2022 ASIPP Abstract and Poster Winners

Overall Physician Attending

Provider Specialty Effect on Spine Pain Resource Use/Cost
– Peter Staats, MD

First Place Resident

Examining the Efficacy of TeleHealth in a multidisciplinary Spine Center
– Maria Lyuksyutova, MD

Second Place Resident

The Prediction of Future Opioid Abuse in Patients Who have been Prescribed Opioids
– Alex D. Pham, MD

Overall Medical Student

– Priya Uppal
Impact of provider specialty on spine pain resource use & costs

Background
Persistent, or recurring, back pain is one of the leading health care crises in America. This cost burden can result in long-term negative effects on a person’s quality of life and overall healthcare costs. Patients seeking care for new-onset chronic pain may follow a variety of care pathways.

The aim of this study was to determine how initial pain specialist selection and subsequent care influenced healthcare costs in the last year after a referral for chronic spine pain management.

Methods
- The Optum Clininformatics™ Data Mart database was queried (2016–2020) to identify adult patients diagnosed with chronic spine-related pain. This database contains claims for ~50 million patients from a large commercial insurer.

Figure 1. Study Population Inclusion/Exclusion Criteria

- Key study measures included: pain-related and all-cause medical resource use, pain-related and total all-cause costs, and opioid prescription fills.

Results
- 366,080 patients were included in the study population—13% of patients saw only a pain specialist (cohort 1), 71% only a surgeon (cohort 2), 7% a pain specialist followed by a surgeon (cohort 3), and 9% of patients initially saw a surgeon and then a pain specialist (cohort 4; Fig. 1).

- Patients managed only by a pain specialist experienced fewer pain-related inpatient hospitalizations during the one-year follow-up period, compared to those who only saw a surgeon (P < .0001).

- Referral to a pain specialist alone was associated with lower resource utilization and per-patient adjusted cost savings of $3,311 (pain-related) and $6,447 (all-cause) compared to patients referred to a surgeon alone (Fig. 2). *P < .0001

Figure 2. Adjusted Total Payer and Patient Payments and Cost Differences to Cohort 1

- Fewer patients managed by a pain specialist alone (38.7%) had spine-related imaging visits within 12 months of diagnosis compared to those managed by a surgeon alone (65.3%) or a combination of surgeon and pain specialists (66.6% to 76.7%, P < .0001, Table 1.)

- Significantly fewer patients managed by a pain specialist alone (0.3%) underwent a spinal fusion procedure versus a surgical specialist alone patient (7.4%) or with a pain specialist (7.2% to 9.4%, P < .0001, Table 1.)

Figure 3. Opioid use - Average daily MME by index year

Results cont.
Table 1. Follow-up Imaging Related Visits

<table>
<thead>
<tr>
<th>Description</th>
<th>Pain Only</th>
<th>Surgeon Only</th>
<th>Pain Only</th>
<th>Surgeon Only</th>
<th>Pain Only</th>
<th>Surgeon Only</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imaging visit with pain</td>
<td>20.1%</td>
<td>0.7%</td>
<td>6.3%</td>
<td>0.1%</td>
<td>20.1%</td>
<td>0.7%</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Spinal Fusion Procedure</td>
<td>0.2%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.1%</td>
<td>&lt; .0001</td>
</tr>
</tbody>
</table>

Conclusion
- Management through pain specialists alone can lead to significant cost savings.
- Starting with a pain specialist may be a cost-effective option for price-sensitive patients and payers that need to manage overall healthcare expenditures.

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Prediction of Future Opioid Abuse in Patients who have been Prescribed Opioids

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Background: One of the greatest threats in medicine today is the abuse of both prescription and non-prescription opioids. Patients are often introduced to these drugs as part of their healthcare before developing Opioid use disorder (OUD). Opioid use disorder is a subset of substance use disorders (SUD), which can lead to a drug addiction pattern that causes physical and social impairments. The DSM-5 uses some criteria to assess for severity of substance use disorders. Problematic behaviors associated with SUD include use of a higher dose than prescribed, craving for the medication, increased tolerance, withdrawal, placing strain on relationships or occupation, and an inability to quit despite a desire to do so.

Opioids are a class of highly addictive analgesics for significant pain management. They were prescribed heavily in the 1960s due to a belief that newly developed opioid medications were safe for use, and children had little risk for addiction. The use of opioids for chronic pain rekindled increased tolerance to the medication, which prompted physicians to prescribe higher doses to maintain adequate analgesia in their patients. In the 2000s, many people suffering from addiction to prescription opioids turned to heroin, which increased the risk of overdose. Now an incredibly strong synthetic opioid, fentanyl, is becoming more prevalent as a drug trend and has greatly increased opioid-related deaths in recent years. The misuse of opioids over the last decade has had a significant impact on the healthcare system. The number of deaths attributed to opioid overdose per year has quadrupled from 1999 to 2019 and has almost surpassed 500,000. In 2019, there were over 60,000 deaths due to overdose with opioids accounting for more than 70% of those deaths. Between 2009 and 2018, there were over 1,200,000 opioid overdose deaths in the United States. This financial price of this epidemic has been staggering for the healthcare system and our nation. The economic impact estimated to be $1.02 trillion, with a majority of the burden due to the reduced quality of life with OUD and the value of lost productivity.

The prevention of future opioid misuse is the most effective and efficient method of reducing the impact of the opioid epidemic on our healthcare system. This involves trying non-opioid forms of pain management first. If opioid medications are necessary, use them for a reduced time with the lowest effective dose and short duration of action. If a patient does not require opioid pain treatment, educating them on the risks of opioid misuse can also reduce problematic outcomes. Other methods of reducing opioid misuse include patient contracts, frequent monitoring of patients using opioids for chronic pain, and intervening with early signs of SUD. One study designed at creating a database that predicted patients at risk for opioid misuse and using non-opioid forms of medications in those scenarios showed to be very cost-effective; however, because it was not implemented, it could not show an impact on the health or outcomes of these patients.

Methods: Conducted a systematic comprehensive literature search using a collaboration of existing publications involving predicting future opioid abuse in patients who have been prescribed opioids. We present the existing literature in understanding of predicting future opioid abuse in patients who have been prescribed opioids.

Results: To track the opioid epidemic, the CDC released a guideline in 2016 detailing the prescription of opioids for patients with chronic pain, recommending a prescription of the lowest effective dose for an immediate-release opioid for acute pain management with a three-day prescription being adequate for treatment. Prior is a seven-day or greater supply necessary. They also recommended careful consideration of patient risk factors before increasing the dose. A 50 morphine milligram equivalents (MME) per day of transitioning to extended-release long-acting opioids as both are associated with a greater risk of overdose. For post-op surgical opioid prescription practices, procedures with rapid recovery, such as opioid dosage procedures, should only require three days. Procedures with a medium-term recovery period, such as a cancer care period, should generally prescribe a 7-day supply. More extensive recovery periods for procedures such as knee replacements should be given no more than a 14-day supply. For all users requiring a longer duration of treatment than recommended, the patient should be re-evaluated and tapered from opioids within six weeks after surgery. While the opioid dispensing rate has declined with these guidelines in place, physicians are still performing high-risk practices as the average number of days for an opioid prescription in 2017 was 18 days with an average daily dose of more than three times the average dose compared to 1999.

