joint dysfunction is a common cause of lower back pain. The diagnosis of SI joint pain remains challenging. Sacroiliac joint injection remains the gold standard of diagnosis of SI joint pain as well as providing therapeutic effect. One complication related to SI joint injection is temporary numbness and weakness of the leg.

Objectives: To evaluate the anatomy of SI joint, the flow of the contrast in the sacroiliac joint, and understand how local anesthetic can affect the nerve roots and cause temporary weakness and numbness of the leg.

Study Design: Retrospective case series.

Setting: Academic medical center

Methods: Patients who underwent SI joint injection with three-dimensional cone beam computed tomography with fluoroscopy (3D-CBCT) imaging were identified through retrospective review of two providers' case log from the electronic medical record. The cone beam CT images were reviewed to study the contrast spread and flow in the SI joint.

Results: 27/32 patients with the mean age 56 years (range 32 – 87 years), 20 females, and 7 males were included in this study. After reviewing cone beam CT images, 4/27 (14.8%) patients showed contrast spread in the SI joint and spread into the S1 posterior neuroforamen. The remainder 23/27 (85.2%) patients had contrast localized in the SI joint.

Limitations: Small population size, retrospective review of medical records.

Conclusion: Our results indicate the injection of lower concentration of local anesthetic with less volume may be necessary to decrease the risk of S1 nerve root block and epidural block. Furthermore, to improve the specificity of a diagnostic SI injection, an appropriate evaluation should be considered to rule out any S1 nerve pathology as a significant pain generator.

Introduction

Sacroiliac (SI) joint pain is a common cause of lower back pain with approximately 15 to 30 percent of the lower back pain originating from the SI joint. Classically, SI joint pain is localized to the lower back and buttocks that radiate to the groin. However, pain in the SI joint region has a wide range of differential diagnosis, which includes pain from lumbar spine, muscles, ligaments, and hip joints, as well as visceral pain. The diagnosis of SI joint pain remains challenging in our daily practice. Common physical examinations for SI joint pain include Fortin finger, sacral distraction, sacral compression, thigh thrust, FADIR, Patrick, Gaenslen's and tenderness over the posterior superior iliac spine (PSIS). However, these tests have high rates of false positives and negatives with variable rates of sensitivity and specificity. History and physical examinations in conjunction with imaging studies can be helpful in the diagnosis of SI joint pain. Currently, the gold standard for diagnosis of SI joint dysfunction is an intra-articular injection of a local anesthetic with or without corticosteroids.

Due to its unique multiplanar orientation, the SI joint can be difficult to access without image guidance. Additionally it can be difficult to access the joint space with traditional fluoroscopic guidance alone. CT scan, with its cross-sectional images, can identify posterior joint gap, which allows interventionist to find the optimal target to access the joint space. Several studies concluded that CT guidance is the best method of precise needle placement into the SI joints. In this retrospective case review, all SI joint injections were performed under three-dimensional cone beam computed tomography with fluoroscopy. Although SI joint injection is a relatively safe procedure, one complication is temporary numbness and weakness in the leg. This weakness is likely associated with nerve block and should resolve within a few hours after the procedure depending on the type of local anesthetic used. However, the exact mechanism of leg weakness associated with SI joint injection is poorly understood. This case review aims to evaluate the contrast spread from SI joint injection with three-dimensional cone beam computed tomography.

Results

Thirty-two patients with sacroiliac joint dysfunction underwent SI joint injections during the study. Five patients were excluded from this study based on exclusion criteria. Twenty-one patients, mean age, 59 years old (range 39-87 years) old, 20 females (74.1%) and 7 males (25.9%), were included in the study. After reviewing the post injection cone beam CT images, we observed that 4/27 (14.8%) patients had contrast spread to posterior S1 neuroforamen. The remaining 23/27 (85.2%) patients showed localized contrast spread within the sacroiliac joint.

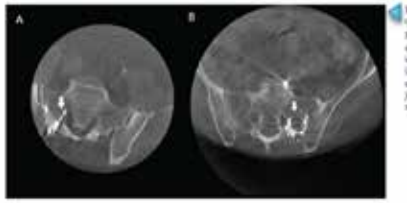

Fig 1: A and B = 3D-CBCT images of two patients who received sacroiliac joint injections. (Arrow indicates contrast spread from sacroiliac joint into posterior S1 neuroforamen)

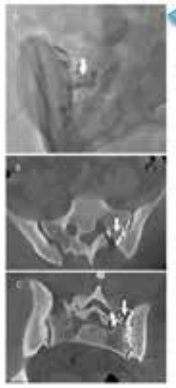

Fig 2: A: Contrast spread from sacroiliac joint to S1 neuroforamen on an oblique view on the fluoroscopic image. B: 3D-CBCT image, axial view of sacroiliac iliac joint. Contrast spread in the sacroiliac joint and S1 neuroforamen. C: 3D-CBCT image, coronal view of sacroiliac joint. Contrast spread in the sacroiliac joint and S1 neuroforamen. (Arrow indicating contrast spread into the S1 neuroforamen)

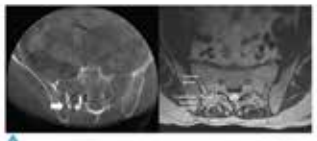

Fig 3: 3D-CBCT images (left) – Arrow indicating contrast spread in the right sacroiliac joint tracking into the right posterior S1 neuroforamen. The similar level axial plane on the lumbar spine MRI (right) demonstrating posterior sacroiliac ligament (solid line) which corresponds to this contrast track. (Dotted line indicating the track through which contrast spreads from the sacroiliac joint into posterior S1 neuroforamen)

Methods/Techniques

A retrospective review of the procedure database of two pain fellowship trained pain physicians was conducted to identify all patients that underwent sacroiliac joint injections with three-dimensional cone-beam computed tomography with fluoroscopy (3D-CBCT) imaging (March 2021 – September 2022) utilizing electronic medical record. The following exclusion criteria were used – patients with prior history of sacroiliac joint fusion or sacral fracture, patients who underwent repeat injection with the same imaging guidance, and patients who did not receive contrast into the joint space. The patients who received bilateral injections were considered as two separate sacroiliac joint injections.

All patients had appropriate informed consent and they underwent SI joint injections under 3D-CBCT. (GE Discovery 2.0S7 with 3D image fusion capability). For the procedure, the patient was positioned prone. A CT scan was performed. The posterior joint space was identified for injection. The navigation system was used target the joint space. The needle entry site was anesthetized with lidocaine 1%. A 22 G spinal needle was used to advance into the sacroiliac joint under fluoroscopic guidance. One mL of contrast was injected through the needle. Cone beam CT images were acquired to evaluate accuracy of needle placement and contrast spread in the SI joint. Once the needle placement is confirmed, 4 mL of mixture of 3 ml bupivacaine 0.25% and 1 ml (1 mg of betamethasone injectable suspension was injected.

Discussion/Limitations

We compared magnetic resonance imaging (MRI) and CT scans and discovered a fault underneath posterior sacroiliac ligament from the ilium to the sacrum through which contrast traveled from SI joint to S1 posterior neuroforamen. Our findings through this review provided clear evidence that injectates can spread underneath the posterior sacroiliac ligament and reach the posterior S1 neuroforamen and into the epidural space. Conceivably, the local anesthetic injected can inadvertently produce a S1 nerve root block.

In this case series, we observed approximately 15% patients had contrast spread to S1 neuroforamen. It is worth noting that one milliliter of contrast was injected in the SI joint before CT scan. If more contrast was injected, we might observe more contrast spread in S1 posterior neuroforamen and more cephaled spread in the epidural space. In addition, after an injection of a mixture containing 3 ml of 0.25% bupivacaine and 1 ml Betamethasone (1mg), some of the patients reported weakness in the lower extremities. However, this does not mean there was no sensory block of S1 nerve root from the injections, because no sensory examination was conducted after the injections. Our findings indicate that there is potential local anesthetic spread to S1 neuroforamen and epidural space from diagnostic SI injections, which may lead to false positive result for patients with pain from S1 pathology and lumbar spine, especially lower segment of the lumbar spine. To minimize the false positive rate, an appropriate evaluation and diagnostic tests should be considered to rule out pain from S1 nerve root and lower segment of lumbar spine prior to diagnostic SI joint injections.

References

[1] Cohen SP, Chen Y, Neufeld NJ. Sacroiliac joint pain: a comprehensive review of epidemiology, diagnosis and treatment. Expert Rev Neurother. 2013 Jan;13(1):99-116. doi: 10.1586/ern.12.151. PMID: 23256492.

[2] Dreyfuss P, Dreyer S, Cole A, Mayo K. Sacroiliac joint pain. J Am Acad Orthop Surg. 2004 Mar-Apr;12(2):255-65. doi: 10.5435/00124635-200403000-00009. PMID: 15132671.

[3] Laslett M, Aprill CN, McDonald B, Young SB. Diagnosing painful sacroiliac joints: validity of a McKenzie evaluation and sacroiliac provocation tests. Aust N Z J Physiother. 2005;51(3):145-54. doi: 10.1016/s0004-9514(05)70023-x. PMID: 16137242.

[4] Maigne JY, Planchon CA. Sacroiliac joint pain after lumbar fusion. Eur Spine J. 2005 Jun;14(5):468-74. doi: 10.1007/s00586-004-0837-1. Epub 2004 Dec 15. PMID: 15599757; PMCID: PMC3489222.

[5] Murakami E, Tanaka Y, Aizawa T, Ishizuka M, Kokubun S. Effect of periarticular anesthetic injection in patients with active sacroiliac joint pain. J Orthop Sci. 2007 Jan;12(1):35-42. doi: 10.1007/s00776-006-1083-1. Epub 2007 Jan 19. PMID: 17235660.

[6] Murakami E, Tanaka Y, Aizawa T, Ishizuka M, Kokubun S. Effect of periarticular anesthetic injection in patients with active sacroiliac joint pain. J Orthop Sci. 2007 Jan;12(1):35-42. doi: 10.1007/s00776-006-1083-1. Epub 2007 Jan 19. PMID: 17235660.

[7] Murakami E, Tanaka Y, Aizawa T, Ishizuka M, Kokubun S. Effect of periarticular anesthetic injection in patients with active sacroiliac joint pain. J Orthop Sci. 2007 Jan;12(1):35-42. doi: 10.1007/s00776-006-1083-1. Epub 2007 Jan 19. PMID: 17235660.

[8] Murakami E, Tanaka Y, Aizawa T, Ishizuka M, Kokubun S. Effect of periarticular anesthetic injection in patients with active sacroiliac joint pain. J Orthop Sci. 2007 Jan;12(1):35-42. doi: 10.1007/s00776-006-1083-1. Epub 2007 Jan 19. PMID: 17235660.

[9] Murakami E, Tanaka Y, Aizawa T, Ishizuka M, Kokubun S. Effect of periarticular anesthetic injection in patients with active sacroiliac joint pain. J Orthop Sci. 2007 Jan;12(1):35-42. doi: 10.1007/s00776-006-1083-1. Epub 2007 Jan 19. PMID: 17235660.

Safety of SI-6603 (Condoliase) for Radicular Leg Pain Associated With Lumbar Disc Herniation: An Integrated Safety Analysis of Clinical Trials

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INTRODUCTION

- Chemonucleolysis with condoliase (CHEMICAL), a chondroitin sulfate ABC endolysin specific for glycosaminoglycans, is the only nonsurgical treatment approved in lumbar disc herniation (LDH) that does not require concomitant treatment strategies[1]
- Phase 2/3 and phase 3 clinical trials conducted in the United States (US) and Japan (JP) showed that condoliase significantly improved LDH-associated radicular leg pain vs placebo[2-4]
- Intradiscal injection of condoliase (1.25 and 2.5 U) has been approved in JP for the treatment of LDH since 2018[5]
- We characterized the safety profile of condoliase for LDH using integrated data from completed phase 2 and 3 clinical trials in the US, European Union (EU), and JP

METHODS

- The safety populations from 5 multicenter, phase 2/3 and 3 studies of a single intradiscal injection of condoliase in participants aged 20-70 years (JP) and 20-70 years (US/EU) with radicular leg pain associated with LDH were analyzed for adverse events (AEs) and other safety outcomes (**Table 1**)
- The primary safety pool comprised 4 randomized, placebo-controlled, double-blind studies of condoliase and were analyzed by the commercially approved condoliase dose of 1.25 U, doses >1.25 U, and pooled placebo groups
- The secondary pool comprised the primary pool and 2 uncontrolled studies of condoliase

Table 1. Clinical Studies Evaluating the Safety of Condoliase

Study #	Phase/ Location	N	Dose/ Comparator	Full Safety Monitoring*	Observation Period
Randomized placebo/sham-controlled trials (primary pool)					
1001	Phase 2/3 JP	195	1.25, 2.5 U (pooled)	12 weeks	52 weeks
1003	Phase 3 JP	156	1.25 U (double-blind)	12 weeks	52 weeks
1101	Phase 3 US/EU	368	1.25 U (double-blind)	104 weeks	104 weeks
1103 (Extended)	Phase 3 US/EU	330	1.25 U (double-blind)	52 weeks	52 weeks
Uncontrolled studies					
1102	Phase 2 US	50	0.5, 1.25, 2.5 U	12 weeks	52 weeks
1102	Phase 3 US/EU	1011	1.25 U	26 weeks	26 weeks

Note: Study 1001, 1003, and 1102 were conducted in JPN and the data from the double-blind treatment period after 52 weeks in the study of the 1.25 U dose group were integrated. Study 1101 was conducted in the US and EU, and the data from the double-blind treatment period after 104 weeks in the study of the 1.25 U dose group were integrated. Study 1103 was conducted in the US and EU as an extension study of Study 1101.

RESULTS

- For the primary pool (**Table 2**), 394 participants treated with condoliase (1.25 U) and 73 (% treated with placebo/sham) completed the study
- The secondary pool included a total of 1273 participants (601 [%, male] who were exposed to condoliase (at 1.25 U in the phase 2 and 3 combined and uncontrolled studies

KEY TAKEAWAYS

1. **Condoliase was well tolerated in adults (N=1679) with radicular leg pain associated with LDH**
2. **Spinal imaging changes seen with condoliase were not associated with clinical symptoms**
3. **Overall, there was a low incidence of AEs of special interest across condoliase and placebo/sham groups**
4. **Condoliase, approved for use in Japan, may offer a minimally invasive option for patients with LDH in the US**

Table 2. Baseline Participant Characteristics: Primary Pool

	Condoliase 1.25 U (n=394)	Condoliase >1.25 U (n=195)	Placebo/ Sham (n=196)
Age, mean (SD), years	45.2 (10.32)	47.1 (10.63)	43.9 (11.51)
Sex, %			
Male	55.4	69.4	53.5
Female	44.6	31.6	46.5
Race, %			
White	64.2	0	35.3
Black	0.7	0	7.6
Asian	34.4	100.0	54.1
Other	2.1	0	3.3
Geographic Region, %			
United States	71.3	0	67.7
Japan	32.7	100.0	32.3
Screening BMI (SD), kg/m²	27.52 (4.79)	25.33 (3.95)	26.90 (4.63)
Smoking Status, %			
Never smoked	50.5	42.9	55.6
Past smoker	23.9	11.2	16.7
Current smoker	25.4	45.9	27.6
Occupation, %			
Light labor	71.4	53.8	70.4
Heavy labor	28.6	70.4	37.8
Days since most recent radicular leg pain, median	180.0	120.0	154.0
Modic Type 1	13/957 (93.7)	15/68 (15.3)	25/206 (16.8)
Modic Type 2	86/577 (17.0)	39/68 (0.1)	35/206 (16.8)
Modic Type 3	4/577 (0.7)	0/68	3/206 (0.9)

- The majority of participants in the condoliase 1.25 U and placebo/sham groups were male (approximately 60%)
- Differences in demographic characteristics aligned with country of enrollment

- Up to Week 13, all-treatment-emergent AE (TEAE) were reported in 85.9% of the condoliase 1.25 U (609 events) and 54.5% of the placebo/sham group (510 events) (**Table 2**; **Figure 1**)
- Only one serious AE (SAE) of back pain was considered related to condoliase

Table 3. Summary of Adverse Events Up to Week 13: Primary Pool

n (%)	Condoliase 1.25 U (n=394)	Condoliase >1.25 U (n=195)	Placebo/ Sham (n=196)
Any TEAE	361 (85.9)	75 (75.3)	215 (54.3)
Any treatment-related TEAE	149 (35.9)	43 (43.9)	52 (13.1)
Any SAE	15 (3.6)	2 (2.0)	10 (2.5)
Any treatment-related SAE	1 (0.2)	0	0
TEAE leading to study discontinuation	3 (0.7)	0	0 (0.2)
TEAEs in ≥5% of participants			
Back pain	133 (33.8)	33 (33.4)	59 (14.8)
Abnormal dreams	67 (16.5)	17 (17.3)	10 (2.5)
Pain in extremity	66 (17.2)	14 (14.3)	46 (12.5)
Nasopharyngitis	34 (8.6)	8 (8.2)	16 (4.3)
Abnormal sensation in leg	29 (8.6)	13 (13.3)	7 (1.8)
Injection site pain	27 (6.7)	5 (5.1)	16 (4.3)

- The incidence of TEAEs was similar for condoliase 1.25 U and placebo/sham groups
- TEAEs leading to study discontinuation was low (equal in the condoliase groups vs placebo/sham)

Figure 1. Participants With TEAEs by Severity*

*Treatment-emergent AEs.

