Abstracts

ASIPP 15th Annual Meeting 4th Annual Abstract and Poster Session

Abstracts printed below are shown in their originally submitted form.

1st Place

Expected Performance of a 32 Contact Paddle with 32 Dedicated Power Sources for Transverse Tripolar Stimulation: A Computational Model Study

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Introduction: Spinal cord stimulation (SCS) is a clinically effective treatment for neuropathic pain via stimulation of spinal dorsal column (DC) fibers. Transverse Tripolar Stimulation (TTS) was proposed to stimulate deep DC fibers by transversally-placed flanking anodes. Recently, Boston Scientific proposed a 32-contact surgical lead with 4 columns. Using a computational model, we compared the expected performance of TTS with this paddle driven by 32 dedicated power sources, to TTS with four commercially available paddles.

Method: We used a mathematical model of SCS consisting of a volume conductor coupled with electric field and the NEURON simulator to determine the activated region of DC and dorsal root (DR) fibers. TTS with five different paddle configurations were studied: (A) BSC 32 contact surgical lead, (B) 5-column, (C) 3-column staggered with longer contacts at guarding columns, (D) 3-column inline, (E) 3-column staggered with identical contacts. Expected performance was measured as the total number of recruited fibers. Maximum performance of paddle (A) was also modeled with PRISM™ Targeting, by including two cathodes around the anode, which we hypothesize enhances ability to guard DR fibers and recruit DC fibers.

Result: The total number of recruited DC fibers without DR stimulation in the model was 648 with Paddle (A), compared to 366(C), 232(B), 192(D), and 161(E). When paddle (A) is used with Prism Targeting technology, this number increases to 837, more than twice the number of fibers recruited by other paddle designs without PRISM Targeting.

Conclusion: The model predicts that the BSC 32-contact paddle with 32 dedicated power sources recruits greater numbers of DC fibers without DR stimulation than other paddle designs modeled here. We hypothesize that this is due to its ability to provide stronger guarding of the dorsal roots for recruitment of more and deeper DC fibers. Further study is required to test this hypothesis.

References DC Lee et al., Investigation of Fibers Activated in Spinal Cord Stimulation (SCS) Using A Computational Model, WIP, Feb, 2012, Miami, FL

2nd Place

Ultra High Frequency Electric Nerve Block for Amputation Pain

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Background: Our previous short-term first-in-human study (< 30 days, N=5) showed that severe neuroma pain in amputated limbs can be reduced via nerve conduction block by high-frequency (10 kHz) alternating current. This report covers initial findings of the first four patients in the pilot study to test the long-term effect of the therapy in a larger patient-population (≥ 12 weeks, N=10).

Objective: To study the long term effects and results of high frequency electric nerve block. Methods Six lower-limb amputees with chronic and severe residual limb pain who attained pain reduction after local anesthetic injection were enrolled to date. A spiral-type nerve cuff electrode was placed on the sciatic nerve in above-knee amputees, or tibial and common peroneal nerves in below-knee amputees, during a 30-min surgery under general anesthesia. An external waveform generator was connected to the implanted electrodes via a percutaneous interface. Therapy sessions were initiated by subjects as needed. A daily diary was used to record pain intensities before and after each session by the 0-10 Numerical Rating Scale. Additionally, the Brief Pain Inventory (BPI) was administered at each office visit to assess the impact of amputation pain on physical and mental status.

Results: Among the 4 subjects who have received home therapy to date, the first subject had 215 therapy sessions in 39 weeks with a mean pain reduction of 78%, the second had 38 sessions in 12 weeks with a reduction of 98%, the third had 27 sessions in 10 weeks with a reduction of 46%, and the fourth had 26 sessions in 4 weeks with a reduction of 70%. For each therapy session, pain reached the lowest level within 20 min, while pain relief lasted from 3 hours to next day. The effect of the therapy was maintained throughout the home use in these subjects without perceivable changes. In addition to pain relief, 4 out of the 4 subjects reported improved physical and mental status measured by the BPI. One dislodged cuff electrode was reinstalled and its functionality restored. No other adverse events occurred

Conclusions: Initial results showed that the effect of pain reduction by high-frequency nerve block can be achieved and retained for many months without deterioration.

3rd Place

Risks of Post-Dural-Puncture Headache after Epidural Steroid Injections

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Background: Epidural steroid injection is one of the most commonly used interventional pain management modalities. However, the risk of developing severe post-dural-puncture headache (PDPH) is undefined.

Objective: The goal of this retrospective study is to investigate the risks of sever PDPH after epidural steroid injections and to assess the clinical efficacy of blood patch for the treatment of PDPH.

Methods: This is a retrospective electronic medical record review in a private pain practice in the USA.

Results: From January 2006 to April 15, 2013, a total of 18371 epidural steroid injections (lumbar epidural (LESI): 11858, cervical epidural (CESI): 4746, lumbar transforaminal: 1021, thoracic epidural (TESI): 393 and caudal epidural: 353) were performed in a private pain practice in the USA. All LESI and caudal ESI were performed with 18 G Tuohy needles and all CESI and TESI were performed with 20 G Tuohy needles. A total of 18 patients (0.1%) developed severe PDPH, which were not responding to conservative treatment such as bed rest, acetaminophen, and oral fluid with caffeine, and required blood patch. There were 7 male, 11 female patients. Mean age was 51.4 years. In 16 cases, the PDPH was associated with LESI and in 2 cases PDPH was after a CESI. None of the TESI, lumbar trasforaminal and caudal ESI induced any cases of severe PDPH. For all the 16 cases of PDPH following LESI, 10ml of autologous blood was injected into the lumbar epidural space at the same level of LESI. 15 of the 16 patients had immediately headache relief following blood patch. Only one case did not respond to the first blood patch. A second blood patch a week late completely resolved her headache. For the two cases with cervical PDPH, one case had a completely headache relief immediately after the cervical epidural blood patch at C7-T1 with one ml of autologous blood. Follow up visit after five months, the patient was still headache free. The second case of cervical PDPH, the spinal headache, nausea, tachycardia, and severe neck pain and muscle spasm in the neck was completely resolved within 5 min after a blood patch with 2ml of autologous blood.

Conclusions: Post-dural-puncture headache (PDPH) has been well studied for spinal and epidural anesthesia (1). However, the risks of PDPH after the epidural steroid injections are not well defined. The current study reported 0.1% incidence of developing severe PDPH after epidural steroid injections. This headache can be effectively relieved by epidural blood patch (94.4% success rate to the first blood patch) without long term consequence. Cervical blood patch has been used to treat headache caused by spontaneous cerebral spinal fluid leakage (2). The results of the current study also indicates that cervical epidural blood patch with one to two ml of autologous blood can effectively and safely treat the PDPH induced by CESIs.

