Top Posters

2025 ASIPP Abstract and Poster Winners

Overall Winners Physician Attending

Identifying Predictors of Spinal Cord Stimulator Trial Conversion to Implantation
– Annu Navani, MD

Overall Winner Trainee

Neurophysiological changes following nerve blocks for post-traumatic headache in Persistent Post-concussive Syndrome: A disconnect between pain relief and functional recovery
– Rowaid Ahmad, MD

Overall Winner Medical Student

Use of Ketamine Infusion Therapy to Treat a Case of Severe Obsessive Compulsive Disorder and Anxiety
–Claire Schroll, BS

Identifying Predictors of Spinal Cord Stimulator Trial Conversion to Implantation

Authors: Annu Navani MD, Jessica Crane DPT, Sarah Goozeé PhD, Angela Giertych DPT

Boomerang Healthcare
Restoring Hope, Returning Health

Introduction

- Spinal cord stimulation (SCS) is an evidence-based intervention utilized for the treatment of chronic intractable neuropathic pain.
- Psychological assessment prior to SCS trial or implantation is widely supported to improve outcomes; however, patient selection continues to remain challenging with reported conversion rates varying widely from 20-70%.[1,2]
- There are several recommendations for psychological inclusion or exclusion criteria for SCS trial appropriateness, but consensus on predictors of SCS trials successfully converting to a permanent implant remains limited.[2,3]

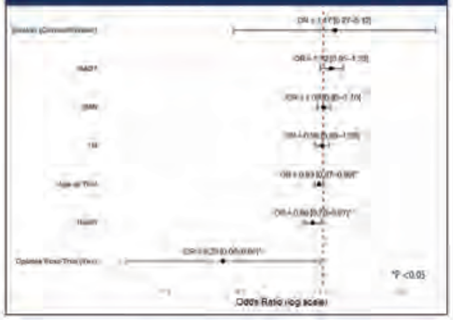
Objectives

To evaluate demographic and pre-trial factors to determine predictors of successful conversion to SCS implantation, with the goal of improving patient selection and identify individuals who are most likely to experience efficacy and satisfaction with the trial.

Methods

- Retrospective chart review.
- 71 patients who completed a SCS psychological clearance evaluation followed by SCS trial with or without SCS permanent implant conversion at Boomerang Healthcare between January 1, 2022, and December 31, 2024.
- **Factors analyzed:** patient age, gender, opioid prescriptions, past medical history, smoking status, and patient-reported outcome measures from the psychological clearance including Brief Pain Inventory (BPI), Center for Epidemiological Studies Depression Scale (CES-D), GAD-7 Anxiety Scale, Insomnia severity Index (ISI), Hamilton Anxiety (Ham-A) and Hamilton Depression (Ham-D) scores.
- **Statistical Analysis:** A hybrid approach that blended data-driven statistical selection with theory-driven clinical insight to develop a model for predicting conversion to a permanent implant after an SCS trial. A stepwise logistic regression of the full set of candidate predictors identified the ones that have the strongest statistical association with the outcome. Additional predictors were incorporated to further enhance the prediction based on theoretical and clinical considerations.

Forest Plot of Predictors of Conversion to Permanent Implant



Predictor Interpretations
(Holding All Other Predictors Constant)

Predictive Factor	Odds Ratio	Interpretation	Significance
Age @ trial	0.931	Younger patients more likely to convert	P=0.027
HamD	0.858	Higher depression scores lower odds of converting	P=0.015
Opiates Post-Trial	0.231	Opiates had 77% lower chance of converting	P=0.043
GAD7	1.123	Anxiety not significant measured by GAD7	P=0.171
ISI	0.981	Insomnia not significant measured by ISI	P=0.696
BMI	1.002	BMI had virtually no effect on odds conversion	P=0.967
Smoker	1.174	Wide confidence interval and non-significance suggest high uncertainty	P=0.831

The overall model is statistically significant (LR $chi^2(7) = 14.89$, $p = 0.0375$) with a Pseudo R^2 of 0.1965. This indicates that as a set, the predictors help differentiate between patients who converted to a permanent implant and those who did not.

Results

- For each additional year of age, the odds of conversion decrease by 6.9%.
- For each one-point increase in the Ham-D score, the odds of conversion decrease by 14.2%.
- Patients being prescribed opioids after the trial have 77% lower chance of converting compared to those not on opioids.
- The other variables (BPI, GAD-7, ISI, BMI, past medical history and smoking status)did not demonstrate a statistically significant relationship with conversion in this model.

Conclusion

Contrary to the findings of this study, which identified younger age, lower depression scores and the absence of opioid prescriptions as statistically significant predictors of conversion to perm implantation, existing research suggest that lower anxiety and better sleep predict successful SCS trials, while smoking is associated with negative outcomes [4,5].

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Neurophysiological Changes Following Nerve Blocks for Post-Traumatic Headache in PPCS: A Disconnect Between Pain Relief and Functional Recovery

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Introduction

Post-traumatic headache (PTH) is one of the most persistent and disabling sequelae of mild traumatic brain injury (mTBI), often accompanied by attention, memory, and processing speed impairments.

We have previously shown that nerve blocks (NBs) are can be used to manage headache symptoms, but their impact on central neurocognitive function remains poorly understood.

Historically, electrophysiological markers such as quantitative EEG (qEEG), evoked potentials (EPs), and reaction time (RT) testing provide objective means to assess changes in cognitive processing, especially in mTBI.

Objective

To assess if nerve blocks affect objective neuropsychiatric testing and if it can be linked to recovery of postconcussive syndrome

Methods

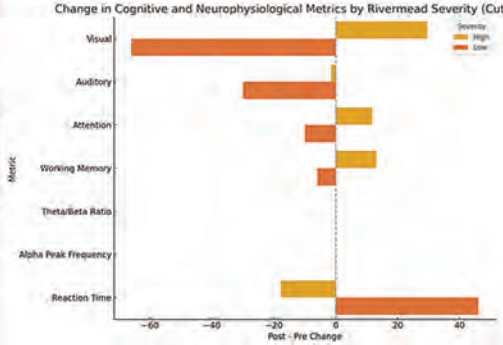
We conducted a retrospective study of patients with chronic post-traumatic headache (PTH) who underwent nerve blocks (NBs). Cognitive and neurophysiological data were collected using the ***BrainView Neurotech System***, a commercially available platform that integrates electrophysiological assessment tools including:

- Quantitative EEG (qEEG): Assesses cortical oscillatory dynamics via frequency-band analysis. We analyzed theta/beta ratio (linked to attentional control) and alpha peak frequency (a marker of cognitive readiness and processing speed).
- Evoked Potentials (EPs): Latency-based cortical responses to standardized visual, auditory, attentional, and working memory stimuli.
- Behavioral Testing Module: Computerized reaction time and accuracy testing to assess psychomotor speed and cognitive fatigue.

Patients completed pre- and post-PNB testing the course of two visits. Symptom severity was measured using the Rivermead Post-Concussion Symptoms Questionnaire, and patients were stratified by score (cutoff of 16). Paired-sample t-tests were used for within-subject comparisons.

Metric	Mean Δ	t-test p
Visual Processing	18.8	0.289
Auditory Processing	-4.7	0.753
Attention/Vigilance	9.3	0.683
Working Memory	11.0	0.657
Reaction Time	-10.7	0.6
Theta/Beta Ratio	0.03	0.215
Alpha Peak Frequency	0.02	0.948

Change in Cognitive and Neurophysiological Metrics by Rivermead Severity (Cutoff = 16)



Results

Across 18 patients, **no statistically significant changes** were observed in any cognitive or neurophysiological measure post-treatment:

- qEEG: Theta/beta ratio (Δ = +0.03, p = 0.22); alpha peak frequency (Δ = +0.02 Hz, p = 0.95)
- Evoked potentials: No meaningful latency shifts in visual, auditory, attention, or working memory components
- Behavioral testing: Reaction time showed a nonsignificant decrease (Δ = −10.7 ms, p = 0.60)

Stratified analyses by Rivermead severity (cutoffs at 16 and 20) revealed no statistically significant differences between low- and high-symptom groups across any measure, though a trend toward improved visual latency in the low-severity group approached significance (p = 0.08).

Discussion

NBs did not produce detectable changes in neurophysiological or behavioral metrics of cognitive function despite improvements in reported post-traumatic headache PTH pain. By combining electrophysiologic (qEEG, evoked potentials) and behavioral (reaction time) measures, we aimed to detect both overt and subtle shifts in cognitive performance.

Patients with lower Rivermead severity scores (≤16) demonstrated a numerical improvement in visual processing latency (mean Δ = −66 ms), whereas those with higher scores showed a mean increase (+29 ms).

While not statistically significant (p = 0.08), this trend may indicate greater neurocognitive responsiveness in less severely affected individuals—consistent with prior reports of visual evoked potentials reflecting cognitive recovery in mild TBI populations [Yadav et al., 2014].

Limitations

- Modest sample size (n=18) may limit detection of small effects
- Short follow-up interval may miss delayed central changes
- All testing occurred within a single post-treatment session detectable central effects on cognition

Conclusion

Peripheral nerve blocks provided effective pain relief for post-traumatic headaches, but this symptomatic improvement was not accompanied by corresponding changes in objective neurophysiological or cognitive performance measures. Although chronic pain is often linked to cognitive impairment, the absence of neurophysiological improvement in our study suggests that cognitive deficits in PPCS arises from mechanisms independent of pain. Clinicians should therefore recognize that while alleviating headache symptoms is beneficial, it may not be sufficient for functional cognitive recovery.

References

Use of Ketamine Infusion Therapy to Treat a Case of Severe Obsessive Compulsive Disorder and Anxiety

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APG ASSOCIATED PHYSICIANS GROUP

Background

•Obsessive-Compulsive Disorder (OCD) is a psychiatric condition affecting 1-3% of the population characterized by recurrent uncontrollable thoughts, and/or compulsive repetitive behaviors, with symptoms occupying more than one hour per day.[6,1]

•OCD is commonly associated with comorbid anxiety disorders, which are present in 75.8% of patients with OCD.[6]

•Unlike anxiety disorders which mainly involve serotonin imbalance[4], OCD has been found to also involve glutamate and gamma-aminobutyric acid (GABA) dysregulation.[2,3]

•Approximately 25-40% of patients with OCD fail to respond to first-line treatment options consisting mainly of SSRIs and CBT.[3]

•Ketamine is a N-methyl-D-aspartate receptor antagonist that is known to modulate glutamate and GABA levels and has gained traction as a potential alternative treatment for OCD and anxiety.

•Existing research has demonstrated rapid improvement in OCD and anxiety symptoms after a single ketamine infusion, but is limited when it comes to long-term efficacy.

Case Presentation

31 year old male with OCD, GAD, and hypercholesterolemia who presented to an outpatient pain clinic to discuss alternative treatment options. His most distressing symptoms consisted of frequent cleaning and hand washing which were disrupting activities at home and at work. He had trialed sertraline and buspirone in the past, and was currently on sertraline and participating in CBT.

Treatment Regimen

Infusions were initially administered at 2-week intervals with follow-up visits in between. Fourteen weeks after the fifth infusion, the first maintenance infusion was administered.

Before each infusion:

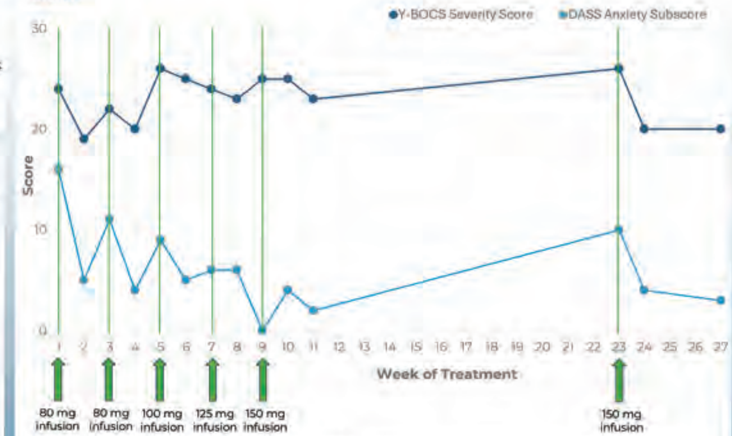
1. Vital signs were obtained
2. 20 gauge IV catheter was placed in the hand
3. Continuous monitoring of blood pressure, heart rate, and EKG
4. Pre-treated with 2-4 mg of IV midazolam and 8 mg of IV ondansetron
5. Started on a maintenance drip of normal saline
6. Dosage of ketamine diluted into 60cc of normal saline and administered over one hour via infusion pump

Yale-Brown Obsessive Compulsive Scale and Depression, Anxiety, & Stress Scale (score interpretations shown below) were used to quantify symptoms throughout treatment.

Y-BOCS Score	OCD Severity
0-7	Subclinical
8-15	Mild
16-23	Moderate
24-31	Severe
32-40	Extreme

DASS Anxiety Subscore	Anxiety Severity
0-7	Normal
8-9	Mild
10-14	Moderate
15-19	Severe
20+	Extremely Severe

Results



Patient consistently reported the following subjective improvements throughout treatment:

•Fewer obsessive episodes per day

•Delay in compulsive response to obsessive episodes

•Less feelings of anxiety

Conclusions

•Ketamine administered at 2-week intervals followed by maintenance treatments has provided significant long-term improvement in the patient's OCD and anxiety symptoms.

•Adjustments to time intervals between ketamine treatments, both in the initial phase and maintenance phase, could be considered in order to optimize symptom relief.

•Findings ultimately contribute to the growing body of evidence that supports the role of ketamine in OCD and anxiety treatment.

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Efficacy of Back Bracing in Treating Chronic Low Back Pain

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BACKGROUND

Over 20% of Americans experience chronic pain, with over 40% of cases being attributed to back pain [1]. It has been reported that, in a typical week, at least one low back pain patient is seen by almost every primary care provider.

Over 90% of CLBP cases are nonspecific, meaning the source of pain cannot be identified [3]. For cases where a pain source can be determined, common etiologies include infections, disc herniation, spinal stenosis, tumors, osteoporosis, muscle/tissue damage, and nerve damage [11].

Non-rigid LSOs have been shown to improve both pain and function [33,34,35] by stabilizing and supporting the back by limiting, correcting, assisting, or eliminating harmful movements [16]. Back braces also serve as a proprioceptive reminder for patients to improve their dynamic posture and balance [34].

…many recent studies have demonstrated that non-rigid back braces have no negative effects on trunk muscle function or composition [16,17,36].

OBJECTIVE

The purpose of this study was to examine the outcomes for patients with CLBP who were managed with lumbar back bracing and physical therapy.

SCAN CODE FOR STUDY REFERENCES

FINDINGS

The VAS score reduced from 6.28 +/− 2.32 to 3.96 +/− 2.66 at three months ($p < 0.001$) for 198 patients. At six and twelve months, the VAS score reduced to 3.74 +/− 2.73 ($p < 0.001$) and 3.23 +/− 2.29 ($p < 0.001$), respectively. The total ODI score for 199 patients improved from 46.56 +/− 15.30 to 33.13 +/− 19.99 ($p < 0.001$) at three months.

DISCUSSION

Our study found that the use of lumbar back bracing with physical therapy resulted in significant improvements in pain and function for patients with various CLBP conditions.

VAS scores improved and decreased by 37% at three months, 42% at six months, and 48% at twelve months.

The total ODI score improved by 29% at three months.

LSO bracing has demonstrated an increase in trunk stiffness of 14%... has not been found to have deleterious effects on trunk core musculature (Azadinia et al. 2019).

CONCLUSION

"Our study suggests that the use of back bracing in combination with physical therapy results in significant improvements in pain and function."

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Post-Traumatic Trigeminal Autonomic Cephalalgias: Efficacy of Nerve Blocks. A Case Series

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Background

- Post-traumatic headaches (PTH) are common after mild traumatic brain injury (mTBI).
- A subset of PTH may resemble trigeminal autonomic cephalalgias (TACs), presenting with unilateral pain and autonomic symptoms.
- Post-traumatic TACs (PT-TACs) can be resistant to medical management and there is limited evidence guiding their management in refractory cases.

Objective

To evaluate the effectiveness of nerve blocks in treating post-traumatic headaches with TAC features.

Methods

- Retrospective review of 4 patients from Jan 2021 to Dec 2023.
- Diagnosis: PTH with TAC features including autonomic symptoms (ICHD-3 criteria).
- Patients failed medical therapy, such as amitriptyline, before receiving nerve blocks.
- Interventions: occipital, supraorbital, and supratrochlear nerve blocks.
- Outcomes: headache frequency, pain intensity (0–10 scale), and autonomic symptoms over 2 months.

Nerve Block Sites

Supratrochlear Nerve Block

Supraorbital Nerve Block

Greater and Lesser Occipital Nerve Blocks

Results

- 2 patients had >50% reduction in frequency and intensity
- 2 experienced near-complete resolution
- Significant improvement in autonomic symptoms (tearing, congestion, periorbital pain)
- No significant adverse effects reported

Limitations

- Small sample size (n=4)
- Short 2-month follow-up
- Retrospective design

Discussion

- PT-TAC is a relatively rare and debilitating headache phenotype.[1]
- Medical management such as indomethacin, amitriptyline, sumatriptan can be ineffective in some cases.
- File C, et al. and Abd-Elsayed A, et al. have demonstrated effectiveness of nerve blocks and radiofrequency ablation (RFA) in treating refractory headaches. [2] [3]

Conclusion

- Nerve blocks offer safe and sustained relief in PTH with TAC features that are refractory to medical management.
- Larger, prospective studies are needed to confirm findings and develop standardized treatment protocols.

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Psoas Abscess/Hematoma-An Unusual Differential for Right Groin Pain: A Case Report

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DOWNSTATE HEALTH SCIENCES UNIVERSITY

BACKGROUND

Psoas abscess is a rare condition characterized by collection of pus in the iliopsoas compartment. It could be primary, due to hematogenous or lymphatic spread of infection from a distant source in patients with conditions like diabetes, kidney failure, immunosuppressive disease or secondary, due to spread of infection from adjacent structures. Psoas hematoma is also rare, though the incidence has slowly increased as a result of anticoagulation and antiplatelet agents.

CASE REPORT

A 71-year-old male with past medical history of end stage renal disease (ESRD) on hemodialysis (HD), mitral and aortic valve repair, atrial fibrillation on warfarin, congestive heart failure presented to the emergency room with complain of right groin pain which started a week before presentation, rated 10/10 on pain scale, causing difficulty with ambulation. Rheumatology was consulted and reported low suspicion for crystal arthropathy given the fact that the patient has been on chronic dialysis which usually maintains uric acid less than 6, also with little to no pain at rest and only present with movement. Patient had no fever, however examination was positive for right groin tenderness on palpation, right inguinal lymphadenopathy, elevated C reactive protein (16) and erythrocyte sedimentation rate (32).

X-ray of the right lower extremity was negative for fracture. Magnetic resonance imaging (MRI) of hip showed marked edema involving the right quadriceps,iliacus and iliopsoas musculature, prominent at the insertion of the lesser trochanter; discrete rounded 1.0 cm fluid signal lesion in the right psoas concerning for a psoas abscess. Interventional radiology (IR) was consulted for abscess drainage, who assessed the abscess as not drainable at the time. Infectious disease (ID) was consulted for antibiotic recommendation, however, with two negative blood cultures, antibiotics were eventually discontinued. General surgery also agreed with conservative management. Pain management recommended intravenous dilaudid and oral oxycodone and tylenol with lidocaine patch for pain relief.

Patient's computed tomography scan for abdomen and pelvis (CTAP) showed interval enlargement of right psoas collection, consistent with abscess/hematoma and received one unit of packed red blood cells for downtrending hemoglobin. Warfarin was held given the risk of bleeding into expanding hematoma and eventually the patient was started on eliquis after discussion with cardiologist and nephrologist. A repeat CTAP during the course of hospitalization showed stable enlarged right psoas muscle measuring approximately 7.8 cm. Patient was discharged following the resolution of symptoms.

CONCLUSION

Psoas abscess usually presents as a triad of fever, back pain and limp, and this triad only occurs in 30% of patients. Psoas abscess and hematoma may present with similar manifestations and require imaging with/without biopsy to distinguish between the two conditions. Management of abscess usually involves drainage or antibiotics only if less than 2-3 cm. Most psoas hematomas undergo spontaneous resorption, with severe cases requiring embolization procedures. In a selective group of patients with multiple comorbidities and with higher risk of bleeding or lower immunity presenting with right hip pain, psoas abscess/hematoma should be included in differential diagnosis in order to ensure timely diagnosis and management

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Metastatic Pelvic B Cell Lymphoma Mimicking Lumbosacral Radiculopathy by Degenerative Spine Disease: A Case Report

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Background

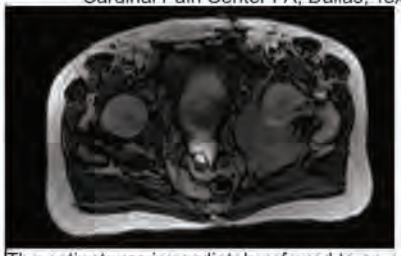
SH is a 74-year-old African-American male who initially presented to the pain management clinic with severe left leg pain and weakness for 4 years.

A lumbar MRI showed mild to moderate stenosis at L4/L5 and L5/S1 due to disc degeneration and facet hypertrophy. The differential diagnosis of femoral nerve injury during angiography or hernia repair was also considered.

Given that his clinical symptoms of severe left leg pain, weakness, and numbness were out of proportion for the degree of stenosis seen on the lumbar MRI, a pelvic MRI was ordered by the pain management physician. In addition, a referral for an EMG was also initiated.

The pelvic MRI identified extensive infiltrative lesions in the pelvis and acetabular region which caused extraspinal compression of the lumbosacral plexus. The MRI also visualized ill-defined, diffuse infiltration in the middle and posterior left acetabulum and left pubic bone with scattered infiltration.

The MRI raised suspicion for a small lesion in the right intertrochanteric region, as well as multiple bilateral sacral and coccygeal lesions. In addition, an extensive soft tissue infiltration around the left acetabulum both in the bone and in the adjacent soft tissues was found, with a large soft tissue lesion in the left pelvis. This also extended inferiorly into the adjacent soft tissue and muscles.



The patient was immediately referred to an oncologist and subsequent biopsy confirmed B-cell lymphoma. He was diagnosed with a plexopathy caused by extensive diffuse large B-cell lymphoma, which compressed the lumbar plexus in the presacral area. He underwent 6 cycles of R-CHOP chemotherapy, which resulted in remission of the lymphoma and complete resolution of his left leg neuropathy.

Discussion

This case illustrates the potential for misdiagnosing extraspinal plexopathy and underscores the importance of maintaining a high degree of clinical suspicion for alternative diagnoses.

The lumbosacral plexus can be affected by degenerative spine disease and stenosis, as well as spinal and sacral lesions, peripheral neuropathy, demyelinating diseases, and iatrogenic injuries. It is difficult to clinically discriminate between radiculopathy caused by spinal disease and plexopathy from the pelvic area, so the use of tactful imaging and labs to rule out all differentials is critical.

Extraspinal radiculopathy can present as lower extremity pain, sensory disturbances, and weakness. In patients with neoplastic plexopathies, pain onset is typically insidious, unilateral, and often the first symptom of disease.

This case depicts the importance of a detailed history, physical exam, imaging studies, and EMGs when needed to identify and isolate the exact etiology of lumbosacral plexopathy, especially in complex patients.