Table 4. Imaging Findings at Week 13: Primary Pool

n (%)	Condoliase 1.25 U (n=376)	Condoliase >1.25 U (n=188)	Placebo/ Sham (n=204)
Decrease from baseline in disc height ≥20%	206/210 (98)	98/101 (97)	66/90
Vertebral posterior angle fissure‡	70/143 (49)	36/81 (44)	20/41 (49)
Vertebral body translation ≥3 mm	65/120 (54)	19/61 (31)	20/41 (49)
Modic Type 1	31/42 (74.3)	10/11 (91)	3/4 (75)
Modic Type 2	34/74 (46)	9/50 (18)	17/37 (46)
Modic Type 3	3/24 (12.5)	0/6	0/4

‡Grade 3 or 4 in Pfirrmann classification.

Because association between imaging findings and clinical symptoms was observed

Table 5. AEIBs by PT in ≥1% of Primary Pool Across All Time Intervals

	Condoliase 1.25 U (n=394)	Condoliase >1.25 U (n=195)	Placebo/ Sham (n=196)
Any AEIB, n/FU days	43/5,414	7/1,711	26/5,313
	11/0.8	1/0.6	3/0.6

There was a low incidence of AEIBs in both treatment groups

- For the secondary pool, across all time intervals, 69.0% of participants treated with condoliase (at 1.25 U) reported at least one TEAE; 4.9% of total are SAE and 0.5% TEAEs leading to discontinuation
- Treatment-related TEAEs were reported for 24.4% of participants (condoliase at 1.25 U) in the secondary pool, none of which were fatal or led to study discontinuation
- The rate of postintervention lumbar surgery at the 2-year level was 2.5% (n=40) for the secondary pool condoliase 1.25 U group

References

1. Watanabe K, Chiba K, Matsumoto M, et al. Long-term follow-up study of chymodiactic treatment with condoliase for lumbar disc herniation: 5-year results. Eur Spine J. 2015;24(4):644-651.
2. Watanabe K, et al. J Pharmacol Exp Ther. 2015;353(3):616-624.
3. Chiba K, et al. Spine. 2015;40(15):1213-1221.
4. Iwai-Saito K, et al. Pain Pract. 2017;17(8):1000-1011.
5. Iwai-Saito K, et al. Int J Rheum Dis. 2018;21(1):205-213.

Acknowledgments & Disclosures

This study was sponsored by Seikagaku Corporation. Medical writing support was provided by Scientific Healthcare Communications and funded by Ferring Pharmaceuticals.

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Presented at the American Society of Interventional Pain Physicians (ASIPP) 20th Annual Meeting | April 4-6, 2024 | Dallas, Texas

Safety Profile of Lateral Transiliac Sacroiliac Joint Fusion: A Single-Center Retrospective Chart Review

Michael Jung, M.D.
Wisconsin Spine and Pain, Sheboygan, WI, USA.

INTRODUCTION

Minimally invasive sacroiliac (SI) joint fusion has become the mainstay treatment for chronic refractory SI joint dysfunction. Multiple procedures are now available, including lateral and posterolateral approaches with metal implants, and posterior interpositional using bone allograft. The lateral approach has the most robust evidence, including multiple level I studies. However, to date, the literature has been published primarily by surgeons.

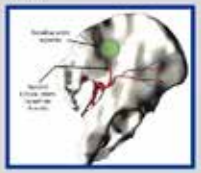
The risk of vascular injury to the superior gluteal artery (SGA) branches has been raised as a potential concern with the lateral transfixing procedure, but the rhetoric is unsubstantiated.

AIM: The aim of this retrospective chart review was to evaluate the safety and preliminary effectiveness of lateral SIJ fusion performed by physicians trained in interventional pain management.

METHODS

Retrospective analysis of patients who underwent lateral SIJF between December 2022 and September 2023 at a single center. Data on demographics, perioperative details, complications, and postoperative outcomes were collected and analyzed.

A.



B.

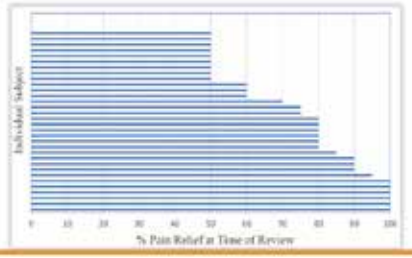
A. General path of a lateral trans-iliac metal implant placement, which has potential to intersect with the superior gluteal artery. B. Fluoroscopy images of metal implants placed using a lateral trans-iliac trajectory.

RESULTS

49 cases were available for review. Mean (SD, range) age was 64 (11, 34-83), BMI was 32.5 (8.4), 59% were female, 35% were smokers and 82% were on opioids at baseline.

Procedural Metrics	
Mean OR time (SD)	40 min (11)
Mean EBL (SD)	16.5 cc (15.9)
Operative facility	100% ASC
Device or procedure related adverse events	0

Mean follow-up time was 96 days, with follow-up pain scores available for 36 patients. At follow-up, 89% of patients reported >50% pain relief. Three patients that reported 0% relief suffer from multiple pain generators, are obese and on long term opioid medication.



CONCLUSION

Results of this single center experience support the safety of lateral SI joint fusion using a threaded implant when performed by interventional pain management physicians. However, further prospective studies with larger sample sizes and longer follow-ups are warranted to validate these findings.

Scrambler Therapy: A Potential Therapeutic Option for Pain in Schwannomatosis

Authors: Rachel Hanke, MD[1], Matthew Chung, MD[2]

1. University of Texas Health Houston, McGovern Medical School 2. The University of Texas MD Anderson Cancer Center

Background

Schwannomatosis

- A disorder characterized by multiple benign nerve sheath tumors composed of Schwann cells, called schwannomas
- Phenotypic umbrella term for the NF-2-, SMARCB1-, LZTR1- and 22q- related Schwannomatosis, Schwannomatosis-not otherwise specified (NOS) and Schwannomatosis-not elsewhere classified (NEC) discriminated by genetic testing focusing on molecular analysis[1]
- Patients suffer from neuropathic pain that is often inadequately relieved with mainstay therapies including medications and surgical resection in consideration of loss of adjacent nerve function

Scrambler Therapy

- A transcutaneous electrical nerve stimulation technique that has shown analgesic effect for pain in several clinical studies and is approved by the Food and Drug Administration for pain treatment
- Originally used for cancer pain but has shown use in several non-cancer neuropathic pain conditions such as diabetic neuropathy, postsurgical neuropathic pain and postherpetic neuralgia [2,3]
- Rather than inhibiting pain transmission by stimulating A-beta fibers as in gate control theory, Scrambler Therapy aims to transform pain signals into non-pain signals via C fibers. Scrambler Therapy has not yet been clinically studied in Schwannomatosis or with application to sites on the head

Case Presentation

44-year-old male with a history of a left thigh malignant peripheral nerve sheath tumor and multiple sarcomas status post resection, presenting with three years of frontal pain in the setting of Schwannomatosis. The pain was described as:

- Constant, throbbing and stabbing, radiating to the temporal and occipital regions of the head and accompanied by paresthesias
- Aggravated by walking, screen time and frowning, and resulted in an inability to work and sleep disruption
- Refractory to serotonin and norepinephrine reuptake inhibitors, tricyclic antidepressants, antiepileptics, nonsteroidal anti-inflammatories, narcotics, ketamine infusions and CGRP inhibitors
- Refractory to supraorbital nerve and supertrochlear nerve blocks, neurolysis, radiofrequency ablation, cervical epidural stimulator, surgical trigeminal nerve decompression, botox and TENs therapy

Objective

To assess Scrambler Therapy as a possible therapeutic option for chronic neuropathic pain in Schwannomatosis.

Images 1 and 2. 8 electrodes through four channels placed around areas of frontal pain on head.

Methods

The patient was treated with 45-minute sessions of Scrambler Therapy on 10 consecutive weekdays. 8 electrodes through four channels were placed around painful areas on the head.

Discussion

The patient noted improvement in neuropathic pain from 7 out of 10 pain to 4 out of 10 after one session, and to 2 out of 10 after ten sessions. The patient reported significant improvement in sleep after one session. He also reported more relief after one session than during his entire pain management experience prior. Of note, there was a decrease in medication dosing after two sessions. He was able to gradually return to walking and screen time after two sessions. No adverse effects were noted during therapy and post-therapy.

Conclusion

We suggest Scrambler Therapy as a non-medicinal, non-invasive, targeted option that may be a viable therapy for chronic pain in Schwannomatosis. This case demonstrates the need for further clinical trials to confirm the pain improvement with Scrambler Therapy in this population.

References

1. Plotkin SR, et al; International Consensus Group on Neurofibromatosis Diagnostic Criteria (I-NF-DC), Huson SM, Wolkenstein P, Evans DG. Updated diagnostic criteria and nomenclature for neurofibromatosis type 2 and schwannomatosis: An international consensus recommendation. Genet Med. 2022; 24(9):1967-1977.

2. Marineo G, et al. Scrambler therapy may relieve chronic neuropathic pain more effectively than gabapentin-based drug management: results of a pilot, randomized, controlled trial. J Pain Symptom Manage. 2012; 43(1):87-95.

3. Ricci M, et al. Managing chronic pain: results from an open-label study using MC5-A Calmare® device. Support Care Cancer. 2012; 20(2):405-12.

SCS using Combination Therapy in Chronic Pain Patients: A Real-World, Observational European Study

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BACKGROUND

Spinal Cord Stimulation (SCS) programming customized to the individual needs of each patient is thought to be integral the most effective clinical outcomes when using SCS for management of chronic pain. This is in part supported by the fact that the experience of chronic pain itself is inherently dynamic and highly subjective in nature. Our previously published work has also shown that, when given multiple available options, a substantial proportion of SCS patients utilize a variety of waveforms including combination-based SCS programming[1,2]. More recently, an RCT study has suggested the added value of using SCS programming that combines neurostimulative modalities such as (but not limited to) the utilization of supra- and sub-perception-based approaches.[3] Here, we report the real-world outcomes of patient implanted with an SCS device, as part of a multi-center observational study, who preferred to use combination therapy to treat their chronic pain.

METHODS

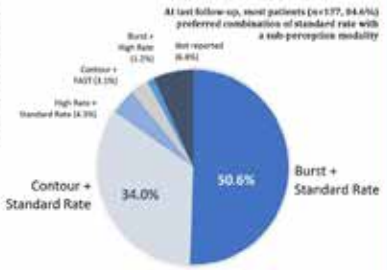
Study Design	Multicenter, Consecutive, Observational, Case-Series
Study Device	WaveWriter Alpha or Spectra Wavewriter SCS Systems with the following capabilities: • Combination Therapy (sequential or simultaneous) • Multiple available sub- and supra-perception waveforms • Fast Acting Sub-Perception Therapy, FAST • Electric field targeting algorithm (Contour) • Waveform Automation
Subjects	162 subjects diagnosed with chronic pain and preferred Combination Therapy-based SCS programming at last follow-up

RESULTS

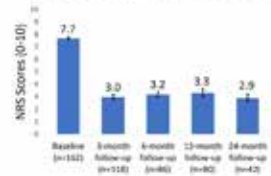
Baseline Characteristics (n = 162)

Age (yrs.) - Mean (SD) n	56.7 (12.9) 158
Gender (Female) - % (n/N)	54.3% (88/162)
Pain location (%)	Low back and/or legs (80%)
Diagnosis for receiving the stimulator (may have multiple diagnosis) - %	
Failed Back Surgery Syndrome	56.8%
Lumbosacral radiculopathy	17.9%
Complex Regional Pain Syndrome	8.0%
Baseline Overall Pain (NRS)- Mean (SD) n	7.7 (1.4) 162
Follow-up Duration (days) - Mean (SD) n; Median	526.8 (444.1) 162; 368.0

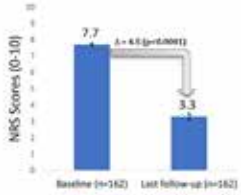
Preferred programs at last follow-up



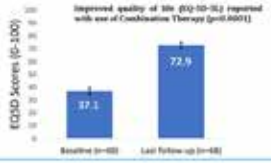
Overall Pain Scores in Combination Therapy-preferred users at up to 24-month follow-up (n=162)



Overall Pain Scores at last follow-up (n=162)



Quality of Life n=69 (EQ-5D-5L)



- **A mean 4.5 ± 2.6-point improvement (p<0.0001) in overall pain was reported at last follow-up (average 1.4 years after implant)**
- **Responder rate (PPR≥50%) at last follow-up was 80% (60/75).**

CONCLUSIONS

- Multiple mechanisms are thought to govern the pain-relieving effects of paresthesia-based and sub-perception-based SCS[4-6]
- Data from this multicenter, real-world, observational case-series demonstrate significant improvement of chronic pain and quality-of-life in patients utilizing Combination Therapy to engage multiple mechanisms of action, simultaneously.
- Results demonstrated a 4.5 ± 2.6-point improvement in overall pain at last follow-up (n=162, p<0.0001), with 80% patients reporting ≥50% pain relief.
- Significant improvement in quality-of-life was noted at last follow-up. (p<0.0001)
- This study is on-going and will continue to evaluate real-world outcomes in patients using Combination Therapy.

REFERENCES

AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT

ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas - April 4-6, 2024

Self-Review of Imaging Leads to an Incidental Finding of Adenocarcinoma of the Pelvis in a Patient with Bilateral Total Hip Arthropathies Presenting with Pelvic and Buttock Pain: a Case Report

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Peconic Bay Medical Center
Northwell Health

Background

- Pain is one of the most common clinical symptoms of metastatic disease.
- This case report discusses the discovery of a metastatic adenocarcinoma in the pelvis in a patient who presented with left sided hip and buttock pain with a surgical history of bilateral total hip arthoplasties.
- This case also highlights the importance of physicians reviewing their own imaging studies.

Patient Presentation

- 74 year old female with a PSHX of b/l THA was referred to pain management for left-sided lower back and buttock pain, that radiated down the left leg along the L5 and S1 dermatomal distributions
- The patient suffered chronically with the pain for years, requiring her to use a cane daily, but had worsened in the weeks prior to presentation
- Prior conservative management, including PT, medication, and trigger point injections, had failed.
- On exam positive findings included tenderness over the left PSIS and 3/5 strength with left hip flexion.
- All other special tests were negative

X-Ray

- New x-rays were compared to imaging performed 2 years prior, which showed stark differences to the left hemipelvis and iliac bone, specifically their sharpness and contour, over such a short of amount of time from Sept 2021 to Sept 2023
- These differences can be seen in Image 1

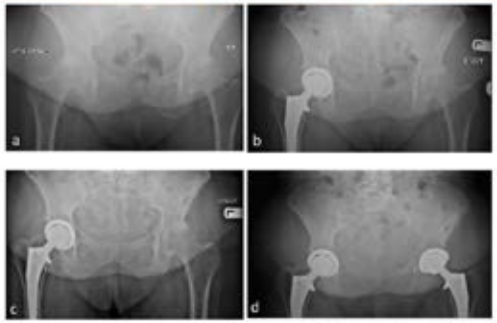


Image 1: The following series of x-rays show the regression and loss of contour of the left hemipelvis from a.) 9/9/21, b.) 4/11/22, c.) 4/28/22, and d.) 9/1/23

MRI

- The patient was referred for MRI, which showed that a large 3.1 cm mass with soft tissue expansion had replaced the left hemipelvis, as shown in Image 2
- These findings were concerning for malignancy with considerations including lymphoma and metastatic disease.