> Opioid Use Disorder: Despite their clinical efficacy for pain management, short and long-acting opioids have displayed a significant potential for abuse. A 2017 systematic review encompassing 158 studies determined opioid misuse in 21% to 29% and opioid abuse in 8% to 12% of U.S. prescribed patients. The number of deaths among these patients has also increased. During 2015, the CDC recorded nearly 70,000 drug overdose deaths, of which 70% were attributed to opioids. The highest per capita death rates were registered in West Virginia, Delaware, and West Virginia. In 2020 at least 70,000 deaths due to opioid overdose in the United States were higher than any previous twelve-month period and 38.4% higher than the prior year. During 2020, all but one jurisdiction reported an increase in opioid deaths with the most significant increases being seen in western states. The CDC determined common factors facing cities with high opioid prescription rates. These include smaller cities or larger towns, a high percentage of white residents, a high number of dentists or primary care physicians per capita, more uninsured people, and more residents with arthritis, diabetes, or disability. Synthetics opioids are responsible for 72.9% of opioid deaths due to overdose. Furthermore, the data shows that physicians have become more cautious in prescribing opioids, as represented by a 19% reduction in annual prescribing between 2006 – 2017. The most prominent risk factor for developing opioid use disorder is diagnosed substance abuse within the prior six months. Other common risk factors include: Young age, high dose prescription, Chronic opioid prescription, Smoking, Non-familial status due to pain, Unique etiology of pain, Psychological disease, Family history of substance abuse, Poor social support.

Conclusion: While opioid drugs carry a great benefit in the relief of pain in both acute and chronic settings, they have the potential to create equal harm in patients. For most of the 20th century, these drugs were reserved for the most severe cancer pain, but we began using them with increased frequency for a wider range of conditions starting in the 1990s. This change in medical practice has snowballed into what is now termed the opioid epidemic. The epidemic continues to take its toll on our population, as we recorded 70,000 deaths due to drug overdose in 2019, with opioids being responsible for 70% of them. We have taken measures to counter this by changing the way we prescribe these drugs and monitoring those with prescriptions, but the numbers are still high. The easiest and safest solution is to use this to improve our methods for predicting abuse in our patients, preventing the problem before it occurs. Understanding the risk factors for OUD would allow physicians to either encourage patients to seek alternative treatments or catch the problem before it is too late. The greatest risk factor for OUD is a history of substance abuse. Other common risk factors include young age, high prescription dosages, long-term prescriptions, smoking, a non-familial status due to pain, unique etiology of pain, psychological disease, family history of substance abuse, and poor social support. Although they have little clinical efficacy, there are three available screening tools to quantify the risk of OUD: the Screener and Opioid Assessment for Patients on Pain (SOAPP-R), the Opioid Risk Tool (ORT), and the Pain Assessment and Documentation Tool (PADD). These could be used in conjunction with a physicians clinical assessment to better predict abuse.

Although we currently do not have an effective way to predict abuse in patients, perhaps there is still a way to prevent it. The driving force behind addiction is a feeling of euphoria experienced when using a drug. Bridging interactions with the mesolimbic dopamine system have been shown to produce euphoria in human and animal studies. Opioids play a role in the mesolimbic system by increasing dopamine, resulting in an increase in the euphoria reward system and the reward system. The next big step for ending the opioid epidemic is a pharmacologic standpoint will be to find a way to separate the euphoria from the analgesia. We have used methods to study this concept and found that the euphoria could be diminished via an increased interaction of the GABA and Serotonin, with increased stimulation of GABA and reduced Serotonin. With opioid’s ability to bind the mu-opioid receptor for a longer duration than morphine, perhaps it will pave the way for a future synthetic opioid to end the opioid epidemic. Whether the solution is found in better production or a different pharmacological approach, strides need to be made to reduce the impact of OUD on the healthcare system and the patient population.

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The COVID-19 pandemic has had a global impact on health, particularly on those aged 65 and older. The present study aimed to determine the prevalence of cervical axial pain in this age group during the COVID-19 pandemic. The study was conducted in a large tertiary care hospital in the USA, where COVID-19 was widespread. The study included patients aged 65 and older who were hospitalized due to COVID-19 and their exacerbation of cervical axial pain. The results revealed a high prevalence of cervical axial pain in this age group, with a notable increase in the severity of pain during the pandemic. The study also highlighted the need for increased awareness and management of cervical axial pain in older adults during the COVID-19 pandemic.
Determining the Efficacy of Autologous Bone Marrow Mesenchymal Stem Cells in the Treatment of Lower Back Pain

Salam Atta, MD,1 Matthew R. Rutty, PhD,2 Kfadeh Boodia, MD,1,3,4,5 Charn B. Hsieh, MD,1 Narineh Beidoo, MD,1 Zaid Syed2

Introduction
- Lower back pain is the most expensive medical condition in the United States with an annual expenditure of $154.5 billion in 2018.
- There has been escalating growth of treatments, including over-the-counter (OTC) medications, structured exercise programs, physical and drug therapy, interventional techniques and surgical interventions.
- The anti-inflammatory, immunomodulatory, and regenerative properties of bone marrow mesenchymal stem cells (BM-MSCs) have not been demonstrated in controlled studies of treating low back pain.
- It is generally known that treating such pain is a result of spinal degeneration and is often difficult to definitively single out a pain generator, consequently, resulting in inadequate therapeutic results.

Objective
The study was undertaken to evaluate the effectiveness of autologous bone marrow MSCs in treating chronic low back pain due to severe lumbar spinal degeneration with involvement of multiple structures.

Methods
The treatment group patients received a one-time bone marrow concentrate injection into spinal structures (i.e., discs, facets, spinal nerves, and sacroiliac joints), along with conventional treatment, whereas the control group received conventional treatment with nonsteroidal anti-inflammatory drugs, over-the-counter drugs, structured exercise programs, physical therapy, spinal injections, and opioids, etc.

Data Analysis
- Outcomes were assessed utilizing multiple instruments, including the Oswestry Disability Index (ODI), Numeric Rating Scale (NRS-11), EuroQOL 5-Dimensional Questionnaire (EQ-5D-3L), Global Mental Health (GMH), and Global Physical Health (GPH).
- Multiple outcomes were assessed with primary outcomes being minimal clinically important differences (MCID) in ODI scores between the groups and a 2-point increase in pain scores.
- In the study group, total nucleated cells, colony forming units-fibroblast, CD34-positive cell numbers and platelets were also recorded, along with post-procedure magnetic resonance imaging changes. Outcomes were assessed at 1, 3, 6, 12, and 18 months.

Results
- Significant improvement was achieved in functional status measured by ODI, pain relief measured by NRS-11, and other parameters measured by EQ-5D-3L, GMH, and GPH, in the study group relative to the control group at all time periods.
- Significant improvements at 12-month follow-up with 67% of the patients in the study group achieving MCID utilizing ODI when compared to 8% in the control group.
- Greater than 2-point pain reduction was seen in 74% of the patients at 3 months, 66% of the patients at 6 months, and 58% of the patients at 12 months. Both ODI and pain relief of 2 points were significantly different compared to the control group.
- Opioid use increased in the investigational group, whereas there was a slight increase in the control group.

Outcome Data for ODI, NRS-11, EQ-5D-3L GMS, and GPH scored

Discussion
- The results of this study showed significant improvement in function and pain relief of 67% of the study group, and achieved 6% of ODI at 12 months, when compared to only 8% in the control group.
- Pain relief was also seen with a 2-point difference in 56% of patients in the study group at 12 months compared to only 6% in the control group.
- The study group also showed reduced opioid usage, thus the trial is the first of its nature study with BM-MSC injecting multiple structures in one setting in chronic spinal degeneration.
- Patients in the study were not eligibly selected, the goal was to evaluate this therapy in “real-life” challenging patients and patients with severe changes in the MRIs were excluded if they did not exhibit neurologic deficits.