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A novel approach to the MILD procedure in the setting of decreased interlaminar space

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Background Minimally invasive lumbar decompression (MILD) has been shown to be an effective treatment for neurogenic claudication due to ligamentum flavum hypertrophy causing lumbar spinal stenosis. There is ongoing controversy about the efficacy of this treatment but it appears that proper patient selection greatly improves the efficacy. In this case report the patient was an ideal candidate but there was minimal space between the superior and inferior lamina blocking access to the ligamentum flavum. The patient was able to ambulate 100 feet before the severity of his leg pain required a resting and sitting interval. Also of note this man rode his bicycle 20 miles nearly every day without leg pain.

Objective We will describe a novel approach used to overcome the challenge of performing the MILD procedure in the presence of decreased interlaminar space.

Methods The patient was placed prone with pillows under his abdomin and pelvis to flatten his lumbar lordosis. After placement of the epidurogram, fluoroscopic contralateral oblique view of L3 and L4 interlaminar space was obtained. The superior and inferior lamina were anesthestized usine a spinal needle and 0.5% Bupivicane. The MILD trochar and introducer were advanced until the inferior lamina was contacted in the usual fashion. The Kerrison bone rongeur from the MILD kit was advanced thru the introducer but was unable to be advanced between the lamina because of decreased interlaminar space. The stylet was replaced and the MILD introducer forcefully advanced and wedged between the superior and inferior lamina causing a distracting force and opening the space. The stylet was then removed and the procedure was completed with the Kerrison bone rongeur and tissue sculptor without complication. Results Patient was seen 1 month postop and reports that the distance he is able to walk has doubled and both he and his wife are pleased with the outcome.

Conclusions Advancing the MILD introducer and stylet into the interlaminar space when it is inaccessable using the conventional approach appears to be safe and effective based on this one case. This approach has not been described previously and may be useful to others.

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Value of high viscosity cement in augmentation of advanced malignant compression fractures

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Background Vertebral augmentation in malignant compression fractures is associated with higher complication rates compared to benign fractures. High viscosity cement is associated with lower leakage rates (1, 2).

Objective We are investigating the value of high viscosity cement in vertebroplasty performed in cases of advanced malignant compression fracture.

Methods Institutional board approval was obtained for this retrospective study. 26 patients (17 females and 9 females with average age of 73.9) underwent vertebroplasty for pain control due to underlying different metastatic diseases which were previously evaluated. A total of 37 levels treated. Post procedure CT and radiographs were evaluated for presence and location of leakage.

Results All treated levels had epidural tumor extension or cortical bone disruption or both (8 levels) in pre procedure CT or MR studies. On post-procedure CT images, there were 25 cement leakages (67%), 15 venous, 8 discal, 3 epidural, and 1 leak in a neural foramen. 2 levels show 2 different leaks. Post procedure radiographs show 16 leakages (43%), 7 venous and 9 discal. None of those leaks were of any clinical significance and none required any further intervention.

Conclusions Vertebral augmentation using high viscosity cement in advanced malignant vertebral compression fracture is relatively safe. Although, there is a high cement leakage in post procedures CT, this is still less than published data in benign lesions (3). All leakages reported are minimal and do not appear to have any clinical consequences.

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Ilioplasty: A case review of treatment of a painful iliac fracture

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Background This is a case of a 64 year old white female with a previous history of L5-S1 instrumented fusion and osteoporosis. She had a fall onto her buttocks approximately 4 months prior to being evaluated. She presented with severe right low back and buttock pain of VAS 8/10. After examination, a presumptive diagnosis of right sacroiliac was entertained given the location of the pain, as well as her previous history of lumbosacral fusion. Therefore, she underwent diagnostic sacroiliac joint injection, but there was no change in her VAS score.

Accordingly, a sacral fracture was suspected. A CT of the sacrum revealed sclerosis of the sacroiliac joints with scattered erosive changes, but no sacral fracture. A bone scan with SPECT demonstrated symmetric uptake within the sacroiliac joints. Given the high index of suspicion for a sacral fracture, an MRI of the sacrum was obtained. The MRI demonstrated bilateral marked sacroiliitis, with a right sacral ala insufficiency fracture, as well as an insufficiency fracture of the adjacent right ilium.

The radiology results were discussed with the patient and she agreed to initially proceed with a right-sided sacroplasty. Right sacral augmentation was performed with essentially no improvement in the pain; the VAS remained at 8.

An ilioplasty was recommended to attempt to resolve the residual right low back pain. After informed consent was obtained, cement was intilled into the right posterior iliac wing adjacent to the sacrum with two 13 gauge vertebroplasty needles. A total of 8cc of PMMA cement (Stryker Vertaplex Cement) was used to fill the posterior wing of the iliac bone on the right side (Figures 3-8). Immediately post-procedure, the pain decreased from VAS 10 to 5. At 2 weeks post-procedure, the pain had subsided to a VAS level 2 for an overall 75% improvement in pain.

Conclusions This case illustrates several points. First, CT scan and bone scan cannot reliably diagnose all sacral fractures: an MRI may be needed for final confirmation. Second, sacral fractures may be accompanied by iliac fractures. Third, an iliac fracture may be more of a pain generator than the associated sacral fracture. Finally, painful posterior iliac fractures may be successfully treated with instillation of bone cement with standard vertebroplasty needles and cement.

Comparison of cement leakage rate and pattern in vertebral augmentation with standard balloon kyphoplasty and targeted cement deposition after channel creation using a nitinol wire, the "Blazer" system

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Background Cement leakage has been described to occur more often with verteboplasty than kyphoplasty.

Objective We are testing the hypothesis that cement augmentation after channel creation using a nitinol wire, the "Blazer" system (Benvenue Medical, Santa Clara, CA) would decrease the incidence of cement leakage compared to standard balloon kyphoplasty. Methods Retrospective analysis of 40 patients with vertebral compression fractures. 19 patients (24 levels) underwent augmentation using the Blazer system while 20 patients (29 levels) were performed using a standard balloon kyphoplasty. Postoperative images were analyzed regarding the incidence and location of any cement leakage. Leakages were classified according to the size; mild = 1-2 mm, moderate = 2-5 mm, and severe > 5 mm

Results In the Blazer group, there were 5 mild leakages, 3 moderate or severe leakages and 16 levels where no leakage occurred. In the balloon kyphoplasty group, there were 12 mild leakages, 5 moderate or severe leakages and 12 levels where no leakage occurred. There was no significant difference in cement extravasation between Blazer and standard balloon kyphoplasty ($p=.098$). A non-significant trend ($p<0.10$) in favor of the Blazer for lower incidence and volume of PMMA leakage compared to balloon kyphoplasty

Conclusions The Blazer system uses a nitinol wire to create channels in cancellous bone. Placement of the wire across the midline to the contra-lateral side results in a uniform distribution and interdigitation of the cement. These channels may help to decrease intravertebral pressure allowing for less leakage when compared to standard balloon kyphoplasty. The system is particularly helpful in augmentation of sclerotic bone and in cases with intra-vertebral clefts where the created channels can bridge the cleft with the normal surrounding bone.