Further Investigation

- The patient was referred to oncology, where biopsy performed was positive for metastatic adenocarcinoma
- Further immunohistochemical profile that was done suggested metastatic adenocarcinoma with origin from the lung

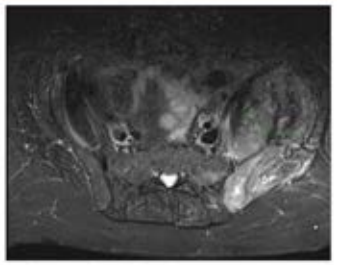


Image 2: MRI from 10/24/23 further captured the 3.1 cm mass that had overtaken the patient's left hemipelvis

Conclusion and Discussion

- The patient went on to receive radiation therapy to the left hip, and initiated treatment with Pembrolizumab with Carboplatin and Pemetrexed for NSCLC
- This study emphasizes the need for providers to review their own imaging studies for differences over time

Acknowledgements and References

- Thank you to Dr. Navlani for your guidance and support, and for the patient who this case report is about for allowing us to discuss her case

References:
1.) Aaron, Alan D. M.D., Washington, D.C. Current Concepts Review - Treatment of Metastatic Adenocarcinoma of the Pelvis and the Extremities*. The Journal of Bone & Joint Surgery 79(6):p 917-32, June 1997.
2.) Schreiderbauer, Michaela M. MD1; von Knoch, Marius MD2; Schleck, Cathy D. BS1; Harmsen, William S. MS1; Sim, Franklin H. MD1; Scully, Sean P. MD, PhD1. Patient Survival After Hip Arthroplasty for Metastatic Disease of the Hip. The Journal of Bone & Joint Surgery 86(8):p 1684-1689, August 2004.

Significant Improvement in Pain Outcomes Using a Disposable All-In-One Radiofrequency Injection Electrode in a Multicenter, Observational European Case-Series

Felice Occhigrossi[1], Georgios Kyriakopoulos[2], Fabrizio Cassini[3], Isaac Peña[4] , Lilly Chen[5], Edward Goldberg[5]

1. San Giovanni-Addolorata Hospital, Rome, Italy 2. St. Marien-Hospital Hamm; Hamm, Germany 3. Presidio Ospedaliera Civile Santi Antonio e Biagio; Alessandria, Italy
4. Hospital Virgen Del Rocio, Seville, Spain 5. Boston Scientific Neuromodulation , Valencia, CA, USA

BACKGROUND

Treating several chronic intractable pain syndromes with a diverse set of etiologies has been consistently shown to be successfully carried out using radiofrequency (RF). Conventional thermal RF (TRF) uses the application of heat (temperature) to thermo-coagulate spinal nerve roots and ablate neural tissue. Alternatively, pulsed RF (PRF) is performed using short pulses (typically 20-ms every 0.5 sec) at much lower temperatures usually no higher than 42°C, thus avoiding destruction of neural tissue. Although these RF methods have specific advantages and disadvantages, they both offer viable alternatives for consideration per the particular aspects of the chronic pain condition as well as the overall health and preference of each patient.[1]

While RF is now a well-established therapeutic modality for chronic pain, periodic assessment of real-world patient data can contribute to the overall compendium of existing evidence as well as spur the initiation of new clinical studies. As such, in this report, we describe our assessment of outcomes from a European case-series of patients who underwent an RF procedure for the treatment of chronic pain.

METHODS

Study Design	Multicenter, Consecutive, Observational, Case-Series.
Study Device	Radiofrequency Ablation (RFA) Systems Unified "All-in One" RF Injection Electrode (Boston Scientific) 
Patients	n = 250
Key Inclusion	Chronic Pain Patients who underwent RFA (pulsed or thermal)

RESULTS

Baseline Characteristics
(n = 250 subject who have completed follow-up)

Gender - Females (%)	58.8% (147/250)
Age [Mean (SD)] n	67.5 (23) years, n = 238
Baseline NRS [Mean (SD)] n	7.9 (1.24), n = 248
Follow-up Duration[Mean (SD)[n	292 (323) days, n = 250

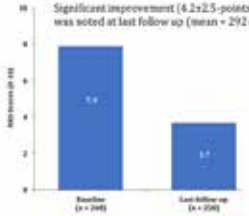
Pain Location (may have multiple locations)	Joints (11.6%)
	Back (43.2%)
	Hip (4.0%)

Of 250 subjects (with no new onset of pain at follow-up) who have completed follow-up:

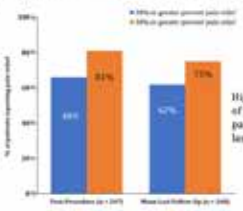
- **164 subjects underwent the RFA procedure using the Unified all-in-one" disposable electrode, cannula and injection tube.**

Overall Pain Scores at Baseline and Last Follow Up

Significant improvement (6.2±2.5-points, p<0.0001) in overall pain was noted at last follow up (mean = 292 days)



Responder Rate at Post-Procedure and at Last Follow Up



High responder rates (proportion of patients with >50% and >30% pain relief) post-procedure and at last follow-up (mean = 292 days)

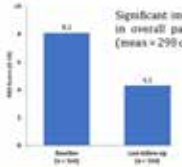
Patients with "All in One" RFA (n = 164)

Baseline Characteristics (n = 164)

Age [Mean (SD) n]	72.89 (24.61) 160
Pain Location (may have multiple locations)	Joints (17.1%)
	Back (49.39%)
	Hip (2.4%)
Follow Up Duration [Mean (SD)] n	298 (335) 164

Overall Pain Scores at Baseline and Last Follow Up

Significant improvement (3.9-points, p<0.0001) in overall pain was noted at last follow up (mean = 298 days)



CONCLUSIONS

- Preliminary data from this ongoing, European, multicenter, observational case-series of 153 chronic pain patients (no new onset of pain at follow up) who utilized radiofrequency (pulse or thermal) is presented here.
- Study results demonstrate significant improvement in pain scores at post-procedure and at last follow-up (mean = 292 days).
- High responder rates (proportion with >50% and >30% pain relief) reported post-procedure and sustained to last follow-up.
- Among these patients, 164 underwent RFA using the all-in-one disposable electrode, cannula, and injection tube, and were found to have significant improvement in overall pain at mean last follow-up (298 days) – demonstrating long-term efficacy.

REFERENCES

1. Abadian FM. Pulsed radiofrequency neurotomy: advances in pain medicine. Curr Pain Headache Rep. 2004;8(1):34–40.

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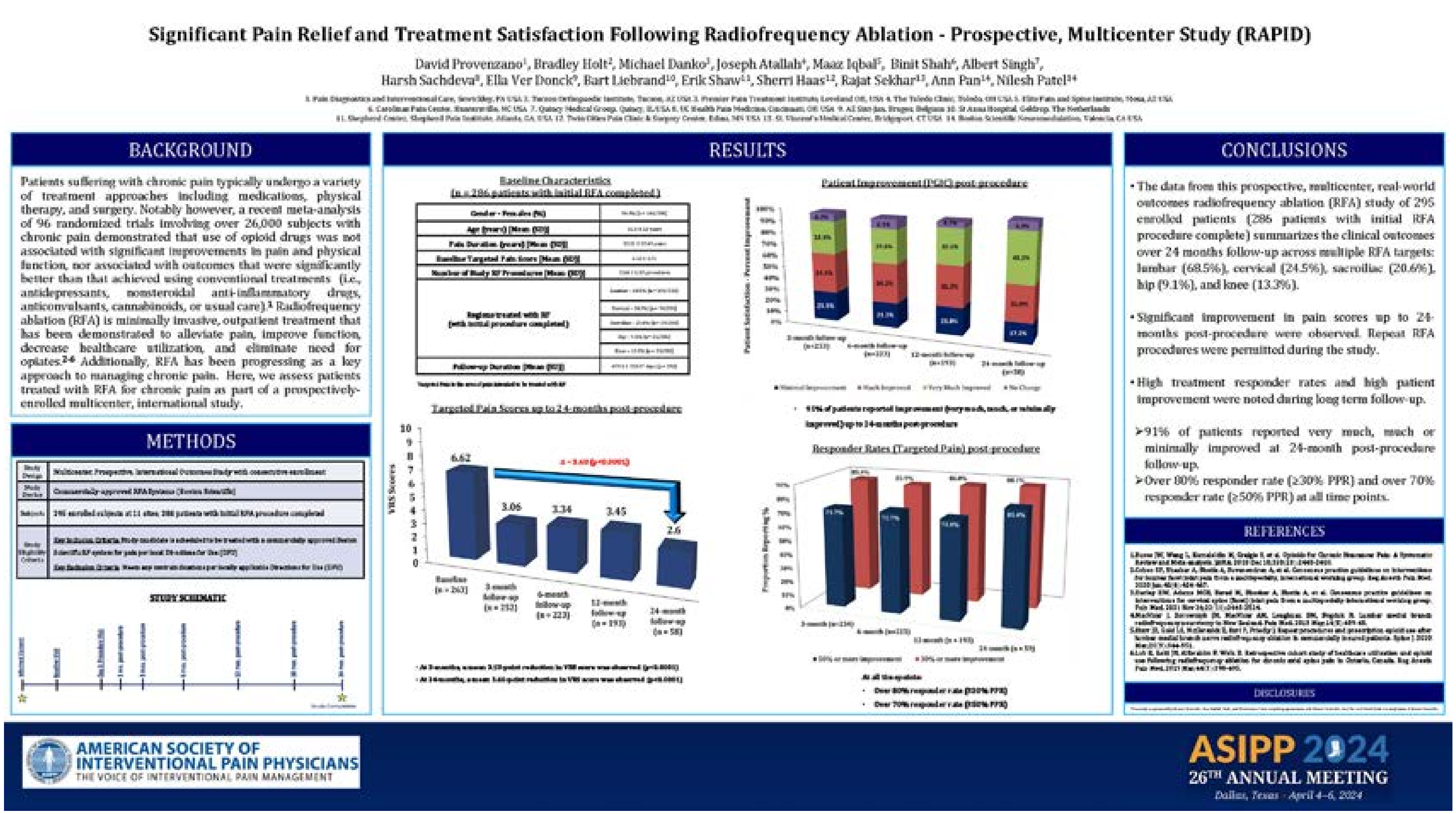
Significant Pain Relief and Treatment Satisfaction Following Radiofrequency Ablation - Prospective, Multicenter Study (RAPID)
David Provenzano1, Bradley Holt2, Michael Danko3, Joseph Atallah4, Maaz Iqbal5, Binit Shah6, Albert Singh7, Harsh Sachdeva8, Ella Ver Donck9, Bart Liebrand10, Erik Shaw11, Sherri Haas12, Rajat Sekhar13, Ann Pan14, Nilesh Patel14
BACKGROUND
Patients suffering with chronic pain typically undergo a variety of treatment approaches including medications, physical therapy, and surgery. Notably however, a recent meta-analysis of 96 randomized trials involving over 26,000 subjects with chronic pain demonstrated that use of opioid drugs was not associated with significant improvements in pain and physical function, nor associated with outcomes that were significantly better than that achieved using conventional treatments (i.e., antidepressants, nonsteroidal anti-inflammatory drugs, anticonvulsants, cannabinoids, or usual care).1 Radiofrequency ablation (RFA) is minimally invasive, outpatient treatment that has been demonstrated to alleviate pain, improve function, decrease healthcare utilization, and eliminate need for opiates.2-6 Additionally, RFA has been progressing as a key approach to managing chronic pain. Here, we assess patients treated with RFA for chronic pain as part of a prospectively-enrolled multicenter, international study.
METHODS
STUDY SCHEMATIC
RESULTS
Baseline Characteristics
(n = 286 patients with initial RFA completed)
Targeted Pain Scores up to 24-months post-procedure
VRS Scores
6.62
3.06
3.34
3.45
2.6
Baseline (n = 263)
3-month follow-up (n = 232)
6-month follow-up (n = 223)
12-month follow-up (n = 193)
24-month follow-up (n = 58)
Patient Improvement (PGIC) post-procedure
Responder Rates (Targeted Pain) post-procedure
At all timepoints:
Over 80% responder rate (≥30% PPR)
Over 70% responder rate (≥50% PPR)
CONCLUSIONS
The data from this prospective, multicenter, real-world outcomes radiofrequency ablation (RFA) study of 295 enrolled patients (286 patients with initial RFA procedure complete) summarizes the clinical outcomes over 24 months follow-up across multiple RFA targets: lumbar (68.5%), cervical (24.5%), sacroiliac (20.6%), hip (9.1%), and knee (13.3%).
Significant improvement in pain scores up to 24-months post-procedure were observed. Repeat RFA procedures were permitted during the study.
High treatment responder rates and high patient improvement were noted during long term follow-up.
➢91% of patients reported very much, much or minimally improved at 24-month post-procedure follow-up.
➢Over 80% responder rate (≥30% PPR) and over 70% responder rate (≥50% PPR) at all time points.
REFERENCES
DISCLOSURES
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
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ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas · April 4–6, 2024

Simultaneous Kyphoplasty and Intrathecal Pump Insertion for Oncology Patient with Neuroendocrine Tumor to the Lumbar Spine

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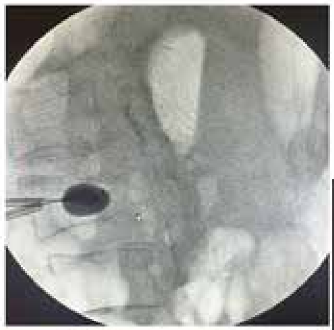
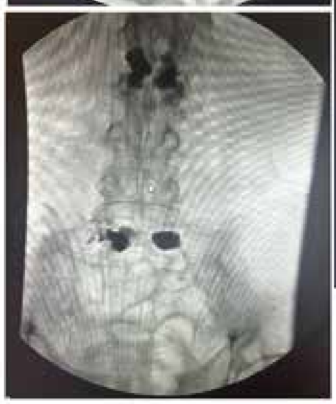
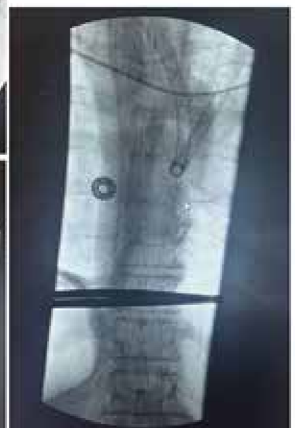
Department of Anesthesiology, Robert Wood Johnson Medical School, New Brunswick, New Jersey

Introduction

Intrathecal pumps are the gold standard for interventional pain management of cancer patients. Concurrent kyphoplasty could provide increased quality of life moving forward for bone metastasis through opioid-sparing improved pain control and expanded mobility.







Top left: Approach at the L5 level with balloon inflation for the kyphoplasty
Bottom left: Final L2 and L5 kyphoplasty following balloon dilation and cement insertion
Bottom right: Intrathecal pump insertion

Background

65 year old male with no significant PMH originally presented to the ED with low back pain and trouble ambulating. He first noticed his pain one month ago which then progressively worsened. He was seen by his outpatient orthopedist and imaging results were pending. The patient reported a weight loss of around 5 pounds over the past 1 week, but denied any other significant symptoms. On presentation, he was found to have an elevated WBC of 17.3, ESR of 60, and CRP of 6.8. A CT CAP found a new large right lung mass with mediastinal and right hilar adenopathy along with a liver mass concerning for malignancy. An MRI of the lumbar spine found progression of an L2 compression fracture and a mild L5 compression fracture with a soft tissue component representing probable metastatic disease. An IR guided liver biopsy revealed metastatic neuroendocrine tumor. His pain regimen prior to his procedure consisted of IV Dilaudid 1.5 mg q2h prn, Oxycontin 30 mg q8h prn, and Cymbalta 60 mg daily.