Conclusions
- Autologous bone marrow cell therapy represents an alternative to traditional treatments for low back pain to provide pain relief via multifractal BM-MSC functions of anti-inflammatory, immunomodulation, cell recruitment, and remodeling/genesis.
- Stem cell therapy has the potential to show, but, in some cases, reverse the progression of degenerative discs and joints.
- Positive outcomes in this study population, which presented with severe spinal degeneration were likely due in part to the combination of injecting high numbers of progenitor cells, BM-MSCs, and reducing multiple pain generator sites.
- It appears that stem cell therapy could be a reasonable option to treat chronic low back refractory to conventional treatment, especially if performed by qualified physicians following the proper guidelines.

Author Contributions
The study was designed by SA, KSS, MB, and IM. Statistical analysis was performed by Sager Quyraeger, Punpm.
RCT on DTM™SCS for Intractable Chronic Low Back and Leg Pain


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BACKGROUND

Spinal cord stimulation (SCS) is a treatment for chronic low back pain (LBP) relief. DTM™ SCS is a SCS programming approach inspired from science where electrical signals are multiplexed spatially and temporally. In preclinical studies DTM™ SCS showed the ability of differentially modulating neurons and glial cells to balance interactions perturbed by neuropathic pain. A feasibility study of DTM™ SCS demonstrated a responder rate of 80% for back pain with 85% of subjects preferring DTM™ SCS to conventional SCS therapy. This large randomized controlled trial (RCT) evaluated the efficacy and safety of DTM™ SCS compared to conventional SCS over a 12-month follow-up period.

METHODS

This was a prospective, multicenter, randomized, open-label, post-market study comparing DTM™ SCS programming to conventional SCS in patients suffering from chronic, intractable pain in the low back and legs. The study was IRB approved and registered on clinicaltrials.gov. Subjects that reported Visual Analog Scale (VAS) of ≥5 in low back pain (LBP) with moderate to severe leg pain at baseline were enrolled. Informed and consenting subjects meeting eligibility criteria were randomized 1:1 to either of the two treatment groups in a parallel assignment. Subjects underwent a SCS trial, per labeling. Subjects that reported ≥50% improvement in LBP relative to baseline during the trial phase were implanted with a rechargeable neurostimulator (Intelli™, Medtronic). Evaluation visits occurred at 1, 3, 6, and 12 months post device activation.

The primary outcome was percentage of responders (subjects with ≥50% LBP relief) to therapy at 3 months after activation of the implanted SCS system. Additional outcomes included changes in leg pain, satisfaction, extent of disability, quality of life, and safety data.

Demographics

A total of 116 subjects completed the trial phase (58 in each arm), 94 subjects were implanted (47 in each arm), 91 subjects completed 3-month visits (46 in each arm), and 75 subjects completed 12-month visits (42 in DTM™ arm and 17 in control arm). Demographics for all randomized subjects (N=123) are detailed in Table 1.

RESULTS

Prolonged Back Pain Responder Rate

Prolonged responder rate is defined as ≥80% pain relief from baseline. Prolonged back pain responder rate at 12-months was 69% with DTM™ SCS and 35% with conventional SCS.

Change in Physical Health (PROMIS)

88% of subjects communicated their quality of life as being excellent, very good, good, or fair with DTM™ SCS at the 12-month follow-up visit (Figure 4).

Subject Satisfaction

83% of subjects were “Satisfied” or “Very Satisfied” with DTM™ SCS at 12-month follow-up visit (Figure 5).

CONCLUSIONS

This study demonstrated that DTM™ SCS and conventional SCS can offer LBP relief, however DTM™ SCS provided superior LBP responder rate and benefits in other clinically meaningful outcomes.

REFERENCES


DISCLOSURE

This study was sponsored by Stryker, which was acquired by Medtronic.
Customized Tuned TX: The Future of Spinal Cord Stimulation

Amol Soin, MD

Introduction

Spinal Cord Stimulation is a modality to treat back and leg pain that has seen significant advancements and increased use over the past 20 years. New modalities, waveforms, and technologies are emerging showing significant advances. However, there should be no reason why we would not be able to consistently and predictably drop pain scores down to 0 for patients who suffer from back and leg pain in the right patient.

Methods

- To test in 20 patients for the first time in humans a new type of spinal cord stimulator that uses aperiodic random electrical signals that is tunes to specific power spectral densities to see if we can get pain scores down close to 0 as possible.

Inclusion Criteria

1. ≥ 18 years of age;
2. Have chronic (defined as at least 6 months duration), intractable neuropathic leg and/or low back pain; any nociceptive pain must be less prominent than the neuropathic pain;
3. Have pain that is unresponsive to conservative treatment options;
4. Has average baseline leg and/or back pain NRS score of at least 6;
5. Be considered by the Investigator as a candidate for implantation of a spinal cord stimulator system;
6. Planning to undergo a SCS trial;
7. Be willing to cooperate with the study requirements including compliance with the study procedures;
8. Reported stable pain (non-escalating) for 30 days prior to signing informed consent;
9. Has stable pain medication use and dosage for 30 days prior to signing informed consent;
10. Be psychologically qualified to receive a spinal cord stimulator as per the clinician's standard clinical practice and does not have clinically relevant psychological condition(s) that would interfere with ability to accurately report outcomes or complete study procedures.

Results

All subjects responded within 45 minutes of treatment with significant pain reduction.

Discussion

1) It is possible to achieve near 0 pain scores using spinal cord stimulation but this requires a completely different paradigm of neuromodulation than one that is used today.

2) This requires using aperiodic random signaling that is specifically tuned by the patient to achieve their desired pain reduction. No other system commercially available uses aperiodic random signaling. What is most interesting is that our data plots of spectral density of stimulation varies significantly from patient to patient.

3) Just like each fingerprint in humans is a unique signature (see Figure 6), the spectral density for patients with similar pain patterns is also unique and may explain why current conventional stimulation is able to achieve very significant pain reduction but mostly unable to receive near 100% reductions reliably and predictably. Further studies are warranted.

Acknowledgments

Thank you.


**Allelic Frequency Differences Between Responders and Non-Responders to CBD Oil: A Pharmacogenetic Study**

**Daniel Roth D.O., Brian Henriksen Ph.D., Yekaterina Afonina D.O.**

### Hypothesis

Allelic differences exist between CBD oil responders and non-responders

### Background

- 2018 Farm Bill legalized the growth, interstate transport, and sale of hemp-derived ingredients containing less than 0.3% THC as well as removed it from the schedule-one list
- The quantity of CBD in the products is not always consistent with the label description
- Possible unsafe manufacturing processes
- CBD known to cause transmisions in animals studies, has not been replicated in human studies
- FDA currently working on establishing guidelines and encouraging further research
- Currently no way to determine whether or not a patient will receive any benefit from trying CBD

### Methods

- Buccal swab samples were collected from participants
- DNA was extracted and purified using the Promega Maxwell16 system
- After elution DNA was quantified using Nanodrop 2000
- 75 SNPs were selected, 50 are part of Genemarkers's Pharmacogenomics Open Array and 16 SNPs due to their specific involvement in CBD metabolism, transport, and efficacy
- Quality control of genotyping data was performed using tagrax Genotype software
- IRR approved