Disclosure Consultant; Benvenue Medical

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Possible Complications of Spinal Cord Stimulators: A literature Review of Reported Cases

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Background: There have been few published reviews on complications of spinal cord stimulators(SCS), but none to our knowledge stratify complications into those which the physician should watch out for before the procedure, intraoperatively and post operatively. As of 2007, across the United States, one spinal cord stimulator was implanted every twenty minutes on average. Clinicians should be aware of the range of possible complications at every stage of the procedure. This article provides a summary of reported complicationspublished in journals since the first spinal cord stimulator was implanted in 1971.

Objective: To explore the range of possible complications of spinal cord stimulator implantation that have been published in the literature since 1971.

Methods: Electronic search on Pub Med was performed using key word 'spinal cord stimulator' to identify articles published between 1971 and 2011. Our Inclusion criteria were all case reports, case series, cohort, case control and randomized control studies that reported complications with implantation of spinal cord stimulators. Articles dealing with the mechanisms of action, design, application, techniques for implantation or other forms of electrical stimulation were excluded from the study. Our search revealed 500 articles. Of those; we chose 21 articles for review.

Results: Preoperatively, physicians should anticipate possible epidural scarring, if patients had previously had intrathecal infusions. In patients on steroids, those with Cushing's syndrome, hypothyroidism, obesity, epidural lipomatosis, an extra pad of fat in the epidural space may be present, which may pose added difficulty in placement of leads in the epidural space. Intraoperatively, physicians may encounter, bleeding, hematoma, seroma, Inadvertent dural puncture, spinal contusion, spinal cord needle puncture, CSF leakage, post dural puncture headache, sixth nerve palsy, paraparesis, quadriparesis, quadriplegia and psychiatric conditions as conversion disorder or panic attacks. Postoperatively, complications could present as intractable pain at incision site, epidural hematoma,cord compression, sixth nerve palsy, paraparesis, quadriparesis, quadriplegia, infections (dermatitis, psoas abscess, epidural abscess, meningitis),hardware related problems (lead electrode fracture, lead migration, pulse generator site discomfort, epidural scarring around electrode, allergy to electrode, battery failure, interference with radio frequency ablation) and micturition inhibition.

Conclusions: Clinicians should be aware of all range of possible complications with the placement of spinal cord stimulators so as to adequately inform patients and watch out for possible pitfalls.

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Stimulation Targeting with 32 Dedicated Power Sources: A Computational Model

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Background An SCS system with 32 dedicated power sources enabling independent control of the polarity and the amplitude of simultaneously active contacts is currently available from Boston Scientific.

Objective To compare, using a computational model, the ability of systems with dedicated power sources to focus stimulation at specific points of the spinal cord with the ability of single source systems to do the same.

Methods The model consisted of volume conductor models of the spinal cord and 32 contact combination leads and cable models of spinal nerve fibers. The stimulation field generated in the spinal cord was computed for specific current configurations of the two IPG's and the resulting volume of activated fibers was determined. The focusing ability of each IPG was assessed by calculating central points of stimulation (CPS) defined as the centers of the volumes of activation.

Results With two 16-contact leads with 1 mm inter-contact separation placed mid-line parallel to the spinal cord, systems with dedicated power sources can create ~150000 CPS, whereas single source systems can create ~170 CPS. For other lead combinations with 32 contacts and tight inter-contact spacing, the CPS number range was ~140000-210000 for independent source systems and ~160-210 for single source systems. - With wider (4 mm) inter-contact spacing, CPS numbers for 32-contact lead combinations dropped to the range ~1600-2400 for independent source systems and ~45-55 for single source systems. Wide separation also resulted in coverage gaps: For example, it was impossible to place a CPS at midway between two adjacent contacts with either system.

Conclusions In the computational model, the SCS system with 32 dedicated power sources and with tightly-spaced contact leads generated many more central points of stimulation than the modeled single source system. Leads with widely-spaced contacts had coverage gaps in the model. Clinical validation of these findings requires further study.

Disclosure Boston Scientific employee

Randomized Controlled Trial of Interspinous Spacers for Lumbar Spinal Stenosis: 2-year Outcomes

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BACKGROUND: Degenerative lumbar spinal stenosis (LSS) with severe intermittent neurogenic claudication symptoms is treated with decompressive laminectomy, with or without fusion. Interspinous spacers may serve as an alternative to open surgery in patients with moderate LSS resistant to nonsurgical treatments.

OBJECTIVE: To evaluate the 2-year clinical outcomes in patients treated with the Superion or X-STOP

interspinous spacer for intermittent neurogenic claudication secondary to radiographically confirmed moderate LSS.

Methods: This multicenter, prospective, randomized, controlled, investigational device exemption trial randomly allocated patients to treatment with the Superion or X-STOP interspinous spacer. All patients with a minimum of 2-year follow-up were included in this report (Superion 101, X-STOP 91). Main outcomes included Condition-specific Zurich Claudication Questionnaire (ZCQ), back function with Oswestry Disability Index (ODI), and back and leg pain severity with visual analogue scale (VAS). Clinical success was defined as a minimum 20-point improvement for back and leg pain severity and a minimum 15 percentage point improvement for ODI.

Results: ZCQ symptom severity and physical function scores improved 34%-36% in both groups through 2 years (all p<0.001). ZCQ patient satisfaction scores at 2 years were 1.8±0.9 with Superion and 1.6±0.8 with X-STOP. Back pain severity decreased from 57±27 mm to 22±27 mm in the Superion group (p<0.001) and from 55±25 mm to 23±25 mm with X-STOP (p<0.001). Leg pain decreased from 64±26 mm to 16±26 mm with Superion (p<0.001) and from 62±26 mm to 20±22 mm with X-STOP (p<0.001). Back and leg pain clinical success rates were comparable (back pain: Superion, 66%; X-STOP, 62%: leg pain: Superion, 79%; X-STOP, 75%). Back function similarly improved with Superion (38±13% to 20±18%; p<0.001) vs. X-STOP (39±12% to 20±16%; p<0.001). Back function success rates were 59% for Superion and 60% for X-STOP. No significant between-group differences were noted for any outcome at 2 years.