Methods

The patient was monitored under general anesthesia for the procedure. After appropriately draping and sterilizing the surgical site, the L2 pedicle was identified under fluoroscopy. Bilateral pedicles were anesthetized with 2% lidocaine with epinephrine. Under AP and lateral fluoroscopic guidance, an 11G needle was used to obtain bilateral transpedicular access. A drill cannula was used to create rooms for coaxial 10 mm balloons which were inflated with 3 mL with radiopaque contrast. Polymethylmethacrylate cement was inserted following balloon removal and incisions were closed with dermabond. The L5 kyphoplasty was performed using a similar technique with the exception of 15 mm balloons to form the cavity.

A 5 cm incision was made between the L3 and L4 vertebral body. A loss of resistance syringe was used to gain access to the L3-L4 intrathecal space which was confirmed with free-flowing CSF upon removal of the stylet. An intrathecal pump catheter, previously soaked in a solution containing vancomycin, was advanced to the base of the T6 vertebra. The intrathecal pump was placed in the left flank between the iliac crest and the 12th rib. Bupivacaine 400 mg a day was delivered via the pump.

Results

Prior to the procedure, the patient had pain that he rated a 90% under his medication regimen. Following the procedure, he reported a daily pain rating of 40% (50% reduction). He reported increased mobility and an ability to ambulate out of bed to take showers and work with physical therapy daily. Prior to the procedure, the patient was unable to ambulate and bedbound. Patient also was eventually able to taper off of his prn IV Dilaudid 1.5 mg q2h within a 2 week time period (was previously using the pushes 8-10 times daily).

Conclusion

This patient was a previously undiagnosed cancer patient who presented to the hospital with metastatic disease from his lungs to his liver and bones. He was in severe pain and unable to go through his day to day activities given his difficulty with movement. After receiving his simultaneous kyphoplasty with an intrathecal pump, his pain was improved and mobility increased.

References

For any questions, please feel free to reach out at
[illegible]
(914)-420-0906

Sphenopalatine Ganglion Stimulation: Systematic Review of Safety and Efficacy in Management of Chronic Cluster Headache
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1. Louisiana State University Health Shreveport, 2. Mayo Clinic Jacksonville, FL, 3. Sloam Hospital Indonesia, 4. Harvard Medical school Boston, 5. Piedmont Columbus Regional
LSU Health SHREVEPORT
Introduction
The origin of pain associated with cluster headache stems from activation of the trigeminal parasympathetic reflex, facilitated by the sphenopalatine ganglion (SPG). We aimed to assess the safety and efficacy of sphenopalatine ganglion stimulation for treatment of chronic cluster headaches.
Methods
Our literature search adhered to PRISMA guidelines, employing a meticulous systematic review conducted by three reviewers who examined various electronic databases, including PubMed, EuroPMC, arXiv, WHO ICTRP, and Clinicaltrials.gov. The search spanned articles published from the inception of studies up to January 5, 2024. MeSH terms and Boolean operators "and" and "or" were integrated into the search strategy, encompassing terms such as "Sphenopalatine Ganglion Blockade" and "Cluster Headache." The primary focus of the investigation was on the extent of pain relief (defined as >50% reduction in pain) and pain freedom (defined as 100% reduction in pain). Secondary outcomes included the documentation of complications after SPG block. Inclusion criteria stipulated that publications must have undergone peer-review, be published in the English language, address key areas of interest, and be structured as two-arm studies.
Results
The present investigation encompassed 293 individuals afflicted with chronic recurrent cluster headache, amalgamated from the participant pool of five randomized clinical trials. The administration of SPG block exhibited a notably low incidence of complications. Moreover, in contrast to the control arm, SPG block demonstrated an increase likelihood of pain relief (Relative Risk [RR] 4.15 [0.74, 23.20]; p = 0.10) and pain freedom (RR 2.57 [0.52, 10.75]; p = 0.26). Notably, a funnel plot illustrated a minimal risk of bias, notwithstanding the presence of substantial heterogeneity.
Meta for pain freedom
Meta for pain relief
Discussion and Conclusion
Our study suggests that SPG block may be a promising intervention for chronic recurrent cluster headache, warranting further exploration and consideration in clinical practice.
References
1. Cady R, Saper J, Dexter K, Manley HR. A double-blind, placebo-controlled study of repetitive transnasal sphenopalatine ganglion blockade with tx360(®) as acute treatment for chronic migraine. Headache. 2015 Jan;55(1):101-16. doi: 10.1111/head.12458. Epub 2014 Oct 23. PMID: 25338927; PMCID: PMC4320736.
2. Salgado-López L, de Quintana Schmidt C, Bevis Nieto R, Roig Arnal C, Rodríguez Rodríguez R, Álvarez Horizalel MJ, Molet Teixidó J. Efficacy of Sphenopalatine Ganglion Radiofrequency in Refractory Chronic Cluster Headache. World Neurosurg. 2019 Feb;122:e262-e269. doi: 10.1016/j.wneu.2018.10.007. Epub 2018 Oct 11. PMID: 30315985.

Spinal Arachnoid Web: Importance of Imaging in Chronic Pain

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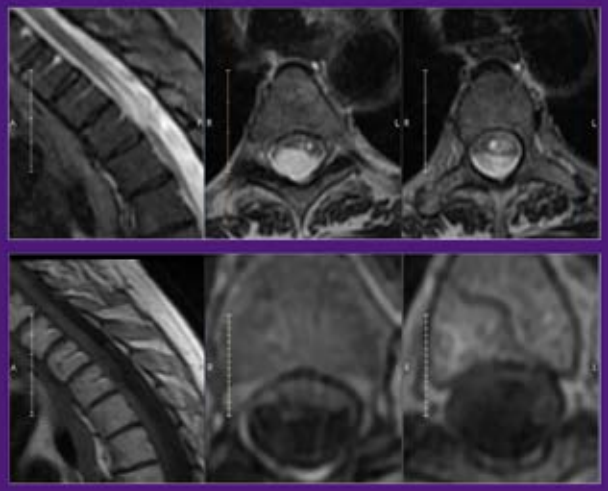
BACKGROUND

- Spinal cord stimulation, typically used for complex regional pain syndrome (CRPS) or failed back surgery syndrome, does not routinely require advanced imaging due to cost.
- Arachnoid webs are thickened intradural bands that can compress the spinal cord, identified by a 'scalpel sign' on MRI, often causing gait abnormalities and neurological impairment when located in the upper thoracic spine.
- Progressive myelopathy secondary to thoracic subarachnoid web can clinically present similarly to CRPS, but optimal treatment is with surgery rather than spinal cord stimulation.

CASE PRESENTATION

- A 56-year-old female with a history of chronic pain, osteoarthritis (OA), and lumbar spine surgery, presented with chronic mid-thoracic and lower back pain.
- History revealed several years of progressive pain and urinary hesitancy.
- Physical exam revealed numerous long-tract signs, including sustained clonus, bilateral Babinski sign, and antalgic gait.
- Thoracic and lumbar x-rays showed diffuse degenerative disc disease and severe facet OA in the lumbosacral region.
- MRI of the thoracic spine showed ventral displacement of the cord with compression at T4-T5, a potential arachnoid web indicated by a "scalpel sign," and a syrinx extending from T3 to T4-T5, suggesting chronic and progressive neurological impairment.

When evaluating patients for chronic regional pain syndrome, the presence of long-tract signs on physical exam indicate the need for advanced imaging techniques to evaluate for any occult spinal cord pathology.



DISCUSSION

- Arachnoid webs are abnormal, thickened bands of tissue within the arachnoid mater that can compress the spinal cord and disrupt CSF flow, potentially leading to neurological symptoms and syrinx formation
- Primarily found in the thoracic spine and identifiable by a 'scalpel sign' on MRI.
- This patient's prior MRI 8 years ago showed no findings. As such, though surgical removal of the subarachnoid web is considered the best treatment for symptom resolution, pain is unlikely to completely resolve.
- Bladder dysfunction, upper motor neuron signs, and gait disorder are likely to resolve.
- This case highlights the importance of comprehensive evaluation and management planning for patients with chronic pain and neurological symptoms, considering both surgical and conservative treatment options, with an emphasis on setting realistic expectations for symptom improvement.

References

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Spinal Cord Stimulator Percutaneous Lead Breakage and Considerations with Magnetic Resonance Imaging

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VA | U.S. Department of Veterans Affairs | Veterans Health Administration

UT Southwestern Medical Center

Background

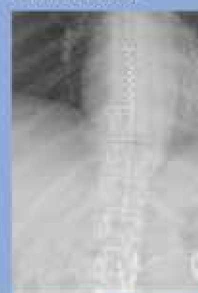
- Spinal cord stimulation is a minimally invasive technique that can be utilized to treat several chronic pain conditions in patients who have failed conservative management
- Complication rates are not insignificant and can be related to multiple etiologies
- Lead fracture is one of these complications, which can lead to device failure requiring surgical exploration for lead replacement
- Additionally, not all devices are MRI compatible, and there is risk of complications even with MRI conditional devices if not managed appropriately

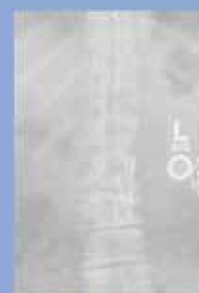
Case Presentation

- 60-year-old female with history of back pain and lumbar radiculopathy presented to the Dallas VA Medical Center for evaluation of a non-functioning spinal cord stimulator placed in Florida
- Patient lost her battery charger a year after device implantation and was subsequently lost to follow-up
- She reports having an MRI at some point after this but was unable to place device in an MRI compatible mode as device was not charged
- New x-rays showed possible kinking in bilateral leads just cephalad to the anchors
- Device interrogation demonstrated high impedance in both leads which was suspected to be secondary to lead fracture, misconnection, or faulty battery output
- The decision was made to proceed to the OR for exploration where it was found that the leads were the cause of malfunction
- Both leads were noted to be physically separated from the distal aspect of the anchor sites
- Old leads and implant were removed from patient without difficulty and new percutaneous leads and device were implanted successfully

Objectives

- To discuss risk of lead fracture, which is one of the more common complications associated with spinal cord stimulator implantation
- To discuss risks associated with MRI imaging and spinal cord stimulation
- To reinforce the importance of counseling patients on device compatibility with MRI or lack thereof





Discussion

- The average incidence of complications with spinal cord stimulation ranges between 30-40%
- These complications can be divided into those that are hardware-related and those that are biological
- Lead fracture, a hardware-related complication, has an incidence of 5.9-9.1%
- It is usually diagnosed after obtaining imaging or checking lead impedances
- In addition, obtaining an MRI with a non-compatible device or an MRI-conditional device not placed in an MRI-compatible mode, can lead to excessive heating of the electrodes, excessive stimulation, damage to the leads, and battery drainage
- It is imperative to discuss these considerations and risks with patients prior to implantation

Conclusions

- It is important for clinicians to recognize complications associated with spinal cord stimulator implantation
- It is equally important to know how to manage such complications once they have occurred
- In addition, providers should discuss with patients any limitations pertaining to MRI as well as counsel them on what should be done if they do require imaging. Failure to do so may lead to complications that could have otherwise been avoided

References

- [illegible]
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Spinal Cord Stimulator Therapy for Chronic Intractable Lower Extremity Pain in an Elderly Patient with Combined Peripheral Arterial Disease and Diabetic Neuropathic Pain:
A Novel Approach to Multifactorial Chronic Pain Management

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MICHAEL E. DEBAKEY VETERANS AFFAIRS MEDICAL CENTER

Introduction

- Diabetes Mellitus and Peripheral Arterial Disease (PAD) are prevalent conditions with rising global incidence rates, particularly affecting the elderly.
- Diabetic Neuropathy (DN) and PAD lead to chronic pain syndromes, impacting quality of life.
- Current treatments for DN or PAD include pharmacotherapy or surgical intervention, which have unfavorable associated risks especially in the elderly population.
- An alternative therapeutic intervention involves a spinal cord stimulator (SCS) to treat pain syndromes associated with PAD and/or DN.
- The subsequent improvement in symptoms after SCS placement is quantified by marked reduction in pain medication use (eg. opioids, neuropathic medication), improved mood, participation in daily activities, and quality of life.

Case Report

- A 76-year-old male with PMH of T2DM with DN s/p cryoneurolysis of RLE sensory nerves, PAD with femoropopliteal bypass graft and revision 6 months later, CAD s/p PCI and previous CVA with residual left- sided weakness presented with a 5-year history of worsening right lower extremity pain
- It was described as a severe cramping pain in the right groin and medial thigh going down to the knee and calf, worse with walking. In addition, patient reported 9/10, severe bilateral foot pain (right >> left) described as burning with electric shock-like sensations
- MRI of the lumbosacral spine showed no significant correlating pathology.
- Interventions included TENS unit, PT, pregabalin and a maximum dose of Norco every 8 hours.
- A decision was made to pursue a spinal cord stimulator trial. Due to >50% pain relief, patient opted for SCS implantation.

Treatment

- The patient underwent a SCS trial with >50% pain relief reported, followed by a permanent SCS placement under fluoroscopic guidance with leads guided into the epidural space at T10.

Results

- The patient reported 80% relief of right medial thigh/knee pain and leg cramping pain but <50% relief in the right foot (burning pain), reduced opioid use, decreased functional impairment and significantly improved mood were noted during follow-up.

Discussion and Conclusion

- This case demonstrates the potential of SCS as a superior therapeutic approach for chronic lower extremity pain due to critical limb ischemia in addition or other confounding etiologies, reducing the need for polypharmacy and invasive treatments especially in the elderly.
- Given that more relief was observed in PAD related symptoms than distal neuropathic pain, further research is warranted to establish the broader applicability of spinal cord stimulation in managing these challenging conditions whether it is by further exploring lead placement or by scrutinizing the electrophysiological differences in each pain syndrome at the cellular level.

References

1. Schreiber AK, et al. Diabetic neuropathic pain: Physiopathology and treatment. World J Diabetes. 2015 Apr 15;6(3):432–44.
2. Zemaitis MR, et al. Peripheral Arterial Disease. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023.
3. Dydyk AM, Tadi P. Spinal Cord Stimulator Implant. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023.