### Results

<table>
<thead>
<tr>
<th>Gene Symbol</th>
<th>NCB SNP Reference</th>
<th>Associations</th>
<th>Responder vs Non-Responder P-value</th>
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</thead>
<tbody>
<tr>
<td>CNRL</td>
<td>rs805380</td>
<td>Risk of cyclothymic syndrome, cannabis dependence</td>
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<tr>
<td>FAAH</td>
<td>rs3205630</td>
<td>Variability in pain response; PTSD</td>
<td>0.021</td>
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<tr>
<td>FAAH</td>
<td>rs324424</td>
<td>Addiction susceptibility; misense mutation known to affectendocannabinoid levels, though to be involved in hypoglycaemia</td>
<td>0.052</td>
</tr>
<tr>
<td>FAAH</td>
<td>rs4141904</td>
<td>Variability in pain levels</td>
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<tr>
<td>GPR55</td>
<td>rs3741907</td>
<td>Binding affinity for endocannabinoids; misense mutation with functional significance</td>
<td>0.040</td>
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<tr>
<td>FS</td>
<td>rs6025</td>
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<td>0.098</td>
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<tr>
<td>HTR2C</td>
<td>rs3813929</td>
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<td>0.059</td>
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### Discussion

- Most frequently tested genes for pain showed no difference between our cohorts
- 5 genes involved in CBD metabolism, transport, and receptors, along with 2 genes from Genemarkers PGK Panel did show a significant difference
- CNRL rs805380 – Previously associated with cannabis dependence, association has not been replicated
- FAAH metabolizes endocannabinoids (ie AEA). CBD inhibits FAAH, resulting in increased activity of AEA. Increased levels of endocannabinoids are associated with analgesic and anti-inflammatory effects
  - Rs324424 – Responders may retain increased levels of endocannabinoids
  - Rs4141904 and rs2295633 associated with variability in pain response in humans
- GPR55 rs3741907 – Alternate Allele results in lower activity and is more abundant in a group of patients diagnosed with anorexia nervosa
- HTR2C rs3813923 has not been extensively studied in response to cannabinoids, however is associated with the risk of antipsychotic induced weight gain
- Fs rs6025, also known as Factor V Leiden, a known risk for thrombosis. The connection between this SNP and the function and/or response to cannabinoids has not been studied

### Limitations

- Single institution
- MAF data is less reliable/should be considered with care

### Conclusion

- Genetic screening resulted in significant allelic differences between CBD responders and non-responders
Clinical Outcomes in a Highly Comorbid Population Using Interspinous Spacers for the Treatment of Lumbar Spinal Stenosis

Ramana Naidu1, Pankaj Mehta2, Yu Fei3, Rosini Jain3

BACKGROUND
Indirect Decompression Systems (IDS) or Interspinous Spacers are an option in well-selected patients with impaired physical function who experience relief in flexion from symptoms of leg, buttock, and/or groin pain due to lumbar spinal stenosis (LSS). A growing body of published clinical evidence has demonstrated excellent long-term clinical benefit with sustained pain relief, improved quality of life and medication reduction up to 5 years post-implant.1,2 In addition, this minimally invasive treatment option may be especially appropriate for highly comorbid patients who have not responded to prior conservative care or interventions for function-limiting claudication. Here, we present our experience utilizing this approach in an observational case-series.

METHODS

<table>
<thead>
<tr>
<th>Study Design</th>
<th>Multicenter, observational case-series. Data collected by site personnel only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Device</td>
<td>Boston Scientific Indirect Decompression System (IDS)</td>
</tr>
<tr>
<td>Study Focus</td>
<td>Lumbar Spinal Stenosis</td>
</tr>
<tr>
<td>Patients/Year</td>
<td>5 patients with multiple comorbidities who received IDS for Lumbar Spinal Stenosis (LSS)</td>
</tr>
</tbody>
</table>

RESULTS
Baseline Characteristics (n = 19)

- **Gender:** Females (%) = 47.4% (9/19)
- **Age (Mean ± SD)** = 71.7 (10.9) years n = 18
- **Baseline NRS (Mean ± SD)** = 6.3 (2.2) n = 19
- **Follow-up (Mean ± SD)** = 375.3 (±53.7) days n = 19
- **Diagnosis:** Lumbar Spinal Stenosis

Overall Pain Scores (n = 19)

A 3.5-point improvement (6.8 → 3.3, p < 0.0001, n = 19) was reported at last follow-up (mean = 375 days) among IDS patients with comorbidities.

**Distribution of Overall Pain Scores (n = 19)**

- Baseline: 6.8
- Last Follow-up: 3.3

68% (13 of 19) of patients reported a clinically significant improvement in their overall pain at last follow-up (i.e., ≥ 2-point improvement).

58% (11 of 19) of IDS patients with comorbidities reported a pain score of 3 or less at last follow up.

CONCLUSIONS

- Lumbar Spinal Stenosis patients with co-morbidities have a higher surgical risk for procedures.
- Results from this ongoing real-world observational case-series of patients with other co-morbidities who received IDS for the treatment of their LSS symptoms demonstrated at last follow-up (mean = 375 days):
  - >3.5-point improvement in overall pain (6.8 → 3.3, p < 0.0001)
  - 68% (13 of 19) of patients reported a clinically significant improvement in their overall pain at last follow-up (i.e., ≥ 2-point improvement)
  - 58% (11 of 19) reported a pain score of ≤ 3
- This preliminary evidence aligns with other published reports.

REFERENCES


DISCLOSURES

Study sponsored by Boston Scientific.
Dr. Naidu holds and has held consulting agreements with Boston Scientific.
Dr. Mehta holds and has held consulting agreements with Boston Scientific.
Dr. Fei holds and has held consulting agreements with Boston Scientific.
Dr. Jain holds and has held consulting agreements with Boston Scientific.
Algorithms to Identify Nonmedical Opioid Use

Methods: Conducted a systematic literature search using a collaboration of existing publications involving over 5000 patients with chronic pain. The patient outcomes were studied using an understanding of the inter-observer data. The data included patient records from 10 academic medical centers across the United States. A total of 4027 patients were included in the study. The patients were divided into two groups: those with nonmedical opioid use and those without. The use of nonmedical opioid use was defined as any use of opioids outside of the prescribed treatment plan.

Results: Of the patients included in the study, 4027 were found to have nonmedical opioid use. The percentage of patients with nonmedical opioid use was 25.6% (1027 patients). The most common reason for nonmedical opioid use was for recreational use (60.8%). Other reasons included pain management (20.7%) and pain reduction (18.5%). The average age of patients with nonmedical opioid use was 42.5 years, and the average duration of opioid use was 3.2 years.

Conclusion: Nonmedical opioid use is a significant problem in the management of chronic pain patients. Identification of patients at risk for nonmedical opioid use is crucial for the development of effective treatment plans. Further research is needed to identify more effective strategies for reducing nonmedical opioid use in chronic pain patients.
Knowledge of Opioid Treatment Patient-Provider Agreement Amongst Providers and Patients

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Background

Patient-provider agreements (PPA) for opioid therapy are documents outlining the expectations and responsibilities of patients and prescribers for the purpose of educating patients, reducing opioid misuse and improving treatment outcomes.¹ Currently, no universal standards for PPAs exist though most enumerate the risks and benefits of opioid therapy, instructions on opioid medication refills, storage and disposal, guidelines for mitigating aberrant drug-related behaviors (ADRB) (such as urine or blood drug screening) and possible consequences for violations.¹ Lack of understanding of the purpose and content of PPAs by patients may limit their effectiveness.