Conclusions: Treatment with the Superion or X-STOP interspinous spacer results in promising 2-year outcomes in patients with intermittent neurogenic claudication secondary to moderate LSS.

Disclosure: Drs. Miller and Block are independent clinical trials consultants and were remunerated by the sponsor to assist in developing the text of the abstract.

Vertebroplasty for Management of Painful Osteoporotic Vertebral Fracture: Review of Evidence from Randomized Controlled Studies.

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Background Osteoporosis is the most common metabolic bone disease in the United States. One of its major complications is vertebral fracture which has devastating consequences on physical, psychological and economical aspects of life. Vertebroplasty, though initially practiced as a method of treatment for spinal hemangioma, with experience was expanded to acute, sub acute and chronic vertebral fracture pain management. Vertebroplasty has been documented to significantly reduce pain in the literature, in turn improve quality of life with increase patient mobility and decrease narcotic needs. However there have been some disagreements on benefits of vertebroplasty lately. Here we review the evidence from 7 randomized controlled studies.

Objective To determine the efficacy of Percutaneous Vertebroplasty (PVP) in management of osteoporotic vertebral fracture pain.

Study design: Review of randomized controlled trials on efficacy of PVP

Study setting: Outpatient clinics (Orthopedic, General Practice, Radiology, Neuro-interventional radiology)

Methods: We searched Google Scholar, MEDLINE, and Cochrane Database of Reviews for randomized studies published since 1984 that compared the efficacy of PVP with a control group for managing osteoporotic vertebral fracture pain. Out of 35 filtered articles, we identified nine to be randomized studies. Among them two were follow ups of previously reported trials.

Results: We identified 7 high quality studies with a total of 622 randomized participants. All studies measured pain with Visual Analogue Score (VAS) for a vari-

able period of time with minimum of 1 day to maximum 36 months. All the studies measured the responders in VAS scores with minimum intensity of 0 to maximum intensity of 10.Responders were defined by absolute reduction of pain (VAS) scores from the initial presentation and significant difference from VAS of controls. 2 out of the 7 studies which used the responder metrics met their outcome measures, while 2 other studies met the metrics immediately after the PVP procedure but no significant difference in long-term follow up with controls. 3 other studies failed to meet the responder metric scale. There was a statistically significant reduction in pain intensity from baseline with p values ranging from 0.01-0.0001 in 2 studies but the rest of the studies concluded with p values ranging from 0.33 – 0.77.

Limitations: Paucity of literature showing randomized trials remains a limitation.

Conclusions Overall vertebroplasty is an effective treatment for osteoporotic vertebral fracture with significant results in two out of seven studies, two other studies reporting immediate pain relief up to 1 month but not in long term follow up patients and rest of the three studies reporting just comparable results with conventional management. Additional randomized controlled trials with large sample size and follow ups are required to validate the efficacy of vertebroplasty.

Keywords: osteoporosis; vertebroplasty; pain measurement; vertebral fracture; randomized trial; compression fractures; randomized study

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Peripheral Nerve Stimulation for Chronic Pain: Review of Evidence from Literature

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Background Chronic pain is a prevalent condition which causes significant morbidity, disability and economic burden. Neuropathic pain is caused by a lesion or dysfunction of the peripheral or central nervous system (Merskey and Bogduk, 1994). It is generally chronic and disabling, and is among the most challenging to treat. When medical therapy titrated to maximum fails to provide appropriate analgesia or side effects impair ability to increase dosages alternative methods such as nerve stimulation can be effective options. One of these methods includes peripheral nerve stimulation (PNS). This uses high-frequency, low-stimulation currents, delivered by percutaneous electrodes in close proximity to peripheral nerves. So far a full mechanistic explanation for observed clinical benefits is lacking. We review the evidence from the literature regarding PNS.

Objective To determine the efficacy of Peripheral Nerve Stimulation (PNS) in management of chronic pain. Methods We searched Google scholar, PubMed, Cochrane Database for the most important published literature published upto 1970 for studies looking at the efficacy of peripheral nerve stimulation for management of chronic pain. References were obtained using keywords "peripheral nerve" together with "electrical", "neurostimulation", "stimulation" or "pain." Results Of 764 articles, we identified 7 high quality studies that included 1 randomized controlled study, 2 prospective studies, 2 restrospective studies and 2 case series. The randomized, controlled, cross over study was on 44 patients with chronic back pain, out of which 32 underwent implantation with trial PNS and 24 were responders. The 3 prospective studies were on a total of 59 patients with intractable occipital neuralgia and severe complex regional pain syndrome (CRPS). In these patients symptoms were entirely or mainly in the distribution of one major peripheral nerve. In these studies 12 out of 13 patients, 7 out of 14 patients and 19 out of 30 patients had significant improvement in pain relief. There were 2 retrospective studies on a total of 49 patients. Of these one of the studies was the largest of its kind in the literature which was on 38 patients with follow up period of over 2 years showing significant pain relief in about 60% of the patients. In the second study the follow up time was about 20 years. We found 2 case series describing elderly patients with intractable post herpetic neuralgia both >5 years. They were effectively treated with PNS of cranial nerve.

Conclusions Peripheral nerve stimulation is a viable option for the treatment of pain related to peripheral nerve injury, such as CRPS or cranial nerve syndromes. This is especially important in older adults who either get inadequate pain relief from analgesics or have intolerable side effects from them. In these patients PNS can be considered as suitable alternative.

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8. Peripheral Nerve Stimulation for the Treatment of Postamputation Pain—A Case Report. Richard L. Rauck MD

9. Peripheral Nerve Stimulation for Unremitting Ophthalmic Postherpetic Neuralgia. Edwin Dunteman MD, MS

An Evaluation of One Level versus Two Level approach in Transforaminal Epidural Steroid Injections

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Introduction: Low back pain (LBP) has become the celebrity of primary complaints in both primary care and specialty clinics. LBP, if not managed properly, may have significant economic and social consequences. Transforaminal epidural steroid injections (TFESI) have become accepted as a safe and effective approach to the treatment of low back pain with associated radicular symptoms. In this study, the purpose is to find improved outcomes with pain management in comparing a one level TFESI (standard technique) versus a two level approach utilizing one injection at the preganglionic level as well as at the post ganglionic level.

Objectives: We hypothesize that there is a better patient outcome in a two level approach of TFESIs compared to a single level approach when combined with a structured physical therapy program to help supplement pain relief and function. This is important for long-term pain control, decreased use of opioids, patient satisfaction, lower medical costs, and improved patient function. We hope to conclude that performing a two level TFESI may be more cost effective in the long term as well as result in improved patient outcomes.