Stellate Ganglion Block for Anosmia and Ageusia in Long COVID

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AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT

INTRODUCTION

- COVID-19 is the most significant public health event in recent history, and its long term impact is still being studied
- Long COVID is characterized by numerous possible symptoms that can affect any organ system
- Anosmia and ageusia are among the distressing long term sequela of long COVID

CASE HISTORY

- A middle aged woman developed a COVID-19 infection in the spring of 2020, at the height of the first wave of the pandemic
- She had the classically associated respiratory symptoms, but also developed anosmia and ageusia
- The respiratory symptoms resolved spontaneously within 1 week, but her anosmia and ageusia persisted with no improvement
- She was evaluated by the otolaryngology team, who was unable to offer a solution
- She attempted to stimulate her sense of smell using essential oils, with no improvement in symptoms
- After nearly 3 years, she was seen by our institution's Long Haul COVID clinic, and was referred to pain management for evaluation

INTERVENTIONS

- This patient underwent a left stellate ganglion block (SGB) resulting in 50-75% resolution in symptoms almost immediately
- The procedure was repeated on the right side 6 weeks later with further improvement

FOLLOW UP PERIOD

- Overall, the patient was satisfied with the results of her procedure
- She reported immense improvement in her quality of life, particularly with the return of her sense of taste
- She was open to the possibility of future blocks if her symptoms were to worsen again; however, the lack of insurance coverage precluded her from seeking additional care with our clinic

DISCUSSION

- Traditionally, stellate ganglion blocks have been utilized to treat a variety of pain syndromes, including complex regional pain syndrome, postherpetic neuralgia, and cluster headaches
- SGB has been used to treat anosmia prior to the COVID-19 pandemic, but has more recently been employed for long COVID patients
- This case provides further evidence for SGB as an effective treatment for anosmia and ageusia associated with COVID-19
- Cost of the procedure remains a barrier to access

CONCLUSION

- The use of stellate ganglion block may be an effective treatment modality for the management of long COVID-associated anosmia and ageusia

REFERENCES

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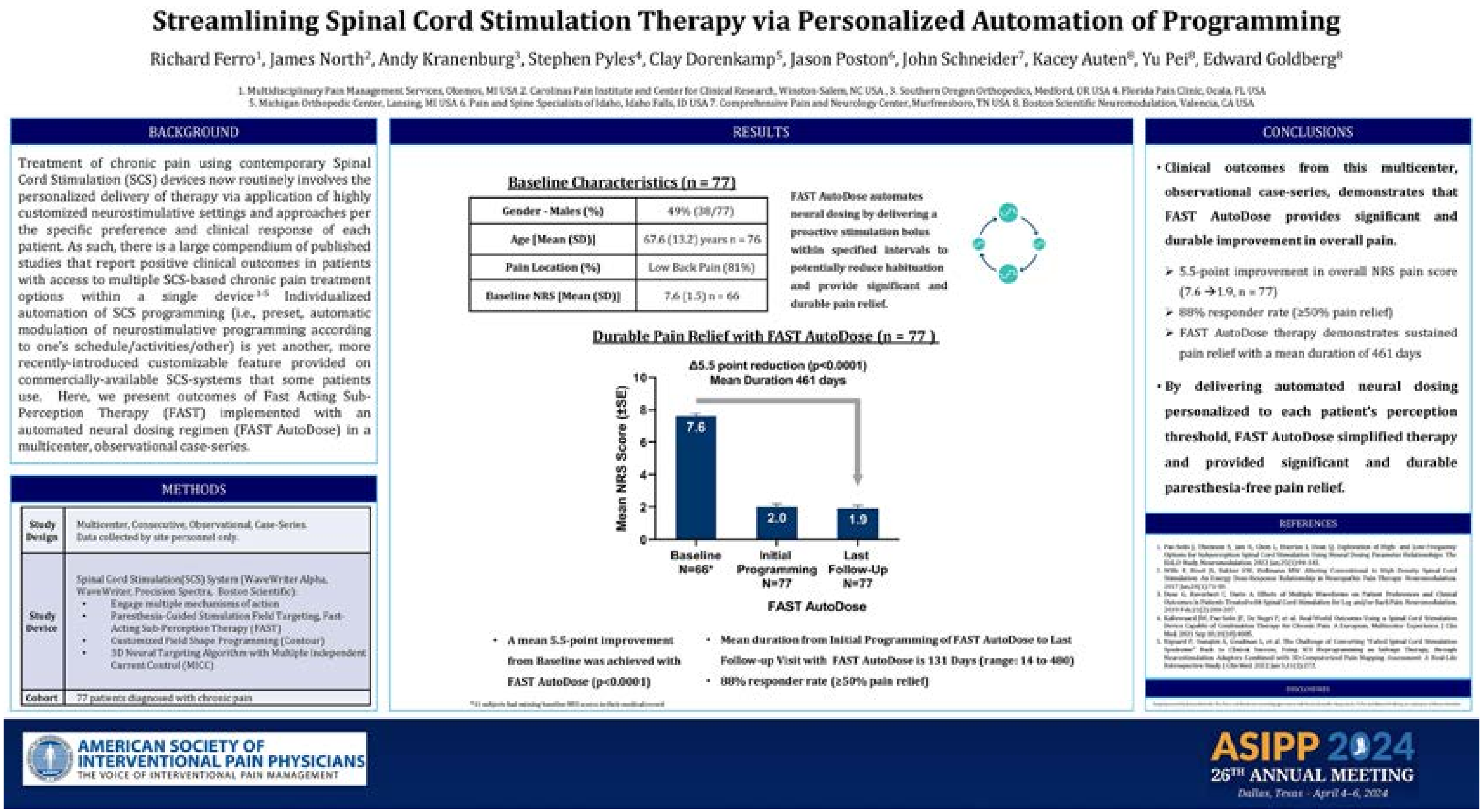
More on this case:


Streamlining Spinal Cord Stimulation Therapy via Personalized Automation of Programming
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BACKGROUND
Treatment of chronic pain using contemporary Spinal Cord Stimulation (SCS) devices now routinely involves the personalized delivery of therapy via application of highly customized neurostimulative settings and approaches per the specific preference and clinical response of each patient. As such, there is a large compendium of published studies that report positive clinical outcomes in patients with access to multiple SCS-based chronic pain treatment options within a single device1-5. Individualized automation of SCS programming (i.e., preset, automatic modulation of neurostimulative programming according to one's schedule/activities/other) is yet another, more recently-introduced customizable feature provided on commercially-available SCS-systems that some patients use. Here, we present outcomes of Fast Acting Sub-Perception Therapy (FAST) implemented with an automated neural dosing regimen (FAST AutoDose) in a multicenter, observational case-series.
METHODS
Study Design: Multicenter, Consecutive, Observational, Case-Series. Data collected by site personnel only.
Study Device: Spinal Cord Stimulation(SCS) System (WaveWriter Alpha, WaveWriter, Precision Spectra, Boston Scientific):
Engage multiple mechanisms of action
Paresthesia-Guided Stimulation Field Targeting, Fast-Acting Sub-Perception Therapy (FAST)
Customized Field Shape Programming (Contour)
3D Neural Targeting Algorithm with Multiple Independent Current Control (MICC)
Cohort: 77 patients diagnosed with chronic pain
RESULTS
Baseline Characteristics (n = 77)
Gender - Males (%): 49% (38/77)
Age [Mean (SD)]: 67.6 (13.2) years n = 76
Pain Location (%): Low Back Pain (81%)
Baseline NRS [Mean (SD)]: 7.6 (1.5) n = 66
FAST AutoDose automates neural dosing by delivering a proactive stimulation bolus within specified intervals to potentially reduce habituation and provide significant and durable pain relief.
Durable Pain Relief with FAST AutoDose (n = 77)
Δ5.5 point reduction (p<0.0001)
Mean Duration 461 days
Mean NRS Score (±SE)
10
8
6
4
2
0
7.6
2.0
1.9
Baseline N=66*
Initial Programming N=77
Last Follow-Up N=77
FAST AutoDose
A mean 5.5-point improvement from Baseline was achieved with FAST AutoDose (p<0.0001)
Mean duration from Initial Programming of FAST AutoDose to Last Follow-up Visit with FAST AutoDose is 131 Days (range: 14 to 480)
88% responder rate (≥50% pain relief)
CONCLUSIONS
Clinical outcomes from this multicenter, observational case-series, demonstrates that FAST AutoDose provides significant and durable improvement in overall pain.
5.5-point improvement in overall NRS pain score (7.6 → 1.9, n = 77)
88% responder rate (≥50% pain relief)
FAST AutoDose therapy demonstrates sustained pain relief with a mean duration of 461 days
By delivering automated neural dosing personalized to each patient's perception threshold, FAST AutoDose simplified therapy and provided significant and durable paresthesia-free pain relief.
REFERENCES
DISCLOSURES
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas · April 4-6, 2024

Strip Lesion Radiofrequency Ablation of the Cluneal Nerve

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INTRODUCTION

Superior cluneal neuralgia can manifest as lower back and radicular pain. It is typically diagnosed clinically, with a positive "iliac crest point sign". The superior cluneal nerves (SCN) originate from the dorsal rami of L1-L3, usually with 3 terminal branches: medial, intermediate, and lateral. Radiofrequency ablation (RFA) of the SCN has been previously performed with singular RFA lesioning, with needle repositioning and repeat lesioning if the patient continues to report pain. [1]

MATERIALS AND METHODS

Preparation:
The lumbar spine and iliac crest were visualized in the AP view. A line was drawn from the L4-5 level starting at 6 cm over toward the iliac crest and then 1 cm. markings going lateral were made over the iliac crest for 5 cm. The area was then prepped and draped in usual sterile fashion. He received 2 mg of IV Versed for conscious sedation. 3 cc of 1% lidocaine was injected as a field block over the area.

Needle Placement:
100mm with 10 mm active tip 22-gauge straight needles were placed in the beginning 4 positions going from the medial over lateral. All the needles were touched off the iliac crest and subtly slid over. After negative aspiration, testing was done with the Stryker radiofrequency generator in parallel between 1 and 2 and 2 and 3 and 3 and 4. The needles were all adjusted so we had capture of pain at 0.2 V at 50 Hz.

Neurolysis:
After negative aspiration, 1 cc of 2% lidocaine was injected into the needles 1 and 2 as well as 3. After retesting and he reported no pain at 1 V at 50 Hz, ablations were done in parallel of 480 seconds for 60 degrees Celsius. This was between needles 1 and 2 and then 2 and 3. I then withdrew needles 1, 2, and 3 and then LeapFrog needles over the past needle 4, so there was now position 5 and 6. Testing was done between needles 3 and 4 subtly adjusted and now between 4 and 5 which did reproduce pain but there was no reproduction of pain between 5 and 6. 1 cc of 2% lidocaine was injected into needles 4 and 5 and then ablations were performed between needles 3 and 4 in parallel at 60 degrees Celsius for 180 seconds and then to needle 4 and 5, again at 60 degrees Celsius for 180 seconds. The needles were then removed.

Follow-Up:
Prior to removing sterile dressings, the patient was re-examined and found to have no pain to palpation throughout the region of the iliac crest that he had previously. The patient was seen 1 month post-operatively with 100% pain relief and 11 months postoperatively with 90% pain relief.

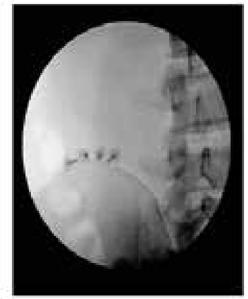
CASE

We present a 33-year-old male with low back pain, with tenderness on palpation over the iliac crest and negative sacroiliac joint provocation tests. He had previously undergone an SCN block with profound relief of symptoms. Therefore, the patient underwent a SCN RFA using a strip lesion technique. The lumbar spine and iliac crest were visualized in the AP view. A line was drawn from the L4-5 level toward the iliac crest and then 6 markings were made, each 1 cm apart, along the line. 100mm with 10 mm active tip 22-gauge straight needles were placed in the first 4 markings. All the needles were touched off the iliac crest and subtly slid over. After negative aspiration, testing was done with the Stryker radiofrequency generator in parallel between needles 1 and 2 and 2 and 3 to capture the patient's pain at 0.2 V at 50 Hz. After negative aspiration, ablations were done in parallel for 180 seconds at 60°C. Needles 1 and 2 were then withdrawn, and replaced as needles 5 and 6. Testing reproduced the patient's pain between needles 3 and 4 and 4 and 5, but there was no pain between 5 and 6. Thus, additional parallel ablations were performed only between needles 3 and 4 and 4 and 5. The patient was seen 1 month postoperatively with 100% pain relief and 11 months postoperatively with 90% pain relief.

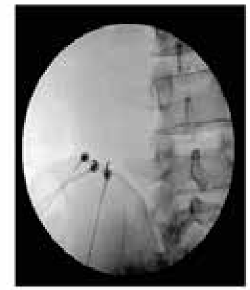
DISCUSSION

This is novel technique for SCN RFA using strip lesions rather than the standard singular lesion. Radiofrequency ablation using singular lesions has previously been shown to be an effective treatment for cluneal trigger points and can lead to long-lasting symptom relief. [2, 3] However, a new RFA technique using strip lesion ablations targeting the multiple lateral branches of the S1-S3 dorsal rami has been shown to provide significantly longer pain relief than the standard RFA technique in patients with sacroiliac joint pain. [3] We propose that using strip lesions for SCN RFA may be more efficacious in providing long-term pain relief in patients with cluneal neuralgia. The role of strip lesion ablations in SCN RFA should be further explored in larger-scale studies.

IMAGES



Needles pre-RFA



RFA being done in succession

REFERENCES

Cheng J, Chen SL, Zimmerman N, Dalton JE, LaSalle G, Rosenquist R. A New Radiofrequency Ablation Procedure to Treat Sacroiliac Joint Pain. Pain Physician. 2016 Nov-Dec;19(8):603-615. PMID: 27906939.
Knight M, Inklebarger J, Tilfelian AE, Lewandrowski KU. Radiofrequency Treatment of Iliac and Paravertebral Cluneal Nerves for Low Back Pain. Pain Physician. 2022 Oct;25(7):E1129-E1136. PMID: 36288600.
Vanjevac, O., Pastrak, M., Ma, F. *et al.* Radiofrequency Ablation of the Superior Cluneal Nerve: A Novel Minimally Invasive Approach Adopting Recent Anatomic and Neurosurgical Data. *Pain Ther* 11, 655–665 (2022). https://doi.org/10.1007/s40122-022-00385-x.

Successful Non-Surgical Management of Cement Extravasation-Induced Radiculopathy Following Kyphoplasty: A Case Report and Therapeutic Approach

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Background

There have been significant improvements in the management of acute vertebral compression fractures over the last 40 years, most noteworthy being the adoption of vertebroplasty and kyphoplasty procedures. However, cement extravasation remains very common with some sources reporting incidence of nearly 30% in kyphoplasty and 40% in vertebroplasty [1,2]. Fortunately, it is rare for patients to develop clinically significant symptoms related to extravasation [2]. Unfortunately, some of these cases lead to neurosurgical intervention. Here we illustrate a case in which a new onset unilateral L4 radiculopathy from intraforaminal cement extravasation resolved after lumbar epidural steroid injection.

The patient is an 85-year-old female with PMH of hypertension, rotoscoliosis, T-score -0.6 and chronic L1 vertebral compression fracture with recent acute vertebral compression fracture of L4 (of 6 lumbar vertebrae). The patient presented at the initial clinic visit with chief complaint of refractory axial back pain. Kyphoplasty of L4 was performed which was complicated by cement extravasation into the superior portion of the left L4-5 foramen. Postoperative day 6 lumbar epidural steroid injection was performed with complete resolution of radiculopathy.

Methods

A kyphoplasty of L4 with placement of implantable fracture reduction system was complicated by cement extravasation into L4-5 left foramen. Lumbar epidural steroid injection was performed from an interlaminar approach with a 17g tuohy needle. The needle was directed to enter the epidural space at the left lateral portion of the interlaminar window. 4 ml of total volume was injected including 2 ml of 0.25% bupivacaine and 2 ml of 40 mg/ml triamcinolone.

Imaging

Figure 1: CT lumbar spine scout view showing complex patient anatomy with severe rotoscoliosis, 6th lumbar vertebrae, chronic L1 vertebral compression fracture, and acute symptomatic L4 vertebral compression fracture

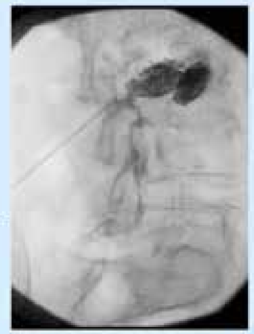

Figure 2: Fluoroscopic view of lumbar epidural steroid injection performed on POD #6. Good spread of contrast can be seen at multiple nerve root levels. Post L4-5 Balloon Kyphoplasty changes can be seen at the L4 level. There was slight extravasation of cement into the left L4 foraminal region causing inflammation of the left L4 nerve root which can be seen better in figure 3.

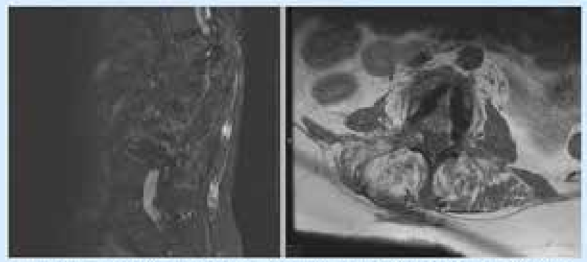

Figure 3: MRI of lumbar spine performed on post-operative day 6 for evaluation regarding left sided radicular pain. A. Sagittal MRI view of the lumbar spine. Cement extravasation into the left L4 foramen can be seen, the nerve root was not enveloped by cement. B. Transverse view of L5 vertebra shows post kyphoplasty changes. Mild compression of the left L4 nerve root by cement can be seen.