Measures

An anonymous true or false questionnaire was distributed to providers and patients prescribed opioids at an academic pain medicine practice. The questionnaire was designed to cover information presented in the opioid treatment PPA at the practice that included both evidence-based information on opioid treatment as well as protocols purposes for decreasing ADRB. Providers were also asked to identify their role (physician assistants, subspecialty fellows in pain medicine, or attending physicians) and their length of time practicing pain medicine. Patients were also asked if they had read the PPA or if a provider had reviewed it with them. Finally, the length of time a patient had been prescribed opioids from the clinic after initially signing the PPA was recorded.

Questionnaire

<table>
<thead>
<tr>
<th>Number</th>
<th>True/False</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>False</td>
<td>It is OK to receive opioid prescriptions from multiple providers, practices, and pharmacies and patients do not have to contact this office prior to filling opioid medications from another provider.</td>
</tr>
<tr>
<td>2</td>
<td>True</td>
<td>The doctor will not replace opioids that have been reported to be stolen or lost.</td>
</tr>
<tr>
<td>3</td>
<td>True</td>
<td>When taking an opioid medication, risk of death is increased in people with liver or kidney disease, depression, or a sleep disorder.</td>
</tr>
<tr>
<td>4</td>
<td>True</td>
<td>Patient must be seen in the practice at least every 3 months.</td>
</tr>
<tr>
<td>5</td>
<td>False</td>
<td>Opioid medications can be filled on nights, weekends, or holidays.</td>
</tr>
<tr>
<td>6</td>
<td>True</td>
<td>Patients must call or send a message at least 3 business days in advance of when you need a refill.</td>
</tr>
<tr>
<td>7</td>
<td>True</td>
<td>Unused medications should be disposed in a state or federally approved drop box or take back program.</td>
</tr>
<tr>
<td>8</td>
<td>False</td>
<td>A woman of childbearing age does not need an effective form of birth control while taking opioids.</td>
</tr>
</tbody>
</table>

Outcomes

- The average percent correct on the questionnaire for providers (91.07%) was higher than for patients (76.8%)
- Time exposed to the practice of pain medicine (time spent in practicing for providers and time receiving opioids under medical management for patients) was a poor predictor of percent correct on the questionnaire for both groups (r² = 0.01 for both providers and patients)
- The majority of patients (85 patients, 72.7%) stated that they had read the opioid agreement and that a provider had reviewed it with them

Conclusion

Improving knowledge of the opioid treatment PPA may help to optimize its role in mitigating opioid misuse and improving treatment outcomes. Guidelines for the formation and implementation of opioid treatment PPA requires further investigation.

Reference

Sphenopalatine Ganglion Blocks Disrupt the Cycle of Chronic Daily Cluster Headaches

Patrick Page, M.D., Li Che M.D., and Jijun Xu, M.D., PhD.
Department of Pain Management, Cleveland Clinic.

Background
- Cluster headaches cause severe pain that is reportedly worse than the pain associated with childbirth [1].
- The attacks are strictly unilateral with a typical duration of 15-180 minutes, and commonly associated with lacrimation and conjunctival injection [2].
- Typically, the attacks are clustered in daily cycles of only a few months duration [3].
- The individual attacks involve activation of the trigeminal-autonomic reflex [4].
- The sphenopalatine ganglion provides a rational treatment target for trigeminal-autonomic cephalalgias, due to its role in the trigeminal-autonomic reflex [5].

Case Presentation
A 71 year old male with a prior history of traumatic brain injury presented to our pain clinic with a history of chronic cluster headaches. The headaches have been present for more than 1 year in duration and almost always occur at night, awakening him from sleep. The headaches are located just below the left eye. The pain is described as throbbing and piercing in character and is associated with lacrimation and conjunctival injection of his left eye. He denies photophobia or sensitivity to sound. Over the time, the headaches have developed from every several nights (episodic) to every night (chronic) and last for approximately one hour in duration. Oxygen provides only temporary relief. He has failed conservative management including NSAIDs, calcium channel blockers, beta blockers, botulinum toxin injections, and monoclonal antibodies.

Results and Discussion
A series of three sphenopalatine ganglion blocks, with a combination of local anesthetic and dexamethasone, broke the daily cycle of chronic intractable cluster headaches in a patient who has previously failed medical management. The sphenopalatine ganglion was accessed using a lateral fluoroscopic technique through the coronoid notch. After the series of local anesthetic and steroid blocks, the patient can go 3-4 days without a headache, and sometimes up to 5 days without symptoms. His frequency of cluster headaches was reduced from 100% of nights to approximately 40% of nights. Now, he is able to control his existing cluster headaches with acetaminophen, oxygen, and trovafloxacin. The durability of his injections is approximately 60 days in duration. To date, SPG blocks have largely been used for abortive therapy for acute cluster headache attacks. We demonstrate that they are also helpful in converting chronic into episodic cluster headaches by disrupting the vicious cycle from dysregulated parasympathetic stimulation.

Figure 1. Anatomy of sphenopalatine ganglion and connections. Figure 2. Fluoroscopy guided sphenopalatine ganglion block with lateral image and needle through coronoid notch.

Symptomatic Pneumocephalus: A Systematic Review and Analysis

Introduction
Epidual injections continue to grow as a part of interventional pain, labor analgesia, and multimodal approach to anesthesia practices. Epidural injections are typically safe and reliable but are not without potential complications. Headache is the most common side effect of epidural injection and often originates from inadvertent dural puncture. The incidence of inadvertent dural puncture during epidural injection is upwards of 30% (15). Headache after epidural or “block top” may be due to post-dural puncture headache (PDPH) and pneumocephalus. PDPH after “block top” is more common with an incidence of up to 60% (16). A rare, more elusive diagnosis is symptomatic pneumocephalus which typically presents with a more rapid onset, non-positional headache. It is vital to note the differences in presentation between PDPH and pneumocephalus because of the differences in management of the two.

Epidural access utilizing loss-of-resistance to air (LORA) is a commonly used technique. This technique vastly increases the risk of pneumocephalus (2). In the event of inadvertent dural puncture during LORA technique, air is entrained into the intracranial space resulting in some degree of pneumocephalus. Rodin et al. demonstrated that less than 2 cc of intrathecal air can lead to symptomatic pneumocephalus (19). Many factors contribute to the degree of symptoms and the presentation of pneumocephalus. It has previously been hypothesized that the amount of intrathecal air correlates with onset and duration of symptoms. However, it remains unclear if this correlation truly exists clinically. Within this review, we present a systematic review and analysis of pneumocephalus following inadvertent intrathecal injection of air.

Objective
The objective of this review is to assess the clinical significance of the amount of intrathecal air injected during inadvertent dural puncture and its effect on the symptoms onset and duration in cases of pneumocephalus.

Methodology
Data was collected via literature review. Cases included in this review provided data on the amount of air injected into the intrathecal space during attempted spinal injection, time to onset of symptoms, duration of symptoms, and resolution of pneumocephalus via C1 after attempted epidural injection. Fourteen cases were found which included all of the criteria (Table 1). Cases excluding any one of these data points were excluded. The alpha value was set at 0.05. Statistical analysis was performed using R statistical software. Spearman correlation was used to determine correlation coefficient between amount of intrathecal air injected vs. time to onset of symptoms of pneumocephalus and amount of intrathecal air injected vs. the duration of symptoms of pneumocephalus.

Table 1. Data collected from systematic review of literature comparing amount of air injected into intracranial space and duration of symptoms.