Methods and Materials: A review of electronic medical records (EMR) of over 120 patient's seen two fellowship trained pain physicians between 2008 and 2012 that received a transforaminal epidural steroid injection was completed. The EMR was used to look at the reported pain VAS scale and opiate usage at the one month, three month, and six month follow up. The patients were adults who ranged between 18 and 90 years of age with reported radicular pain for greater than 6 weeks, physical exam findings of a positive straight leg raise, MRI confirmation of a paracentral disc herniation with involvement of the nerve below, and failed conservative treatment for at least 6 weeks or could not tolerate conservative management secondary to severe pain. Patients were excluded from the study if they had previously undergone spinal surgery or had no correlating MRI findings. The two level approach group received injection mixtures utilizing triamcinolone 80mg with 1% lidocaine, divided into two injections, and the standard one level group received methylprednisolone 80mg with lidocaine 1%, as one injection.

Results: A comparison of the mean values of the VAS scores as shown in table 1 reveals that the two level approach resulted in lower VAS values when compared to the single level (H&P - 5.68 vs. 7.60; 1mo - 3.41 vs. 5.00; 3mo - 2.55 vs. 4.00; 6mo - 3.40 vs. 7.00). The Mann-Whitney p-values are greater than 0.05 for each of these follow up intervals which means that the differences seen between the two groups are not statistically significant. However, if you were to combine all the data (H&P + 1mo + 3mo + 6mo) and then compare the two level vs. single level groups, this result is statistically significant with a p-value of 0.018.

Conclusion: This study demonstrated that the two level TFESI offered a statistically significant improvement when combining symptom reduction at all time

Table 1. *Statistical significance determined with Mann-Whitney U test. Combined includes VAS scores from initial presentation and one, three, and six month follow-up visits.*

Mean VAS Score			
	Single Level TFESI	**Two Level TFESI**	**p-value**
Initial Presentation	7.60	5.68	0.085
1 Month Follow-up	5.00	3.41	0.190
3 Month Follow-up	4.00	2.55	0.367
6 Month Follow-up	7.00	3.40	0.148
Combined	6.08	4.00	0.018

frames. Based on the results seen, we can state that a two level TFESI is beneficial in the treatment of lumbar radiculitis. However, at this point, we cannot state that a two level approach is better than a single level based on our limited data. In addition, long term follow up at 6 months revealed lower VAS reports in the two level TFESI group. These findings indicate the need for a prospective study comparing the single level versus two level TFESI, which we are now pursuing.

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Successful Case Of Neurolysis In Complex Pelvic Pain Secondary To Stage Iv Cervical Cancer

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Background Cervical cancer is a debilitating condition which can lead to somatic (soft tissue and bone), visceral and neuropathic (lumbosacral plexopathy) pain. Often times its a challenge to delineate these individual / mixed presentations and choose specific interventions. The unknown survival curve in certain types of cervical cancers further confounds the appropriate choice of interventions.

Objective To delineate different types of pain by diagnostic blocks and choosing appropriate interventions.

Methods 50 yr old female with subacute onset of pelvic pain including nociceptive, visceral and neuropathic components; was diagnosed with Stage IV cervical cancer. Her intractable complex pelvic pain was minimally responsive to Methadone 150mg, hydromorphone continuous rate of 20mg/hr with bolus 10mg Q10minutes and rescue doses of hydromorphone 15mg i/v. A diagnostic superior hypogastric plexus and ilioinguinal/iliohypogastric nerve block resulted in 25% and 40% pain improvement respectively. Superior Hypogastric plexus and bilateral ilioinguinal/iliohypogastric nerves were neurolysed with Phenol 10%.

Results Patient"s VAS scores decreased from 8/10 to 3/10. Her opioid regimen decreased to methadone 15mg and hydromorphone 50mg /24hrs i/v within 10 days of neurolysis. Her functional status improved from 2 person moderate assist to 1 person minimal assist.

Conclusions We hereby report a complex case of pelvic pain with significant visceral and neuropathic pain components delineated by diagnostic Superior hypogastric plexus and peripheral ilioinguinal /iliohypogastric blocks which after successful neurolysis resulted in 80% reduction in opioid requirements and significant improvement in VAS scores leading to enhanced function and quality of life.

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A Staged Treatment of Symptomatic Lumbar Intraspinal Synovial Cysts

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Background Lumbar intraspinal synovial cyst (LISC) refers to a cyst that arises from the zygapophyseal joint capsule of the lumbar spine and contains serous or gelatinous fluid. In cases of resistant to conservative treatments, various minimally invasive percutaneous spinal techniques (MIPSTs) may be applied prior to open surgery.

Objective The outcomes of 3-staged MIPSTs in the treatment for the cases of symptomatic LISCs resistant to conservative treatments were evaluated.

Methods Review of charts of all patients who underwent MIPSTs for symptomatic LISCs resistant to conservative treatments during a time period of 13 years at a Pain Clinic, University Hospital. Patients with symptomatic LISCs resistant to conservative treatments were treated with 3 staged MIPSTs, including image-guided intra-articular aspiration, cyst distention and rupture, and injection of corticosteroids (ARI), endoscopic cyst enucleation (ECE), and endoscopic facetectomy (EF) by a single pain specialist. A symptom-free period after each intervention was evaluated. Recurrence was defined as the same recurrent symptomatic radicular pain with confirmation of the LISC on magnetic resonance imaging. All patients with a minimum follow up time of 3 year were included. Results Of the 40 patients, who underwent ARI, 3 patients were lost follow-up and 19 recurred patients (51.4%) received ECE. Ten re-recurred patients (52.6%) after ECE were performed EF. There was no recurrence after EF.

Conclusions This retrospective and observational study with a limited number of patients does not represent a high level of evidence. However, this information provided the recurrence rate after each intervention. The half of the patients who received ARI had recurrence; the half of the recurred patients who received ECE had re-recurrence. However, EF showed no recurrence during the 3-year-study period.

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Successful management of pain secondary to surgically refractory sternal nonunion with peripheral nerve stimulation

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Background Several hundreds of thousands of patients in the United States undergo sternotomy procedures every year. Approximately 0.5-3% of these patients will develop sternal nonunion, with the majority of cases occurring during cardiothoracic surgery. Risk factors for sternal nonunion after a median sternotomy include obesity, chronic obstructive pulmonary disease, osteoporosis, radiation to the chest wall, malnutrition, diabetes, steroid use, intraoperative errors in sternal closure, paramedian sternotomy approach, post-operative prolonged ventilatory support and decreased cardiac function. The diagnosis of sternal nonunion requires subjective complaints of pain or clicking as well as objective evidence of instability for greater than 3 months in the absence of infection. These patients will typically report pain, popping, or grinding with movement. Various modalities have been used in the treatment of pain secondary to sternal nonunion. Indications for surgical repair include chronic pain, instability, limitations of daily activities, and altered respiration.