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Novel Treatment of Atypical Facial Pain with Intranasal Ketorolac and Oral Dilaudid

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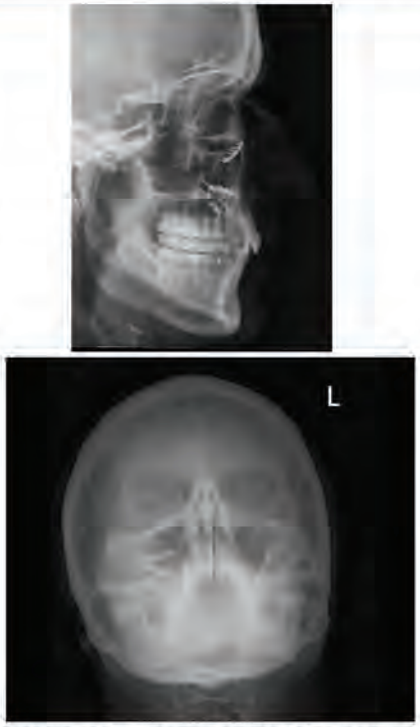
Background

Atypical facial pain can be a complex pain disorder that often involves one or more of the three trigeminal nerve distributions, the Ophthalmic, Maxillary, or Mandibular branch (V1, V2, or V3, respectively). It can typically be described as a recurrent, unilateral, stabbing and shock-like sensation, brought about by innocuous stimuli.[1] Trigeminal pain is known for severely impacting function and quality of life. Pharmacologic therapy is recommended first line in management, while procedural modalities are considered in the event of medication intolerance or refractory pain.[2] Occasionally pain is refractory to all first line medications and subsequent interventional procedures, requiring advanced or alternative treatment options

Case Presentation

51-year-old male with a history of chronic, right-sided atypical facial pain episodes, following sinus barotrauma and ORIF of the right orbital floor and zygomatic-maxilla in 1992. Pain flares occurred every 3 to 5 days, disrupting his overall quality of life for several decades. Moreover, this patient had little to no relief with standard of care, including medication, surgery, and interventional procedures.

The failed medicine treatments included topical modalities, Gabapentin, Duloxetine, Acetaminophen-Aspirin-Caffeine, Oxymetazoline, Pseudoephedrine, Montelukast, Tramadol, Acetaminophen-Codeine, Oxycodone, Indomethacin, and Naltrexone. He had minimal lasting benefit with sphenopalatine (x5), stellate (x1 left, x2 right), and auriculotemporal (x1) blocks, as well as maxillary/sphenoid sinus dilation with turbinate ablation (x1).



Radiographs highlighting metallic hardware along the right maxillofacial region from fracture of the right zygomatic arch, lateral wall of right maxillary sinus and right orbital floor.

Interestingly, he found complete resolution after treatment with IV Ketorolac and Hydromorphone during a hospitalization for a severe episode. Given his complex course, the decision was made to attempt mimicking this treatment as closely as possible in the outpatient setting.

He was prescribed oral Hydromorphone 2mg (Q3H PRN during pain episodes) and intranasal Ketorolac (Q8H PRN during pain episodes) for pain control during active flares. Notably, at his follow up he endorsed significant improvement in symptom severity as well as episode duration and frequency with this new regimen. His pain flares have remained well controlled with self management using IN Ketorolac (3 boxes each with 5-day course per month) and oral Hydromorphone (40 tablets per month), thereby avoiding emergency room visits since starting the treatment. He has not required any further escalation of care and has been able other pain medictions.

Conclusions

For patients with refractory atypical facial pain, specifically those to whom interventional and surgical procedures may no longer be an option, intranasal Ketorolac in conjunction with rapid acting opiate therapy might yield successful clinical outcomes for management of flares.

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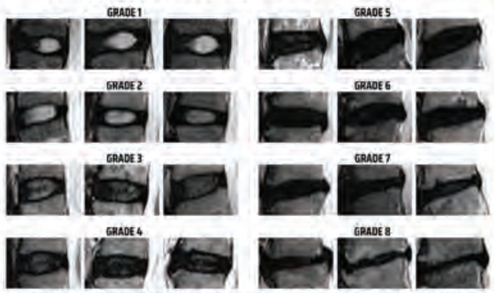
Predicting intradiscal nucleus pulposus allograft outcomes with "double positive provocative discogram:" A Case Series

Chase Beal, D.O. [1], Chase Haddock, MS1 [1], Nikolas Soto [2] Allan Hays, M.D.[3]

1. University of Texas Health Science Center at San Antonio; 2. University of Texas San Antonio 3. South Texas Veteran's Health Care System

Background

- Degenerative disc disease can be a common source of Chronic low back pain.[1]
- Diagnostic local anesthetic injections aid in diagnosis of low back pain and can guide treatment.[2]
- Provocative discography is a specialized diagnostic test with a low false positive rate (6.0%) when utilizing recommended technique to help pinpoint a discogenic source of back pain.[3]
- Evidence suggests significant and durable improvement in discogenic low back pain with a single injection of nucleus pulposus allograft (NPA) into symptomatic discs.[4]
- This retrospective case series includes patients who had provocative discogram prior to receiving NPA and those who proceeded directly to allograft.



The modified Pfirrmann classification for disc degeneration takes changes in the intensities and the disc height into account. Grade 1 is a normal disc and grade 8 represents total disc collapse.

Methods

A retrospective case series of 11 patients who received intradiscal NPA within a 6-month timeframe at our clinic. Chart review revealed that 6 of these patients received a provocative discogram using a "double positive" technique prior to receiving the allograft while the other 5 proceeded directly to allograft. The "double positive provocative discogram" (DPPD) involved an intradiscal injection with 2.75 mL of 40% Lidocaine and 0.25 mL of Cefazolin (12.5mg) at the level of interest. A positive response included immediate reproduction of their back pain with complete resolution 30 seconds later.

Age	Sex	Level(s) Treated	mPG	DPPD	1 Month	3 Months
49	M	L5/S1	6-7	No	60%	60%
63	M	L5/S1	6-7	No	50%	80%
46	F	L4/5 & L5/S1	4-5	No	0%	0%
39	M	L4/5 & L5/S1	6-7	No	15%	80%
49	M	L4/5 & L5/S1	6-7	No	80%	80%
65	M	L4/5	6-7	Yes	80%	90%
35	M	L4/5	4-5	Yes	80%	60%
64	M	L5/S1	6-7	Yes	60%	50%
41	M	L5/S1	6-7	Yes	75%	50%
43	F	L5/S1	4-5	Yes	98%	100%
32	M	L4/5	6-7	Yes	97%	100%

Through chart review, demographics including age, sex and modified Pfirrmann grade (mPG) were collected from pre-procedural visits. Pain reduction was collected from post-procedure follow ups at 1 and 3 months. Responders had 50% or better pain reduction. Excellent responders had 90% or better pain reduction.

Results

Responder rates were 82% and 91% at 1 and 3 months respectively. There was a 100% responder rate at both 1 and 3 months for patients who received DPPD. Excellent responder rates were 18% and 27% at 1 and 3 months respectively, with all of them being patients who received DPPD.

Conclusion

Significant reductions in pain were noted for more than 80% of patients at 1 and 3 months following intradiscal injection with NPA. The DPPD appears to be a useful tool to select correct levels and predict favorable outcomes with allograft.

References

Tardive Dyskinesia Induced Chronic Tongue Pain: A Case of Self-Mastication

Austin Peralta-Fogle, MD[1]; Chase Beal, DO[2], Christopher Yopp, MD[2]

1. The University of Texas at Austin Dell Medical School. 2. The University of Texas Health San Antonio

Case Description

54 year old male presented for evaluation of chronic tongue pain. He had suffered from tongue pain for several months associated with an ulcerative lesion on the left lateral surface. Consultation with Otolaryngology (ENT) yielded a biopsy showing typical acute and chronic inflammation changes, thought likely to be from recurrent biting trauma in the setting of repetitive jaw movements. ENT performed a partial glossectomy to prevent further biting. However, despite cessation of trauma the patient continued to suffer from chronic pain.

Exam revealed frank tardive dyskinesia manifested as repetitive upper extremity and jaw movements; and further investigation showed that the patient had been chronically managed with antipsychotic medication for his mood disorder.

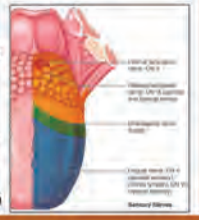
Introduction

Tardive dyskinesia is defined as involuntary athetoid or choreiform movements, typically of the tongue, lower face and jaw, or extremities that develop in association with extended use of a dopamine receptor antagonist (DRAs)[1].

This can often involve repetitive movements such as jaw clenching, tongue writhing, chewing, and lip pursing.

Tongue sensation is divided:

- Anterior two-thirds innervated by the Lingual branch of Facial Nerve (VII)
- Posterior one-third served by the Glossopharyngeal nerve (IX)



2)

Photo - Area of chronic left-sided tongue pain with partial glossectomy post-surgical changes.

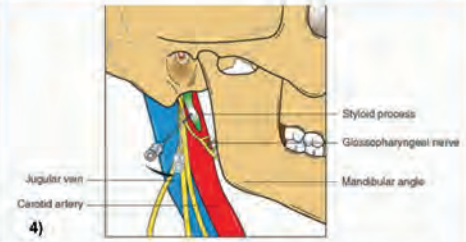
Management

Therapeutic options were discussed including conservative measures, as well as interventions such as a Glossopharyngeal vs Lingual nerve block. We recommended starting with a Glossopharyngeal nerve block given the location of the patient's symptoms, shown above. The patient opted to trial medications (Pregabalin) first, and then would consider intervention.

Further follow-up is pending.

Discussion

Tardive dyskinesia can affect between 15-30% of those using DRAs.[3] While stereotyped oral movements are a common presentation, pain from these are rarely described in literature. Discontinuation of the offending agent is the gold standard for abating the behavior if possible, however this is not always feasible in every clinic situation. Additionally, this would only address the movement disorder and not the underlying pain caused by the repetitive trauma.



4)

Glossopharyngeal nerve block can be performed as a means of palliating posterior tongue pain. This nerve can be targeted from several approaches, with the non-oral route pictured above. A needle is guided fluoroscopically or by ultrasound to contacting the ipsilateral styloid process, with care to not advance beyond into the underlying vascular structures.[4]

Conclusion

Repetitive tongue trauma is an uncommon presentation of tardive dyskinesia, with this patient demonstrating a unique case of subsequent post-surgical chronic pain. Conservative management should be approached first with medications such as nerve pain agents (gabapentinoids, TCAs) and interventional options can include therapeutic glossopharyngeal or lingual nerve blocks.

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UC San Diego Health

Use of Prolonged Continuous Infraclavicular Block for Trauma

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Background

The use of continuous peripheral nerve blocks (CPNB) have become an effective tool in managing acute postoperative and trauma-related pain, offering the additional benefit of reducing opioid consumption. Prolonged use of CPNBs, beyond the traditional short-term application, is emerging as a promising advanced pain management strategy, demonstrating both safety and efficacy in providing sustained analgesia when done with vigilant daily evaluation. Despite inherent risks, such as infection and nerve injury, prolonged CPNB use can lead to significant patient satisfaction, effective pain control, and reduced reliance on opioids.

Case Description

We present the case of a 55-year-old male with a medical history of hypertension, hyperlipidemia, and insulin-dependent type II diabetes, who presented to the emergency department following a crush injury to his right arm. The patient reported severe pain, and multiple extensive surgical interventions were required.

On postoperative day one, an ultrasound-guided right infraclavicular nerve block with continuous catheter placement was performed, delivering ropivacaine 0.2% at 8 ml/hour continuously and 4 ml boluses with a lockout period of 30 minutes. Over the first 48 hours post-block, the patient reported minimal pain (scores of 0-3/10), and the hydromorphone PCA was discontinued. The patient was evaluated daily by the acute pain service, without reported complications related to the continuous catheter during its use. Pain scores remained low, ranging between 0-4/10, and daily oxycodone use remained between 10-20 mg total. The patient underwent an additional eight surgeries while the catheter was in place. The catheter was removed after 28 days, following an overnight cessation of the infusion without an increase in pain.

Discussion

Although prolonged CPNBs are generally considered safe, they may carry a higher risk of infection when catheters are left in place for longer than 48 hours, with an even greater incidence of complications in patients with risk factors such as diabetes, trauma, or uncontrolled hyperglycemia. Close daily monitoring, with laboratory values and physical assessment, is critical to detect early infectious signs. Studies with daily evaluations have shown to help identify minor incidents and bacterial colonization, which were frequent but rarely led to major clinical consequences. In addition, data collected from studies using CPNB's in acute burn patients, who are at an increased risk for infectious complications, have suggested their use without a substantial increase in infection rate. Daily evaluations have also shown to help manage pain effectively, resulting in lower pain scores and reduced opioid consumption in geriatric hip fracture patients. In this case, daily evaluations by the acute pain service helped ensure that no infectious complications arose and pain was minimized throughout the duration of continuous analgesia.

Prolonged use of a CPNB may carry potential risks such as nerve injury which can occur if the local anesthetic is inadvertently delivered intrafascicularly as well as myotoxicity with long-term local anesthetic use. Despite these risks, the benefits of prolonged CPNBs, including significant pain relief, improved patient satisfaction, and reduced opioid consumption, often outweigh these concerns when the procedure is managed with caution and appropriate monitoring.

Interpreting Clinical Meaningfulness of SP-102 for the Treatment of Lumbosacral Radicular Pain (LRP): A Post-hoc Analysis of the CLEAR-1 Trial and A Systematic Review of Literature

Miller AM, Knezevic NN, Nalamachu S, Meske D, Ambrose C, Vought K, Chan EK, Lissin D

BACKGROUND

Analgesic clinical studies performed for the purposes of FDA approval produce results that require interpretation to fully understand their clinical meaningfulness. The results of these studies are often misinterpreted with the most common source of confusion arising when the magnitude of group differences are conflated with the determination of the magnitude of improvement within subjects that can be considered clinically important[1,2,3]. While there has been consensus on what constitutes a clinically meaningful change with-in individual subjects, group differences should include evaluations based on the overall risk-benefit profile of the treatment within the context of other available treatments for the indication[4].

Lumbosacral radicular pain (LRP), is a common and debilitating disorder that affects millions of Americans in their lifetime (13 to 40%)[5], leading to short- and long-term disability and increased healthcare costs[6,8]. There are no products approved by FDA to treat LRP. Therapeutic approaches include oral corticosteroids, non-steroidal anti-inflammatory drugs (NSAIDs), and non-pharmacologic approaches[7]. When conservative methods fail, patients are often referred for epidural steroid injections (ESIs) as a last line before surgery[8]. ESIs are used off-label in the absence of any Class I data and are associated with significant risks, including neurological complications and death, as outlined in the product labels.

SP-102 (10 mg of dexamethasone sodium phosphate in 2 mL of viscous gel solution) is an investigational non-particulate, preservative-free injectable product designed to increase the residence time of dexamethasone at the site of injection without increasing systemic exposure[9]. Recently, the CLEAR Trial (Corticosteroid Lumbosacral Epidural Analgesia for Radiculopathy) investigated the safety and efficacy of single and repeat SP-102 transforaminal injection (TFI) compared to a placebo sham intramuscular (IM) injection in subjects with LRP[9].

OBJECTIVE

Interpret the clinical meaningfulness of the magnitude of group mean differences (GMD) of the CLEAR-1 Trial by comparing to the effects observed for other analgesic products and in the context of overall safety.

METHODS

CLEAR Trial Population and Procedures:

- The CLEAR Trial was a double-blind, randomized, placebo-controlled, multicenter study conducted in the US (January 2018 - January 2022). The primary results were previously reported[9]. Subjects were screened for current episodes of LRP and randomized (1:1) to receive either a TFI of SP-102 (active) or an intramuscular (IM) placebo injection and followed for 24 weeks. If clinically warranted, a repeat open-label SP-102 injection was allowed between 4-20 weeks for both groups. Fluoroscopic guidance and verification of epidural contrast spread was used to confirm study drug administration. Subjects that did not have verified needle placement and contrast spread were excluded from the modified intent-to-treat (mITT) analyses (pre-defined in the statistical analysis plan (SAP). The intent-to-treat (ITT) population included all randomized subjects.

CLEAR Trial Endpoints:

- The primary endpoint was change in average daily pain on the Numeric Pain Rating Scale (NPRS) in the affected leg over 4 weeks. This publication also includes results from other pre-defined and post-hoc endpoints: (1) responder analysis, (2) Oswestry Disability Index (ODI) group mean comparisons, and (3) Brief Pain Inventory (BPI) Pain Interference group mean comparisons. The ODI and BPI clinically meaningful cutoff comparisons are post-hoc, the remainder were pre-defined.

Systematic Reviews:

Comparison to Other Approved Analgesics

- Because there are no approved products for LRP, Phase 3 efficacy results for existing analgesic products used to treat chronic low back pain (CLBP) were collected through database searches of: FDALabel (https://nctr-crs.fda.gov/fdalabel/ui/search), Centerwatch "FDA Approved Drugs", and PubMed. Identified products were further evaluated by searching in Drugs@FDA database for a product label. Once all products were identified every effort was made to find the results of their Phase 3 study(ies) by searching for publications, data presented in their product label, FDA summary basis of approvals, and clinicaltrials.gov. When multiple studies/ doses were identified for a single product, data were selected for presentation based on pre-defined criteria (in order of descending importance): (1) parallel designed studies (i.e., no enriched-enrollment randomized withdrawal [EERW]), (2) fixed-dose, (3) dose// data presented in the product label, (4) if 2 studies were available the highest standardized effect size (SES; Cohen's D) was selected and if three studies were available the middle SES was selection (the group mean differences are presented for the corresponding SES), and (5) if multiple doses were included in the study the highest approved dose in the product label is presented.

Comparison to Other Transforaminal Epidural Steroid Injections

- There are no products approved for the treatment of LRP and while ESIs are commonly used, it is exclusively off-label. A recent Cochrane review examined the efficacy of ESIs using various administration techniques, including transforaminal[10]. All studies stated that fluoroscopic imaging was used and all injections were confirmed to be given successfully (i.e., a population most similar to the mITT population from the CLEAR Trial). The primary publications were reviewed and primary endpoint data from the closest timepoint to the CLEAR Trial (Week 4) was analyzed when available. Due to potential differences in efficacy, only studies using TFI were included.

Statistical Analyses:

- The primary endpoint comparison used a linear contrast of the least square (LS) means comparing the weekly mean scores up to Week 4 (average of Weeks 1, 2, 3, and 4 change from baseline LS means estimated from the model). Responder analyses for NPRS Responder, ODI, and BPI Pain Inventory utilized chi square tests.
- Cohen's D was used for SES calculations and is determined by calculating the mean difference between the active and placebo groups (i.e., Group A mean – Group B mean) and then divided by the pooled standard deviation (SD). When publications only presented standard error (SE), SD was calculated by multiplying the SE by the square root of the N for each group.

RESULTS

The CLEAR Trial demonstrated a statistically significant difference between SP-102 and placebo for the primary endpoint and many secondaries for both populations (mITT and ITT) and supported the overall safety of the product[9] (Table 1).

Clinically Meaningful With-in Subject Results:

Responder analyses:

- A ≥30% and/or ≥50% reduction in pain represents a clinically meaningful reduction in an individual subject based on the correlation to patient reported outcomes of "Much Improved" and "Very Much Improved" from the PGIC measure[4]. This is referred to as the responder analysis and the percentage of subjects reporting ≥30% and ≥50% is presented in Table 1.

Oswestry Disability Index

- Results from the CLEAR Trial demonstrated a statistically significant difference in change from baseline to Week 4 in ODI for both the mITT and the ITT population (Table 1). General consensus suggests that a ≥10 point change from baseline or ≥30% improvement represents the minimum clinically meaningful change with-in subjects[11]. These results are presented in Table 1.

Brief Pain Inventory – Pain Interference

- In the mITT population, a statistically significant difference in the BPI-SF Pain Interference was observed for the GMD, and a similar trend was observed for the ITT population. Clinically meaningful improvement (>1 point improvement) is presented in Table 1.

Table 1. Secondary endpoint results at Week 4

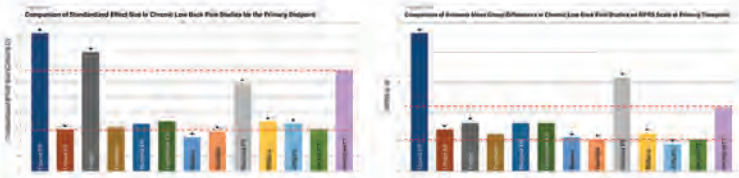
Outcome	Endpoint	mITT Population			ITT Population		
		SP-102 n=154	Placebo n=169	p-value	SP-102 n=202	Placebo n=198	p-value
NPRS Responder (≥30%)	≥ 30% improvement n(%)	89 (57.8)	49 (29.0)	<0.001	84 (41.6)	51 (25.8)	0.002
	≥50% improvement n(%)	54 (37.7)	35 (16.6)	<0.001	54 (26.6)	41 (20.9)	0.253
Oswestry Disability Index	LS Mean Difference (SE)	-2.39 (1.48)		<0.001	-2.39 (1.20)		0.015
	≥10 point improvement n(%)	78 (48.8)	53 (30.7)	0.005	79 (39.1)	65 (32.7)	0.119
	≥30% improvement n(%)	82 (50.3)	49 (28.8)	0.000	70 (34.7)	47 (23.8)	0.116
Brief Pain Inventory – Pain Interference	LS Means Difference (SE)	-1.01 (0.35)		<0.001	-0.44 (0.23)		0.048
	≥1 point improvement n(%)	93 (59.3)	49 (31.7)	<0.001	99 (49.0)	69 (34.3)	0.000

Abbreviations: mITT = intent to treat; mITT is modified from to treat; SE = standard error
*SP-102/IM from the statistical significance was used

Clinically Meaningful Between Group Differences:

Comparison of SESs for Currently Approved Analgesics:

- The most appropriate way to compare the results of the primary endpoint is by comparing the SES (Cohen's D)[4]. However, the NPRS GMD between active and placebo arms products were also compared (Figure 1a and 1b).

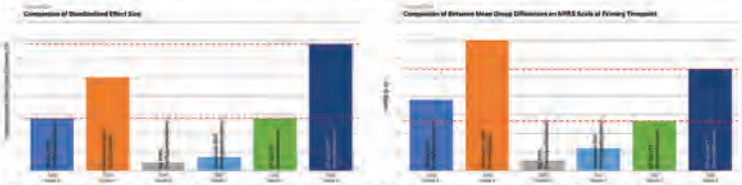


Results for the mITT population (SES = 0.68) for SP-102 produces the 4th highest SES among currently approved analgesics (Figure 1A). In the ITT population, the SES was aligned with other products (SES = 0.28) (Figure 1A). Results were similar when NPRS GMD were compared, with results for the mITT population ranking 3rd (1.08-point difference) and the ITT population result being comparable to other analgesic products (0.52-point difference) (Figure 1B). If these approved products are assumed to be clinically meaningful analgesics, it can be concluded that SP-102 (both analysis populations) is also a clinically meaningful analgesic.

Clinically Meaningful Between Group Differences:

Comparison of SESs for Studies of Off-Label Use of TFI Administered Steroids:

- As there are no products approved for treatment of LRP, there are limited high quality data available for comparison. All four 4 studies included in this analysis reported that all subjects included had fluoroscopic confirmation of a successful injection (i.e., a population most similar to the mITT).



Results for the mITT population (SES = 0.68) for SP-102 produced the highest SES among the studied TFIs (Figure 2A). In the ITT population, the SES (SES = 0.28) was smaller than one study, similar to one study and greater than two studies (Figure 2A). Results were similar when the NPRS GMD were compared with SP-102 showing the second highest separation in the mITT population and 3rd highest for the ITT (Figure 2B). Results suggest SP-102 may have greater and or longer efficacy than products used off-label.

DISCUSSION

- Interpretation of the clinical meaningfulness of results requires consideration of primary and secondary endpoints assessed with-in subject based on consensus benchmarks, and the between group differences in the context of the overall risk-benefit and in comparison to other approved products for similar indications.
- The results of the CLEAR Trial show clear clinically meaningful separation between SP-102 and placebo in multiple with-in subject endpoints (NPRS Responder Analyses, ODI and BPI Pain Interference). This result is enhanced when solely considering the mITT population.
- This trend is also observed in the magnitude of GMD, particularly when the SESs of SP-102 is compared to other marketed and approved analgesics for CLBP, as well as other TSIs.
- The SP-102 formulation was intentionally created to offer a safer alternative to current off-label use of products that contain warnings of the potential dangerous and life-threatening AEs associated with epidural administration.
- Collectively, the benefit-risk profile presented supports SP-102 being a safe and efficacious product that has the potential to offer a much-needed therapy for the treatment of LRP.