<table>
<thead>
<tr>
<th>Case</th>
<th>Air Injected (cc)</th>
<th>Symptom Onset (minutes)</th>
<th>Symptom Duration (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Han et al (15)</td>
<td>5</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>Kim et al (15)</td>
<td>3</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Kim et al (15)</td>
<td>1</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>Yoo et al (15)</td>
<td>1</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Jo et al (15)</td>
<td>1</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Park et al (15)</td>
<td>1</td>
<td>1</td>
<td>20</td>
</tr>
</tbody>
</table>

Results
A total of fourteen (n=14) cases among 13 publications were analyzed. When comparing the amount of intrathecal air to the duration of symptoms in patients with symptomatic pneumocephalus, we found no statistically significant correlation (r = -0.3, p = 0.42) (Figure 1). When comparing the amount of intrathecal air to the time to onset of symptoms in patients with symptomatic pneumocephalus, we likewise, found no statistically significant correlation (r = 0.3, p = 0.15) (Figure 2). Pearson correlation coefficient was calculated as a static measure, however, confidence of determination results to nonlinearly between variables. In this systematic review and analysis, we accept the null hypothesis that the amount of intrathecal air injected during inadvertent dural puncture has not affected symptom onset or symptom duration in cases of symptomatic pneumocephalus.

Conclusion
Symptomatic pneumocephalus has been described with a wide range of clinical presentations. Literature review shows a spectrum of severity, onset, and duration of symptoms associated with pneumocephalus (Table 1). In cases of symptomatic pneumocephalus during epidural injection, headache is the most common symptom and onset is often immediate. However, pneumocephalus has been reported as late as two days after initial inadvertent dural puncture and intrathecal administration of air. Resolution of symptoms has been reported between ten minutes to two weeks after onset. The amount of air injected into the intrathecal space has previously been hypothesized to correlate with onset and duration of symptoms of pneumocephalus, however, we find no statistically significant correlation to support this claim.

These findings are limited to inadvertent dural puncture with LORA and epidural injection and are injectate of less than 10 cc (typical loss of resistance syringe). In addition, the symptoms occur in duration of pneumocephalus may be multifactorial. Our data was limited by number of published case reports that provided the data required for inclusion. Future research may investigate correlations between amount of air injected intracranially and severity of symptoms or occurrence of associated symptoms.
An Unusual Mimic Of Tarlov Cyst Causing Pain- A Case Report And Literature Review
From a Pain Physician Perspective
Sankeerth Challagurunda1, Mathew Weinstein1, Jose Sarria2
1Yellow, Pain Medicine, Department of Neurology, University of South Florida Morsani College of Medicine, 2Residents, Department of PM&R, University of South Florida Morsani College of Medicine, Tampa, FL, USA

INTRODUCTION

- Tarlov cysts (TC) are defined as CSF-filled sacular lesions located in the extradural space of the spinal canal and are formed within the nerve root sheath at the dorsal root ganglion.
- TC are typically located at the junction of the dorsal ganglion and the posterior nerve root and usually develop between the endoneurium and perineurium of the nerve root. TC are classified as Type 2 Spinal meningeal cysts.
- These cysts are predominantly found in the sacral region but can also be found in the other regions in the spine.
- TC are predominantly seen in females. The prevalence of TC is about 4.5% in the general adult population. About 70% of these cysts are asymptomatic, 17% have additive effects on other pathological entities and only 13% are symptomatic.
- TC are more often seen in patients with connective tissue disorders like Marfan syndrome or Ehlers-Danlos syndrome.
- The cause of TC is not clear. Many theories have been proposed, and the most important ones include TC resulting from: increased hydrostatic and pulsatile pressure in the spinal canal, inflammation of nerve root cysts followed by inoculation of fluid, arachnoidal proliferation along and around the sacral nerve root, breakage of venous drainage in the perineurium and epineurium secondary to hemosiderin deposition after trauma, and developmental or congenital origin.

CASE DESCRIPTION

- A 40-year-old female presented to Interventional Pain Clinic with a 2-month history of severe perineal pain and numbness concerning for pudendal neuralgia.
- Other symptoms included urinary retention and constipation.
- MRI of her sacrum done a few weeks prior at the Emergency Department showed features of TC at the S2 level.
- Neurosurgery referred her to Gynecology who then referred her to Interventional Pain Clinic.
- Physical exam in clinic showed bilateral hip flexion weakness, decreased perineal sensation, and decreased rectal tone.
- She was subsequently referred to neurosurgery emergently who performed sacral laminectomy.
- Intraoperatively she was found to have an epidural tumor that was resected along with a lesion at the S2 nerve root that was biopsied.
- Epidural lesion was diagnosed as Ewing’s sarcoma and S2 lesion was diagnosed as a reactive fluid.
- She was eventually seen by oncology with plans for further staging followed by chemo-radiotherapy.

DISCUSSION

- Misconception exists that TC are asymptomatic and incidental findings.
- However, if the signs/symptoms correlate with the level of the TC they should be considered in the differential diagnosis.
- Signs/symptoms include pain, weakness, paresthesia, numbness, dysesthesia, coccygodynia, constipation/ diarrhea, bladder dysfunction (urinary retention/ frequency), cauda equina syndrome, headache.
- MRI is diagnostic modality of choice for TC – appear hypointense on T1-weighted images, hyperintense on T2-weighted images, and show no enhancement with gadolinium contrast.
- Sometimes other cystic lesions (i.e., schwannoma, abscess, etc.) can be misread as TC on MRI, like in our case.
- Red flag symptoms (i.e., neurological deficits, unremitting pain) should prompt further evaluation and need for histopathological diagnosis.
- No consensus exists regarding management of symptomatic TCs.
- Many believe treatment is indicated when TC are >1.5 cm in diameter and symptomatic.
- Conservative treatment with PT and medication (analgesics, NSAIDs) is often helpful.
- Epidural steroid injection can be considered if conservative treatment fails.
- In refractory cases, CT-guided percutaneous cyst drainage, tissue adhesive injection into the cyst, or open surgery with sacral laminectomy/laminoplasty followed by microsurgical resection of the wall of the cyst(s) can be considered.
- Lumbo-peritoneal shunt has also been suggested for patients with multiple TCs when it is difficult to determine which one is symptomatic.

CONCLUSION

- TC are often classified as incidental findings; however, they should be considered as the source of a patient’s pain when the signs and symptoms correlate with the level of the TC.
- Red flag symptoms should prompt further evaluation and need for histopathological diagnosis as imaging alone can lead to misdiagnosis.
- Treatment options for symptomatic TC vary and range from conservative measures to more invasive surgical modalities.
- Prompt recognition of TC as the culprit of a patient’s symptoms is necessary to determine the most appropriate next step in management.
Repeated fluoroscopic-guided pulsed radio frequency ablation in the treatment of pudendal neuralgia: a case series

Mona Abdulkarim, MD, MB, Lutfi Ghi, MD, Joseph Abdulkarim, MD

Cleveland Clinic, Department of Pain Management, Cleveland, OH, USA

BACKGROUND

Pudendal neuralgia (PN) can be a very debilitating and difficult-to-treat condition. The pain is often described as burning, stabbing, or cramping. The diagnosis is typically made based on history and physical examination. The standard treatment options for PN include medications, nerve blocks, and surgery. However, these treatments may not always provide adequate relief.

METHODS

A 38-year-old female presented with a 2-year history of severe perineal pain. The pain was described as burning and constant, and was not relieved by medication. Physical examination revealed tenderness over the pudendal nerve distribution. Magnetic resonance imaging (MRI) of the pelvis showed no evidence of a mass or lesion. Nerve blocks were performed with lidocaine and bupivacaine, which provided temporary relief. Pulsed radio frequency (PRF) ablation was then performed under fluoroscopic guidance.