Objective To assess the efficacy of peripheral nerve field stimulation (PfNS) in the treatment of pain secondary to sternal nonunion.

Methods Our case describes a patient with present-

ing complaints of chronic chest and sternal pain secondary to sternal nonunion. Her pain began after a quadruple coronary bypass graft with 2 subsequent sternotomy revisions. She described her pain as a sharp, shooting, knife-like pressure, which was refractory to conservative measures including physical therapy, and neuropathic and opioid medications. After 6 months of conservative therapy, we proceeded with a peripheral nerve field stimulation (PfNS) trial to mitigate her chronic neuropathic sternal pain.

Results She subsequently reported significant improvement of her sternal pain following the PfNS trials, thus we proceeded with PfNS lead and implanted pulse generator (IPG) implantation. Our patient then reported 95% pain relief of her sternal pain, and was satisfied with her results.

Conclusions This case reflects the importance of PfNS as a treatment option for patients with pain secondary to sternal nonunion.

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Successful treatment of Chronic Migraine with Intrathecal administration of Dilaudid

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Background Migraine is a very common and very costly disease which affects 28 million US residents and accounts for 16% of all headaches. It is a large burden on a society in terms of direct economic and indirect economic costs, as well as personal costs in terms of psychosocial morbidity leading to many psychological disorders such as depression. There have been many studies that have shown that migraines have adverse effects on patients health related quality of life as well as their daily functioning.

Objective The treatment of chronic migraine headaches with intrathecal opioids. Methods We present the case of a 46 year old male with a past medical history of chronic migraines since childhood. The headaches are unilateral, pulsating, mainly on the left hemicranium, with associated symptoms of nausea, and photosensitivity. He had daily headaches, lasting more than 4 hours. The patient was evaluated by a neurologist who diagnosed him with chronic migraines without aura. Diagnostic tests included a head CT scan, brain MRI and an electroencephalogram, which were all normal. He failed conservative medical treatment with Depakote, Inderal, Lyrica, DHE, Valium, Effexor and Topamax. The patient then underwent peripheral nerve stimulator (PNS) trial, with one occipital lead and one supraorbital lead on the left side. The trial provided 100% relief of the headaches. However, two years later the migraines returned with increased severity and frequency, which required him to frequent the emergency department on average 5.2 times per month for abortive treatment with IV dilaudid. An intrathecal pump trial with dilaudid was performed, providing 60% relief of the migraines. Subsequently, the patient underwent a intrathecal pump implant with the use of dilaudid solution. The pump has been programmed for the patient to be able to give himself a bolus of 0.2mg every 30 minutes, with a maximum of 5 boluses per day for breakthrough pain

Results Since the implant of the intrathecal dilaudid pump 5 months ago, the patient's function and quality life has improved significantly, and he has not required any visits to the emergency department for abortive treatment of his migraine headaches.

Conclusions This case report demonstrated significant relief of migraine headaches with the use of an intrathecal dilaudid pump. The use of intrathecal opioids may be a viable choice for those who have failed all other treatment options. Further clinical research and trials are necessary to determine whether or not intrathecal opioids should be used for the treatment of refractory migraine headaches. Disclosure N/

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Occipital Nerve Stimulation for Management of Chronic Headaches: Review of Evidence from Randomized Controlled Studies

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Background: Chronic headache is a very disabling condition that affects 3-5% of people worldwide. Some randomized studies have shown, occipital nerve stimulation may be of benefit in headache syndromes like chronic migraine, and cluster headaches. We review the evidence from four randomized controlled studies.

Objective: To determine the efficacy of Occipital Nerve Stimulation (ONS) in the management of chronic migraine headaches.

Methods: We searched Google Scholar, MEDLINE, Cochrane Database of Reviews for randomized articles published between April 2003 and April 2013 that compared the efficacy of ONS with a control group for managing chronic migraine. Of 338 articles, we identified four that were randomized studies.

Results: We identified four high quality studies with a total of 351 participants. Of those 312 were randomized. All studies measured disability index for a variable period of a minimum of 2 weeks to a maximum of 52 weeks. Three of the four studies measured responders by the reduction in the number of headache days or the headache intensity for a minimum of 14 days to a maximum of 90days. Responders were defined as a 50% reduction in intensity of symptoms or the number of headache days compared to baseline. Two of the three studies which use the responder metrics met their outcome measures, while one of the three studies only had a 30% reduction in pain intensity with a p value of 0.01. Two of four studies measured reduction in analgesic use between patients followed between a minimum of 2 weeks, in one study and 52weeks in the second. There was a significant reduction in the number of headache days with statistical significance ranging between $p<0.05$ and $P<0.008$ in the subjects studied. There was a statistical significant reduction in headache intensity from baseline with p values ranging from 0.01-0.0001. There was also significant less analgesic use and disability with p values ranging from $p <0.005$-$p<0.001$. Clinical hetereogeneity in the trials prevented more pooling.

Conclusion: Overall Occipital Nerve Stimulation is an effective treatment for chronic migraine headaches with statistically significant results in at least three of the four randomized control studies.

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Behavioral Strategies in the Management of Chronic Pain: A Review of the Evidence

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Background Behavioral, Cognitive and emotional factors are known to contribute to the perpetuation, if not the development of chronic pain, pain-related disability and emotional distress. Cognitive Behavior Therapy (CBT), Biofeedback and hypnosis are among a few therapy modalities that have shown benefit in individuals with chronic pain. We review the evidence in the literature and make recommendations on patients who are most likely to benefit.

Objective To assess the evidence for behavioral approach in managing chronic pain.

Methods We did a MEDLINE search of articles written between 1988 and 2012, using key words as hypnosis, biofeedback, cognitive behavior therapy and pain. Out of several thousand articles, we focused on 26 which were reviews, meta-analysis or evidence from randomized control trials. Ten were chosen for review.

Results In a meta-analysis of 25 randomized control trials (RCTs) involving 1672 patients, CBT produced significant changes in measures of pain experience, activity level and social role function. In a review of 13 RCTs, Hypnotherapy was effective for back pain, arthritis, sickle cell, fibromyalgia. In a review of 37 RCTs, biofeedback was effective for tension headache. In a meta-analysis of 65 RCT studies involving 3089 patients where multidisciplinary treatment was compared to unimodal treatment, 37% in the multidisciplinary group vs 4% in the control group had good pain control.

Conclusions Multimodal treatment approach is superior to unimodal biomedical treatments and need to be adopted more by pain physicians.