Midline Removal and Replacement of a Failed Interspinous Fixation Device

Sandra Thompson, MD, Kingsley R. Chin, MD, William Costigan, MD, Erik Spayde, MD, Taylor Headley, MBA, Jordan Acosta, Vito Lore, PE, Sukanya Chebrolu, MS, Hope Estevez, Chukwunonso Ilogu, MD, Jason A. Seale, MBBS

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Background

Some interspinous fixation devices placed via a lateral approach pose technical challenges for removal due to locking orientation and scar tissue.

This study introduces an **innovative midline approach** to address these challenges by enabling direct removal and replacement with a **novel interspinous fixation device** while applying an **innovative less exposure spine surgery methodology** to minimize tissue disruption, surgical complications, and postoperative recovery time.

Objective

Evaluate a **midline approach** for revision of failed interspinous fixation with an advanced implant using a unique **less exposure spine surgery techniques** and **bioactive glass bone grafting**.

Methods

Two patients (age 55) with failed interspinous implants at L4–5 underwent midline revision:

- Scar debridement
- Implant removal
- Replacement with bilateral screw-based interspinous fixation
- Application of **bioactive glass** and decortication

VAS scores collected pre- and postoperatively. Statistical test: paired t-test ($p < 0.05$).

Results

- **VAS 10 → 2** post-op ($p = 0.014$)
- **No intra- or postoperative complications**
- Imaging confirmed **ideal implant positioning and early fusion**
- **Early return to activity**, reduced operative time

Conclusion

This **midline less invasive technique** allows safe revision of interspinous fixation with minimal disruption. **Substantial pain relief and structural preservation** support its use in complex revision scenarios.

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Biomechanical Comparison of Posterior Fixation in Lumbar Fusion

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Background

Posterior stabilization in lumbar fusion **prevents implant migration and failure**.

Common techniques include **pedicle screws (PS)**, **transfacet screws (FS)**, and **spinous process plates (SPP)**.

Their combined use with **standalone lumbar interbody fusion techniques (SLIFT)** at L4-L5 under physiological loading remains underexplored.

Objective

Compare the biomechanical stability of **PS, FS, and SPP** constructs paired with SLIFT at L4-L5 using range of motion (ROM) testing under physiological loads.

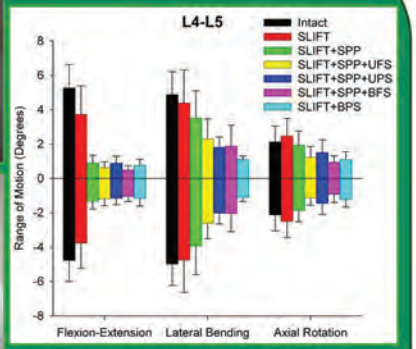
Methods

14 cadaveric lumbar spines (L3-S1) tested in 5 sequential conditions:

- SLIFT alone
- SLIFT + SPP
- SLIFT + SPP + unilateral fixation
- SLIFT + SPP + bilateral fixation
- SLIFT + PS or FS

Motion measured during **flexion-extension, lateral bending, axial rotation** (7.5 Nm). ANOVA and t-tests ($p < 0.05$) were used.

Results



- **Bilateral constructs** (PS, FS) reduced ROM most effectively
- **In lateral bending**, SLIFT+SPP allowed more motion (**$p = 0.073$** vs. bilateral)
- **Axial rotation**: Bilateral outperformed unilateral fixation (**$p < 0.05$**)
- **No significant difference** in pullout strength (**$p = 0.979$**)

Conclusion

Bilateral PS or FS constructs offer superior biomechanical support vs. SLIFT alone. **SPP provides moderate stability** and benefits from supplemental fixation. **Optimizing posterior fixation improves fusion reliability.**

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MRI-Based Comparison of Percutaneous vs. Open Decompression
Kingsley R. Chin, MD, Vito Lore, PE, Roger D. Sung, MD, Jeffrey R. Carlson, MD, Mark W. McFarland, DO, Erik Spayde, MD, William M. Costigan, MD, Hope Estevez, Marilyn Speid, Sukanya Chebrolu, MS, Chukwunonso C. Ilogu, MD, Jason A. Seale, MBBS
Background
Cervical degenerative disc disease is traditionally treated with fusion, which increases risk of adjacent segment degeneration. Conventional disc replacements can lead to heterotopic ossification (HO) and unnatural mechanics. Novel viscoelastic disc implants more closely mimic native disc biomechanics.
Objective
Evaluate 1- to 4-level viscoelastic cervical disc replacement for motion preservation and clinical improvement in patients with cervical disc disease.
Methods
Six patients (5 female, 1 male; mean age: 50.7) underwent 14 total viscoelastic disc replacements (levels C3–C7). Evaluations:
VAS for pain
Neck Disability Index (NDI)
Segmental range of motion
Radiographic review for HO or migration
Follow-up: 2 years. Mann-Whitney U test (p < 0.05)
Results
NDI: 67.3% → 16% (p < 0.001)
VAS: 9.5 → 1.83 (p = 0.013)
100% motion preservation
0 complications, 0 cases of HO
All patients discharged within 48 hours
Conclusion
Multilevel viscoelastic disc replacement is a safe, motion-preserving alternative to fusion. Results show high functional recovery and no complications. Larger trials are needed to validate long-term durability.

Toxin-Induced Neuropathy from Trailer Home Exposure

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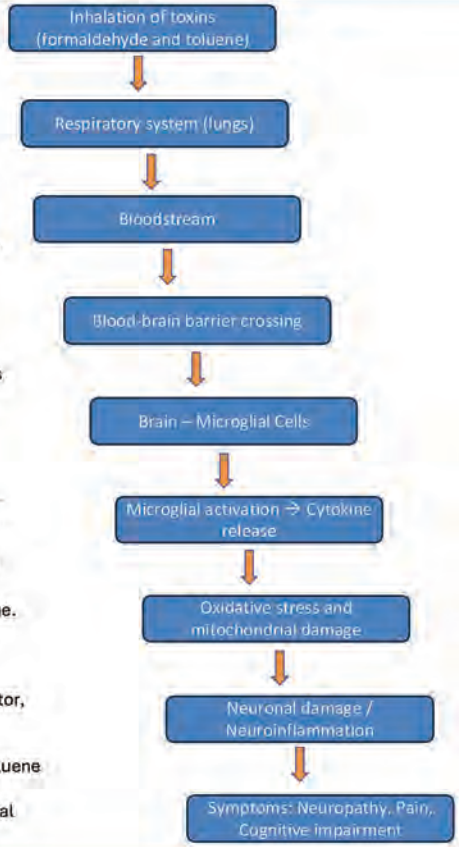
The University of Texas Health Science Center at San Antonio[1]

Introduction

- Peripheral neuropathy affects millions and can stem from various causes including metabolic, autoimmune, infectious, and toxic exposures.
- Environmental toxins, such as toluene and formaldehyde, are commonly found in manufactured homes and building materials.
- These chemicals can lead to oxidative stress, neuroinflammation, and mitochondrial dysfunction, damaging peripheral nerves and the central nervous system.
- Chronic exposure may result in burning pain, paresthesias, motor symptoms, and even cognitive decline.
- Toxin-induced neuropathy is often under-recognized and may mimic other neurologic disorders, complicating diagnosis and management.
- Awareness of environmental risk factors is critical in patients with unexplained or treatment-resistant neuropathy.

Case Description

- 69-year-old male with severe peripheral neuropathy, C4-C5 stenosis, and COPD.
- Presented with confusion, worsening neuropathic pain, and respiratory failure.
- Neuropathy began 8 years ago after moving into a trailer home.
- Home testing revealed elevated formaldehyde (42 ppb) and toluene (0.4 ppb).
- Wife also developed milder neuropathy symptoms.
- Despite extensive treatments (surgeries, spinal cord stimulator, IVIG, ketamine infusions, multimodal pain management), symptoms persisted.
- Urinary metabolites confirmed chronic formaldehyde and toluene exposure.
- Cognitive symptoms included dysarthria, stuttering, and facial grimacing, but full evaluation was limited.



Discussion

- Toluene exposure (>0.3 ppm) disrupts neuronal lipid membranes → demyelination, neurotransmitter imbalance.
  - Sources: sealants, cabinetry, paneling in manufactured homes.
- Chronic exposure causes neuropathic pain, cognitive dysfunction, motor impairment.
- Formaldehyde exposure (>20 ppm) induces oxidative stress → microglial activation, neuroinflammation.
  - Sources: vinyl flooring, insulation, carpeting.
- Leads to axonal degeneration and enhanced pain signaling (NMDA receptor sensitization).
- Patient's burning dysesthesias and hyperalgesia suggest small fiber neuropathy.
- Persistent symptoms despite multimodal therapy imply central pain matrix dysfunction, not just peripheral injury.
- Cognitive symptoms suggest overlapping neuroinflammatory mechanisms affecting pain and cognition.
- Potential treatments targeting neuroinflammation (e.g., low-dose naltrexone, neurosteroids) may offer benefit.

Conclusion

- Toxin-induced neuropathy likely due to formaldehyde and toluene exposure.
- Rising use of manufactured homes may increase cases of environmental neurotoxicity.
- Refractory symptoms and family clustering highlight the cumulative environmental impact.
- Understanding neuroinflammatory mechanisms is key to developing targeted therapies.

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Long Term Successful Lumbar RFA Followed by Gradual Diminished Efficacy: A Case Report and Reriew of The Literature

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INTRODUCTION

Use of Radiofrequency Ablation

Radiofrequency ablation (RFA) is a widely used interventional technique for managing chronic facetogenic back pain by targeting the medial branches of the dorsal rami innervating the facet joints. While RFA is generally considered safe and effective, the long-term effects of lumbar medial branch nerve RFA (LRFA) on paraspinal muscles have been called into question.

Role of Multifidus Muscle in Low Back Pain

The multifidus muscle, a key stabilizer of the lumbar spine, is primarily innervated by the medial branch of the dorsal ramus. Studies have shown significant multifidus atrophy and fatty infiltration following unilateral LRFA compared to the untreated side. Multifidus atrophy and dysfunction may contribute to persistent or worsening back pain, spinal instability, and functional impairment. Multifidus fatty infiltration, a late-stage finding of muscular degeneration, is strongly associated with low back pain, particularly in women.

Restoring Multifidus Muscle Function

Fortunately, motor control and dynamic lumbar stabilization exercise programs can significantly increase the cross-sectional area of the multifidus muscle. Additionally, a small case series of three patients demonstrated a decrease in multifidus atrophy in patients who completed spinal manipulative therapy (SMT) and lumbar stabilization exercises, while multifidus atrophy worsened in one patient who completed SMT alone. A recently developed restorative neurostimulation device has been shown to substantially improve LBP and disability by selectively stimulating the lumbar medial branches, providing another option for the treatment of multifidus muscle dysfunction.

OBJECTIVE

To discuss treatment and prevention of multifidus atrophy following LRFA and to relieve chronic low back pain with a component of multifidus dysfunction in the setting of multiple prior LRFA procedures.

CASE DESCRIPTION

A 77-year-old male with chronic low back pain secondary to lumbar facet arthropathy, lumbar spondylosis, and spinal canal stenosis, who presented to the Veterans Affairs Medical Center Pain Management clinic. The patient had undergone bilateral L4-S1 medial branch RFA a total of seven times over the course of four years, with gradually diminished benefit from near 100% relief to 70% relief. A repeat MRI of the lumbar spine most notably showed a greater increase in fatty infiltration and a decrease in the cross-sectional area of the bilateral multifidus muscles, along with multilevel degenerative changes.

A decision was made to stop offering LRFA due to decreasing efficacy. The patient was prescribed outpatient physical therapy and encouraged to continue a home exercise program. Targeted rehabilitation exercises, such as lumbar stabilization training, motor control exercises, and biofeedback-based techniques, were utilized to help re-engage the multifidus and surrounding musculature. The patient was later offered bilateral lumbar medial branch nerve blocks (LMBBs) for pain relief.

Figure 1. Axial T2-weighted MRI of the spine at L5/S1 level before (A) and after (B) LRFA. Solid arrow shows significant multifidus muscle atrophy and fatty infiltration.

RESULTS

Since discontinuing LRFA, the patient has received 10 bilateral L3-S1 LMBBs, with greater than 70% pain relief lasting for three months between injections. He continues to perform his home exercise program and reports that this contributes to pain relief.

CONCLUSIONS

LRFA can be an effective treatment for facetogenic back pain, but denervation of the medial branch may contribute to multifidus atrophy. Management of multifidus atrophy and dysfunction involves a multimodal approach aimed at restoring muscle function and spinal stability. Additionally, neuromuscular re-education, electrical stimulation, and manual therapy techniques may facilitate recovery.

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Serratus Plane Block and Botulinum Toxin Injection Combination Treatment for Post-Mastectomy Pain Syndrome: A Case Report

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UofL SCHOOL OF MEDICINE

INTRODUCTION

Definition of Post-Mastectomy Pain Syndrome (PMPS)
Chronic neuropathic pain affecting the ipsilateral breast/chest wall, axilla, and/or arm following any breast surgery including, but not limited to, mastectomy, lumpectomy and cosmetic augmentation.

Prevalence and Risk Factors
PMPS affects between 20% to 50% of women who undergo mastectomy. Age < 35 years, history of chronic pain, total mastectomy, and axillary lymph node dissection have been identified as independent risk factors for development of PMPS.

Traditional Treatment Options
First line treatment for PMPS includes oral medications and physical therapy.

Botulinum toxin-A (BTX-A) has been used to reduce painful muscle spasms following mastectomy and implant-based breast reconstruction by preventing the release of acetylcholine at the neuromuscular junction. Several studies have also shown BTX-A may have analgesic benefit by preventing the release of neurotransmitters involved in the pain signaling pathway including substance P, calcitonin gene-related peptide, and glutamate.

Serratus plane blocks (SPB) anesthetize the hemithorax by targeting branches of the intercostal nerves either superficial or deep to the serratus anterior muscle. A case series of SPBs for PMPS demonstrated 25% to near complete pain relief after initial procedure with varying duration of pain relief ranging from 2-3 days to 12 weeks.

OBJECTIVE

To examine the efficacy of combination treatment of SPB and BTX-A for the treatment of PMPS. There was previously no available literature documenting the concurrent use of SPB and BTX-A for the treatment of PMPS.

CASE DESCRIPTION

A 55-year-old female with history of infiltrating ductal carcinoma of the right breast who underwent mastectomy and axillary lymph node dissection with neoadjuvant chemotherapy and radiation. Patient presented to Physical Medicine and Rehabilitation clinic for right anterolateral chest wall pain, muscle spasms, lymphedema, reduced shoulder range of motion, and fatigue.

She was taking gabapentin for intercostobrachial neuralgia with minimal efficacy and undergoing occupational therapy with mild improvement. Radiation fibrosis syndrome of the right pectoralis major muscle was previously treated with BTX-A injection with > 50% benefit. SPB was performed at following visit for myofascial chest wall pain to examine synergistic effect.

PROCEDURE DESCRIPTION

BTX-A injections were performed by injecting 100 units of BTX-A into the pectoralis major under EMG guidance.

SPBs were performed using an in-plane approach under ultrasound guidance. A 25-guage 2-cm needle was used to inject 9-mL of 0.5% bupivacaine with 40 mg of triamcinolone into the superficial serratus plane. The patient was positioned in a lateral decubitus position with the affected side facing up.

Figure 1. In-plane approach to serratus anterior plane block using ultrasound guidance. Courtesy of Zocca et al.

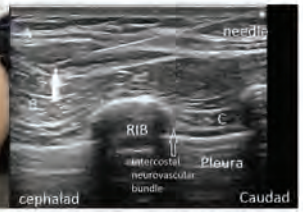

Figure 2. Serratus anterior plane with surrounding anatomy after block. A = latissimus dorsi, B = serratus anterior, C = intercostal muscles, solid arrow = spread of local anesthetic. Courtesy of Zocca et al.

RESULTS & DISCUSSION

The patient reported improved pain relief with the combination of SPB and BTX-A injections. She received BTX-A injections approximately every 3 months for a total of 6 times over the course of 2 years. She received a total of 4 SPBs over this period. SPB injections were intended to be repeated every 3 months, but one procedure was cancelled due to a nonhealing biopsy site on ipsilateral axilla.

Pain relief improved when SPB and BTX-A injections were performed 1-2 weeks apart. When combined, both procedures resulted in 100% pain relief of her chest wall pain and improvement in her ability to perform her activities of daily living. There were no complications associated with these procedures.

CONCLUSIONS

Combination treatment of SPB and BTX-A injections are an effective option for post-mastectomy pain syndrome treatment. There may be a synergistic effect when these procedures are performed concurrently.

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UC San Diego Health

The Role of Nerve Ablations in the Treatment of Freiberg's Disease

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Background

Freiberg's Disease (FD) is an osteochondrosis primarily affecting the metatarsal heads, with the 2nd metatarsal head being the most frequently involved. It is characterized by avascular necrosis, leading to subchondral bone collapse and subsequent joint degeneration The condition predominantly affects adolescent females, often presenting with pain, swelling, and limited range of motion in the metatarsophalangeal joint.

Case Presentation

A 48-year-old male initially presented with an 8-month history of pain in the right 2nd metatarsophalangeal (MTP) joint. Pain was exacerbated with weight-bearing, relieved with rest and demonstrated occasional swelling and bruising without any neurological abnormalities. X-ray imaging revealed evidence for avascular necrosis, consistent with a diagnosis of FD. Symptoms were refractory to conservative treatments including multiple intraarticular corticosteroid injections at the 2nd MTP joint. The patient subsequently underwent MTP interposition arthroplasty followed by a revision surgery but experienced no significant improvement in pain or functionality. In consideration for pulsed radiofrequency ablation (PRFA) of involved nerves, a diagnostic superficial and deep peroneal nerve block under ultrasound guidance was trialed.

Objective

To evaluate the role of nerve blocks and ablations in treating MTP joint pathologies such as FD.

Methods

Diagnostic nerve blocks were performed with 3cc of 0.5% bupivacaine at each nerve under direct visualization with a Sonosite linear ultrasound transducer.

Results

Patient received inadequate pain relief from the nerve block.

Figure 1 . Degenerative changes in 2nd metatarsal head in Freiberg's Disease Frontal View
Case courtesy of Domenico Nicoletti, Radiopaedia.org, rID: 44376

Figure 2 . Degenerative changes in 2nd metatarsal head in Freiberg's Disease Oblique view
Case courtesy of Domenico Nicoletti, Radiopaedia.org, rID: 44376

Figure 3. Dorsal Innervation and Arterial Circulation of Foot **Figure 4.** Plantar Innervation and Arterial Circulation of Foot

Conclusion

Interventional Treatment of Freiberg's Disease

- Targeted nerve ablation is a challenging option given:
  - The complexity of innervation to the MTP joints
  - The superficial position of involved nerves
  - The lack of any pure sensory targets
- Intraarticular CSIs can be considered but have deleterious effects in avascular necrosis.
  - Not possible in patients status-post surgical joint fusion, such as this.

MTP Joint Innervation

- Primary innervations of MTP joints are plantar nerves, a terminal branch of tibial nerve (TN), and the SPN.
- Exceptions are the 1st and 2nd MTP joint, which also have innervation from the DPN.

Ablation Considerations

- These nerves have mixed motor and sensory functions, thus PRFA is necessary to avoid complications associated with high-temperature RFA.
  - Ex: Neuroma formation, reduced motor function, neuritis.
- US imaging can localize the SPN and DPN in anterolateral distal lower extremity and ankle, respectively.
- Plantar nerves are difficult to localize under US imaging and are challenging to block given superficial position on plantar surface. Best targeted proximally as the TN posterior to the medial malleolus.

Our Patient

- Patient's pain was mainly dorsal and TN nerve blocks have potential for more profound motor dysfunction of intrinsic foot muscles. Therefore, only SPN and DPN were targeted. We believe by not targeting all 3 nerves, we did not get complete block coverage/analgesia
- Nerve blocks or PRFA for pain originating from the 1st or 2nd MTP should target the distal TN, SPN, and DPN for complete coverage.
- Patients should be counseled on expected motor weakness of foot with local anesthetic block, especially if blocking TN.
- Further research is needed to determine the efficacy and safety of nerve blocks and ablations in managing pain associated with Freiberg's Disease.

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Inexpensive Ultrasound Guided Regional Anesthesia Model for Sciatic Nerve Blocks Using Pork and PVC Pipe

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BACKGROUND

Sciatica and lower back pain is a common Emergency Room complaint that can be debilitating to patients and difficult to treat. Often, patients receive inadequate pain control, receive high doses of opiates, or get admitted for persistent pain The Transgluteal Sciatic Nerve Block is a novel nerve block that has been recently popularized in the Emergency Department that can provide analgesia for patients with sciatica.

Figure 1: Pork shoulder cut open with gel soaked yarn packed next to the pork bone, with meat glue

Figure 2: PVC pipe placed inside of the pork shoulder on the opposite side of the pork bone and yarn

OBJECTIVE

Ultrasound guided regional anesthesia is an important aspect of Emergency Medicine training, however, experience in regional anesthesia, and especially the sciatic nerve block, is variable. Our goal was to help create a replicable, high fidelity nerve block model for the Transgluteal Sciatic Nerve Block for emergency physicians to gain experience in performing this block. In addition, the materials used are relatively inexpensive, injectable, and appear similar to human sonoanatomy. Meat models have been created to simulate peripheral nerves, fascia iliaca compartment, serratus anterior plane, and interscalene brachial plexus models[1]. Our model of the transgluteal sciatic nerve adds to the wealth of knowledge to further the use of regional anesthesia in the emergency department.

DISCUSSION

Low Back Pain is a common Emergency Department chief complaint that is often difficult to treat., Treating refractory sciatica commonly requires escalation to intravenous analgesia including opiates and may possibly lead to admission to the hospital . The Transgluteal Sciatic Nerve Block can prevent adverse effects associated with opiates, higher dose NSAIDs, and can be used to reduce hospital admissions and long term disability.

Ultrasound guided regional anesthesia (UGRA) has taken place as an important aspect of Emergency Medicine training, helping provide safe and efficacious analgesia for a wide variety of pathologies. UGRA training however is dependent on patient encounters, and prior experience performing UGRA. UGRA can be limited considering the lack of realistic, high fidelity nerve block models. By using low cost and readily available materials, we were able to recreate the sonoanatomy for the transgluteal sciatic nerve block. We used relatively inexpensive and easily obtainable materials including pork shoulder, yarn soaked in ultrasound gel, a PVC pipe, and meat glue to create the model. Our goal was to create an inexpensive, replicable, high fidelity nerve block model for UGRA training. Hopefully with this model, we can provide multimodal analgesia, reduce opiate use, and reduce hospital admission for patients that suffer from sciatica.

METHODS

Materials:

- Pork shoulder: $2.59/lb, approximately 7.5 lbs
- Yarn: $5.00 per roll
- Ultrasound Gel: $4.00 per bottle
- Meat Glue: $14.99 per 2 oz

We used pork shoulder, yarn soaked in ultrasound gel, a polyvinyl chloride(PVC) pipe, and meat glue. The landmarks of the ischial tuberosity(IT) and greater trochanter(GT) are created by the bone in the pork shoulder and a small PVC pipe. The meat glue is applied between sections of bone, meat, and PVC pipe, creating the hyperechoic appearance of the sciatic nerve and fascial plane that sits between the two bony landmarks.

To create the model, first soak yarn in ultrasound gel and set to the side. Next, cut the pork shoulder open at its widest portion until you reach the bone. Then, place the soaked filled yarn next to the pork bone and sprinkle meat glue on both sides of the pork that was just cut open. Next, fold the pork closed, ensuring to minimize air and to maximize contact with the pork. Before closing all the way, place a PVC pipe parallel to the native pork bone and finally seal the meat shut. The final results of the model and the sonographic images are demonstrated in Figures 1-3.