RESULTS

PRF ablation was performed in the left pudendal nerve with a 40% decrease in pain intensity at 6 months. The pain intensity remained low at 12 months. No complications were noted.

CONCLUSIONS

PRF ablation is a safe and effective treatment option for PN. Further research is needed to determine the long-term efficacy of this technique.
Real-World Evaluation of Patients Using an Interspinous Spacer for the Treatment of Lumbar Spinal Stenosis


BACKGROUND

Indirect Decompression Systems (IDS) or Interspinous Spacers are an option in well-selected patients with impaired physical function who experience relief in flexion from symptoms of leg, buttock, and/or back pain due to lumbar spinal stenosis (LSS). A growing body of published clinical evidence has demonstrated excellent long-term clinical benefit with sustained pain relief, improved quality of life and medication reduction up to 5 years post-implant.

Real-world reports demonstrated excellent long-term clinical benefit for patients including leg pain responder rate and pain severity of 75% and 60% respectively at 12 months post operation.

Here, we provide real-world outcomes in patients with severe pain who received an Indirect Decompression System (IDS) for LSS related pain and symptoms as part of an ongoing multicenter observational case series

METHODS

Study Design: Multi-center, observational case-series. Data collected by site personnel only

Study Device: Superior Indirect Decompression System (Boston Scientific)

Subjects: 122 patients with severe pain (8 or above) at 9 centers who received IDS for their Lumbar Spinal Stenosis (LSS)

RESULTS

<table>
<thead>
<tr>
<th>Baseline Characteristics (n = 122)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: Females (%)</td>
</tr>
<tr>
<td>69% (79/122)</td>
</tr>
<tr>
<td>Age (Mean SD):</td>
</tr>
<tr>
<td>71.3 (11.6) years n = 118</td>
</tr>
<tr>
<td>Baseline NRS (Mean SD):</td>
</tr>
<tr>
<td>8.6 (3.9) = 122</td>
</tr>
<tr>
<td>Follow-up Duration (Mean SD):</td>
</tr>
<tr>
<td>127 (168 days) = 122</td>
</tr>
<tr>
<td>Diagnosis:</td>
</tr>
<tr>
<td>Lumbar Spinal Stenosis</td>
</tr>
<tr>
<td>Gender: Females (%)</td>
</tr>
<tr>
<td>69% (79/122)</td>
</tr>
</tbody>
</table>

| Distribution of pain scores at last follow-up (n = 122) |

<table>
<thead>
<tr>
<th>Overall Pain Scores (n = 122)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRS Scores (0-10)</td>
</tr>
<tr>
<td>8.6</td>
</tr>
<tr>
<td>4.3</td>
</tr>
</tbody>
</table>

A 4.4-point improvement (8.6 → 4.3, p<0.0001) was reported at last follow-up (mean = 127 days) among patients with severe pain at Baseline (8 or more)

78% (95 of 122) of patients reported a clinically significant* improvement in their overall pain at last follow up ≥ 2-point improvement in pain scores (NRS)

CONCLUSIONS

- Results from this ongoing real-world observational case-series of severe pain patients (8 or more on NRS) who received an IDS for the treatment of their LSS symptoms demonstrated at last follow up (mean = 127 days):
  - 4.4-point improvement is overall pain (8.6 → 4.3, p<0.0001)
  - 78% reported a clinically significant improvement in pain (≥ 2-point improvement)
  - 43% reported a pain score of less

- This preliminary evidence aligns with data from previous reports in the peer-reviewed literature

REFERENCES


DISCLOSURES

Study Sponsored by Boston Scientific
No financial disclosures, author and consultant agreements with Boston Scientific, Boston Scientific, Boston Medical, or Boston. All are employees of Boston Scientific
2022 Abstracts and Poster Winners

RESULTS

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Presence of Harms</th>
<th>Subsequent Lumbar Spine Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Procedure</td>
<td>4.8%</td>
<td>26.2%</td>
</tr>
<tr>
<td>Surgery open decompression</td>
<td>11.6%</td>
<td>21.7%</td>
</tr>
<tr>
<td>Surgery open decompression</td>
<td>16.0%</td>
<td>35.0%</td>
</tr>
</tbody>
</table>

CONCLUSION

The robust safety profile and lower rate of subsequent interventions support mild as the gold standard of care.

OBJECTIVE

To evaluate mild and benchmark lumbar spinal decompression (LSS) procedures using national Medicare claims data to determine if mild patients achieving better or equivalent outcomes.

METHODS

- Mild Procedure
  - Surgical decompression
  - Overall success: p < 0.001

REAL-WORLD DATA

- Data extracted from Medicare Beneficiaries
- 100% of Medicare beneficiaries during 12 months follow-up

MEDICARE CLAMS STUDY:

mild® vs. BENCHMARK LSS PROCEDURES

PETER S. STAATS, MD, MBA

www.painphysicianjournal.com
Novel Treatment of Muscle Tension Dysfunction Secondary to Post-Acute COVID-19 Syndrome Associated with Chronic Cough and Laryngeal Dysfunction

Sefam Wei BA, Frima Damar I, Edward Corder, BS

Mount Sinai Hospital

Objective

The objective of this study was to evaluate the effectiveness of a novel treatment approach for muscle tension dysfunction (MTD) secondary to post-acute COVID-19 syndrome associated with chronic cough and laryngeal dysfunction.

Introduction

Post-acute COVID-19 syndrome has been associated with muscle tension dysfunction (MTD) secondary to chronic cough and laryngeal dysfunction. There is a lack of evidence-based treatment options for this condition.

Methodology

We retrospectively reviewed the charts of patients with post-acute COVID-19 syndrome who presented with chronic cough and laryngeal dysfunction. The treatment approach consisted of a combination of biofeedback, muscle energy techniques, and cognitive-behavioral therapy. The patients were followed for a minimum of 6 months.

Results

We identified 10 patients who met the inclusion criteria. All patients showed significant improvement in their symptoms after the treatment. The average duration of symptoms before treatment was 6 months, and the average duration of treatment was 3 months. All patients reported a subjective improvement of at least 50%.

Conclusion

The combination of biofeedback, muscle energy techniques, and cognitive-behavioral therapy is an effective treatment approach for muscle tension dysfunction secondary to post-acute COVID-19 syndrome associated with chronic cough and laryngeal dysfunction.

References

CONCLUSION

The study's main objective was to assess the correlation between the level of pain and the type of analgesic treatment administered. The results indicated a significant correlation between the two variables, suggesting that more effective pain management strategies should be developed.

DISCLOSURES

None

REFERENCES


METHODS

In this study, we assessed the efficacy of a new analgesic treatment in chronic pain patients. The treatment was administered to a group of 100 patients with chronic pain, and their pain levels were measured using the Visual Analog Scale (VAS). The results showed a significant reduction in pain levels after the treatment compared to the baseline.

RESULTS

The results of this study indicate a significant correlation between the level of pain and the type of analgesic treatment administered. The correlation coefficient was found to be 0.75, indicating a strong positive correlation.

BACKGROUND

Chronic pain is a common issue that affects millions of people worldwide. The use of effective pain management strategies is crucial to improve the quality of life of these patients.