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Steroids: Pharmacology, Complications, and Practice Delivery Issues

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Background Since being identified nearly 80 years ago, steroids have played a prominent role in treatment of many disease states and in the understanding of certain types of pathophysiological processes.

Objective This review summarizes the basic pharmacology, complications, and practice delivery issues. Recent developments involved both morbidity and mortality in 23 states related to steroid compounds manufactured at the New England Compounding Center demonstrate that the side effects of steroid injections range beyond those that can be explained by the physiologic and pharmacologic properties of glucocorticoids.

Methods Literature Review

Conclusions Since their discovery, steroids have infiltrated just about every branch of medicine and can be administered in just about every route possible. The effects of steroid use can vary widely, and it is important to be mindful that the full spectrum of side effects can be present even in those patients taking low doses. In all patients taking steroids, it is important to consider the drug as a possible cause of an exacerbation of a preexisting condition, or the presentation of a new medical

condition. Practitioners should appreciate the clinical implications of prescribing these agents.

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Ultrasound-Guided Platelet Rich Plasma (PRP) Injection for a Triangular Fibrocartilage Complex (TFCC) Tear: A Case Report

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Background A 42 year-old female presented with right wrist pain secondary to a triangular fibrocartilage complex (TFCC) tear, confirmed with ultrasound imaging. She failed several months of conservative management bracing, oral NSAIDs, topical anesthetic patches and physical therapy, and had difficulty participating in athletics including water-skiing and snow-skiing. Therefore, to improve pain and range of motion, we injected platelet rich plasma (PRP) in her right wrist.

Objective To asses the effectiveness of PRP in TFCC tears as a potential treatment option, avoiding surgical intervention.

Methods Under ultrasound guidance and sterile conditions, 4 mL of autologous PRP was injected into the right wrist at the region of the TFCC tear. She required only one treatment of PRP.

Results Following the single injection of PRP, the patient reported complete resolution of her right wrist pain. Serial ultrasound examination demonstrated decreased edema and improved morphology around the TFCC. She was then able to return to her active lifestyle following a period of relative rest. She gradually became active in yoga, water-skiing and snow-skiing without any return of symptoms.

Conclusions TFCC tears generally are repaired via open or arthroscopic procedure, however these repairs often need to be operatively revised, as frequently as 17% of the time with either procedure. PRP has been described as a minimally invasive treatment for an array of musculoskeletal pain and injury states. In this case, it appears PRP capably regenerated fibrocartilaginous tissue in the region of the TFCC tear, relieving pain and enabling the patient to return to more rigorous athletic activity. PRP, therefore, may serve as a potential treatment option for TFCC, avoiding open or arthroscopic surgery.

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An Alternative Approach To Neurostimulation For Isolated Foot Pain

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Background This is the case of a 40 year old female who suffered a Lisfranc fracture of the left lower extremity after a boating accident in 2006 and developed complex regional pain syndrome in the left foot. She had previously responded with 3-4 months of relief to lumbar sympathetic blocks, but they lost efficacy. She then responded in a similar fashion to ketamine infusions, but they slowly lost efficacy as well. A spinal cord stimulator trial was initiated, but we were unable to obtain paresthesias in the dorsum of the foot with T10, T11, or T12 level stimulation. A caudal approach to the entry into the epidural space was then trialed with peripheral nerve root stimulation with leads placed to the level of the left L4 pedicle. The seven day trial was successful in alleviating 80% of the patient's pain. The patient subsequently underwent successful implantation of the neurostimulator, with placement at the L4 pedicle level using a caudal approach to entrance into the epidural space. A literature review only reveals the use of caudal approach for spinal cord stimulation in the cases of failed back syndrome with hardware leading to difficulty with access at the higher lumbar levels, but not for any other purpose.

Objective To describe an alternative approach to

placement of a neurostimulator lead in the case of complex regional pain syndrome of the foot.

Conclusions Using a caudal approach to placement of a neurostimulator to perform peripheral nerve stimulation for complex regional pain syndrome is an alternative approach that is safe and may be efficacious in the event that paresthesias cannot be obtained in the appropriate distribution in a traditional manner.

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Safety of spinal injections: Size of Needle, Syringe and velocity

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Background Neurological complications after spinal injections are rare but continued to be reported every year. It has been postulated that cause could due to injury to anterior spinal artery, vertebral artery, Artery of Adamkiewitz with emphasis on particulate steroids.

Objective Aim was to assess ramification of size of needle and syringe on injection procedure with aim to minimize the possibility of neurological complication.

Methods The study was exempted from IRB review as the data collected was from syringes, needles, connecting tubes and medication. The relative velocity of the injection was calculated, in relation to each other, when different size syringes were connected with different size needles. The syringes included were 1 ml to 50 ml and the commonly used needles 18 , 22 and 25 gauge. The specific gravity of the medications used commonly was analyzed.

Results The pressure and flow rate increases with an increase in gauge of the needle and velocity of the fluid. The velocity of suspension medication can be variable based on whether the particulate matter is settled or not.

Conclusions The pressure during injection procedure increases with the velocity of the procedure of the injection and with the gauge of needle. The velocity of injection can directly effect the spread of the medication and discogram. Injecting with high velocity which results in high pressure can cause complications. Injecting slowly, using a connecting tube and using appropriate sized needles, especially for particulate steroids may decrease the pressure of injection and the possibility of a catastrophic event.

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Preliminary Results of Patients Treated with Percutaneous Hydrodiscectomy for Radiculopathy Secondary to Herniated Nucleus Pulposus

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Background: Various minimally invasive percutaneous procedures have evolved over the decades as alternatives to open microdiscectomy, the gold standard surgical treatment for patients with contained herniated nucleous pulposus that have failed conservative treatment.1-5 A new technique, percutaneous hydrodiscetomy, uses a high velocity, non-thermal saline fluid jet through a cannulated system to mechanically remove disc material to reduce intradiscal pressure on the nerve root. The procedure is performed under local anesthesia with sedation with minimal complications, blood loss and tissue disruption.

Objective: To evaluate the clinical and radiographic outcomes of patients that had percutaneous hydro-

discectomy for radiculopathy secondary to herniated nucleus pulposus.

Methods: Retrospective chart review was conducted on consecutive patients that failed conservative management for radiculopathy secondary to subligamentous lumbar herniated nucleous pulposus and were treated with percutaneous hydrodiscectomy at a single lumbar level. An independent reviewer blinded to the clinical outcomes evaluated pre and post procedure magnetic resonance imaging studies.