Figure 3: Image of sciatic nerve block model under ultrasound with needle visualization

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Cement Pulmonary Embolism After Vertebroplasty in Suspected Multiple Myeloma: A Case Study
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Case Presentation
A 74-year-old male with history of clear-cell renal carcinoma status-post partial nephrectomy presented to an acute care hospital with low back pain:
Imaging demonstrated severe thoracic kyphosis with compression fractures of T11-L1 and lytic lesions of L5.
The patient underwent T8-L3 percutaneous stabilization with L1 vertebroplasty and L5 vertebral bone biopsy.
Hospital course complicated by left upper lobe pulmonary embolism (LUL-PE) requiring initiation of oral anticoagulation.
Patient discharged to acute rehabilitation due to significant functional decline.
8-days into rehabilitation course (3-weeks post-vertebroplasty), patient experienced new onset shortness of breath and pleuritic chest pain. The patient had a new oxygen demand and was hypotensive.
A CTA-Chest was ordered (images displayed). Of note, the previous LUL-PE from the acute care hospital had resolved.
Post-Contrast CT Imaging Demonstrating Cement Pulmonary Embolism
Imaging:
→ CTA-Chest demonstrating a 3.6 cm long cement pulmonary embolism (CPE) at the distal right main pulmonary artery with extension into the interlobar and right middle lobe segmental arteries (red arrows).
→ Note the severity of thoracic kyphoscoliosis in sagittal plane
Pathology Report:
→ Serum Lambda Light Chains > 800mg/L
→ Kappa/Lambda Ratio < 0.01
→ Bone Marrow Biopsy > 10% of plasma cells
→ Findings are consistent with Multiple Myeloma (MM)
Outcome & Discussion
Cement pulmonary embolism (CPE) status-post vertebroplasty is often clinically silent, but in rare cases can lead to cardiopulmonary distress.
Patient's Pulmonary Risk Factors: include recent surgery, known organic PE, and severe thoracic kyphoscoliosis creating a restrictive lung pattern.
Literature also suggests a greater likelihood of CPE in patients with Multiple Myeloma.
This may be secondary to Myeloma's primary bony origin, increasing the risk of cement infiltration into the venous system.
A standardized treatment protocol is lacking. Immediate evaluation for thrombectomy versus conservative measures is imperative:
Mechanical thrombectomy was considered but ultimately not pursued.
Patient improved with non-invasive positive pressure ventilation, IV fluid resuscitation, and continued oral anti-coagulation.
Conclusion
Symptomatic CPE after vertebroplasty is rare.
Cautious risk stratification should be taken for patients with Multiple Myeloma and poor baseline pulmonary function.

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Intralymphatic Injection During Lumbar Sympathetic Block

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University of CINCINNATI

Introduction

- Lumbar sympathetic blocks (LSB) are used to treat a variety of sympathetic-mediated pain disorders[1].
- Among these, they are indicated for the treatment of Complex Regional Pain Syndrome (CRPS)[1].
- Although LSBs are generally safe and well tolerated, there are several rare complications that have been reported. These include neuralgia, subarachnoid injections, renal and ureteral puncture, intravascular injection and intralymphatic injection[2].
- The patient presented in this case experienced intralymphatic injection of contrast while undergoing LSB for CRPS.

Methods and Materials

All patient information has been de-identified for this case report. Per University of Cincinnati Medical Center policy, single patient case reports are exempt from IRB review.

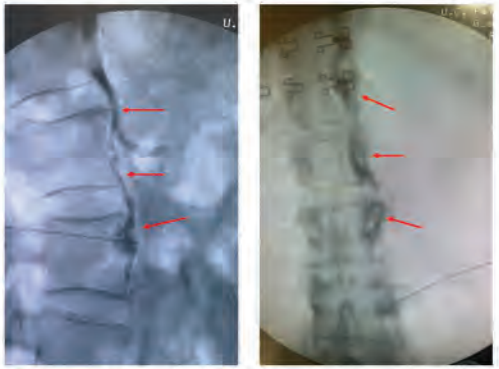
Case Report

- The patient was a 53 yo female with a PMH of HFrEF, OSA, COPD, and CRPS. She presented for a repeat right L3 LSB.
- The L3 vertebral body was identified using fluoroscopic guidance. A 22 gauge, 6 inch spinal needle was advanced and then placed anteriorly to the vertebral body under fluoroscopic guidance. No paresthesias were noted.
- The needle tip position was confirmed using fluoroscopy and contrast agent.
- The contrast spread was suspicious for vascular vs lymphatic spread, which was seen under both AP and lateral fluoroscopy views.
- Upon multiple aspirations, there was no heme noted at any point during the procedure. Additionally, there was no typical disappearance of contrast in the next fluoroscopy image, making the suspicion for lymphatic spread higher.
- After discussion with the patient, the decision was made to proceed with the injection at the level of L4 instead. The LSB was then successfully performed at that level, and she was discharged home in good condition.

Discussion

Intralymphatic spread is a rare, but possible, complication of LSBs[2,3]. There are very few case reports describing this phenomenon. Retroperitoneal lymph nodes are typically found around the major vessels and anterior to the lumbar vertebrae. They are not usually located in the area of the sympathetic chain, which is at the anterolateral vertebral edge[2,3]. However, it is thought that prone positioning or aortocaval compression, especially in obese patients, can displace these lymph nodes posteriorly, making intralymphatic injection more likely. Complications of intralymphatic injection include lymphatic obstruction due to damage of the lymphatic vessel, lymphocele formation, and lower extremity edema[3]. One case study described a patient who developed a mass in his flank a few days after undergoing a lumbar sympathetic block. He was found to have a large retroperitoneal lymphocele, which was later excised[3]. Leg swelling has been reported as a complication of LSBs, and is thought to be secondary to vasodilation in the blocked extremity[3,4]. However, it is possible that persistent cases might be due to lymphatic obstruction after damage to the lymphatic vessel[3].

Clinicians should have a high suspicion for intralymphatic spread of contrast if it has the appearance shown above, with negative blood aspiration. Additionally, if a patient presents with new lower extremity edema or flank pain after undergoing a LSB, clinicians should consider intralymphatic injection as a possible cause of their symptoms.



Intra-procedural fluoroscopic images of contrast injection during lumbar sympathetic block (lateral and AP views)
Arrows: Intralymphatic spread of contrast

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A Single-center High-volume Long-term Real-world Review of 10 kHz High-Frequency Spinal Cord Stimulation Outcomes

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ASIPP 2025 27TH ANNUAL MEETING

Introduction

- High-frequency (10 kHz) spinal cord stimulation (SCS) provides significant, durable pain relief for individuals with chronic back and leg pain, non-surgical back pain (NSRBP) and painful diabetic neuropathy, as successfully established by RCTs [1,2,3].
- Only a few observational studies have assessed the therapy's efficacy in real-world settings, but none provide a long-term (> 2 years) review within a single high-volume (> 500 patients) center [4,5,6].

Objective

- Perform a real-world retrospective analysis of 10 kHz SCS therapy efficacy in pain patients implanted for more than 5 years with a long follow up at 2 years.

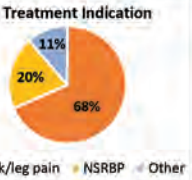
Methods

- Data were collected from a high-volume pain center and retrospectively sourced from manufacturer's database record for patients that were implanted with 10 kHz SCS between July 2016-December 2024.
- Patient inclusion, as of Jan 2025:
  - Implanted for ≥ 5 years
  - Last follow up ≥ 2 years
  - Primary physician as Drs. Essay, Zach or Brooks
- Patient-reported outcomes: Overall pain relief, overall change in function (improved: yes or no), sleep (improved: yes or no), and medication intake (increased, decreased, or unchanged).
- Last visit assessment: defined as the last clinic or telephone follow-up with the patient at any time post implantation.
- Responder rate: defined as ≥ 50% pain relief at last visit.
- Outcomes data were included in analysis wherever available.

This study was sponsored by Nevro Corp.

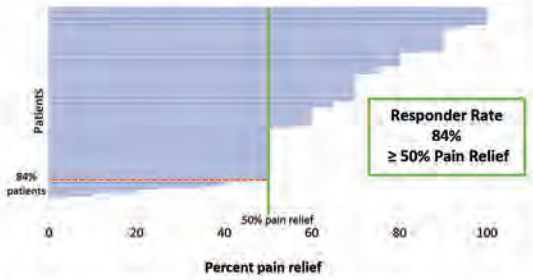
Results - Demographics

Patient Demographics	
Total patients	N = 594
Sex (% female)	53.5% females
Age (mean ± SD)	70.7 ± 12.9 years
Cross-sectional Analysis	
Patients included	n = 226
Time since implant	6.5 ± 0.9 years
Time since last follow up	4.8 ± 2.2 years



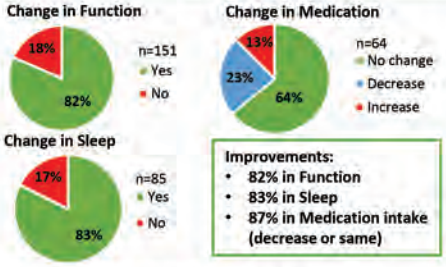
- 594 patients were implanted at this center from Jul 2016-Dec 2024 for chronic back/leg pain, NSRBP and other pain indications.
- 226 patients were implanted for ≥ 5 years and had their last follow up ≥ 2 years post implantation.

Results – Pain Relief



- Tornado plot represents individual patients (n=176) that reported pain relief scores at their last visit and were were analyzed to calculate the responder rate (≥ 50% pain relief).

Results – Quality of Life



Improvements:
- **82% in Function**
- **83% in Sleep**
- **87% in Medication intake (decrease or same)**

Results - Explants

- The overall explant rate for any reason at the center was 8.2% (n=49/594); including ineffective therapy (24), infection (12), pain and discomfort (5), MRI (2), device issues (2), lead migration (1), and non-compliance (2).

Conclusions

- 500+ patients were implanted with 10 kHz SCS in 8 years.
- Long term (avg 6.5 years) and effective pain relief (84%) was experienced by patients with long follow up (avg 4.8 years).
- Substantial improvements in quality-of-life measures and reduction in medication usage were also reported.
- These results are consistent with the findings of the previously published RCTs and provide real-world evidence to support the durability of treatment for chronic back/leg pain and NSRBP with this therapy.

References

[1] [2] [3] [4] [5] [6]

Peripheral Nerve Stimulation for Hemiplegic Shoulder Pain: A Systematic Review

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ABSTRACT

Background: Hemiplegic shoulder pain (HSP) is a debilitating post-stroke complication with limited effective treatments. Percutaneous peripheral nerve stimulation (PNS) has emerged as a promising minimally invasive approach targeting nociceptive pathways. Objective: To systematically evaluate the clinical efficacy and safety of PNS for the treatment of chronic HSP. Methods: A comprehensive literature search was conducted in MEDLINE, EMBASE, Cochrane, CINAHL, PsycINFO, and ClinicalTrials.gov from January 2000 to December 2023. Included studies evaluated percutaneous PNS in adult stroke survivors with HSP and reported outcomes related to pain, function, or safety. Primary outcome was pain reduction; secondary outcomes included spasticity, range of motion (ROM), quality of life (QoL), and adverse events. Effect sizes (Hedges' g) were calculated for RCTs. Results: Eleven studies met inclusion criteria (3 RCTs, 2 clinical trials, 3 case series, 3 case reports). Improvements in spasticity, ROM, and functional use of the affected shoulder were reported in several studies. Adverse events were minimal and self-limited, primarily minor lead migration or site irritation. Conclusion: PNS appears to be a safe, well-tolerated, and clinically effective intervention for chronic HSP. Improvements extended beyond pain relief, with secondary benefits in mobility and function. Larger, multicenter trials are needed to further validate these findings.

INTRODUCTION

- Hemiplegic shoulder pain (HSP) affects up to 40% of stroke survivors and contributes significantly to disability, impaired rehabilitation, and reduced quality of life.
- Mechanisms include rotator cuff pathology, glenohumeral subluxation, spasticity, and central sensitization.
- Conventional therapies (e.g., physical therapy, medications, injections) often yield limited relief.
- Percutaneous peripheral nerve stimulation (PNS) offers an alternative approach by modulating afferent sensory input to reduce pain.
- Objective: To systematically review and synthesize evidence on the efficacy, secondary functional outcomes, and safety of PNS for the treatment of HSP.

METHODS

- Systematic review protocol registered in PROSPERO.
- Databases searched: MEDLINE, EMBASE, Cochrane, CINAHL, PsycINFO, ClinicalTrials.gov (Jan 2000 - Dec 2023).
- Inclusion Criteria: Adults (18+) with post-stroke hemiplegic shoulder pain treated with percutaneous PNS.
- Exclusion Criteria: Non-stroke etiology, use of other neuromodulation (e.g., TENS, FES).
- Primary Outcome: Pain reduction (VAS, BPI); Secondary Outcomes: Spasticity, ROM, QoL, adverse events.
- Analysis: Narrative synthesis for clinical trials, case series, and reports.

RESULTS

Study	Study Type	N	Stimulation Programming	Tx Duration	Control Group	Follow-Up	Change in Outcome	Adverse Effects
Wilson 2014	RCT	26	12 Hz, 20 mA, 6 hrs/day	3 weeks	Usual care	6 and 12 weeks	↓VAS 7.5→4.2, ↑ROM	None reported
Wilson 2017	RCT	32	12 Hz, 20 mA, 6 hrs/day	3 weeks	Physical therapy	6 and 12 weeks	↓BPI interference; ↑biomechanics, ↑ROM	Mild lead migration
Chae 2005	RCT	61	12 Hz, 250 µs, 8 hrs/day	6 weeks	Usual care	3, 6, and 12 months	↓Pain, ↑ROM, improved QoL sustained	Minor skin irritation
Chae 2013	Case Series	8	12 Hz, 20 mA, 6 hrs/day	8 weeks	None	4 and 12 weeks	↓70% pain at EOT; ↓63% at 12m, ↓spasticity	Skin irritation, granuloma
Wilson 2018	Case Series	28	IPG, 6 hrs/day	3-week trial + implant	Short trial	6, 12, 24 months	↓69–84% pain, ↑ROM, ↑QoL	Mild site irritation
NCT02928055	Clinical Trial	30	Smartpatch	~3–6 weeks	Short intro period	6–12 months	↓Pain ~55%, ↑function	None serious
NCT01847885	Clinical Trial	28	Not specified	Not specified	Short intro phase	6–12 months	↓Pain, ↑mobility	Not specified
Nguyen 2015	Case Report	1	12 Hz; 20 mA, 50 µs; 6 hrs/day	3-wk sham + 3-wk active	Sham-controlled intro	12 weeks + implant	↓BPI 8-9→3, sustained improvement	None reported
Yu 2010	Case Report	1	30 Hz; 5 mA, 200µs, 50% duty	12 weeks	None	3 months	↓Pain 8→3, ↑ROM 95°→160°	None related
Hasson 2021	Case Report	1	Not fully specified	6 weeks	None	4–6 weeks	↓Pain ~65%, ↑ROM	No serious events
Wilson 2011	Case Report	1	12 Hz, 20 mA, 6 hrs/day	3 weeks	None	4+ weeks	↓Pain ~7→2, ↑ROM	Mild site irritation

Table summary. Summary of included studies evaluating percutaneous peripheral nerve stimulation (PNS) for hemiplegic shoulder pain. The table includes study design, sample size (N), programming, treatment duration, reported primary pain outcomes, secondary functional improvements (e.g., range of motion, spasticity), and any adverse events.

DISCUSSION/CONCLUSION

- RCTs, clinical trials, case series, and case reports consistently reported significant reduction of pain. It was also demonstrated that the duration of effect was longer.
- Secondary outcomes included improvements in shoulder biomechanics, range of motion, spasticity reduction, and enhanced functional use of the affected limb, but were not significant compared to physical therapy.
- Adverse events were rare, mostly involving lead migration or transient discomfort; no serious infections or deaths were reported.
- Limitations: Small sample sizes, heterogeneity in study protocols, lack of blinding in some observational studies.
- Future Directions: Larger randomized studies are warranted to better quantify functional gains, optimize stimulation parameters, assess durability of pain relief, and validate improvements in secondary outcomes. Understanding the underlying mechanism of action of PNS for HSP

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MACON & JOAN BROCK VIRGINIA HEALTH SCIENCES
Eastern Virginia Medical School
AT OLD DOMINION UNIVERSITY

Pain Relief With Anterior Spinal Cord Stimulator Lead Placement

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INTRODUCTION

- Spinal Cord Stimulator (SCS) has been one of the well studied interventions for treating chronic pain.
- The Food and Drug Association, approved multiple SCS for the treatment of Failed Back Surgery Syndrome (FBSS).
- Currently cases of anterior lead location are explored due to anterior lead migration. We present the peculiar case of a patient with anterior lead placement with maintained efficacy of his SCS.

CASE DESCRIPTION

- Patient is a 62 year old male with a past history of L4-S1 fusion, that presented with several years of neck and lower back pain and associated radiculopathy, and was diagnosed with FBSS.
- Medtronic Percutaneous Vectris Trial Compact (MPVTC) lead was placed at the top of T8 vertebral level, confirmed with Anterior/Posterior (AP) view on fluoroscopy, along with loss of resistance.
- Second MPVTC lead was also placed at the top of the T8 vertebral level visualized with AP view, but was noted to be anterior with fluroscopic lateral view.
- Patient received 80 percent pain relief with posterior lead, and 50 percent pain relief with anteriorly placed lead throughout the spinal cord stimulator trial week.

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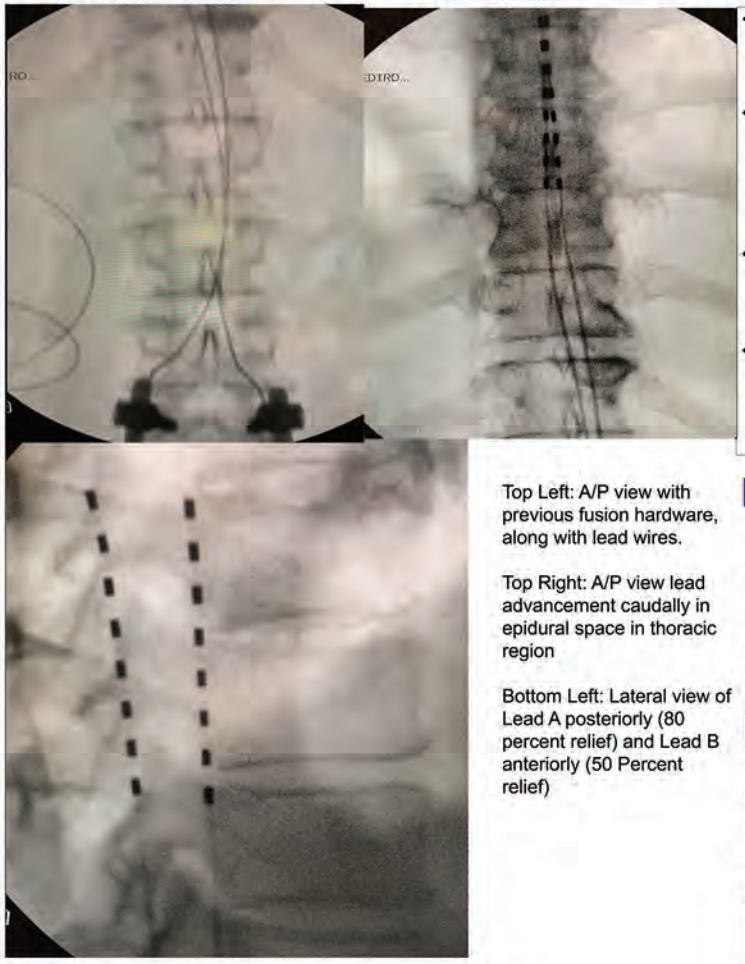
RESULTS



Top Left: A/P view with previous fusion hardware, along with lead wires.

Top Right: A/P view lead advancement caudally in epidural space in thoracic region

Bottom Left: Lateral view of Lead A posteriorly (80 percent relief) and Lead B anteriorly (50 Percent relief)

DISCUSSION

- Current practices focus on the neuromodulation of the dorsal aspect of the spinal cord, due to the understanding that pain fibers are located in the dorsal aspect of the spinal cord.
- Pain signals are initially transmitted ascending from the initial site of irritation to the dorsal root ganglion (DRG), followed by the dorsal horn, which then travels to the anterior aspect contralaterally up to the thalamus, followed by a descending pathway to medulla to the dorsal horn of the spinal cord.
- The observation of continued pain relief with anterior lead placement, presents a unique opportunity for potential neuromodulation anteriorly at the contralateral aspect of the spinal cord.
- This also presents an opportunity for neuromodulation for patients with pain from anterior spinal cord syndrome.

CONCLUSION

The observed continued pain relief with anterior lead placement, presents the unique opportunity for neuromodulation in the orthodromic pathway of pain signaling.
The lead placement in our patient also present an opportunity for pain control in patient with anterior spinal cord syndrome.

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PROSPECTIVE COHORT STUDY OF CERVICAL RADIOFREQUENCY ABLATION FOR AXIAL NECK PAIN WHEN FACET JOINTS ARE IDENTIFIED AS ETIOLOGY OF PAIN WITH CERVICOGENIC HEADACHE TREATED WITH NIMBUS RFA (TON/C3 & C4 MEDIAL BRANCH)

DR. MAYANK GUPTA

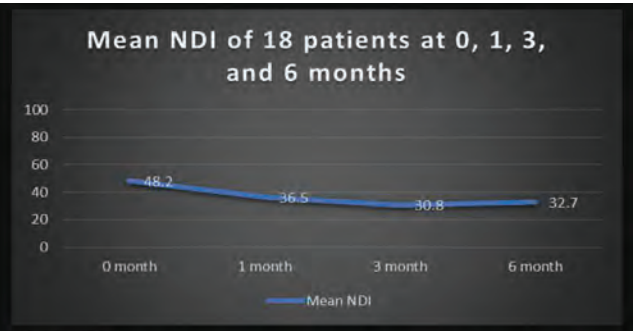
OBJECTIVE

To investigate long-term patient outcomes to Radiofrequency Ablation for cervicogenic headache and neck pain when treated with Nimbus RFA (TON/ C3 & C4 Medial Branch).

METHOD

RF ablation was performed using a Nimbus 17-gauge needle(Stratus Nimbus) on Potential patients.
Base line data was recorded prior to the procedure and at 1, 3, 5, and 12 months after the procedure.

Months	Number of Patients	Mean NDI	Mean VAS score
0	37	49.2	7.1
1	29	40.1	5.0
3	26	35.5	4.3
6	18	32.7	4.2

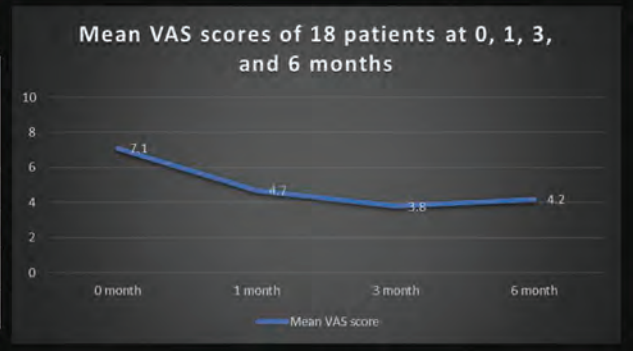


RESULTS

Among the 18 patients who completed the 6-month period,

- The average NDI dropped from 48.2 to 32.7.
- The average VAS scores dropped from 7.1 to 4.2.

After the procedure, the patients showed a significant decrease in the usage of pain medications. Patients also reported a significant decrease in the headaches and overall improvement in quality of life.