ACKNOWLEDGMENTS

The authors wish to thank the patients who participated in this study.
Pectus Excavatum Intercostal Neuralgia Relief with Peripheral Nerve Stimulation

Background

- Pectus excavatum, the posterior displacement of the sternum and adjoining ribs into the thoracic cavity, is the most common anterior chest wall deformity.
- Incidence: 1 in 40 to 1 in 400 births.
- Moderate to severe cases are often associated with chronic sternal and chest wall pain.
- In recent years, intercostal nerve cryoablation during surgical correction of the anatomy via the Nuss procedure has been associated with a shorter hospital length of stay, decreased opioid consumption, and longer duration of chest numbness particularly in adults.
- Intercostal neuralgia is commonly treated with oral medications and single-shot injections; however, pain relief can be unsatisfactory or short-lived.
- To date, there are only scant case reports on using spinal cord stimulation and no study on using peripheral nerve stimulation (PNS) to treat intercostal neuralgia from pectus excavatum.
- We describe a case in which a 59-year-old woman with a history of chronic chest wall pain secondary to pectus excavatum found pain relief with PNS at the T4 nerve root bilaterally after minimal pain relief with physical therapy, multiple neuropathic agents, and chronic opioids.

Intervention

- Ultrasound-guided bilateral single-shot intercostal nerve blocks with local anesthetics were performed to diagnose the primary distribution of pain (T4).
- Fluoroscopic-guided bilateral PNS leads were placed at the T4 nerve root.
- PNS stimulation therapy for a total of 60 days.
- Patient reported better mobility, increased duration of sleep, more independence, decreased oral pain medication consumption, superior quality of life, and improved pain relief during the 60-day stimulation period and persistent pain relief at 1 month follow-up after lead extraction.
- Further follow-ups pending.

Conclusion

- Peripheral nerve stimulation of the T4 nerve root is a safe and viable treatment option for refractory pectus excavatum-associated intercostal neuralgia as part of an opioid-sparing, multimodal treatment regimen.
- Long-term sustainability of pain relief after a 60-day stimulation period needs to be further evaluated.

References

Long term Outcomes with 10kHz Spinal Cord Stimulation for treating Non-surgical Refractory Back Pain: 18-month Results from Multicenter RCT

Leonardo Kapural, MD, PhD, Jessica James, MD, Curtis Johnson, MD, Daniel Kloser, MD, Aaron Caldey, MD, Peter Kosek, MD, Julie Pilinis, MD, PhD, Markus Bendel, MD, Erika Petersen, MD, Cengizan Wu, MD, MSHiEM, Taisia Cherry, MD, Shivanand Lad, MD, PhD, Cong Yu, MD, Davood Sayed, MD, Jonathan Goree, MD, Mark K. Iyono, MD, Andrew Back, MD, Diana Bruce, PA-C, Frances Robinson, PhD, Rose Province-Azzalda, MD, MPH, Hsu, David Caraway, MD, PhD,
Narcoz P. Patel, MD

Introduction
- What is non-surgical refractory back pain (NSRBP)?
  - Pain that is refractory to conventional medical management (CMM) – this includes pain medications, anticonvulsants, antidepressants, physical therapy, nerve block therapies, etc.
- Patient has had no previous spine surgery
- Surgical evaluation indicates not acceptable candidate for surgery
- Until recently limited evidence existed for treatment of NSRBP with SCS, most with 10kHz SCS (1)
- An RCT was undertaken to evaluate clinical and cost effectiveness of 10kHz SCS in addition to CMM for NSRBP (2), we present the 18-month results.

Methods
- NSRBP patients were enrolled if ineligible for surgery based on surgical consultation (3)
- Subjects were randomized 1:1 to either 10kHz SCS in addition to CMM or CMM alone
- 10kHz SCS group underwent permanent implantation if ≥50% pain relief was achieved during a temporary trial
- Both groups continued with CMM, and had the option of crossover at 6 months (M), if satisfactory pain relief was not achieved
- Subjects had the option of consenting to a study extension which allows for observation of outcomes though 24 M of follow-up
- We present pain relief on visual analog scale (VAS), Oswestry disability index (ODI), and quality of life (EQ-5D-5L). Pain responder was defined as achieving at least 50% pain relief, and remission was defined as a reported VAS score at or below 3 cm for at least 6 M

Results
- There were 159 NSRBP patients randomized to either CMM alone (n=75) or to 10kHz SCS in addition to CMM (n=83), with similar baseline characteristics (Table 1).

<table>
<thead>
<tr>
<th>Age (mean, range)</th>
<th>CMM</th>
<th>10kHz SCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-70</td>
<td>60-85</td>
<td></td>
</tr>
<tr>
<td>60-70</td>
<td>50-85</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CMM</th>
<th>10kHz SCS</th>
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<tbody>
<tr>
<td>50-70</td>
<td>60-85</td>
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<th>CMM</th>
<th>10kHz SCS</th>
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Table 1. Baseline characteristics

- The primary and secondary endpoints were all met (p<0.001)
- Pain relief was not diminished over the 18 M follow-up (Figure 2 and 3)

Figure 2. Reported pain VAS was reduced by 5 points following 10kHz SCS implant in both original and crossover groups. Durability to 18 M is shown.

Figure 3. Responders rate, pain reduction, and per centage of remission are shown for all implanted (10kHz group only at 18M). Last Observation Carried Forward (LOCF) for 12 and 18 M.

Figure 4. Disability (ODI) reported through 18 months

Figure 5. In the 30 patients reported pain relief reached 50%, the criteria for crossover and were implanted, mean visited to crossover from 10kHz SCS arm

Figure 6. In the 30 patients reported pain relief reached 50%, the criteria for crossover and were implanted, mean visited to crossover from 10kHz SCS arm

Conclusion
- The current study demonstrates that the addition of 10kHz SCS to CMM results in profound improvements in pain relief, function, and quality of life
- Even in this hard-to-treat NSRBP population:
  - Who have been deemed not surgical candidates, and
  - Exhusted all available appropriate nonoperative medical management
- These improvements are achieved with a safe, reversible therapy
- Treatment effects show durability through 18 month follow-up in this large multicenter study.

References

This study was funded by Neo nhiệt.

American Society of Interventional Pain Physicians
The Voice of Interventional Pain Management.
Cooled Radiofrequency Ablation vs. Standard Medical Management for Chronic Sacroiliac Joint Pain: A Multi-Center, Randomized Comparative-Effectiveness Study

**Introduction**

Low back pain (LBP) is one of the leading causes of physician visits and disability in the United States, with a lifetime prevalence rate ranging between 26% and 80%. Cooled radiofrequency ablation (CRA) has previously been demonstrated to provide pain relief by pain or grinding in the sacroiliac joint (SIJ). The objectives of this multi-center, comparative-effectiveness study are to compare CRA to standard medical management (SMM).

**Methods**

The CRA consists of 3 stimulating electrodes: 2 placed bilaterally, and 1 placed on the contralateral side of the spine. The electrodes are connected to a generator that delivers a constant potential difference of 2-8 V and a frequency of 60-200 Hz. The intensity of the current is adjusted to achieve a temperature of 60-70°C at the target site. The SMM includes nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, and other analgesics.

**Results**

The CRA group showed a significantly greater reduction in mean visual analog scale (VAS) score at 6 weeks compared to the SMM group (p < 0.05). The CRA group also had a significantly greater improvement in Oswestry Disability Index (ODI) score compared to the SMM group (p < 0.05).

**Conclusion**

CRA is superior to SMM in the management of chronic SIJ pain.

The majority of subjects in the CRA group reported a significant improvement in pain and functional outcomes compared to the SMM group.

**Figure 1. Postulated Pain Mechanism**

The proposed pain mechanism involves the activation of nociceptors in the SIJ, which send signals to the spinal cord via the dorsal horn. The signals are then processed by the brain, leading to pain perception.

**Figure 2. Pain Relief Comparison**

The CRA group showed a greater reduction in mean VAS score at 6 weeks compared to the SMM group (p < 0.05).