Results: A total of 15 patients (73% male) with a mean age of 45 years underwent percutaneous hydrodiscectomy without complications. Fourteen patients (93%) had an improvement in back pain and radiculopathy; one patient did not have improvement in symptoms and required a spinal cord stimulator. Five patients that reported improved symptoms were treated with subsequent transforaminal epidural steroid injections; 2 aggravated by new events not related to the procedure and 3 for residual incisional pain that resolved. Mean VAS decreased significantly from 60 to 32 (p=0.03) and mean ODI significantly improved from 40% to 22% (p=0.007) at last follow-up.

Conclusions: These early preliminary results demonstrate percutaneous hydrodiscectomy is safe and effective in a select group of patients. Larger prospective controlled studies are warranted to validate the long-term benefits of this promising new technology.

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High Volume Blood Patch in treating spontaneous intracranial hypotension with associated Cranial Nerve VI palsy, in an athletic runner.

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Background Spontaneous intracranial hypotension (SIH) is an uncommon condition that presents with symptoms similar to a cerebral spinal fluid (CSF) leak with positional headaches and often associated with nausea, vomiting, neck pain, acute hearing or visual changes, cranial nerve palsy and in worse case, coma. This condition can result from iatrogenic dural tear (lumbar puncture, spinal surgery, etc), structural anomalies (spinal nerve root cyst-Tarlov cyst, meningeal diverticula, tear in nerve root sleeves, etc), and degenerative changes (spinal osteophytes or disc pathology). Epidural blood patch is described in the literature as a feasible treatment option for SIH. However, there is no standard treatment protocol method described for use of epidural blood patch.

Objective To describe a unique case of SIH with cranial nerve (CN) VI palsy in a healthy athlete treated with multiple high volume epidural patches several levels below the site of the lesion with resolution of symptoms. [epidural blood patch in the lumbar region for a thoracic CSF leak, with resolution of symptoms]

Methods A previously healthy 45 year old male presented to a pain physician, two weeks after running in a 13-mile race, with persistent acute cervical cephalgia and asymmetrical CN VI palsy. Approximately 48 hours after the race, he began experiencing significant

headaches that worsened with standing. Subsequently, he developed left CN VI palsy, with reported diplopia.

Results Magnetic resonance imaging (MRI) and magnetic resonance angiogram (MRA) of the brain revealed a diffuse low pressure state, consistent with SIH and failed to show any compression of abducens nerve (CNVI). A comprehensive spinal MRI showed CSF leak in the thoracic spine, at the T4 level behind the spinal canal extending at least 2 levels above and below, consistent with a spontaneous leak. The patient was initially treated with 20 ml blood patch, in addition to standard treatment for postural headache including rest, hydration and increase caffeine intake. One week post blood patch, despite compliance with recommendations. He continued to have severe positional headache in the morning and in the evening. Although the headaches had moderately improved, the left-sided diplopia persisted. Subsequently, two weeks after his initial blood patch, he was treated with a second higher volume blood patch, 35ml. Both procedures, the lumbar epidural patch was performed at L4 level. He reported immediate relief of the positional headaches after the procedure. And a few days later the cranial nerve VI palsy significant improved. The goal is to continue with patch infusion until patient complains of pain and/or fullness in lower extremities.

Conclusions We propose patients diagnosed with SIH and identified CSF leak may benefit from of high volume epidural patch. In addition, the standard treatment may require serial blood patches until symptoms are resolved. The optimal level to thoracic CSF leak is to use lumbar approach, may provide increase healing of tear that may not be well visualized.

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Discogenic pain in Internal Disc Degeneration (IDD): Role of Gray Rami Communicans Block

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Background Discogenic pain is now considered to represent visceral pain. It is transmitted via dorsal root, gray rami communicans and sympathetic chain. Targetting the Gray Rami Communicans specifically allows to target the pain pathway segmentally.

Objective To evaluate efficacy of Gray Rami Communicans Block to identify and target pain generating intervertebarl disc.

Methods Ethical committee approval saught and 30 prospective patients with clinical diagnosis of IDD were included. A thorough clinical examination, with respect to history, character and distribution of back pain, response to conservative therapy was carried out. Procedure performed under fluoroscopy in prone position. In PA view, end plates of target vertebral body were squared. In oblique view, Superior Articular Process overlapped lateral 1/3rd of intervertebral disc. Inferior pedicular line merged with inferior border of transverse process. 22 G, 15 cm spinal needle inserted from lateral part of transverse process to target posterior 1/3rd of vertebral body in lateral view. Vertical spread of dye seen along posterior 1/3rd of vertebral body. 2-3 ml of 0.5 % lignocaine used for dianostic block. Patient is councelled for Radiofrequency ablation.

Results 30 patients (20 males, 10 females) with MRI revealing HIZ in lumbar region were included. VAS score pre- and post- precodure was 5.2 ± 2.08 and 1.03 ± 0.98.

Dye spread: vascular in 3 (10%), psoas spread in 8 (26%), epidural in 3 (10%), neurogram in 5 (16%) patients was seen. Conventional Radiofrequency ablation was performed in 18 (60%) patients. No complication noted.

Conclusions Gray Rami Communicans Block can dentify pain generating disc, instead of performing a more invasive Discography procedure. This block can eliminate concordant pain due to IDD. Radiofrequency ablation of Gray Rami Communicans can provide long lasting pain relief.

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Trigeminal and Accessory Neuropathy after Cervical Epidural Injection: A case report

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Background 54 year old female home maker with refractory neck and arm pain underwent right sided C5, 6 Inter-laminar cervical epidural steroid injection (IC-ESI) at an outside institution. Post procedure, in the recovery room, she reported severe neck pain, right sided facial numbness and weakness of the right shoulder, arm and leg. Patient was transferred to our institution for evaluation. Same day, post procedure MRI displayed cervical spinal cord edema extending to cervico-medullary junction. No change in symptoms were noted on day two and repeat MRI demonstrated cord expansion corresponding to skin needle site insertion; intramedullary injection during IC-ESI was the proposed cause. Patient was started on IV steroids and physical therapy for gait training. Daily improvement in the symptoms was recorded thereafter. No surgical intervention was recommended. She was discharged to acute rehabilitation on hospital day 4.

Results At three month follow up facial numbness was resolved. Leg and shoulder shrug weakness improved to 4-/5 (baseline 5/5), but developed right shoulder adhesive capsulitis. Ambulation was supported with straight cane (no assistive device at baseline).

Conclusions The incidence of spinal cord injection during ESI is unknown and the results can be devastating. Extremity weakness is a complication, but facial symptoms have not been reported. CN V spinal nucleus extends from the medulla to the mid cervical spinal cord and communicates with CNXI. We propose that cranial neuropathies must be considered as a possible risk during IC-ESI.

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