Discussion

Cement leakage is a frequent occurrence in kyphoplasty procedures, but it is rarely symptomatic. In cases where a post-kyphoplasty MRI shows cement extravasation, several factors should direct therapeutic decision making. If the cement does not encase any nerves, or cause significant mechanical encroachment upon nervous structures, and there is an absence of motor or neurological deficits, an epidural steroid injection can be considered as a first step before opting for surgery. However, in situations where these conditions are not met, surgical intervention might be necessary to relieve pressure on the affected structures. This paper presents a case where new radicular pain due to cement leakage was effectively managed with non-surgical methods, including a lumbar epidural steroid injection, medical management, and physical therapy.

Results

On postoperative day 1, the patient developed severe left lower extremity radicular pain in the left L4 distribution that was unresponsive to a steroid dose pack. Post surgical MRI demonstrated a L4 nerve root interiorly displaced but not enveloped by cement. Left L4-5 foraminal stenosis was mild. A lumbar epidural steroid injection was performed on postoperative day 6 resulting in significant improvement of her left leg radicular pain. Her pain score at 18 days post op was 3/10 and her total prescription narcotic needs have decreased by greater than 50% from pre-kyphoplasty levels. She continues to have no central axial pain, and she has graduated from physical therapy.

References

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

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SUPRASCAPULAR PNS TREATMENT FOR CHRONIC SHOULDER PAIN

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OBJECTIVE

To assess and treat chronic refractory shoulder pain after multiple interventions with peripheral nerve stimulation (PNS)

BACKGROUND

- Chronic shoulder pain has an annual incidence of about 14.7 per 1000 patients and a lifetime prevalence of 70%[1]. It is defined as pain lasting longer than 6 months.
- When conservative measures fail, interventional methods such as peripheral nerve stimulators (PNS) can be used.
- The *SUPRASCAPULAR NERVE* originates from the upper trunk of the brachial plexus (C5 - C6) & is both motor and sensory.

MOTOR
innervates the supraspinatus and infraspinatus muscles

SENSORY
supplies about 70% of the sensory input to the acromioclavicular joint, glenohumeral joint, capsule, and overlying skin

Peripheral Mechanisms

1. Gate-Control Theory: stimulation of Aβ fibers results in excitation of the inhibitory dorsal horn interneurons that process and transmit nociceptive information from the Aδ and C nerve fibers, thus inhibiting pain signal transmissions from the spinal cord to the CNS
2. Local environment biochemical modulation with downregulation of neurotransmitters, endorphins, and local inflammatory mediators

Central Mechanisms

1. May modulate higher CNS centers, including dorsal lateral prefrontal cortex, anterior cingulate cortex, and parahippocampal areas
2. Change in GABA and glycine pathway
3. Change in NMDA-mediated plasticity

CASE PRESENTATION

62-year-old M with a PMHx of chronic right shoulder pain and joint stiffness. He had difficult to treat osteomyelitis, requiring multiple long courses of antibiotics. The patient reports his pain is primarily at the anterior aspect of his shoulder and occurs frequently throughout the day but is not necessarily constant in nature. There is no reliable inciting maneuver, although increased activity does generally tend to worsen his pain. He denies any catching or instability in the shoulder and denies any radiation of pain, numbness, tingling, or weakness.

CONSERVATIVE MANAGEMENT
- nonsteroidal inflammatory medications
- neuropathic (gabapentin) agents
- physical therapy

- 2017: right rotator cuff repair and biceps tenodesis
- 2019: right shoulder arthroscopy
- 02-2021: right shoulder open arthrotomy w/ debridement and revision biceps tenodesis
- 09-2022: unremarkable right shoulder MRI & US w/ subscapularis & bicipital groove CSI
- 11-2022: biceps tendon trigger point injections (TPI) x3
- 11-2023: Suprascapular nerve stimulator (Curonix) placement

INTERVENTION

Anatomical landmarks are identified by palpation and by using the *Meier technique*.

1

At the mid-point of the scapula, *2 cm cranially and 2 cm laterally* from this point, a 1.5in 25-G needle is inserted. XR is used to visualize the spine and the notch. The artery is visualized along with the nerve under ultrasound.

2

After negative aspiration, the skin and subcutaneous tissue is injected with 1% lidocaine. A small stab incision is made to allow for easy insertion of the introducer.

3

An introducer is passed through the subcutaneous tissues toward the nerve target. The introducer is advanced using a "tenting" approach to stay within the subcutaneous layer and to prevent diving into muscular fascia.

4

The introducer is placed at a shallow angle no more than 10 degrees.

5

The electrode array is inserted through the introducer and advanced towards the spinoglenoid notch.

6

The lead is deployed *at the mid-point of the scapula, 2 cm cranially and 2 cm laterally from the notch.*

CONCLUSION

- There are a few case reports and case series[2], but no prospective studies or RCTs on the efficacy of suprascapular nerve PNS therapy in chronic refractory shoulder pain.

This case report demonstrates the effectiveness of suprascapular PNS in the treatment of chronic refractory shoulder pain.

- Beyond rotator cuff pathologies, chronic shoulder pain due to glenohumeral instability, glenohumeral osteoarthritis, acromioclavicular joint pathology, adhesive capsulitis, and others may be treated or better controlled with SS PNS.
- Future studies should investigate the long-term effects and outcomes of SS PNS on pain scores and functionality.

REFERENCES

[1]Van der Windt DAWM, Koes BW, De Jong BA, Bouter LM. Shoulder disorders in general practice: incidence, patient characteristics, and management. Ann Rheum Dis. 1995;54(12):959-964. doi:10.1136/ard.54.12.959
[2]Elahi F, Reddy CG. Neuromodulation of the suprascapular nerve. Pain Physician. 2014 Nov-Dec;17(6):E769-73. PMID: 25415792.

Ten-Year Refractory Sternocleidomastoid Syndrome Treated with Cryotherapy and Soft Tissue Mobilization.
Diejomaoh E M 1,2 , Robinson CL 3, Kaye A D 4, Orhurhu V 5, Ogala-Akogwu 6, Ebuta A N 6
Background
Case Presentation
Discussion
Artwork by: Sodiba Mareau & Aleksy Dejnow

The danger of a pocket fill from an intrathecal pump refill: A case report

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MINIVASIVE PAIN & ORTHOPEDICS

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Baylor College of Medicine

Background

- Intrathecal drug delivery (IDD) is a drug delivery system using a battery-operated pump that dispenses medication(s) into the subarachnoid space
- Patients using IDD devices often are experiencing significant side effects of oral or transdermal opioids and/or cannot reach adequate analgesia
- Common medications used for IDD include opioids, ziconotide, bupivacaine, clonidine, baclofen, and other combinations
- Complications of IDDs include withdrawal with sudden reductions, overdose, catheter displacement, medication side effects, and others including a pocket fill
- Pocket fills are inadvertent injection of some or all of the medication outside of the reservoir into the subcutaneous tissue

Objective

To present a case on a pocket fill and explore best clinical guidelines for intrathecal device pocket refills for minimal complications

Refill Process

- FDA regulates pumps to be refilled minimum every 6 months but may vary from 1-6 months even if pump is not completely empty[2]
- A kit is often provided by the pump manufacturer and a template. Ultrasound or fluoroscope use and tactile feel help outline the reservoir fill port
- Once the access needle enters the reservoir, any remaining solution is withdrawn prior to refilling and compared to the calculated amount based on programmed rate of delivery
- New medication is refilled and followed with pump reprogramming

Case

64-year-old female with chronic pain presented to our clinic to establish care after experiencing a pocket fill with her previous physician. Patient had an intrathecal pump implanted and managed by an outside pain physician. She had been receiving refills every three months by her doctor, but approximately one year prior to establishing care, the patient's intrathecal pump was inadvertently filled outside of the reservoir fill port and the narcotic was injected into surrounding tissue creating a pocket fill. As this was not immediately recognized, the patient collapsed in the parking lot and resuscitation was initiated with intubation and CPR via EMS. Patient survived without any neurologic deficits but continues to experience psychological distress in conjunction with her chronic pain. The trauma from her experience dissuaded her from continuing with her previous physician, and she ultimately decided to change her pain physician to our institution.

Example of US of intrathecal implant

Discussion

- A pocket fill has been estimated to occur one in every 10,000 refills worldwide, but the true incidence is unknown due to large underreporting[4]
- Training in refilling pumps has been variable with guidance on pump manufacturers' refill procedure guide, refill kits, or clinical practice guidelines (CPG), but few rely on CPGs such as from the Polyanalgesic Consensus Conference of 2012 or Best Practices for IDD[3-5]
- CPGs are produced from best available evidence and expert consensus to reduce mortality and morbidity versus manufacturer instructions that may lack the same amount of clinical evidence[4]
- Review of CPGs via proctored hands-on training, didactic teaching, mentoring, and continued education are recommended to decrease the risk of pocket fills and life-threatening events, but there are still many constraints to these training modalities

References

1. Maino P, Perez RSG, Koetsier E. Intrathecal pump refills, pocket fills, and symptoms of drug overdose: A prospective, observational study comparing the injected drug volume vs. the drug volume effectively measured inside the pump. Neuromodulation. 2017;20:733-739.
2. Bottros MM & Christo PJ. Current perspectives on intrathecal drug delivery. Journal of Pain Research. 2017;7:615-626.
3. Prager J, Deer T, Levy R, Bruel B, Buscher R, Caraway D, Cousins M, et al. Best practices for intrathecal drug delivery for pain. Neuromodulation. 2014;17:354-372.
4. McGlothlen GL, Rodriguez L. Training for the intraspinal drug delivery system reservoir refill procedure highly variable: A nationwide survey of healthcare professionals. Neuromodulation. 2017;20:727-732.
5. Deer TR, Levy R, Prager J, Buscher E, Burton A, Caraway D, Cousins M, et al. Polyanalgesic Consensus Conference– 2012: recommendations to reduce morbidity and mortality in intrathecal drug delivery in the treatment of chronic pain. Neuromodulation. 2012;15:467-482.

The Efficacy of Targeted Drug Delivery for Managing Chronic Pain

Dr. Andrew Will, MD DABPM, Grace Thompson, BS, and Jack Will, BS

Background:

The management of chronic pain has long been associated with the use of oral opiate regimens, a method that often leads to unintended systemic side effects such as opioid dependence, gastrointestinal disturbances, cognitive impairments, and the risk of overdose.[1] Recognizing the drawbacks of this conventional approach, there has been a shift towards more targeted and efficient solutions. Targeted drug delivery (TDD) systems have emerged as a promising alternative, aiming to provide relief by directly delivering medications into the cerebrospinal fluid without the need for patients to adhere to an oral opiate regimen. Traditionally, TDD systems have relied on administering over 1 milligram of morphine equivalent every 24 hours.[2,3] However, recent evidence suggests a groundbreaking approach through micro-dosing, wherein less than 1 milligram of medication is administered every 24 hours. This novel strategy not only offers comparable pain relief but also holds the potential to minimize the debilitating side effects associated with higher doses, marking a significant advancement in chronic pain management.[4,5,6,7]

Hypothesis:

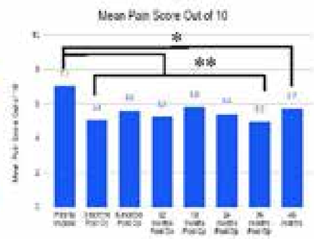
1) Patient's pain scores who are managed on TDD systems, using microdosing, will be equal to, or less than patients who are not managed on TDD systems.
2) Patient's Pain, Enjoyment of Life and General Activity (PEG) scores who are managed on TDD systems, using microdosing, will be equal to, or greater than patients who are not managed on TDD systems.

Methods:

Demographics:

Sex:		
-	Male	24 (0.429)
-	Female	32 (0.571)
Age:		
-	18-30	2 (0.036)
-	31-50	11 (0.196)
-	51-70	27 (0.482)
-	Over 70	16 (0.286)
Diagnosis:		
-	Post-Laminectomy Syndrome	24 (0.375)
-	Chronic Pain Syndrome	15 (0.268)
-	Spondylosis	6 (0.107)
-	Chronic Regional Pain Syndrome	4 (0.071)
-	Other	7 (0.125)
Opioid Use:		
-	Naive	29 (0.518)
-	Use at Time of Implant	27 (0.482)

Tables:



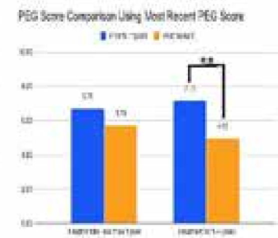


Table 1. Numeric Rating Scale (NRS) scores at pre and post-op intervals following TDD system implant.

Table 2. PEG scores at pre and post-op intervals following TDD implant.

* P-Value less than 0.05, ** P-Value less than 0.01

Results:

The results of the study demonstrate a significant decrease in patients' pain scores following treatment with a Targeted Drug Delivery (TDD) system, particularly when employing the micro-dosing strategy. Remarkably, the reduction in pain scores persists for an extended period, up to 48 months (4 years) while utilizing micro-dosing. Furthermore, patients' Pain, Enjoyment, and General activity (PEG) scores exhibit a noteworthy decrease after more than a year of TDD treatment. However, there is no statistically significant difference in PEG scores for patients during their initial year of TDD treatment and those who have undergone TDD treatment for more than 4 years. These findings substantiate the first hypothesis, affirming that micro-dosing via a TDD induces a substantial and sustained decrease in pain levels. Additionally, the data aligns with the second hypothesis, highlighting a significant improvement in the quality of life for patients following the implantation of a TDD, particularly after being treated with it for over a year. These results underscore the potential of TDD systems, especially when employing micro-dosing, as a viable and effective approach to chronic pain management, with enduring positive effects on patients' well-being.

Discussion:

The findings of this study underscore the significance of Targeted Drug Delivery (TDD) as a crucial and, at times, underutilized treatment modality within the realm of chronic pain management. The focus on microdosing in this study highlights the potential efficacy of TDD, but it's important to note that TDD can also be employed with macrodosing, providing a versatile approach that caters to individual patient needs. This flexibility opens up the possibility of achieving greater pain relief, particularly for patients who may not experience adequate relief through microdosing alone. Importantly, TDD serves as a valuable alternative for individuals who have been on chronic opioid regimens, especially in the current climate where stringent government regulations are placing restrictions on providers' ability to prescribe opioid medications. As these regulations tighten, TDD emerges as a viable solution, offering continuous and targeted pain relief without the systemic side effects associated with oral opiate regimens. The study's emphasis on microdosing within the TDD framework sheds light on the potential of this approach to address the evolving challenges in chronic pain management while ensuring patient well-being and compliance with regulatory guidelines.

Acknowledgements:

This study was conducted using the patient population at Twin Cities Pain Clinic (TCPC) under the supervision of Dr. Andrew Will. Dr. Andrew Will is the medical director at TCPC. No outside financial support was provided.

References:

The Safety and Efficacy of Myofascial Release for Cervicogenic Pain: A Systematic Review of Randomized Controlled Trials

Saurabh Kataria[1], Utsav Patel[2], Jeremiah Hilkiah Wijaya[3], Julius July[3], Rutvij Shah[1], Christopher Robinson[4], Brian Berhandt[1], Prathima R Anand[1], Richard Fair[1], Alan David Kaye[1]

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Introduction

The existing body of evidence regarding myofascial release (MFR) therapy for chronic musculoskeletal pain is limited in certain regions of the body, including the cervical region. Therefore, we aimed to determine safety and efficacy of MFR for cervicogenic mediated pain.