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May 15-17, 2025 • Orlando, Florida
Spinal Cord Stimulation For Schwannomatosis
Justin Jackson, M.D., Caleb Graham, M.D., Ivan Chew, M.D.
University of Texas Southwestern, Dallas, Texas
Case Description
40 year old female with a medical history notable for schwannomatosis, which was diagnosed in 2002, who presented to UTSW spine clinic with chronic low back and bilateral radicular leg pain. She had undergone multiple surgeries in the past, including removal of >40 schwannomas.
She had undergone multiple SI joint injections and a SI joint fusion in the past. She continued to experience chronic pain, despite increased doses of gabapentin.
After consultation with NSY, it was deemed that her interventional options were further surgical schwannoma excision or neuromodulation.
Imaging
Fig. 2 MRI - sagittal
NCS/EMG
Challenges
The primary goal in this patient was to offer neuromodulation with hopes that it would provide significant and sustained pain relief
The first challenge was that she was on high dose gabapentin with diminishing efficacy
The second challenge was her anxiety and overall hesitancy regarding outcomes of SCS
Fig. 3 Fluoroscopically guided SCS trial leads
Outcome
3/27/24: SCS trial
4/3/24: Patient reports near complete resolution of back pain, leg pain, and radicular symptoms
4/19/24: SCS Implant
8/19/24: Patient reports 1/10 pain and able to decrease gabapentin dose
Present: Patient reports 1/10 pain and is no longer taking gabapentin
Conclusions
This medically challenging case demonstrates successful treatment of chronic pain syndrome and lumbar radiculopathy with SCS in a patient with schwannomatosis. This rare disorder presented treatment challenges due to the nature, location, and overall burden of the nerve sheath tumors. Physicians should be aware of the potential off-label uses of SCS to help manage patients with chronic pain syndromes, even if the chronic pain syndromes are due to rare genetic disorders such as schwannomatosis.
References

PULSED RFA OF INTERCOSTAL NERVES PROVIDES 2 YEARS OF SUSTAINED RELIEF

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Introduction

Intercostal neuralgia is a form of neuropathic pain caused by damage to intercostal nerves, which typically results in sharp, burning pain radiating in a band-like dermatomal distribution (1,4). It is a debilitating diagnosis impairing daily living, causing an average of 70 days of short-term disability and typically a large percentage progress to long-term disability (1, 5). Common causes include mastectomies, thoracotomies, abdominal surgeries, traumatic rib fractures, and herpes zoster infections (1).

Traditionally, intercostal neuralgia was managed with medical therapy, however emerging studies have shown efficacy in temporary intercostal nerve blockade, cryoablation, and radiofrequency ablation (RFA). RFA is a neuroablative technique that uses radiofrequency technology to cause a thermal lesion, damage nerves and interrupt nociception. Though traditionally utilized in the treatment of facet syndrome, this technique has also been utilized in the treatment of intercostal neuralgia (2, 6,7). Few studies have explored the use of pulsed RFA, which uses lower temperatures to disrupt signals (8). We present a patient with treatment-resistant intercostal neuralgia who benefited from bilateral thoracic intercostal pulsed RFA.

Objective

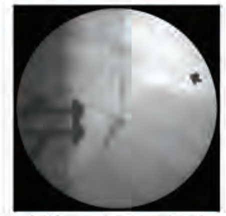
This report aims to illustrate the successful use of pulsed radiofrequency ablation (RFA) in providing long-term pain relief for a patient with intercostal neuralgia.

Case Presentation

A 72-year-old female presented with 10 years of intercostal neuralgia after a traumatic T8 cowith kyphoplasty and surgical fixation. She failed medication trials including mpression fracture, treated naproxen, gabapentin, Lyrica, Cymbalta, and tramadol, and failed 2 unspecified thoracic spine injections with 2 pain specialists. Upon initial presentation to our clinic, her pain was 6-8/10 in the thoracic ~ T8 level, radiating into the bilateral anterior chest wall along 8th and 9th thoracic dermatomes.

Materials and Methods

The patient's skin was prepped and anesthetized over the right upper back using 1% lidocaine. A 20G 5mm active tip Stryker RFA needle was inserted under fluoroscopic guidance, walking the tip ~ 5 mm deep to the inferior border of the 9th rib, 6 cm lateral to the spinous process. Sensory and motor testing were performed, inducing localized paresthesias at 0.8V and no motor stimulation into the extremities up to 2V, respectively. Pulsed RFA was then applied at 42°C for 120 seconds. After confirming appropriate needle placement with contrast dye, a 1.5 ml solution of bupivacaine and dexamethasone was injected. The same procedure was repeated at the right 8th intercostal nerve. The patient was brought back on a different day to perform the left-sided pulsed RFA of 8th and 9th intercostal nerves, to avoid any possibility of bilateral pneumothorax, a potential complication of this procedure.



Results

Initial trial of bilateral 8th and 9th intercostal nerve blocks provided greater than 50% reduction in pain. This was followed by staged right 8th and 9th pulsed RFA and then left pulsed RFA of 8th and 9th intercostal nerves. She had notable improvement in her pain and an increase in daily activity at a 2-month follow-up. She reported 2 years of profound (75%) relief and thus underwent repeat pulsed RFAs at the same level when her pain returned, with again 2 years of sustained relief.

Discussion

Bilateral thoracic intercostal pulsed RFA provided significant long-term pain relief for our patient. This finding is consistent with other studies demonstrating efficacy of RFA for intercostal neuralgia (1,3,4) and response to pulsed RFA (8). This supports the use of pulsed RFA as a safer, equally effective alternative to thermal RFA with decreased risk of neuroma formation. Further studies including RCTs and systematic reviews are needed to further elucidate the efficacy of pulsed RFA as a treatment modality for intercostal neuralgia.

References

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Transcranial Focused Ultrasound as a Non-Invasive Tool for Pain Modulation: Mechanisms and Clinical Potential

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ONE BROOKLYN HEALTH SYSTEM

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Background

Transcranial focused ultrasound (tFUS) is a non-invasive neuromodulation technique that modulates pain by targeting deep brain structures like the thalamus and anterior cingulate cortex (ACC) with precise acoustic energy. Unlike invasive methods (e.g., deep brain stimulation), tFUS reversibly alters neuronal excitability without tissue damage. Studies show it can influence pain perception and autonomic responses in both experimental and clinical settings.

Case Presentation

While clinical case reports are scarce, recent randomized trials have tested tFUS for chronic pain. One study found that medial thalamotomy in trigeminal neuropathic pain altered brain activity but provided minimal symptom relief. Another showed that low-intensity tFUS targeting the ACC reduced acute pain perception and modulated autonomic responses in healthy subjects.

Administration of tFUS in the MRI Scanner. a) compound picture of setup in scanner with thermode, hand pad, tFUS device, b) Photograph of how tFUS is attached to participant in the scanner head coil (32ch), c) Overview of tFUS sonication block design paradigm, d) screenshot of the MRI console screen demonstrating how active-time tFUS targeting is conducted.

Literature Review Table Summary

Title	Type	Therapy/Exposure	Outcome/Results
Disrupting nociceptive information processing flow through transcranial focused ultrasound neuromodulation of thalamic nuclei (Mishra et al., 2023)	Animal (non-human primate) neuroimaging study	Low-intensity FUS (650 kHz, 550 kPa, 10 ms pulses) applied during 47.5°C heat pain to target thalamic nuclei (CM_para, MD, VL, VLpv). Used fMRI to measure brain activity.	FUS suppressed pain-related brain activity in thalamus and disrupted signal flow to sensory and cognitive brain regions. Proved that ultrasound can alter deep pain processing circuits in real time. Study measured acute pain perception via nociceptors with the use of heat.
Sonication of the anterior thalamus with MRI-Guided transcranial focused ultrasound alters pain thresholds in healthy adults (Badran et al., 2020)	Human, double-blind, randomized, sham-controlled crossover trial (n=19)	tFUS to right anterior thalamus: 650 kHz, 10 Hz pulse repetition, 5 ms pulse width, 30 s bursts × 10 (active vs sham). Measured thermal pain threshold pre/post.	Active tFUS caused smaller drop in pain sensitivity, showing a mild but significant antinociceptive effect. Suggests anterior thalamus is a viable noninvasive pain modulation target.
Low-intensity transcranial focused ultrasound suppresses pain by modulating pain-processing brain circuits (Kim et al., 2024)	Animal study (normal and sickle cell mice), behavioral + EEG	Custom 128-element array. tFUS (1.5 MHz) applied to somatosensory cortex (S1), insula, and thalamus. PRF: 40 Hz or 3 kHz. Ultrasound durations: 100–400 ms. Total sessions: 10–60 min.	tFUS reduced pain behaviors and heat sensitivity, especially in sickle-cell mice. Also modulated pain-related brain waves (EEG). Effects varied by brain region and stimulation pattern. No side effects observed.
Noninvasive targeted modulation of pain circuits with focused ultrasonic waves (Riis et al., 2024)	Human chronic pain study, randomized, sham-controlled crossover (n=20)	Low-intensity tFUS to anterior cingulate cortex (ACC). 40-minute session. Real-time MRI-based targeting with skull correction. Active and sham treatments spaced one week apart.	After active tFUS, 60% of patients had clinically meaningful pain reduction. Avg pain dropped by 60% immediately, 43% on day 1, and 33% on day 7. Sham group had little change. No serious side effects. Was for Chronic pain (varied sources: fibromyalgia, migraines, back pain, arthritis, neuropathy, etc.)
Bilateral focused ultrasound medial thalamotomies for trigeminal neuropathic pain (Ishaque et al., 2023)	Bilateral focused ultrasound medial thalamotomies for trigeminal neuropathic pain (Ishaque et al., 2023)	High-intensity FUS used to create permanent lesions in central lateral thalamic nucleus. Sham group received no energy. Pain scores tracked for 3 months.	No significant difference in pain scores between real and sham. But real group showed improved quality of life and reduced brain connectivity to pain areas. Study was small (n=10). Study was for Trigeminal neuropathic pain (chronic facial pain condition). Study measured acute pain perception via nociceptors with the use of heat
Low-Intensity Focused Ultrasound to the Human Dorsal Anterior Cingulate Attenuates Acute Pain Perception and Autonomic Responses (Strohman et al., 2024)	Human within-subject, sham-controlled study (n=16)	LIFU (650 kHz, 5% duty cycle, ~720 mW/cm²) applied to dorsal ACC during short heat pain (contact heat at ~47°C). Measured EEG (CHEP), heart rate, skin conductance.	LIFU led to 1-point reduction in pain ratings, 38% drop in CHEP amplitude, and increased heart rate variability (SDNN, LF/HF ratio). Showed impact on both pain and autonomic systems. No adverse effects. Study measured acute pain perception via nociceptors with the use of heat

Objectives

This review examines tFUS evidence for pain modulation, exploring mechanisms, efficacy, and clinical applicability. It summarizes neurophysiological pathways involved and reviews clinical/experimental studies on acute and chronic pain. Challenges, limitations, and future directions for integrating tFUS into pain management are also addressed.

Methods

A literature review of PubMed and pain journals identified recent (5-year) human studies on tFUS for pain modulation, prioritizing RCTs, systematic reviews, and experimental research. Analysis focused on brain targets, stimulation parameters, pain outcomes, and safety.

Results

Functional imaging suggests tFUS modulates pain via altered thalamocortical connectivity and metabolic changes in the ACC/insula. Low-intensity tFUS inhibits pain-related cortical activity and enhances autonomic regulation. Clinical trials in chronic pain show mixed results—some report significant relief, while others find limited effects, likely due to parameter variability or patient selection. Anterior thalamic stimulation elevates pain thresholds in healthy subjects, supporting analgesic potential. No serious adverse events have occurred; mild transient effects (e.g., dizziness, scalp discomfort) were occasionally reported.

Conclusions

tFUS is a promising non-invasive pain modulation tool with mechanistic and clinical support, but requires standardized parameters and larger trials to confirm efficacy. Future research should optimize targeting and evaluate long-term outcomes for integration into pain management.

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Patient Selection and Predictors of Response to Peripheral Nerve Stimulation for Migraines: A Literature Review

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Background

Peripheral nerve stimulation (PNS) is an effective neuromodulation therapy for refractory migraines, especially in treatment-resistant patients. However, response variability poses a clinical challenge, highlighting the need for predictive factors to optimize patient selection and outcomes.

Case Presentation

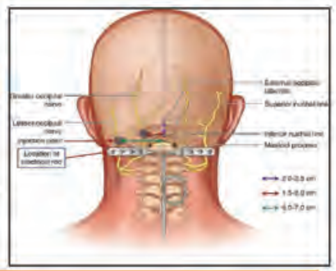
A review of case reports and clinical trials involving chronic migraine patients treated with PNS—after unsuccessful pharmacological and interventional therapies—reveals inconsistent outcomes post-implantation. For instance, Li et al. (2019) reported lasting migraine relief with preauricular PNS in a patient unresponsive to occipital nerve stimulation. Similarly, Valenti et al. (2025) described a case of occipital neuralgia where PNS significantly reduced pain after other treatments failed. Such findings emphasize the importance of improving patient selection criteria for PNS therapy.

Objectives

This review aims to analyze the clinical, physiological, and technical factors that influence patient response to PNS for migraines. By synthesizing data from various studies, we seek to identify characteristics associated with favorable outcomes, guiding clinicians in selecting appropriate candidates for PNS therapy.

Methods

A review of published literature, including randomized controlled trials, retrospective studies, and case reports, was conducted to assess predictors of response to PNS in migraine treatment. Key parameters analyzed included headache chronicity, comorbidities, prior treatment history, stimulation parameters, and anatomical placement of electrodes.



Occipital nerve stimulation (ONS), also called peripheral nerve stimulation (PNS) of the occipital nerves, is used to treat chronic migraine patients who have failed to respond to pharmaceutical treatments

Literature Review Table Summary

Title	Type	Therapy/Exposure	Outcome/Results
Safety and Efficacy of PNS for Chronic Migraine	Randomized Controlled Trial	Patients with chronic migraine who underwent occipital nerve stimulation using an implanted neurostimulation system, compared against a sham control for 12 weeks followed by open-label treatment	Significant reduction in headache days (mean reduction of 6.7 days in the intent-to-treat population), improvement in pain intensity and disability scores. However, 70% of patients experienced adverse events, with 40.7% requiring surgical intervention.
Percutaneous PNS for Occipital Neuralgia	Case Report	Single patient with refractory occipital neuralgia treated with a percutaneous PNS device targeting the occipital nerves	Patient reported a 70% reduction in pain, improved quality of life, and decreased reliance on opioid analgesics. Pain relief was sustained even after lead removal, suggesting long-term neuromodulatory effects.
Long-Term PNS for Intractable Chronic Headache	Retrospective Study	Cohort of 46 patients with refractory chronic headaches who were permanently implanted with PNS devices targeting the occipital and supraorbital nerves	Significant reduction in pain scores (from 7.6 to 2.04 on the NRS), decrease in headache days per month (mean reduction of 14 days), and no correlation between headache duration and efficacy. Some patients required lead revisions due to complications.
PNFS for Chronic Headache	Case Series	60 patients with chronic headache syndromes, including chronic migraine and occipital neuralgia, who received peripheral nerve field stimulation (PNFS) targeting occipital, supraorbital, and infraorbital nerves	68% of patients reported greater than 50% pain relief. Medication use was reduced in 83% of patients, and there was a significant decrease in depression and disability scores. Ten patients required surgical lead revisions, but no long-term complications were reported.
PNFS to the Preauricular Area for Chronic Migraine	Case Report	Single patient with refractory chronic migraine who underwent PNFS targeting the preauricular region after failing occipital nerve stimulation	Patient with refractory chronic migraine achieved sustained pain relief (VAS score reduction from 9 to 2), significant improvement in daily functioning, and reduced medication reliance over two years. This case demonstrated the efficacy of non-traditional PNS placements.

Results

Clinical predictors of PNS response include headache duration, comorbidities (e.g., depression/anxiety), and prior treatment failures. Shorter migraine histories correlate with better outcomes, while psychiatric conditions may influence variability. Failed nerve blocks or spinal cord stimulation don't preclude PNS success, as alternative placements (e.g., preauricular, supraorbital) can be effective.

Physiological predictors involve migraine phenotype and central sensitization. Chronic migraines with marked sensitization may respond less favorably than episodic cases. Imaging suggests reduced central sensitization predicts better outcomes.

Technical predictors include electrode placement (occipital, supraorbital, preauricular) and stimulation parameters (pulse width, frequency, amplitude), which should be tailored to pain distribution and individual response.

Conclusions

PNS effectively treats refractory migraines, but optimal outcomes depend on careful patient selection, considering clinical history, migraine type, comorbidities, and electrode placement. Future research should establish standardized criteria, refine protocols, and compare stimulation approaches through multicenter trials. Advanced imaging and biomarkers may also help predict response, enabling personalized PNS therapy.

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Combined Genicular Radiofrequency Ablation and Cryoablation for Painful Scar Neuropathy in Refractory Post-Total Knee Arthroplasty Pain

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Introduction

Genicular radiofrequency ablation (RFA) is a widely used technique in interventional pain medicine to treat refractory knee pain. It delivers targeted thermal energy to the genicular nerves, causing localized neuronal destruction and thermal coagulation, which disrupt nociceptive pain signaling by neurolysis. However, it fails to address underlying structural pathologies, such as scar tissue formation and nerve impingement, which may contribute to pain and range of motion (ROM) restriction in post-total knee arthroplasty (TKA) patients.
Cryoablation is a minimally invasive procedure used to destroy abnormal tissues by causing cold-induced cellular injury. This case report presents the unique application of cryoablation to directly target and destroy the scar tissue responsible for nerve compression in combination with genicular RFA in treating post-TKA refractory knee pain and improving functional outcomes.

Case Description

A 55-year-old male experienced persistent pain and significant ROM restriction after robotic-assisted TKA for severe osteoarthritis, despite undergoing manipulation under anesthesia. Ultrasound-guided diagnostic genicular nerve block provided greater than 50% pain reduction. During the procedure, it was discovered that the patient had a suprapatellar scar resulting in the entrapment and compression of the anterior femoral cutaneous nerve, which likely contributed to the limited knee extension and persistent pain.

The patient subsequently received a combined intervention utilizing image-guided cooled RFA of the right genicular nerves and cryoablation of the suprapatellar scar. COOLIEF RFA targeted the superomedial, inferomedial, and superolateral genicular nerves for 150 seconds at 60°C. Cryoablation targeted the heterogeneous avascular scar (23 x 19 mm), creating a 24 mm ice ball ablation zone. Both procedures were performed consecutively under general anesthesia without intraoperative complications.

Results and Discussion

At the 7-day and 1-month follow-up assessments, the patient reported a sustained >50% reduction in pain and significant improvement in right knee ROM. This significant reduction in pain highlights the efficacy of this novel combined approach in treating complex post-TKA pain.
The combined RFA and cryoablation approach offers synergistic benefits, managing nociceptive pain signals and addressing the underlying structural source of pain simultaneously. The significant and lasting pain relief observed in this patient suggests that this combined approach may represent a valuable therapeutic option for patients with refractory post-TKA pain. Further research, including larger controlled trials is warranted to confirm these findings and to establish the long-term efficacy and safety profile of this combined intervention.

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Early Insights into Patient Experience using an AI-Enabled 10 kHz Spinal Cord Stimulation Therapy System

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Background

- High frequency spinal cord stimulation using 10kHz (10kHz-SCS) is a well-established treatment for chronic back/leg pain, non surgical back pain (NSRBP) and painful diabetic neuropathy (PDN) [1,2,3].
- SCS systems typically require individualized optimization to sustain pain relief and enhanced quality of life.
- Conventionally, patients communicate with clinicians or device representatives to report pain outcomes and adjust therapy settings, placing additional burden on patients.
- A novel AI-enabled-10kHz-SCS system, integrating a patient-centric mobile application aims to streamline therapy optimization and empower patient control

Objective

- To evaluate early patient experiences with the AI-enabled-10kHz-SCS system – usability and satisfaction, patient-clinical interactions, age-based stratification.

Methods

- A preliminary analysis on the patient records from the manufacturer's database was conducted as of April 2025.
- In the 90-day post implantation period, we evaluated:
  - Patient demographics: distribution across age, sex and treatment indications.
  - Patient call requirement: determined by the number of calls (duration >1 minute)made by the patient to a therapy consultant to optimize therapy.
- Using a patient survey at a mean follow up time of 75 days, we evaluated user experience with mobile features,
  - Ease of "accepting therapy recommendations"
  - Ease of "using the progress tracker"
  - Age-based comparative analysis (<75 years vs. ≥75 years) in patients' experience with the digital app.

Methods – Mobile Application

- The mobile app prompts the patient for daily check-ins on their quality of life assessments of pain relief, sleep, activity and pain medication use.
- Based on patient inputs, the system provides personalized therapy recommendations via the app that the user can accept and track using the patient diary.

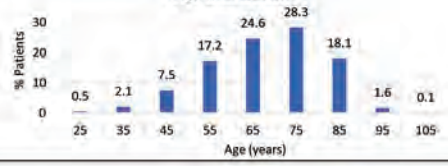
Results – Patient Demographics

Characteristics	
Total patients	N = 1405
Sex (% female)	56.5% females
Age (mean ± SD)	63.5 ± 13.1 years

A broad distribution across age (including older population), sex and, treatment indication, demonstrates equitable usage and adoption of the AI-enabled-10kHz-SCS system.

Treatment Indication

Age Distribution



Results – AI Efficiency and Engagement

- **Call interaction requirements (90-day evaluation)**: On average, patients with AI-enabled-10kHz-SCS (n=1405) made 10 calls vs. 14 calls by manually-programmed 10kHz-SCS (n=22,077) patients.

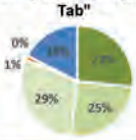
28% reduction in therapy-related support calls, validates the value of automated recommendations and therapy optimization.

- **User survey (75-day follow up, n=424)**: Neutral to very easy experience for 88% patients in accepting recommendation and 81% in viewing progress; no age-based statistical difference in both cases (X^2=5.81, p=0.121) (X^2=0.36, p=0.941), respectively.

85% (composite score) patients reported ease in using the mobile app features, indicating an intuitive user experience.

"Accepting My Recommended Program"

"Using the My Progress Tab"



Older patients (≥75 years) were as comfortable as <75 year-old ones in using the mobile app and engaging with AI-enabled therapy.

Conclusions

- The AI-enabled-10kHz-SCS system effectively reduces clinical workload by minimizing the need for additional clinical representative interactions while maintaining strong patient engagement through a streamlined mobile application.
- Patients of all ages, including 75+ years, were comfortable with the digital app, refuting common assumptions about older adults and technology acceptance
- Long-term studies are warranted to quantify sustained impacts on therapy adherence and outcomes.

Personalizing 10 kHz Spinal Cord Stimulation Therapy with Artificial Intelligence for Optimal Patient Care

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Background

- In healthcare, artificial intelligence (AI), has been leveraged as a predictive tool for patient selection, and therapy customization for improved outcomes [1].
- In the field of neuromodulation, where personalization and optimization of therapy is needed, data from robust data pipelines can be leveraged to feed decision making algorithms to customize therapy for improved chronic pain management.
- The use of AI-enabled systems for therapy optimization without clinician intervention is limited to date [2].

Objective

- To present two case studies of patients with different pain patterns who were implanted with an AI-enabled 10 kHz-frequency spinal cord stimulation (AI-enabled-10kHz-SCS) system, highlighting their customized pain relief journeys guided by the AI-enabled system.

Methods

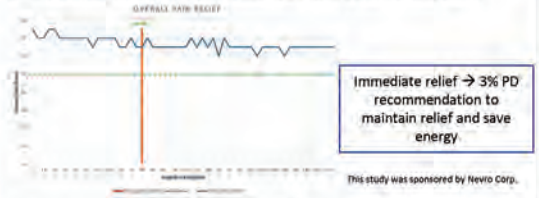
- The AI-enabled-10kHz-SCS collects 187 unique variables for each patient.
- Input variables include:
  - Device function basic and advanced monitoring (e.g., low battery, failing to charge, not using devices, relief status, lead impedance)
  - Patient reported outcomes (e.g., relief, sleep, activity and pain medication use)
- The system integrates real-time device metrics and patient reported outcomes to inform the expert algorithm that may then recommend a therapy change as output.
- The output parameters that can be customized by the algorithm include therapy target bipole(s), amplitude, and waveform.
- Based on real-time therapy notifications, care team can provide proactive intervention to accelerate return to relief.