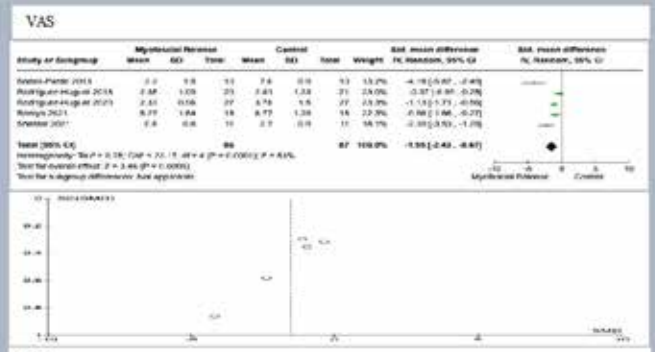
Methods

PubMed, EuroPMC, and arXiv were systematically searched to identify articles on treatment of MFR for patients with cervicogenic pain. Inclusions were limited to English publications subjected to a peer-review process, specifically describing outcomes of interest, excluding animal studies, and constrained to randomized controlled trials only. The primary outcomes focused on a reduction in pain, as defined by the Visual Analogue Scale (VAS) and Numeric Pain Rating Scale (NPRS). Secondary outcomes included the minimum pressure required to elicit a pain sensation, assessed through the pain pressure threshold (PPT). Included studies' quality was assessed using the Cochrane Risk of Bias version 2 (RoB v2). Meta-analysis was conducted using Revman, and mean standard deviations along with 95% confidence intervals (CIs) were computed.

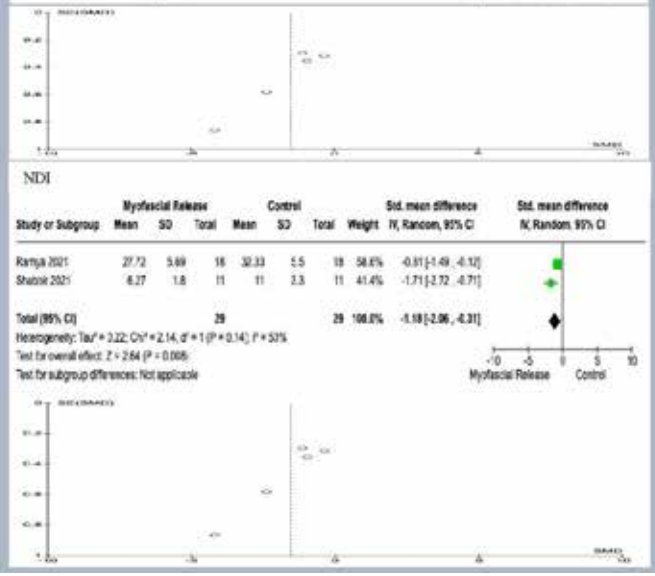
Results

This systematic review encompassed a total of 173 patients from 5 randomized controlled trials. Quality assessment indicated a high level of internal validity consistency among the included studies. Across studies, the reported PPT was lowered for patients undergoing MFR. One meta-analysis suggests a significant reduction in both pain (VAS; SMD -1.55 [95% CI -2.43 , -0.67]; P = 0.0005) and neck disability (NDI; SMD -1.18 [95% CI -2.06 , -0.31]; P = 0.008) in the myofascial treatment group.

VAS



NDI



Cochrane RoB v2

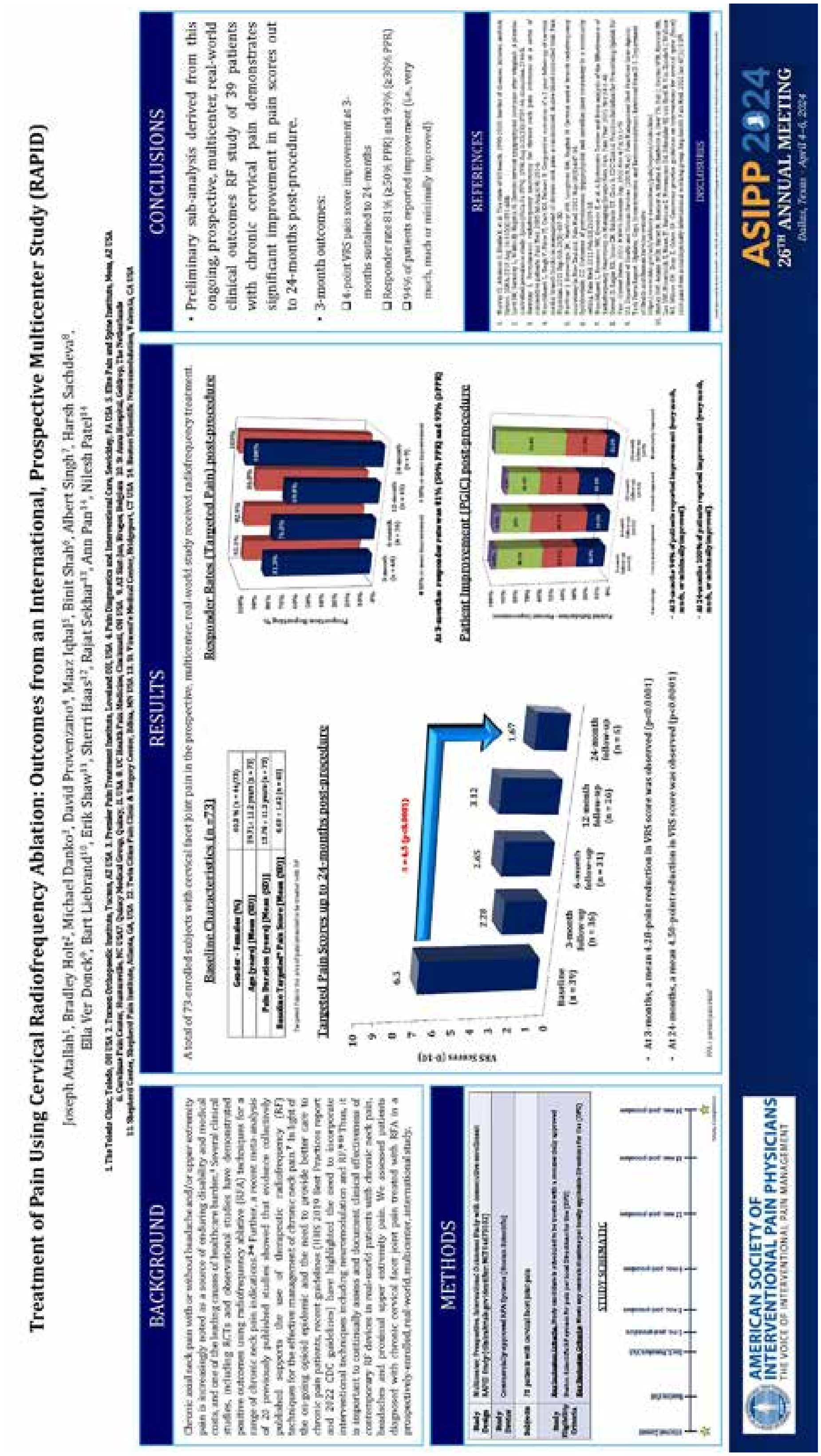
Discussion and Conclusion

MFR on cervical muscles significantly reduces pain and disability in cervicogenic headache patients, warranting clinical recommendation. More studies are warranted to better determine best practice strategies.

References

Rodriguez-Huguet M, Gil-Salú JL, Rodriguez-Huguet P, Cabrera-Afonso JR, Lomas-Vega R. Effects of Myofascial Release on Pressure Pain Thresholds in Patients With Neck Pain: A Single-Blind Randomized Controlled Trial. Am J Phys Med Rehabil. 2018 Jan;97(1):16-22. doi: 10.1097/PHM.0000000000000790. PMID: 28678033.

Bodes-Pardo G, Pecos-Martín D, Gallego-Izquierdo T, Salom-Moreno J, Fernández-de-Las-Peñas C, Ortega-Santiago R. Manual treatment for cervicogenic headache and active trigger point in the sternocleidomastoid muscle: a pilot randomized clinical trial. J Manipulative Physiol Ther. 2013 Sep;36(7):403-11. doi: 10.1016/j.jmpt.2013.05.022.Epub 2013 Jul 8. PMID: 23845200.


Treatment of Pain Using Cervical Radiofrequency Ablation: Outcomes from an International, Prospective Multicenter Study (RAPID)
Joseph Atallah[1], Bradley Holt[2], Michael Danko[3], David Provenzano[4], Maaz Iqbal[5], Binit Shah[6], Albert Singh[7], Harsh Sachdeva[8], Ella Ver Donck[9], Bart Liebrand[10], Erik Shaw[11], Sherri Haas[12], Rajat Sekhar[13], Ann Pan[14], Nilesh Patel[14]
BACKGROUND
Chronic axial neck pain with or without headache and/or upper extremity pain is increasingly noted as a source of enduring disability and medical costs, and one of the leading causes of healthcare burden.[1] Several clinical studies, including RCTs and observational studies have demonstrated positive outcomes using radiofrequency ablative (RFA) techniques for a range of chronic neck pain indications.[2-6] Further, a recent meta-analysis of 20 previously published studies showed that evidence collectively published supports the use of therapeutic radiofrequency (RF) techniques for the effective management of chronic neck pain.[7] In light of the on-going opioid epidemic and the need to provide better care to chronic pain patients, recent guidelines (HHS 2019 Best Practices report and 2022 CDC guidelines) have highlighted the need to incorporate interventional techniques including neuromodulation and RF.[8-10] Thus, it is important to continually assess and document clinical effectiveness of contemporary RF devices in real-world patients with chronic neck pain, headaches and proximal upper extremity pain. We assessed patients diagnosed with chronic cervical facet joint pain treated with RFA in a prospectively-enrolled, real-world, multicenter, international study.
METHODS
STUDY SCHEMATIC
RESULTS
A total of 73-enrolled subjects with cervical facet joint pain in the prospective, multicenter, real-world study received radiofrequency treatment.
Baseline Characteristics (n =73)
Targeted Pain Scores up to 24-months post-procedure
VRS Scores (0-10)
6.3
2.28
2.65
3.12
1.67
Baseline (n = 39)
3-month follow-up (n = 36)
6-month follow-up (n = 31)
12-month follow-up (n = 16)
24-month follow-up (n = 6)
• At 3-months, a mean 4.20-point reduction in VRS score was observed (p<0.0001)
• At 24-months, a mean 4.50-point reduction in VRS score was observed (p<0.0001)
Responder Rates (Targeted Pain) post-procedure
Patient Improvement (PGIC) post-procedure
CONCLUSIONS
• Preliminary sub-analysis derived from this ongoing, prospective, multicenter, real-world clinical outcomes RF study of 39 patients with chronic cervical pain demonstrates significant improvement in pain scores out to 24-months post-procedure.
• 3-month outcomes:
❑ 4-point VRS pain score improvement at 3-months sustained to 24-months
❑ Responder rate 81% (≥50% PPR) and 93% (≥30% PPR)
❑ 94% of patients reported improvement (i.e., very much, much or minimally improved)
REFERENCES
DISCLOSURES
AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS
THE VOICE OF INTERVENTIONAL PAIN MANAGEMENT
ASIPP 2024
26TH ANNUAL MEETING
Dallas, Texas · April 4–6, 2024

Ultrasound Guided Regional Anesthesia: A Safe Approach to Treat Pediatric Complex Regional Pain Syndrome

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BACKGROUND

Complex regional pain syndrome (CRPS) is a debilitating condition that is often difficult to diagnose in children. This condition is characterized by chronic, spontaneous, and provoked pain in the distal extremities which can lead to chronic psychosocial dysfunction in children and adolescents. Regional interventional pain management under ultrasound guidance may be an effective treatment option for pediatric patients with treatment refractory CRPS. It has been well understood that peripheral sympathetic interruption after stellate ganglion block (SGB) is effective in treating CRPS of the upper extremities. However, the shift from using fluoroscopic guidance to ultrasound guidance has only begun to gain in popularity in past decade While there are currently few randomized controlled trails evaluating the safety profile of ultrasound guided SGB versus fluoroscopic guided and blind techniques, several observational studies have demonstrated that ultrasound guidance provides a distinctive advantage in soft tissue visualization and lack of radiation exposure that may be beneficial for pediatric patients. We present a case in which an ultrasound guided SGB was performed to significantly relieve pain in a treatment refractory pediatric patient with CRPS affecting the upper extremity.

CASE REPORT

A 15-year-old otherwise healthy female presented with a one-year history of 8/10 continuously stabbing left wrist and left forearm pain that failed conservative treatment. An initial left SGB under ultrasound guidance was performed which resulted in significant pain relief and functional improvement for 2 months with no complications. Subsequent injections were performed after her initial block for recurrence of pain which provided significant pain relief with increased interval between pain episodes, reduced pain intensity, and further increased functional status.

METHODS

Figure 1.

Figure 2.

An ultrasound probe was used to visualize the cervical spine and the cervical articular pillars were counted until a dropout was appreciated, effectively identifying C7. By transitioning the ultrasound probe up to the last appreciated cervical pillar, C6 could be isolated. The probe was transitioned anterior to visualize vital anatomy including the internal jugular vein, carotid artery, thyroid tissue, thyroid artery, and longus colli muscle.

DISCUSSION

This is the first case report on the usage of ultrasound guided stellate ganglion blockage to treat complex regional pain syndrome in a pediatric patient. The case reported significant reduction, with increased interval between pain episodes, of pain and improvement of function without any significant complications. We hope to highlight the importance and effectiveness of ultrasound guided interventional pain management in pediatric patients.

REFERENCES

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RUTGERS
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Use of Google Trends to Examine Public Interest in Sacroiliac Joint Injections: 2004 to 2023

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INTRODUCTION

Sacroiliac (SI) joint pain is a common cause of chronic low back pain. It is frequently treated with therapeutic injections, which have efficacy for pain improvement. Google trends is a public tool that displays temporal and geographic trends for Google search queries.

OBJECTIVE

The purpose of this study was to examine search interest in SI joint pain and treatment with injections to provide insight into its use in the United States.

METHODS

- Data queried Google Trends on November 16, 2023. Search was limited to the United States date range January 1, 2004, to November 16, 2023
- Search terms: "sacroiliac osteoarthritis," "sacroiliac joint pain," "sacroiliac joint injection," and "lidocaine injection"
- Google trends calculates the number of searches of a unique term normalized to the total number of searches ("search volume index" (SVI)
- Pearson correlation coefficients (CC) were generated to assess associations

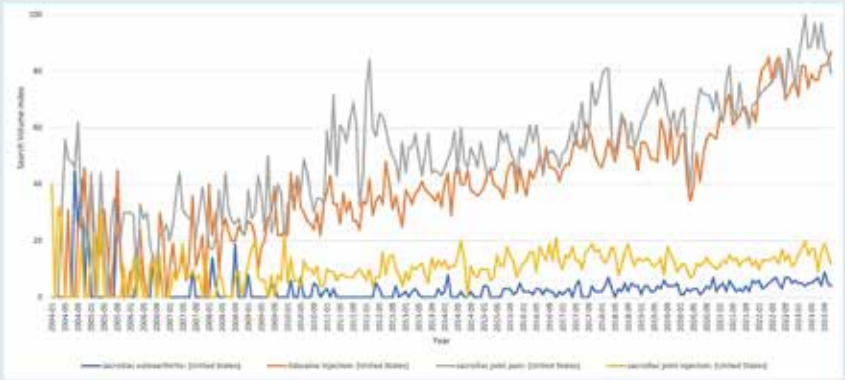

Figure 1. Google Trends search volume index for "sacroiliac osteoarthritis," "sacroiliac joint pain," "sacroiliac joint injection," and "lidocaine injection" from 2004 to 2023.

RESULTS

- CC "sacroiliac joint pain" & "lidocaine injection": r = 0.80 (95% CI: 0.75-0.84, p<0.001)
- CC "sacroiliac joint pain" & "sacroiliac joint injection": r = 0.33 (95% CI: 0.21-0.43, p<0.001)
- CC "sacroiliac joint injection" & "lidocaine injection": r = 0.37 (95% CI: 0.26-0.48, p<0.001).
- Estimated annual SVI for "sacroiliac joint pain" ranged between 22 to 90, peaking in 2023.
- Since 2006, the year with the lowest SVI, the annual SVI has grown by four times.
- Related queries associated with "sacroiliac joint pain" included "SI pain," "lower back," and "sacroiliac pain exercises", each of which was designed as a "breakout" search term, which denotes >5,000% increase in searches.