Methods – Mobile Application

- The mobile app prompts the patient for daily check-ins on their quality of life assessments of pain relief, sleep, activity and pain medication use.
- Real-time and seamless app empowers patients to optimize their own treatment with minimal effort and thus enables the delivery of personalized therapy recommendations for continuous pain relief.

Results – Case 1: Optimized Energy Delivery

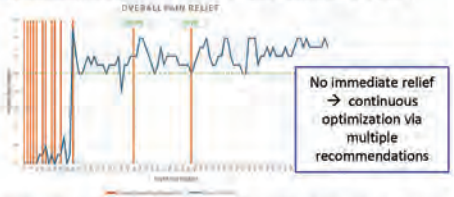
- In the first case, a patient (age 71 years) with **painful diabetic neuropathy** pain was implanted with the AI-enabled-HF-SCS system in Sep 2024.



- The app-based assessments indicated that the patient experienced early pain relief using the first program with 14% pulse-dosing (PD).
- With further optimization, sustained relief was achieved at 3% PD, demonstrating the ability of the algorithm to maintain effective pain management at lower energy requirements and reduced charging burden.

Results – Case 2: Continuous Optimization

- In the second case, a patient (age 52 years) with **back/leg pain** was implanted with AI-enabled-HF-SCS system in Aug 2024.



- With the patient not experiencing immediate relief due to challenging pain, the algorithm provided continuous optimization via multiple therapy change recommendations until effective pain relief was achieved, which was then sustained through optimized iterations of 14% PD and 3% PD.

Conclusions

- Most patients experience immediate relief with the initial program of the AI-enabled-10kHz-SCS system.
- For patients with challenging pain patterns, algorithm continuously optimizes therapy, accounting for patient variability and fine-tuning to each patient's pain relief journey.
- This AI-enabled SCS system provides an opportunity for patients to be actively involved in controlling their own therapy, allowing them to achieve and return to pain relief more efficiently.
- AI-driven shifts toward pulse dosing can also lower charging burden and more variation in therapy targets and parameters may reduce habituation, all leading to higher therapy satisfaction and improved outcomes for patients.

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Dorsal Root Ganglion-Targeted Spinal Cord Stimulation for Refractory Post-Thoracotomy Intercostal Neuralgia & Causalgia: A Case Report

Samuel Lee DO [1], Raj Murthy MD [1]

Background

Intercostal neuralgia is a challenging neuropathic pain syndrome that results from injury, entrapment, or irritation of the intercostal nerves, leading to persistent, often debilitating pain characterized by sharp, burning, or tingling sensations. Post-thoracotomy intercostal neuralgia (PTIN) following thoracic surgical procedures, such as thoracotomies or segmentectomies remains an underrecognized and underreported complication, despite its significant morbidity. This condition can severely impact patients' quality of life and is frequently resistant to conventional treatments, including pharmacological therapies, physical therapy, and intercostal nerve blocks. Effective management strategies are limited, as current therapeutic options often fail to provide adequate or long-term pain relief in refractory cases.

Objective

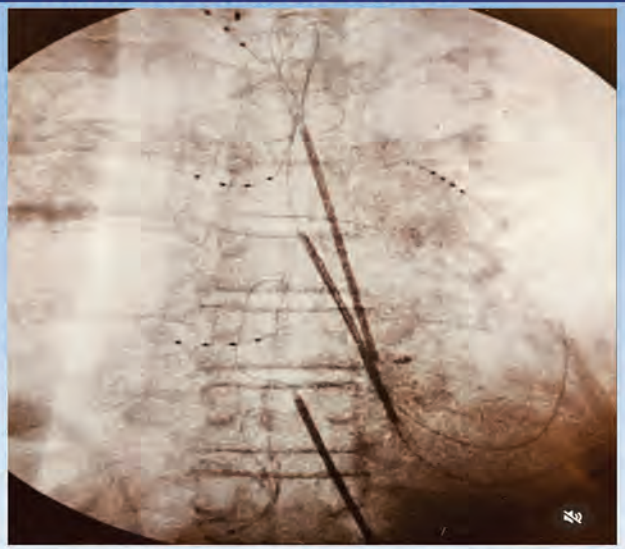
We present a rare case of chronic left intercostal neuralgia following lung surgery, successfully treated with dorsal root ganglion (DRG) spinal cord stimulation (SCS).

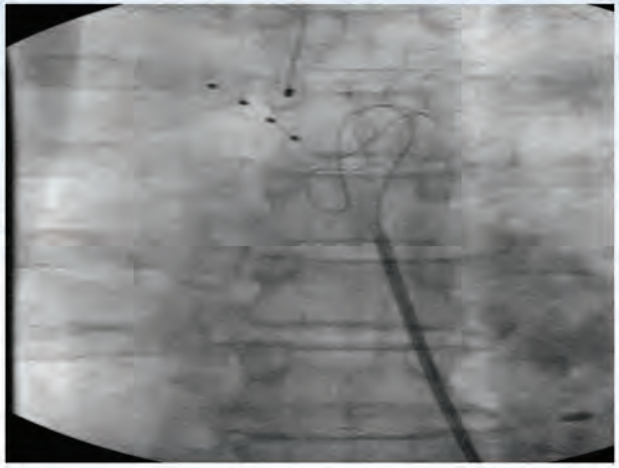
Methods

A 61-year-old male with a history of coronary artery disease, diabetes, hypertension, and chronic arteriovenous malformation of the left upper lobe with progressive cystic changes presented with chronic left chest wall pain radiating from thoracic spine (T) 5 to thoracic spine (T) 10 region. His surgical history included flexible bronchoscopy, robotic-assisted lysis of adhesions, and left upper lobe lingular segmentectomy to address fibrotic and cystically dilated lung parenchyma. He was subsequently diagnosed with intercostal neuralgia.

His pain, refractory to conservative therapies and intercostal nerve blocks, was severe and debilitating, with a baseline intensity of 9/10. Although diagnostic nerve blocks provided only temporary relief, his symptoms persisted, highlighting the chronic, refractory, and severe nature of his condition.

FIGURES POSTER PRESENTATION





Results

The patient underwent a trial of DRG-targeted SCS covering the T5–T11 region, which resulted in significant pain reduction, exceeding 50%, and marked improvement in quality of life. Encouraged by the trial's success, a permanent SCS device was implanted at the left T5, T7, T9, and T11 levels. The patient achieved sustained pain relief, with over 95% improvement in pain intensity and daily function. Pain intensity scale of 0-1/10.

Significance

Chronic post-thoracotomy intercostal neuralgia is a rare and challenging condition with limited treatment options. This case underscores the potential of dorsal root ganglion-targeted spinal cord stimulation as an effective intervention for this patient population with refractory pain. Despite its established use for other neuropathic pain syndromes, the application of SCS in this population remains underreported, highlighting the need for further research to guide clinical practice and improve outcomes.

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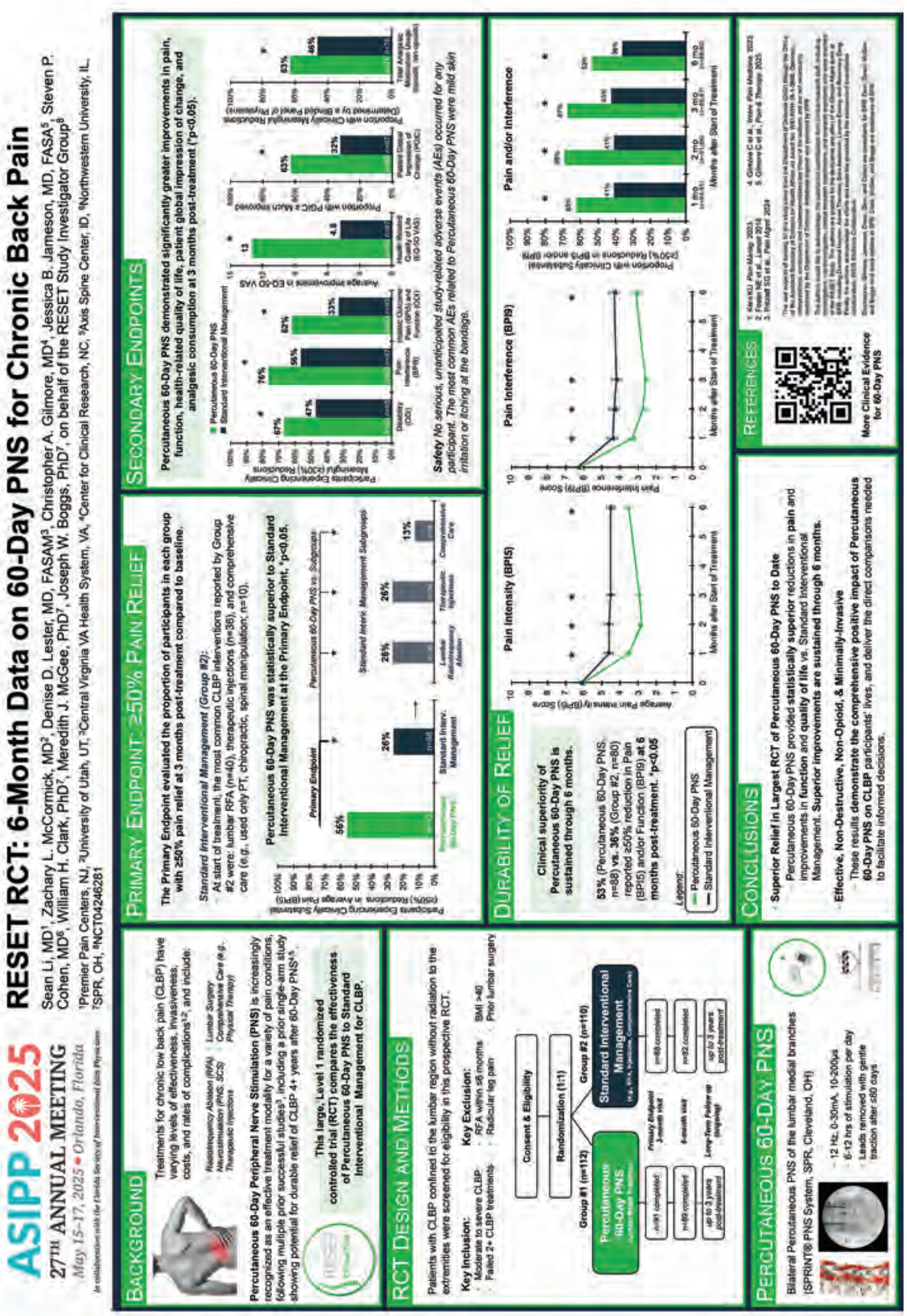
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RESET RCT: 6-Month Data on 60-Day PNS for Chronic Back Pain
Sean Li, MD1, Zachary L. McCormick, MD2, Denise D. Lester, MD, FASAM3, Christopher A. Gilmore, MD4, Jessica B. Jameson, MD, FASA5, Steven P. Cohen, MD6, William H. Clark, PhD7, Meredith J. McGee, PhD7, Joseph W. Boggs, PhD7, on behalf of the RESET Study Investigator Group8
1Premier Pain Centers, NJ, 2University of Utah, UT, 3Central Virginia VA Health System, VA, 4Center for Clinical Research, NC, 5Axis Spine Center, ID, 6Northwestern University, IL, 7SPR, OH, 8NCT04246281
BACKGROUND
Treatments for chronic low back pain (CLBP) have varying levels of effectiveness, invasiveness, costs, and rates of complications1,2, and include:
Radiofrequency Ablation (RFA)
Neurostimulation (PNS, SCS)
Therapeutic Injections
Lumbar Surgery
Comprehensive Care (e.g., Physical Therapy)
Percutaneous 60-Day Peripheral Nerve Stimulation (PNS) is increasingly recognized as an effective treatment modality for a variety of pain conditions, following multiple prior successful studies3, including a prior single-arm study showing potential for durable relief of CLBP 4+ years after 60-Day PNS4,5.
This large, Level 1 randomized controlled trial (RCT) compares the effectiveness of Percutaneous 60-Day PNS to Standard Interventional Management for CLBP.
RCT DESIGN AND METHODS
Patients with CLBP confined to the lumbar region without radiation to the extremities were screened for eligibility in this prospective RCT.
Key Inclusion:
Moderate to severe CLBP
Failed 2+ CLBP treatments
Key Exclusion:
RFA within ≤6 months
Radicular leg pain
BMI >40
Prior lumbar surgery
Consent & Eligibility
Randomization (1:1)
Group #1 (n=112)
Group #2 (n=110)
Percutaneous 60-Day PNS
Standard Interventional Management
n=91 completed
Primary Endpoint 3-month visit
n=88 completed
n=89 completed
6-month visit
n=82 completed
up to 3 years post-treatment
Long-Term Follow-up (ongoing)
up to 3 years post-treatment
PERCUTANEOUS 60-DAY PNS
Bilateral Percutaneous PNS of the lumbar medial branches (SPRINT® PNS System, SPR, Cleveland, OH)
12 Hz, 0-30mA, 10-200μs
6-12 hrs of stimulation per day
Leads removed with gentle traction after ≤60 days
PRIMARY ENDPOINT: ≥50% PAIN RELIEF
The Primary Endpoint evaluated the proportion of participants in each group with ≥50% pain relief at 3 months post-treatment compared to baseline.
Standard Interventional Management (Group #2):
At start of treatment, the most common CLBP interventions reported by Group #2 were: lumbar RFA (n=40), therapeutic injections (n=36), and comprehensive care (e.g., used only PT, chiropractic, spinal manipulation; n=10).
Percutaneous 60-Day PNS was statistically superior to Standard Interventional Management at the Primary Endpoint. *p<0.05.
Primary Endpoint
Percutaneous 60-Day PNS vs. Subgroups
Standard Interv. Management Subgroups
56%
26%
26%
26%
13%
Percutaneous 60-Day PNS
Standard Interv. Management
Lumbar Radiofrequency Ablation
Therapeutic Injections
Comprehensive Care
SECONDARY ENDPOINTS
Percutaneous 60-Day PNS demonstrated significantly greater improvements in pain, function, health-related quality of life, patient global impression of change, and analgesic consumption at 3 months post-treatment (*p<0.05).
Percutaneous 60-Day PNS
Standard Interventional Management
67%
47%
76%
56%
62%
33%
13
4.8
63%
32%
63%
46%
Disability (ODI)
Pain Interference (BPI9)
Holistic Outcome: Pain (BPI5) and Function (ODI)
Health-Related Quality of Life (EQ-5D VAS)
Patient Global Impression of Change (PGIC)
Total Analgesic Medication Usage (opioids, non-opioids)
Safety No serious, unanticipated study-related adverse events (AEs) occurred for any participant. The most common AEs related to Percutaneous 60-Day PNS were mild skin irritation or itching at the bandage.
DURABILITY OF RELIEF
Clinical superiority of Percutaneous 60-Day PNS is sustained through 6 months.
53% (Percutaneous 60-Day PNS, n=88) vs. 36% (Group #2, n=80) reported ≥50% reduction in Pain (BPI5) and/or Function (BPI9) at 6 months post-treatment. *p<0.05
Legend:
Percutaneous 60-Day PNS
Standard Interventional Management
Pain Intensity (BPI5)
Pain Interference (BPI9)
Pain and/or Interference
Months after Start of Treatment
CONCLUSIONS
Superior Relief in Largest RCT of Percutaneous 60-Day PNS to Date
Percutaneous 60-Day PNS provided statistically superior reductions in pain and improvements in function and quality of life vs. Standard Interventional Management. Superior improvements are sustained through 6 months.
Effective, Non-Destructive, Non-Opioid, & Minimally-Invasive
These results demonstrate the comprehensive positive impact of Percutaneous 60-Day PNS on CLBP participants' lives, and deliver the direct comparisons needed to facilitate informed decisions.
REFERENCES
More Clinical Evidence for 60-Day PNS

Sustained Knee Pain Relief with Peripheral Nerve Stimulation at a Remote Site

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Introduction

Neuropathic pain is an often-debilitating condition that arises from complex mechanisms of aberrant nerve conduction. Peripheral nerve stimulation (PNS) has emerged as an effective treatment modality for chronic pain syndromes, particularly in cases where conservative management has failed. The mechanism by which PNS exerts its effects is multifaceted and not fully understood. A proposed mechanism of action is through neuromodulation of abnormal central and peripheral nervous system activity while recruiting endogenous pain-inhibitory pathways.[1,2]

Purpose

The aim of this case report is to present a patient that achieved long term chronic pain relief from a peripheral nerve stimulator beyond its removal. It also shows the complex nature of chronic pain as the patient received pain relief in regions separate from the expected nerve distribution. This case is significant as it highlights that chronic pain can cause aberrant and unexpected nerve connections.

Imaging

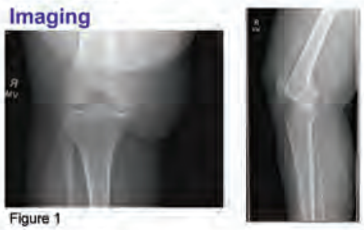

Figure 1

Case Description

An 83-year-old female with a past medical history of arthritis, asthma, basal cell carcinoma, bronchiectasis, GERD, hypertension, and lumbar facet arthropathy presented with chronic right knee and right lower back pain. On her initial presentation to the chronic pain clinic, she described her pain as located in the right axial lower back with occasional radiation to the posterolateral thigh/lateral calf/knee. With a differential diagnosis of lumbar facet arthropathy, a right medial branch block (MBB) of L3, L4, and L5 followed by a radiofrequency lesioning (RFL) if adequate relief was planned with hopes to relieve both back and knee pain.

The patient returned to clinic post MBB with relief of back pain but continued right knee pain. The right knee pain became her primary concern which she described as constant throbbing, shooting, stabbing and aching pain that gradually worsened by walking, standing and exercise. Her pain on a scale of 1 to 10 averaged 6/10 with a max of 8/10. A 4 view Xray of the knee showed mild tri-compartment osteoarthritis, most significant in the medial compartment (figure 1). She completed conservative measures of physical therapy for > 6 weeks, weekly home isometric and isotonic stretches, and OTC pain medication.

The patient had history of a genicular nerve block completed by a specialist in another discipline one year prior to presenting to our pain clinic with improvement of knee pain. However, her pain had returned, and she was seeking longer term pain relief as the symptoms were inhibiting her daily functioning. We offered a repeat genicular nerve block or peripheral nerve stimulator placement with the thoughts that her knee pain was secondary to knee arthropathy. She opted to participate in a 2-month SPRINT peripheral nerve stimulator trial from 9/9/24 to 11/5/24.

On the day of PNS placement to the right saphenous nerve, her initial pain was 9/10 which decreased to 0/10 post procedure. On the 2-week wound check follow up, she reported that her average and worst pain was a 4/10. At her four week and eight-week post R SPRINT placement follow-ups, the patient reported sustained 90% relief of knee pain in the medial and anterolateral aspect of her knee. The leads were removed on 11/5/24 (8 week follow up appointment). Two weeks post Sprint PNS removal, patient reported 70% pain relief of right knee. On her follow up three months later, she reported that she is no longer having knee pain with her continued home physical therapy and OTC pain medication regimen. She had experienced improved mobility and quality of life.

Discussion

The effectiveness of PNS on chronic neuropathic pain has been postulated to be multifactorial but not completely understood. Several potential mechanisms have been proposed over the years. It is thought that peripheral nerve stimulators work peripherally and centrally based on the gate control theory first proposed by Melzack and Wall in 1965.[3] Pain signal transmission is inhibited from the spinal cord by excitation of Aβ fiber's inhibitory action on the dorsal horn interneurons.

Neuropathic pain is hypothesized to be triggered by damage to the somatosensory nervous system that results in modifications to the transmission, inhibition and connectivity of neuronal synapses including the formation of new synaptic circuits.[4] These modifications likely played a role in the patients relief of pain in the anterolateral aspect of her knee despite the PNS only stimulating the saphenous nerve. Another theory is based on the idea that peripheral nerve stimulator leads are placed at a closer proximity to the desired nerve which allows broader activation of the targeted large diameter fibers that may be advantageous.

The patients long term relief post removal of peripheral nerve stimulator may be due to changes in both the peripheral nervous system and CNS throughout the duration of the stimulator being present. In the peripheral nervous system, it is believed that new synaptic pathways that were formed may be reversed by activating the spinal gating mechanism.[5] The PNS would effectively inhibit these peripheral pain signals over the 60-day period that would allow for a transient reversal of aberrant plasticity that had formed over time. Simultaneously, the imbalances in somatosensory processing may be corrected after providing non-nociceptive input to the CNS.[6]

Conclusion

This case highlights the complexity of chronic neuropathic pain. Although the mechanism of peripheral nerve stimulators are still not fully understood, it has allowed chronic pain relief beyond the time it is implanted. More research needs to be done on the mechanisms of long-term pain relief after temporary PNS placement and on the modifications to the somatosensory pathways with chronic neuropathic pain.

References

Exploring the benefit of peripheral nerve stimulation in treating pain from chemotherapy-induced peripheral neuropathy: A Longitudinal Single Center Pilot Study

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Background

- Chemotherapy-induced peripheral neuropathy (CIPN) is a challenging complication of many chemotherapeutic regimens
- Many life-saving chemotherapeutic agents can be dose-limiting and potentially debilitating due to neuropathic pain
- Patients affected by CIPN require effective management of their symptoms during the duration of treatment and beyond
- Temporary, percutaneous peripheral nerve stimulation (PNS) is an emerging technique that has been described for to treat pain secondary to cancer treatment related neuropathy

Objectives

- This study aims to evaluate the efficacy of temporary, percutaneous PNS to treat pain from CIPN
- We seek to assess the effect of PNS on quantitative outcomes such as:
  - sensory testing
  - epidermal nerve fiber density via skin punch biopsy
  - gait parameters measured by computer-assisted analysis.
- Further endpoints include:
  - patient-reported measures of pain disability
  - pain interference
  - patient global impression of change

Figure 1. Box plot of Brief Pain Inventory (BPI) scores of lower extremity CIPN

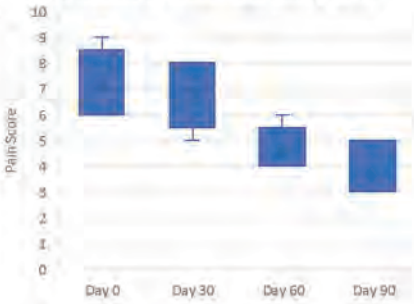

Figure 1. Average BPI pain scores of from each visit (Days 0, 30, 60, and 90)

Methods

- This is a longitudinal single-center pilot study involving 10 patients.
- Patients who were enrolled, presented for a pre-intervention assessment to collect data on Pain Numeric Rating scale (NRS) score, pain disability questionnaire, pain interference questionnaire, global impression of change, quantitative sensory testing (QST), gait testing, and skin biopsy.
- Day 0: Temporary, percutaneous PNS was applied to treat lower extremity CIPN
- Day 30: Endpoints assessed
- Day 60: Endpoints assessed and PNS electrodes removed
- Day 90: Endpoints assessed (30 days after PNS removal) and skin biopsy performed
- At each timepoint, patients were evaluated via QST, gait testing, and pain disability/interference, and global impression of change

Results

- Five patients have completed follow-up for endpoints regarding pain NRS score, QST, gait evaluation, and skin punch biopsy

Conclusions

- This study evaluates the use of temporary, percutaneous PNS as an effective treatment modality to treat pain from chemotherapy induced peripheral neuropathy
- PNS has the potential to provide improvement in objective gait/walking parameters, skin epidermal nerve fiber density, and patient-reported pain disability, pain interference, and global impression of change

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Sacrococcygeal Pain Relieved Using Neuromodulation: A Case Report Series

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Introduction

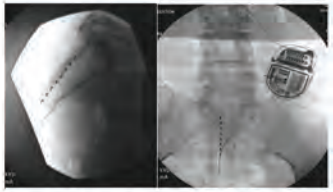
The successful treatment of sacral pain was first described by Aloe et. al. Most patients present with either complaints of either "low back pain" or "tailbone pain". Some have only sacral pain, others will have only coccydynia, and some patients will have a combination of both. We're reporting a technique that has been successfully used to treat pain associated with pain of either the sacrum and/or the coccyx.

Methods

A retrospective review of two patients diagnosed with chronic sacral pain who underwent SCS implantation between 2023 and 2024 was conducted. All patients had previously failed conservative treatments (NSAIDs, gabapentinoids, physical therapy) and interventional procedures.

Each patient underwent a 72 hour trial period using a SCS system with eight contact leads. Patients with ≥70% pain relief elected to proceeded to permanent implantation. Outcomes were assessed using the Numeric Pain Rating Scale (NPRS) and at the postop day 1-3, 1-month, and 3-months post-implantation. At each follow-up, programming adjustments were guided by dermatomal coverage, defined as the presence of pleasant paresthesia in the affected region. Further investigation is warranted to determine patient preference between subperception and paresthesia-based stimulation paradigms.

Category	Patient 1	Patient 2
Patient	57 yo F	71 yo F
Medical History	Arthritis, peripheral vascular disease, degenerative disc disease, post-laminectomy syndrome	Arthritis, heart disease, hypertension, reflux, anxiety, lumbar degenerative disc disease, thyroid disease, hyce 2 diabetes, depression
Primary Complaints	Chronic **coccyx pain** (2 years), worsened by sitting/standing, sharp and constant	Chronic, constant sacral pain and chronic **lower back pain** with **radiation to posterior bilateral lower extremities (R>L)** stopping at the ankle
Surgical History	Previous **coccygectomy**, cervical laminectomy	C5-C6 fusion
Prior Treatments	Physical therapy, epidural injections, ganglion impar block, radiofrequency ablation all providing limited or temporary relief	**-6 lumbar injections** in 2024 with 0-3 weeks of relief **- Physical therapy** in 2024 with no benefit
Imaging Findings	Mild facet arthropathy at **L5-S1**, left foraminal annular fissure at **L4-L5**	L2-L5 mild facet arthropathy
Procedure	**Boston Scientific SCS**	**Medtronic SCS**
Lead Placement(s)	2 leads at **C2-4** cervical pain with radic 1leads at **T7-8** for LBP/radic 1 lead midline superior caudal canal	- One **midline lead** spanning **T6-T8** - Second **midline lead** placed midline in superior caudal **canal**
Surgical Course	Uneventful	Uneventful
Initial Outcome	At first follow-up: **100% pain relief** in neck, low back, and coccyx with improved ADLs and sleep	1 month postoperative reports "95% pain relief"



Fluoroscopic imaging of a 71-year-old female with severe chronic sacral pain. Surgical implantation of linear 8-contact lead (Boston Scientific). (Left) Lateral fluoroscopic view demonstrating the placement of the lead in the superior region of the caudal canal vs. the floor of the canal. (Right) Anterior-posterior fluoroscopic view illustrating the midline trajectory and positioning of the lead.

Discussion

Chronic sacral-coccygeal pain remains challenging to manage, particularly when conventional treatments such as medications, physical therapy, and nerve blocks fail. Surgical options such as coccygectomy also reportedly has a high failure rate. Neuromodulation has evolved as a viable option for patients with refractory sacral-coccygeal pain, particularly those with neuropathic or mixed-pain syndromes (Deer et al., 2019; Kapural et al., 2020). Unlike lumbar radicular pain, sacral pain involves lower sacral nerve roots (S1-S5), requiring more precise neuromodulation strategies to target these segments effectively. Optimal outcomes rely on appropriate patient selection, meticulous lead placement, and individualized programming. Long-term data from larger cohorts will further clarify the role of neuromodulation in sacral-coccygeal pain management and help guide patient-centered care strategies.

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SAINT LOUIS UNIVERSITY.

Treatment of COVID Vaccination Associated Myalgia with PECs I and II Blocks

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APG ASSOCIATED PHYSICIANS GROUP

Introduction

- Reports of chronic musculoskeletal (MSK) pain after COVID-19 vaccination have been reported globally as a rare yet significant adverse effect in certain individuals.
- Myalgia reported in up to 50% of vaccines after the first dose, 75% of the vaccines after the second dose for the Pfizer BioNTech vaccine.[1]
- Other reported adverse events include myositis, muscle spasms, fasciitis[2], bursitis, and adhesive capsulitis.[3]
- With the continued effort of vaccinations globally, it is important to explore effective management strategies for patients experiencing post-vaccination associated myalgia.
- One promising approach is the use of a pectoralis nerve block, traditionally used in thoracic and breast surgeries, to provide analgesia for post-vaccination associated myalgia.
- This case report highlights the use of an interventional procedure as an alternative to systemic analgesics to reduce post-vaccination associated musculoskeletal pain.

Case Presentation

- 61 y/o female presenting for persistent right-sided chest wall pain; BMI 26.88, VSS
- PMHx significant for right sided breast cancer treated with lumpectomy and chemotherapy
- PSHx: tonsillectomy/adenoidectomy, hysterectomy, and lumpectomy
- In 2020, patient received COVID vaccination → 3 weeks later had pruritus, burning sensation, and 8/10 pain in the right pectoral muscle over her previous port site, upper extremity, and posterior scapular region; patient had nontraumatic incomplete rotator cuff tear of the right shoulder in 2023

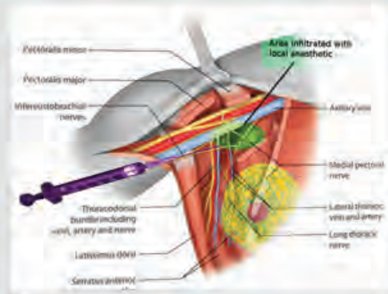

Figure 1. Image of pectoralis nerve block [1]

- Negative workup including cardiac, gastrointestinal, psychiatric, and dermatological; presented to pain clinic in 2024.
- Physical exam significant only for pain over the right subacromial bursa and anterior chest wall.
- MRI showed previously diagnosed OA, subacromial subdeltoid bursitis, and anterior supraspinatus full thickness tear with cuff tendinopathy.
- **Dx: chronic myalgia secondary to COVID vaccination**
- Procedure: right PECs block I and II under ultrasound guidance
  - 1cc of triamcinolone 40mg/cc, 4cc of lidocaine 1%, and 10cc of 0.5% bupivacaine used
- Procedure was well tolerated, discharged same day
- 2 week follow up, pain decreased to 1/10 with 90% relief
- 6 months follow up, no recurrence of pain

Discussion

- Chronic MSK pain seen with COVID-19 infection → pathophysiology suspected to be 2/2 angiotensin converting enzyme 2 and cytokine storm[4]
  - Less is known about the effect of the vaccine → suspected chronic MSK pain 2/2 antigen-specific immune response[4]
- Study in 2022 noted most common cause of shoulder injury post COVID vaccination to be adhesive capsulitis, bursitis, and supraspinatus tear; affected females in 73% of cases, median 51 y/o[3]
- PECs I and II block: analgesia of pectoral nerves, intercostal nerves 3 to 6, intercostobrachial nerves, and long thoracic nerve[5]
  - PECs I block: in between pectoralis major and minor muscle[5]
  - PECs II block: also in between the pectoralis minor and serratus anterior muscle[5]
- **Recent meta-analysis shows that in comparison to systemic analgesia alone, the PECs I and II block improved pain better.[5]**

Conclusion

- Currently, there are no FDA-approved treatments for chronic MSK pain after COVID-19 vaccination.
- PEC block offers a safe alternative to systemic analgesics including NSAIDs and opioids with less adverse effects.

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SOUTHWEST OHIO PAIN INSTITUTE
Patient Care Education Research

Effects of Steroid Administration during Interventional Pain Procedures on Blood Glucose Levels in Non-Diabetic Chronic Pain Patients

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BACKGROUND

Steroids are commonly utilized in interventional pain management for their potent anti-inflammatory and analgesic properties (1,2). While their impact on glucose metabolism is well-documented in diabetic patients, the effects on blood glucose levels in non-diabetic individuals undergoing spinal injections remain unclear. This study aims to evaluate the incidence and extent of steroid-induced hyperglycemia in non-diabetic chronic pain patients undergoing spinal interventional procedures with steroids.

OBJECTIVE

To assess changes in blood glucose levels following injection of steroid during interventional spinal procedures in non-diabetic chronic pain patients.

METHODS

Following IRB approval, seven non-diabetic patients scheduled for repeat spinal procedures with injection of 80 mg of triamcinolone were enrolled. Baseline glucose levels were recorded, and a continuous glucose monitor (FreeStyle Libre Pro, Abbott) was applied to the upper extremity.

METHODS (cont'd)

Glucose data were collected over 14 days post-procedure. One patient with a baseline glucose of 186 mg/dL was excluded from the study. Data from six patients (ages 52-60) were analyzed. Daily average glucose levels post-procedure was compared to baseline using one-way repeated measure ANOVA with Dunnett's multiple comparisons posttest.

RESULTS

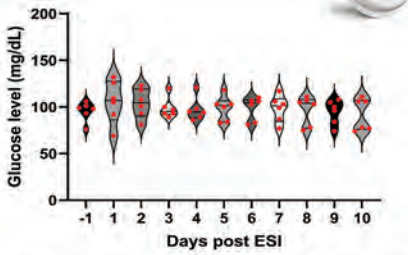

Figure 1. The mean baseline blood glucose level was 95.5 ± 10.44 mg/dL. Post-injection, the average change from baseline over the monitoring period was 1.61 ± 4.08 mg/dL. Statistical analysis was performed using one-way repeated measure ANOVA and Dunetts posttest was used to compare blood glucose on each day with baseline. This revealed no significant differences in daily glucose levels compared to baseline throughout the 14-day period.

CONCLUSIONS

In this cohort of non-diabetic patients, spinal interventional procedures with injection of 80 mg of triamcinolone did not result in significant elevations in blood glucose levels over a two-week period. These findings suggest that such procedures may be safely administered without adversely affecting glucose metabolism in non-diabetic individuals.

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DISCLOSURE

The authors declare no conflicts of interest related to this study.

Empowered Relief Intervention for People with Chronic Pain: A Review of Clinical Trials
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TIRR MEMORIAL HERMANN Rehabilitation & Research
Background
Empowered relief, a group-based 2-hour single session intervention, has shown to improve pain severity and pain-related disability through cognitive reframing and relaxation techniques, with comparable efficacy to traditional cognitive behavioral therapy.
Objectives
Gain a comprehensive understanding of the feasibility and efficacy of the empowered relief intervention on health-related outcomes delivered to individuals with chronic pain.
Methods
A search of relevant literature was performed in the MEDLINE (PubMed) database. Clinical trials on the ER intervention for chronic pain management published between 1/2010-12/2024, were reviewed and analyzed regarding feasibility, acceptability, and effect on pain-related outcomes. Effect on secondary outcomes including sleep, depression, anxiety, and physical function was also assessed.
Results
In a prospective clinical trial (n=76) implementing an in-person ER intervention, participants experienced reduction in pain catastrophizing at both 2- and 4-weeks post-treatment (P<0001) and large effect sizes were reported.[2]
Figure 1: Cohen's d Effect Size Ranges
Negligible
Small
Medium
Large
Very Large
Cohen's d (Effect Size)
Figure 2: Pain Catastrophizing at 3 Months
ER vs CBT
ER vs HE
CBT vs HE
Mean Difference in Pain Catastrophizing Score
Overall, the intervention was viewed favorably with high acceptability, and patient satisfaction. In an RCT with 263 chronic low back pain patients, ER delivered in-person was found to be noninferior to traditional cognitive behavioral therapy (CBT and HE) (8 sessions, 16 hours total) for pain catastrophizing scores at 3 months post-treatment(difference from CBT, 1.39 [97.5% CI, -∞ to 4.24]).[3]
Furthermore, ER was noninferior to CBT for pain intensity, pain interference, sleep disturbance, pain bothersomeness, pain behavior, depression, and anxiety. In a subsequent study assessing these outcomes at 6 months post-treatment, ER showed greater reductions in pain catastrophizing, pain bothersomeness, and anxiety compared with CBT (P=0.03, P=0.03, P=0.03, respectively).[3] Another RCT assessed implementation of the ER intervention with with delivery via Zoom during the COVID-19 pandemic, comparing it to waitlist control (WLC) conditions among individuals with chronic pain.[4] At 3-months post-treatment, clinically meaningful reductions in pain catastrophizing scores were found for the ER group but not for WLC group (ER: PCS -8.72; WLC: PCS -2.25).
Figure 3: Change in Pain Catastrophizing Scores (PCS)
Change in PCS Score
ER
WLC
The ER group also experienced significant improvements in pain intensity, sleep disturbance, and pain bothersomeness. Take-home materials provided post-intervention enabled patients to continuously practice and strengthen learned techniques to maintain an improvement in their end results.
Conclusion
Current data suggests the ER intervention is feasible, acceptable, and offers a promising approach to address the biopsychosocial needs of individuals with chronic pain. Based on existing literature, empowered relief could provide considerable improvements in pain-related outcomes comparable to CBT, facilitated through a more cost effective, scalable, engaging, and accessible technique. Further large trials are needed to establish its efficacy for chronic pain relief, assess its impact on psychosocial metrics, and explore alternative delivery methods including online delivery.
References

Bias in AI and Pain Management

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Background

- AI systems rely on vast datasets to inform their predictions and decisions. However, if these datasets are not carefully curated, they can perpetuate and even amplify biases present in society. In the context of pain management, these biases can lead to inaccurate pain assessments, improper treatment recommendations, and overall suboptimal care for certain groups of patients.

Sex and Gender Bias

Sex and gender biases in AI are particularly prominent in healthcare. Historically, women have been underrepresented in clinical trials, and their experiences with pain have often been trivialized or misdiagnosed (Loder et al., 2015). When AI systems are trained predominantly on male-centric data, the algorithms may fail to accurately assess pain in women. For example, research has shown that women tend to experience pain differently than men, both in terms of perception and response to treatment, yet many AI models fail to account for these differences (Loder et al., 2015). As a result, women may receive inappropriate treatment or be misdiagnosed, leading to worse pain management outcomes.

Racial and Ethic Bias

Racial and ethnic biases are another significant concern in AI development for pain management. AI models trained on predominantly white, European ancestry data often struggle to accurately assess pain in patients of different racial or ethnic backgrounds. This issue arises from the overrepresentation of certain demographic groups in clinical trials and the underrepresentation of minorities, such as African American, Hispanic, and Indigenous populations (Obermeyer et al., 2019). These biases can lead to misdiagnosis, inadequate treatment, and healthcare inequities for non-European populations. In some cases, AI systems may fail to identify specific pain conditions that predominantly affect these groups, resulting in poor patient outcomes.

Socioeconomic Status (SES) Bias

Socioeconomic status (SES) is an important determinant of health outcomes, including pain management. Individuals from lower SES backgrounds often face barriers such as limited access to healthcare resources, poor nutrition, and higher levels of stress, all of which can influence their pain experiences. However, AI models often fail to incorporate SES factors adequately, leading to biases in the prediction and management of pain. For example, AI models trained on data from affluent patients may not accurately predict or manage pain in lower-income populations who may have different access to pain relief medications or therapies (Williams & Mohammed, 2009). This can result in significant disparities in treatment recommendations and healthcare access.

Machine Learning Capabilities and the Potential for Improvement

While the challenges of bias in AI are significant, one of the key strengths of machine learning (ML) algorithms is their ability to learn and improve over time. Machine learning models have the capacity to identify patterns and adjust to new data, which could be instrumental in addressing some of the biases identified above.

Adaptive Learning and Bias Correction

As AI systems are exposed to more diverse and balanced data, adaptive learning algorithms could potentially reduce the biases present in early-stage models. For instance, if AI systems are continuously fed data that reflects a broader spectrum of pain experiences—including varied racial, ethnic, and socioeconomic backgrounds—the algorithms can adjust their predictions and reduce biased outcomes (Amodei et al., 2016). This adaptability is particularly beneficial in mitigating biases related to underrepresented populations, as AI models can "learn" to make more accurate assessments for these groups as more inclusive data is collected.

Added Features by AI Programmers to Mitigate Bias

AI programmers can also introduce specific features or safeguards within machine learning algorithms to directly address biases during the development process. Some potential features include:

- **Bias detection layers: Implementing pre-emptive checks within the AI system to monitor and flag potential biases before they affect the system's output.**
- **Dynamic data weighting: Adjusting the importance of various data sources during training to ensure that underrepresented groups receive adequate consideration.**
- **Fairness constraints: Including fairness-related metrics within the optimization process to ensure that predictions are equitable across different groups, irrespective of demographic characteristics (Chouldechova & Roth, 2018).**

Conclusion

- AI has the potential to revolutionize pain management, offering personalized and more efficient care. However, biases in AI systems—stemming from factors like sex, race, socioeconomic status, and statistical methods—pose significant challenges to equitable healthcare. These biases can perpetuate disparities, leading to unequal pain management outcomes across diverse patient populations. While the challenges are significant, machine learning's adaptive capabilities provide a unique opportunity to continuously improve AI systems over time. By diversifying training data, employing fairness-aware algorithms, encouraging interdisciplinary collaboration, implementing continuous monitoring, and promoting transparency, we can enhance the role AI systems contribute to more inclusive, effective, and equitable pain management for all patients.

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HCA Healthcare

A Novel Target Area for Spinal Cord Stimulation in the Treatment of Refractory Cervical Neuralgia: A Case Series Report.

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Background

Cervical neuralgia is a chronic neuropathic pain syndrome arising from cervical spine pathology, often associated with nerve root irritation, disc degeneration, or failed surgical interventions. Traditional treatments, including pharmacological and interventional approaches, may fail to provide long-term relief in refractory cases. Spinal cord stimulation (SCS) has emerged as a promising neuromodulation therapy by altering pain transmission through dorsal column activation, offering an alternative for patients with persistent cervical pain (Deer et al., 2019).

Objective

This case series evaluates the efficacy and safety of a novel lead placement for SCS in managing refractory cervical neuralgia.

Methods

This is a retrospective review of six patients (including five consecutive cases) diagnosed with chronic cervical neuralgia who underwent SCS implantation after previously failed conservative treatments. Before the SCS trial, all patients underwent computed tomography or magnetic resonance imaging (MRI) imaging to exclude severe spinal stenosis.

Patients underwent a 5–7-day trial period with a SCS system and 2 eight contact leads placed parallel and slightly flared laterally at the top. Patients with ≥70% pain reduction proceeded to permanent implantation. Outcomes were assessed using the Numeric Pain Rating Scale (NPRS) and the at postop day 1-3, 1-month, and 3-months post-implantation.

Discussion

This case series shows consistent relief of axial cervical pain using parallel 8-contact leads placed near midline, with distal contacts at C2 and active cathodes at C3. All patients had significant pain reduction and improved cervical motion. A 100% success rate, functional gains, and no major complications support SCS as an effective, minimally invasive option for chronic cervical neuralgia. Early consideration of SCS is recommended. Larger studies are needed to refine patient selection and stimulation parameters.

Case descriptions

Age/ Sex	Medical History	Primary Complaint(s)	Prior Treatments	Leads Placement	Initial VAS Score	Outcomes
46/F	Chiari I malformation, syncope, VP and LP shunts	Chronic LBP (28 years) radiating to buttocks, cervical pain (3 years) radiating to arms/hands with numbness	Lumbar injections (2023) x2, cervical laminectomy, dural graft, shunt placement, no PT	16-contact T7-T9, 8-contact C2-C4	LBP: 7/10, Cervical : 8/10	80% LBP relief, 100% cervical relief postop; at 3 months, 100% cervical relief, 30% LBP relief; SI joint injections provided 100% right-sided and 90% left-sided relief
59/F	Arthritis, DDD	Chronic LBP (20 years) radiating to toes, cervical pain (17 years) with BUE radiculopathy	Lumbar injections x6 (3 days relief), PT/chiropractor worsened symptoms	16-contact T8-T10, 8-contact C2-C3	LBP: 8/10, Cervical : 8/10	100% relief at 1st visit; 100% relief at 2 months; 100% LBP relief, 70% cervical relief at 3 months (reprogramming restored cervical relief)
57/F	Arthritis, PVD, DDD, post-laminectomy syndrome	Chronic cocyx pain (2 years) and cervical radiculopathy (45 years)	Cocygectomy worsened cocyx pain, PT, epidural injections, ganglion impar block, RFA	1 lead at T7-T8 (lumbar/ coccyx), 2 leads at C2-C4 (cervical)	Cocyx: 9/10, Cervical : 8/10	100% pain relief at 1st visit, 95% relief at 1 month, 100% lumbar/coccyx relief at 2 months; cervical pain (VAS 8/10) required reprogramming
50/F	GERD, DDD, osteoporosis	Chronic cervical pain (20 years) radiating to shoulders/feet hand; LBP radiating to buttocks and right leg	Cervical discectomy & fusion, SI fusion, cervical injections x50, lumbar injections x20	16-contact T6-T8, 8-contact C2-C4	LBP: 7/10, Cervical : 7/10	90-100% relief at 1st visit, 100% cervical and 70% lumbar relief at 1 week (reprogramming restored lumbar relief); 100% relief at 3, 4, 6 months with periodic reprogramming
51/M	GERD, HTN	Chronic cervical pain with BUE radiculopathy, LBP with BLE radiculopathy	SCS implanted (2019) with lead migration, cervical ESI (no relief)	16-contact T7-T8, 2 8-contact C3-C5	LBP: 7/10, Cervical : 7/10	70% LBP relief, 80% cervical relief at 2 weeks (reprogramming improved to 90-100%); sustained relief at 1 month, opioid wean initiated
78/F	HTN, hypothyroidism, DJD	Chronic cervical pain (4 years) with BUE radiculopathy, LBP with BLE radiculopathy	Cervical fusion (2019), left TKA, cervical ESI (50% relief for 1 week)	Trial 1: C2-C6 Trial 2: T4-T7 and C3-C4	LBP: 6/10, Cervical : 7/10	1st trial: initial 80% cervical relief, lost left-side coverage due to lead migration; 2nd trial successful with correct placement

Imaging

- Fluoroscopic images of a 50-year-old female with chronic lumbar and cervical pain after implantation of two 8-contact leads. (Left) Lateral view shows lead placement. (Right) AP view shows lead trajectory with slight flaring (red arrow).
- Fluoroscopic images of a 46-year-old female with Chiari malformation and chronic lumbar and cervical pain after implantation of two 8-contact leads. (Left) Lateral and (Right) AP views show lead trajectory, with slight flaring (red arrow).

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Neuropathic Pain Relief with Brachial Plexus PNS after COVID

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BACKGROUND

Acute respiratory distress syndrome secondary to severe COVID-19 may lead to intubation. Currently guidelines recommend 12 to 16 hours of prone positioning. SARS-Cov-2 infections have been linked with neurological complications such as polyradiculoneuropathies.[1] This may be a result of direct injuries to peripheral nerves via compression and stretching due to prone positioning.[2] These patients often experience chronic neuropathic pain past the acute phase of infection. The prone positioning most commonly leads to upper limb peripheral injuries at sites such as the ulnar nerve, radial nerve, median nerve, and brachial plexus. There is a high prevalence of peripheral nerve injury in COVID-19 intubated patients who are placed in the prone position, which is most likely multifactorial, the factors for which include older age, history of diabetes mellitus, and hyperinflammatory state of COVID-19 infections that increases the susceptibility to peripheral nerve damage.[3] Treatment for these patients range from conservative rehabilitation to surgery; notably, peripheral nerve stimulation is an effective treatment for the management of peripheral neuropathy.