CONCLUSION

- Public interest for "sacroiliac joint pain" and "lidocaine injection" demonstrated a steady increase over the past 19 years
- These public interest trends may help clinicians with patient counseling and collective decision-making

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Precision Pain Management
Functional outcomes for patients with lumbar spinal stenosis treated with MinuteMan™ minimally invasive fusion monotherapy compared to combination therapy with percutaneous-image guided lumbar decompression in a real-world pain clinic
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Introduction
Lumbar spinal stenosis (LSS) is a clinical condition characterized by low back pain and lower extremity motor deficits which has been estimated to affect as much as 11% of the general population[1]. Previously, this condition could only be managed conservatively or with major spine surgery. New treatment options have emerged to treat this condition with minimally invasive surgery which produce outcomes on par with major surgical interventions[2]. Percutaneous image-guided lumbar decompression (PILD) is a technique which has shown to decrease self-reported disability in addition to improving functional capacity in patients with LSS by de-bulking the ligamentum flavum[3]. Interspinous process decompression (IPD) hardware to hose the interspinous processes which has been shown to be effective for the treatment of LSS[4-6]. We used the PILD and interspinous process decompression (IPD) device to treat patients from our pain clinic with LSS at level L2-3 – L4-5 since January 2021. The objective of this report is to evaluate whether patients diagnosed with LSS treated with IPD MinuteMan monotherapy report different pain and disability scores compared to those with combination IPD MinuteMan and PILD.
Materials and Methods
We reviewed medical record for all patients treated for clinical LSS from January 2021 until December 2023 (n=382). Of these patients, 32.4% were treated with PILD monotherapy (n=59), 35.3% were treated with IPD MinuteMan monotherapy (n=72), and 28.0% were treated with combination PILD/IPD MinuteMan therapy (n=51). We analyzed the data for self-reported improvement in specific ODI and EQ5D categories and reported whether the patient reported improvement versus no change or negative change. Incomplete data sets were excluded from analysis. Our patient population is very representative of patients in a traditional pain clinic. We did not control other variables such as medication use, prior surgery, activity, smoking, etc.
Results
All groups saw improvements in Oswestry Disability Index with 64.3% of PILD monotherapy patients, 44.3% of IPD MinuteMan monotherapy patients, and 52.6% of combination therapy patients reporting long-term improvement in disability index percentage. Pre- and post-operative ODI and EQ5D specific categories did not show statistically significant improvement in PILD or IPD MinuteMan monotherapy groups. However, the combination therapy group reports results approaching statistical significance for improvements in pain severity (p = .0535), walking (p = .0793), and standing (p = .09) on the ODI questionnaire and statistically improvements in Pain/Discomfort on the EQ5D questionnaire (p = .0282).
Pre- and Post-Operative Changes in Pain Severity
Pre- and Post-Operative Changes in Walking Severity
Pre- and Post-Operative Changes in Standing Severity
Pre- and Post-Operative Changes in Pain/Discomfort as Measured by EQ5D Quality of Life Scale
Conclusion
Our data suggests that the PILD procedure and implant of the IPD MinuteMan fusion device improve disability index scores and that there may be a summative effect when combining these two therapies for improvements in pain, standing, and walking. Due to the real-world nature of this investigation, no significant differences were found between pre- and post-operative changes, likely due to the lack of control for confounding variables. However, differences approaching statistical significance were identified for post-operative improvement in patients receiving combination therapy, suggesting improved outcomes when the two therapies are combined.
The reason performing both procedures for patients with lumbar spinal stenosis produces better results than either alone is unknown. However, human biomechanical models show that load on the ligamentum flavum is greatest during flexion[8]. Prolonged strain in this position results in an inflammatory cascade[9] leading to a deposition type I collagen flavum resulting in ligamentum flavum hypertrophy[10]. It has been observed that patients adopt a compensatory forward flexion due to intervertebral disc degeneration, known as the "stepping cart sign"[11]. Ligamentum hypertrophy therefore may be a may occur because patients adopt a forward flexion stance for exertion when upright.
PILD reduces the ligamentum flavum hypertrophy but does not address the underlying cause of hypertrophy – stress on the ligamentum flavum. MinuteMan fusion has shown in human models to decrease relative flexion motion[12], suggesting that it decreases load on the ligamentum flavum. This means that PILD may be treating pathological anatomy, but the IPD MinuteMan device treats the etiology which results in the development of the ligamentum flavum hypertrophy.
References
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Impact of Music on Patient Experience During Office-Based Pain Management Procedures

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Background

Chronic pain treatments encompass minimally invasive office-based procedures such as steroid injections, epidural injections, and nerve blocks. These procedures are performed with local anesthesia and are known for their speed, minimal side effects, and swift recovery. Nevertheless, patients may still experience emotional distress due to chronic pain and anxiety. While some providers address this issue with pharmacologic interventions, there is a need to further explore non-pharmacologic options. Music is a therapeutic approach that has been shown to decrease pain and anxiety in a variety of office-based clinical and dental procedures.[1-3]

Objective

Determine if the music of patient choice played during office-based procedures reduces pain and anxiety levels and stabilizes stress biomarkers more than no music.

Methodology

This randomized, controlled non-blinded clinical study tested the effects of music of choice played during non-corticosteroid minimally invasive treatments in a pain management clinic setting in Wesley Chapel and Zephyrhills, Florida. 73 subjects were enrolled. The primary outcome measures were subjective responses to visual analog scale (VAS) and state-trait anxiety inventory (STAI) instruments and objective measurements of stress markers via salivary cortisol, blood pressure, and heart rate before and after a scheduled office-based procedure.

Results

Characteristic	Control	Treatment
N (sample size)	39	34
Females (%)	58.97%	61.76%
Age, mean ± SD	65.74 ± 13.59	60.47 ± 14.15
White (%)	87.18	82.35
Hispanic/Latino (%)	7.69	8.82
African-American (%)	2.56	8.82
Unspecified race or ethnicity (%)	2.56	0
Lumbar medial branch block (%)	41.03	38.24
Unspecified procedure (%)	23.07	23.53
Cervical medial branch block (%)	17.95	20.59
Misc. blocks (%)	12.82	11.76
Steroid injection (%)	5.13	2.94
Spinal cord stimulator trial (%)	0	2.94

Table 1. Descriptive statistics. The majority of participants were female, non-Hispanic White. The majority of participants underwent a lumbar medial branch block procedure.

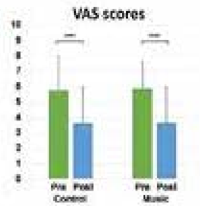

Figure 1. Both groups experienced a statistically significant reduction in pain levels post-procedure based on VAS scores (see scale below). Results are shown as means ± SD.

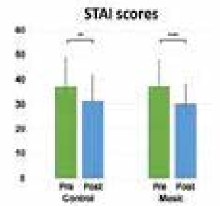

Figure 2. Both groups had a statistically significant reduction in STAI scores post-procedure. Results are shown as means ± SD.

Additional finding: A significantly higher proportion of music-treated subjects (68.42%, n=15) had ≥10-point STAI score reduction post-procedure compared to control (30%, n=9), p=0.04.

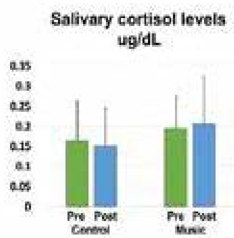

Figure 3. The cortisol levels did not change significantly in either control or treatment groups when compared pre- and post-procedure. Results are shown as means ± SD.

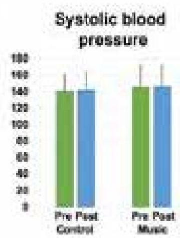

Figure 4. Systolic blood pressure did not change significantly post-procedure in either group. Results are shown as means ± SD.

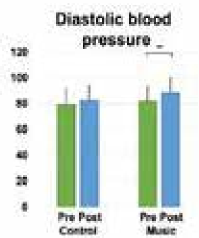

Figure 5. Diastolic blood pressure increased significantly in the music group only. Results are shown as means ± SD.

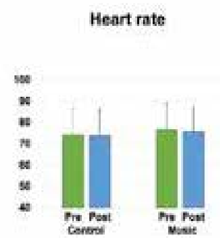

Figure 6. Both control and music-treated subjects experienced a small heart rate decrease post-procedure, although this change was not statistically significant. Results are shown as means ± SD.

Conclusions

Pain and anxiety levels per VAS and STAI scores decreased after procedures in both groups. Among those who had high anxiety and distress, more subjects in the music treatment group reported significant improvements in their STAI scores, which could be attributable to music. Furthermore, the significant increase in diastolic blood pressure after the procedure in the music group could be due to the stimulatory and pleasurable effects on the nervous system leading to a release of catecholamines and increased vasculature resistance. However, the lack of a similar effect on systolic blood pressure and heart rate was unexpected and requires further exploration.[6,7] This study demonstrated that music is a promising non-invasive treatment to reduce high anxiety and subjective distress levels in patients undergoing office-based procedures for chronic pain. Additional studies with improved controls and larger sample sizes are needed to further investigate the effects of music on objective measures of stress.

References

Acknowledgments

The study was supported by LECOM-T grant awarded to James Toldi, DO.

Postherpetic neuralgia mimicking lumbar radiculopathy: A case report

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BACKGROUND:

- Herpes zoster is the reactivation of latent varicella-zoster virus in the dorsal root ganglia of the spinal cord.
- There are two cases of patients who present with neuropathic pain in a dermatomal distribution with the emergence of skin lesions after failing conservative management and undergoing epidural steroid injection (ESI)

CASE DESCRIPTION:

- 79-year-old male with a two-week history of left-sided acute low back pain (ALBP) radiating to the left L2-L3 distribution, with the development of several overlapping erythematous papules (see Figure 1).

OBJECTIVE:

- To emphasize the value of a complete history and physical examination in patients with acute low back and leg pain while maintaining a broad differential diagnosis to avoid unnecessary diagnostic testing and procedures.

METHODS

- Lumbar spine magnetic resonance imaging (MRI) revealed moderate L3-4 bilateral foraminal stenosis

RESULTS

- Patient diagnosed with acute herpes zoster infection in the lumbar region.

CONCLUSION

- To our knowledge, this is the fifth documented case of herpes zoster infection with neuropathic pain localized to the lumbosacral region and mimicking symptoms of lumbar radicular pain.
- When evaluating back pain, it is essential to complete a thorough clinical examination focusing on factors such as chronicity, severity, distribution, and precipitating events.

Low back pain remains a prevalent cause of physical disability and reduced functionality.

In the setting of the geriatric population, who are at a 30% higher incidence of herpes zoster, it should remain a viable alternative on the differential diagnosis.

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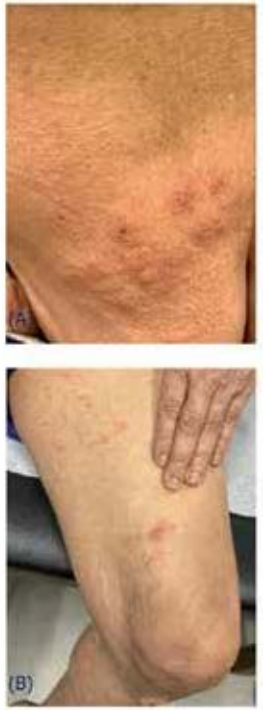

Figure 1: Overlapping erythematous papules in different stages of healing across L2-L3 distribution noted in the patient's left low back (A) and left anterior thigh (B).

Spinal Cord Infarction in 42-Year-Old Woman with Complex Regional Pain Syndrome Post-Dorsal Root Ganglion Placement Found to Have Prothrombin Gene Mutation: A Case Report

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BURKE
REHABILITATION

CASE DESCRIPTION

42-year-old-woman with a history of non-insulin dependent diabetes mellitus, provoked pulmonary embolism, and left upper extremity Complex Regional Pain Syndrome who presented with refractory pain. Her CRPS significantly limited the range of motion of her left upper extremity and caused allodynia and hyperalgesia. She had trailed physical and occupational therapy, while using oral neuromodulators with no benefit. Her refractory symptoms prompted her to present for dorsal root ganglion stimulator placement. Following the procedure, she developed quadriparesis, most profound in the lower extremities, leading to a code stroke and transfer to a hospital site. At presentation, her National Institutes of Health Stroke Scale was 10, and she underwent an extensive workup. CT and CTA imaging for stroke was negative. MRI was unable to be obtained due to her stimulator being incompatible.

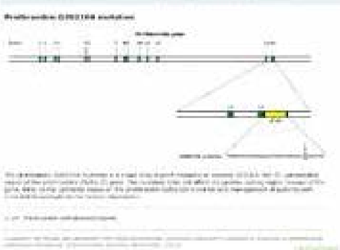

Figure 1. Prothrombin gene mutation

ASSESSMENT

Upon further investigation, she was found to have a prothrombin gene mutation, which may have increased risk for thrombotic complication.[3] As a result of the above there was a concern for etiology of a spinal cord infarction, however due to her DRG stimulator she was unable to get an MRI to confirm if an infarct had occurred. **No other causes for her quadriparesis were found on laboratory investigations or imaging so a presumed diagnosis of spinal cord infarction was made. The patient opted to keep her stimulator as it was effectively treating her pain, and she was transferred to an acute rehabilitation center for further care after becoming medically stable. Over time, with intense physical and occupation rehabilitation she was able to regain most of her strength and function, and her CRPS remained under control.**

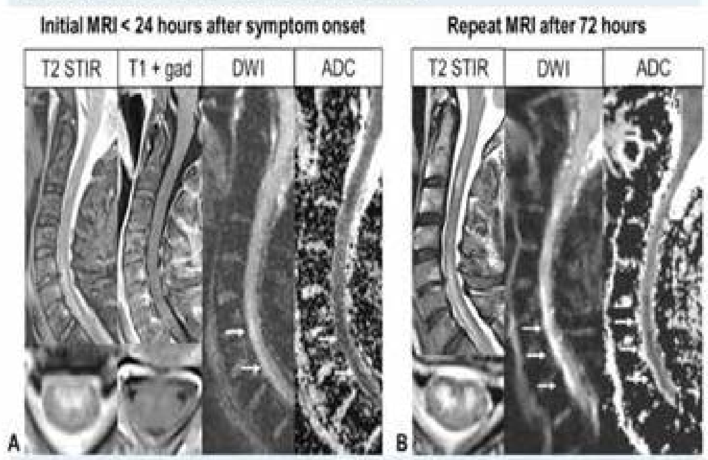

Figure 2. MRI imaging of spinal cord infarction

DISCUSSION

Dorsal root ganglion stimulator implantation, like all procedures, has risks associated with it. These risks include but are not limited to infection, lead damage, and spinal infarction. Current research cites an approximate 2% rate of spinal cord injury with DRG placement. However, this may not reflect the risk in those who have had thromboembolic disease or have prothrombotic disorders. Our case is unique as it illustrates a rare complication and encourages us to ponder if patients need more advanced screenings for factors that increase complication risk.

CONCLUSIONS

While all procedures are designed and performed to help patient's it is important to be cognizant of the risks associated with them, even unexpected ones, such as in our case. Future research is needed to ensure that simulator placement is safe in special population groups, such as in our case. Future studies may include the rate of spinal cord infarction post dorsal root ganglion stimulator placement in those with thrombotic disorders.

References

1. [illegible] Neuromodulation 22:1–26, 2019.
2. [illegible] Complications and Effects of Dorsal Root Ganglion Stimulation in the Treatment of Chronic Neuropathic Pain: A Nationwide Cohort Study in Denmark. Neuromodulation. 2021;24(4):[illegible]
3. Kujovich JL. Prothrombin Thrombophilia. [illegible] Seattle (WA): University of Washington, Seattle; 1993-2023. Available from: [illegible]
4. [illegible] The Incidence of Spinal Cord Injury in Implantation of Percutaneous and Paddle Electrodes for Spinal Cord Stimulation. Neuromodulation. [illegible]
5. Dahlbäck B. Advances in understanding pathogenic mechanisms of thrombophilic disorders. Blood 2008; 112:19.
6. [illegible] Chapter 9 - Spinal Cord Infarction, [illegible] 2005, Pages 221-227, [illegible]