CASE PRESENTATION

A 60 year-old male with history of artificial disc and fusion of cervical spine, wrist drop and diabetes mellitus presented with peripheral neuropathy with pain in bilateral hands, wrists, and arms after a hospitalization for COVID-19 infection requiring an intubation. Of note, the patient had received right and left radial and median nerve blocks as well as multiple surgical nerve decompressions, including a radial nerve release and triceps release. On initial visit, the patient rated his pain 10/10 on VAS scale, characterizing it as sharp and burning radiating distally to the dorsum of hands and fingers. Despite the trial of physical therapy and multi-modal analgesic regimen, including gabapentin, duloxetine, and tapentadol, the pain persisted. Furthermore, the patient underwent platelet-rich plasma injections in the cervical region which provided 80% improvement of pain, though only lasting a short period. After thorough discussions and counseling, the patient underwent percutaneous placement of peripheral nerve stimulator to brachial plexus with blockade of bilateral radial nerves.

OBJECTIVE

To suggest the therapeutic potential of peripheral nerve stimulation on subjection pain relief in a patient with peripheral neuropathy secondary to COVID-19-associated intubation.

IMAGES

Example of an intubated patient in prone positioning which can subsequently lead to peripheral nerve injuries.[4] This reflects the inciting incident of our patient's peripheral neuropathy with pain in bilateral hands, wrists, and arms.

METHODS

Ultrasound was employed to identify location of interest in brachial plexus, and the stimulating needle was introduced to the desired area under live visualization. During the stimulation trial, paresthesia was obtained in the intended nerve distributions. Then, the lead was deployed, with final confirmation of paresthesia. Topical skin adhesive was utilized to secure the leads.

RESULTS

Peripheral nerve stimulation of brachial plexus was successful in providing complete relief of neuropathic pain for three months. The patient rated 0/10 on VAS scale and no longer required oral analgesics.

CONCLUSION

The case illustrates the potential role of peripheral nerve stimulation in treatment of neuropathic pain in COVID-19 patients. Further randomized, controlled studies are required to establish the benefits of peripheral nerve stimulation in patients suffering from intubation-related peripheral neuropathy.

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27TH ANNUAL MEETING

The Effectiveness of the SPRINT PNS System for Temporary Pain Relief in a Suburban Pain Management Practice

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Background

Chronic pain presents a significant challenge in clinical practice, with traditional pharmacologic treatments, particularly opioids, often falling short of providing effective long-term solutions[1]. In recent years, there has been a growing emphasis on developing non-pharmacologic interventions that avoid the risk of addiction. Peripheral nerve stimulation (PNS) has emerged as a promising alternative[1]. Even though peripheral nerve stimulation has been used to treat pain for more than 50 years, only recently has an implantable percutaneous system using open coil leads been developed[2,3].

The SPRINT PNS System represents a significant advancement in PNS technology. This minimally invasive device is implanted percutaneously and stimulates peripheral nerves for approximately 60 days[2,3]. The system consists of an external pulse generator and leads placed 0.5-3.0 cm from the target nerve[2,3]. Patients then control the intensity of the stimulus using a wireless remote[1].

A key feature of the SPRINT PNS System is its temporary nature. After the 60-day treatment period, the leads are removed, transitioning patients to the next phase of their pain management phase[1]. This approach offers a low-risk alternative to more invasive treatments such as permanent implants or surgery. Recent data on the SPRINT PNS System is encouraging. A large-scale review found that 71% of subjects had either a 50% decrease in reported pain or an improvement in quality of life[1]. The treatment group was found to have had a 63% decrease in their pain burden at the end of the 60-day treatment period with consistent results across various implantation sites. These promising outcomes warrant further investigation to confirm their reproducibility in diverse clinical settings, including suburban pain management practices.

Objectives

- Determine the effectiveness of the implantable SPRINT PNS System on chronic pain experienced at multiple anatomic sites.
- Discover the impact of the SPRINT PNS System on quality of life, physical function, and sleep.
- Determine whether the noted efficacy of the SPRINT PNS System is generalizable to a suburban pain management practice.

Materials and Methods

Between Q4 2022 and Q3 2024, a comprehensive study was conducted at NeuSpine Institute locations in Wesley Chapel and Zephyrhills, Florida, involving 34 patients who received the SPRINT PNS System implantation. This innovative peripheral nerve stimulation technology was applied to various anatomical sites, including the lower back, buttock, knee, shoulder, and neck, to address chronic pain conditions.

Prior to the implantation of the devices, the patients gave written consent for data to be recorded and used for research. After implantation of the SPRINT PNS System, they were scheduled to be evaluated weekly for eight weeks using the Brief Pain Inventory (Item #8) (BPI-8) and the Patient Global Impression of Change (PGIC) Scales. The PGIC scale was scored between -3 and +3, with improvement being represented by a positive number. PGIC evaluation was completed for sleep, physical function, and overall quality of life.

Results

Of the 34 participants who began the study, 27 (79.4%) remained engaged through the end of the eight-week evaluation period. While not all participants completed every assessment scale throughout the study, this high retention rate supports the validity of the findings. The SPRINT PNS System was implanted at various anatomical sites, as illustrated in Figure 1. The most common locations were the low back, shoulder, and buttock. This distribution highlights both the versatility of the system and its application across different types of chronic pain conditions. Results of the BPI-8 for different implantation sites can be seen in Figure 2. Pain relief ranged from 60% for the hip to 100% for the upper back. For the entire cohort of patients implanted with the SPRINT PNS System, the mean pain relief was 83.6%.

Quality of life (QOL) data was obtained using the PGIC scale. 14 of 19 (73.68%) patients noted an improved QOL while using this device (Figure 3). Patients were also evaluated for their perception of physical functioning. The PGIC scale found that 14 of 18 participants (77.78%) noted that their physical function had improved (Figure 4).

Improvement in sleep was also measured using the PGIC scale in patients who had reported difficulty sleeping at baseline (Figure 5). While 5 patients did not respond, of the 15 who did, 11 (73.3%) noted an improvement in sleep. Of that group, 7 of the 15 (46.7%) felt that their sleep was very much improved. During weekly check in calls, patients' pain relief was evaluated using the BPI-8. For the first 8 weeks, participants pain was noted to range from a 57% to 75%, with 75% being the modal response (Figure 6).

Discussion/Conclusion

The results from this suburban pain management practice demonstrate the efficacy of the SPRINT PNS System in managing chronic pain and improving overall quality of life. Patients experienced rapid pain relief, with benefits observed as early as 24 hours post-implantation and sustained throughout the eight-week study period.

The SPRINT PNS System not only reduced pain but also yielded significant improvements in other areas. Quality of life increased for 73.63% of participants, while physical function improved in 77.78% of patients. Among those reporting sleep difficulties at baseline, 73.3% experienced better sleep. These findings align with larger studies, such as a comprehensive real-world analysis of over 6,100 patients, which showed that 71% of patients were responders, reporting ≥50% pain relief and/or improvement in quality of life.

The SPRINT PNS System offers several advantages as a non-pharmacologic pain management option: it can be used to treat multiple anatomical sites and provides up to 60 days of therapy. This makes it particularly beneficial for patients with both chronic pain and substance abuse concerns.

Long-term efficacy has been demonstrated in follow-up studies, with more than two-thirds of patients reporting clinically significant pain relief an average of 4.7 years after treatment. This study reinforces the potential of the SPRINT PNS System as an effective tool for physicians in managing chronic pain, improving patients' quality of life, sleep, and physical function. Its minimally invasive nature and drug-free approach make it a valuable addition to comprehensive pain management strategies.

Future Directions

This study suggests that the SPRINT PNS System may have a significant role in the treatment of chronic pain. Future research directions should include:

- Larger-scale studies to further validate these findings.
- Site-specific studies focusing on particular body regions to better understand the efficacy of the SPRINT PNS System at each anatomical location.
- Investigations into extended treatment durations beyond the current 60-day period to explore potential additional benefits.
- Comparative studies with other pain management modalities to establish the relative efficacy of the SPRINT PNS System.
- Cost-effectiveness analyses to evaluate the economic impact of this treatment approach in various healthcare settings.

These future studies will help to further establish the role of the SPRINT PNS System in comprehensive pain management strategies and potentially expand its applications in clinical practice.

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An Unusual Cause of Chronic Hip Pain – Iliospoas Bursitis

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Background

Hip pain is a common complaint in pain medicine, but its causes are numerous. Iliopsoas bursitis is a cause of hip pain that is often misdiagnosed and undertreated due to the number of pathologies that cause pain at and refer pain to the hip. Anatomically, the iliopsoas is the largest synovial bursa in humans and acts as a hip flexor and external rotator. Its bursa lies between the musculotendinous junction and pelvic brim and may be visualized under ultrasound. Given the hip's complex regional anatomy and depth, ultrasound is an inexpensive and widely available tool that can be useful in guiding diagnosis and intervention.

Objective

Evaluate and consider the efficacy and applicability of ultrasound in diagnosis of Iliopsoas bursitis along with Iliopsoas bursa injection in the treatment of Iliopsoas bursitis.

Case Presentation

82-year-old male with history of cerebrovascular accident (CVA) with residual left sided weakness who presented to clinic with complaints of left hip pain. He had previously undergone botulinum toxin injections for spasticity at the hip along with multiple sessions of physical therapy with minimal relief in his symptoms. He had also failed a round of prescription analgesics and muscle relaxants. MRI of the left hip showed fluid within the iliopsoas bursa concerning for iliopsoas bursitis vs. iliopsoas tendon insertional tear. He then underwent an ultrasound guided iliopsoas bursa injection with steroid and local anaesthesia. He had lasting relief for greater than 4 months along with improved quality of life.

Results

The patient reported greater than 70% pain relief along with marked improvement in activities of daily living for 4 months. Patient experienced no significant side effects.

Images

Conclusion

Iliopsoas bursitis can be a prominent pain generator for patients experiencing hip pain but often goes unrecognized or misdiagnosed. Pain can be debilitating with simple activities of daily living. The etiology of iliopsoas bursitis in this case appears related to overuse due to spasticity of the iliopsoas unit secondary to the CVA. Ultrasound guided injection of steroid into the iliopsoas bursa should be considered as a treatment option in conjunction with treatment of spasticity. Non-invasive measures such as physical therapy, analgesics, stretching, and modalities should also be used with interventional procedures to prevent recurrence. Given the impact of iliopsoas bursitis on quality of life, keeping it in the differential diagnosis is important in recognizing and treating this under-diagnosed pathology.

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RUSH

False Security in Imaging: Why the Exam Still Matters – A Case Study on Piriformis Syndrome

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INTRODUCTION

• Piriformis syndrome is a neuromuscular condition where the piriformis muscle compresses the sciatic nerve, causing buttock and leg pain (1).

• The piriformis muscle connects the sacrum to the femur, and spasms can lead to sciatic nerve compression (2).

•The diagnosis relies on clinical evaluation rather than imaging. Consequently, it may be missed if imaging identifies other pathologies (e.g. disc herniations).

CASE PRESENTATION

•A 36-year-old male presented to the ED with severe left-sided sciatica following a mechanical fall three months prior. He was discharged with oral pain medications and a prednisone taper.

•Initial CT imaging revealed mild degenerative changes at L3-4 and severe fatty atrophy of bilateral gluteal muscles. Despite treatment, he returned to the hospital with persistent left-sided sciatic pain and new muscle weakness.

•Upon admission, severe pain prevented participation in physical therapy. The physical exam showed tenderness at the ischial tuberosity, pain with FABER test, weakness with left knee extension, weakness with left dorsiflexion, and decreased sensation in the left L3-5 dermatomes.

IMAGING

Figure 1: Sagittal MRI view of the lumbar spine revealing an L4-5 disc protrusion.

Figure 2. Left piriformis trigger point injection contrast spread under fluoroscopy

Figure 3: Axial MRI view of the lumbar spine revealing an L4-5 disc protrusion.

CASE PRESENTATION (cont.)

•MRI findings indicated an L4-5 disc protrusion with moderate-severe left subarticular narrowing. Neurosurgery recommended against any acute intervention.

•A left L4-5 epidural steroid injection was performed, which achieved 50% pain relief, but the patient was still unable to ambulate or participate with physical therapy.

•A left piriformis trigger point injection was performed, which achieved 90% pain relief and improved muscle strength. This enabled the patient to ambulate 250 feet with therapies.

•He was discharged with a rolling walker and outpatient physical therapy, with plans for repeat piriformis trigger point injections.

CONCLUSION

- We present a case of a patient with debilitating sciatic pain and radiographic evidence of lumbar disc protrusion
- The patient experienced mild pain relief from oral pain medications and an epidural steroid injection, but achieved 90% pain relief from a piriformis trigger point injection. He was also able to ambulate again.
- Piriformis syndrome is a diagnosis of exclusion and is frequently overlooked in patients with severe sciatic pain, but pertinent history and physical exam findings can aid in prompt diagnosis.

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A case report of the usage of Radiofrequency in the treatment of a stump neuroma

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A TEACHING HOSPITAL

Background

A **stump neuroma** is a painful complication that can arise after any surgery involving nerve transection, including neuroma excision procedures. When a nerve is severed, regenerating axons attempt to grow without organized guidance from Schwann cells, leading to disorganized, bulb-like nerve growth known as a neuroma.
This abnormal growth results in **localized neuropathic pain**, often described as shooting, burning, or electric-like sensations.
Management traditionally includes **conservative treatments** such as medications and injections, but persistent cases may require advanced interventions.

Case Presentation

Patient: 23-year-old-male
Initial Diagnosis: Morton's neuroma and Hauser's neuroma in the right foot

Initial Treatment: Conservative management with glucocorticoid injections — **unsuccessful.**

Surgical Intervention: Surgical excision of the neuromas performed, resulting in temporary pain relief.

Complication: The patient developed **recurrent neuropathic pain** proximal to the incision site.

Secondary Diagnosis: Stump neuroma confirmed by clinical examination and imaging.

•Secondary Management:
- Trial of **conservative management** (NSAIDs, physical therapy, nerve blocks) — **unsuccessful.**
- Subsequently underwent **Radiofrequency Ablation (RFA)** of the stump neuroma.

Methods

•**Design**: Single-patient case study
•**Interventions Assessed**:
- Conservative measures: glucocorticoid injections, physical therapy, neuropathic pain medications
- Surgical excision of primary neuromas
- Radiofrequency Ablation (RFA) targeting the stump neuroma

•**Outcome Measures**:
- Pain severity (Visual Analog Scale, VAS)
- Functional recovery (return to activities of daily living)
- Symptom recurrence over a 6-month follow-up period

Results

Conservative Management: No significant or lasting relief
•**Surgical Excision**: Temporary pain improvement, followed by recurrence
•**Radiofrequency Ablation**:
•Pain score decreased from 8/10 to 1/10 (VAS)
•Complete resolution of neuropathic symptoms
•Patient returned to unrestricted daily activities, including sports
•No recurrence at 6-month follow-up

Images

Fig 1: MRI-3T image showing enhancement in the second metatarsal webspace

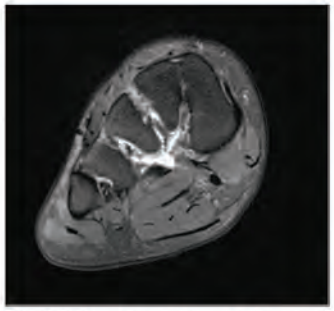

Fig 2: MRI-3T image showing enhancement in the second and third metatarsal webspaces

Conclusion

Radiofrequency Ablation (RFA) provided significant and lasting pain relief for a stump neuroma after failure of both conservative and surgical treatments. As a minimally invasive, low-risk procedure, RFA should be considered earlier in the treatment pathway for patients with persistent neuroma pain. Its success in this case highlights the importance of a multidisciplinary approach and the need for broader awareness of RFA as a viable alternative to repeat surgery. Further studies are encouraged to establish standardized guidelines for its use.

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Effectiveness and Safety of Interventional Pain Management in Pediatric Complex Regional Pain Syndrome (CRPS)

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ABSTRACT

Background: Pediatric Complex Regional Pain Syndrome (CRPS) is a rare but debilitating chronic pain condition that typically follows trauma to the limbs. As this condition is difficult to diagnose and manage, effective treatment strategies remain a significant challenge.

Objective: To explore the effectiveness and safety of interventional pain management strategies for pediatric CRPS, with a focus on understanding the impact of these strategies on pain relief, functionality and quality of life.

Methods: A comprehensive literature search was conducted to identify studies and articles relevant to the pathophysiology of CRPS, chronic pain management in the pediatric population, and management of CRPS using interventional pain techniques in the pediatric population.

Results: Sympathetic nerve blocks, intrathecal drug delivery, epidural anesthesia combined with physical therapy, and spinal cord stimulation in refractory cases were found to show effectiveness in pain reduction.

Conclusion: Interventional pain management techniques offer promising options for managing pediatric CRPS, but more research is needed to better understand the long-term safety and efficacy of these treatments.

INTRODUCTION

- Chronic pain in the pediatric population is highly prevalent, with the estimated percentage of children experiencing chronic pain worldwide being between 11% and 38%.
- Pain management in pediatric populations is a critical aspect of pediatric healthcare, with significant implications for the development, functioning, and overall well-being of children. Complex Regional Pain Syndrome (CRPS) stands out as a particularly challenging disorder, especially given its rarity amongst the pediatric population.
- Diagnosis is done on a clinical bases and relies heavily on the history and physical examination. Regardless, it is important to continually recognize effects CRPS has on both patients and families beyond clinical symptoms.
- This review aims to explore the effectiveness and safety of interventional pain management strategies for pediatric CRPS, with a focus on understanding the impact of these strategies on pain relief, functionality, and quality of life.

METHODS

- A literature search was conducted to identify studies and articles relevant to the pathophysiology of CRPS, chronic pain management in the pediatric population, and management of CRPS using interventional pain techniques in the pediatric population
- **Databases used**: PubMed, Google Scholar, and NIH Library of Medicine
- **Keywords included**: "CRPS", "Pediatric Pain Management", "CRPS in Pediatric Population", and "Interventional Pain Management in Pediatric Population"
- **Criteria to be included in the review**:
  - Literature reviews, case studies, case reports, case-controlled studies and meta-analysis
  - Publication Years: 2005-2025
  - Language Restrictions: English only
  - Age range: pediatric population (0-18 years)
  - Discuss the pathophysiology, management, and diagnostic criteria for CRPS in the pediatric population. Discuss pharmacotherapy and/or interventional pain techniques including lumbar sympathetic blocks, spinal cord stimulators, intravenous blocks, epidural anesthesia, sympathetic nerve blocks, peripheral regional anesthesia, and other emerging therapies studied for CRPS in the pediatric population.

RESULTS

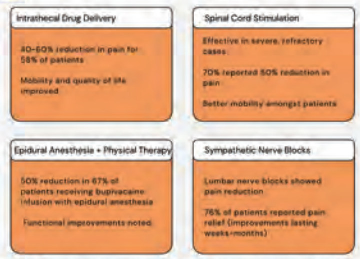

Figure 1. Results of the interventional pain techniques assessed in the literature review. Effectiveness and safety of each technique were analyzed in the review.

CONCLUSIONS

- **Interventional pain management** (nerve blocks, epidural injections, spinal cord stimulation, intrathecal drug delivery) offers **promising options** for pediatric CRPS.
- Proven to **reduce pain** and **improve function** when **conservative treatments fail**.
- **Further research needed** to assess **long-term safety**, **efficacy**, and **optimize treatment protocols**.
- **CRPS impacts** extend to **financial, academic, and mental health** burdens on patients and families.
- Management must be **multidisciplinary**, addressing both **clinical** and **psychosocial** factors.
- **Psychiatric support** and **regular family check-ins** promote a **patient-centered approach**.
- Future focus: **case-controlled trials**, **long-term outcomes**, and **standardized measures** for clinical guidance.

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Risk of Intrathecal Pump Malfunction After Non-Invasive Cryolipolysis: A Case Report

Mia Robb Stahler, DO; Casey Salandra, DO; Patricia Krohn, PA; Chaitanya Konda, DO

ASIPP 2025 ORLANDO

Intro/Objectives

Cryolipolysis, a non-invasive fat reduction procedure, uses controlled cooling (-1°C to -4°C) to eliminate subcutaneous fat and is generally considered low risk.

Intrathecal pain pumps, used for chronic pain management, are sensitive to mechanical and environmental changes.

While pump malfunction is rare, external cooling could pose an underrecognized risk.

This case highlights a potential complication of Cryolipolysis interfering with intrathecal pain pump function, aiming to raise awareness among clinicians treating patients with implanted medical devices.

Methods

Retrospective case review of medical records, device interrogation logs, and manufacturer communication.

Correlated timeline between Cryolipolysis procedure and intrathecal pump malfunction.

Evaluated pump function history prior to Cryolipolysis.

Case Summary

65-year-old female with chronic back pain and an intrathecal pain pump (implanted 8 years ago). Underwent Cryolipolysis (abdominal region; external temperatures -1°C to -4°C).

Within 4 days, patient experienced increased pain. Pump interrogation revealed motor stall; device logs were inaccessible.

Medtronic identified probable mechanical disruption related to external cooling.

No alternative causes found; symptoms managed with medication adjustment.

External Cooling and Intrathecal Device Vulnerability

Key Takeaways/Clinical Implications

Cryolipolysis may unintentionally disrupt implanted intrathecal devices via localized cooling effects.

Pre-procedural assessment of implanted devices should be standard before cosmetic body contouring treatments.

Patients with intrathecal pumps should be counseled on potential risks prior to undergoing cryogenic aesthetic procedures.

Clinicians should maintain a high index of suspicion for device malfunction in symptomatic patients post-procedure.

Conclusion

Non-invasive aesthetic procedures like Cryolipolysis may pose rare but serious risks for patients with intrathecal pumps. Patient counseling and careful monitoring are essential.

Recognition of environmental risks can inform better implant design and clinical practices.

Uncommon Relief: The Role of Sternoclavicular Joint Injections in Managing Chronic Neck Pain and Migraines - A Case Report

Mia Robb Stahler, DO; Victoria Noel, MD; Kavita Trivedi, DO

ASIPP 2025 ORLANDO

Intro/Objectives

Chronic neck pain and migraines often overlap, with musculoskeletal factors playing a key role in migraine pathophysiology. Conventional treatments typically focus on facet joints and trigger points.

This case report explores the use of sternoclavicular (SC) joint injections — an underutilized technique — for managing chronic neck pain and reducing migraine frequency.

Methods

A retrospective review of electronic medical records was performed. Following each SC joint injection, the patient reported pain relief as a percentage, and migraine frequency was recorded at routine follow-ups.

Case Summary

A 70-year-old woman with chronic neck pain and migraines since a 1980 injury experienced limited benefit from prior treatments. Since initiating SC joint injections in 2012, she consistently achieved 80-99% pain relief per session, with a notable reduction in migraine frequency from seven to three or four episodes per month. This intervention became the cornerstone of her long-term symptom management.

Sternoclavicular Joint Injection Technique

Key Takeaways/Clinical Implications

- SC joint pathology may be an underrecognized contributor to migraines.
- Targeting the SC joint could represent a novel therapeutic strategy, particularly in patients with persistent neck pain and migraines refractory to traditional treatments.
- This case supports expanding the musculoskeletal approach to migraine management.

Conclusion

SC joint injections provided durable neck pain relief and reduced migraine frequency, suggesting a potential new avenue for treatment. Further research is needed to understand the mechanisms involved and to determine the broader applicability of this approach.

Unmasking A Potential Hidden Culprit: Tarlov Cysts And Chronic Pelvic Pain – A Case Series

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Albany Medical Center; Physical Medicine and Rehabilitation Residency Program

ALBANY MEDICAL COLLEGE
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Case Description

We present three patients referred from urology with possible symptomatic Tarlov cysts, without contributing lumbar, hip, or gynecologic pathology who failed conservative and oral management - discussing their identification, treatment, and outcomes in the context of recent literature

Patient 1

- 39-year-old female with 15-year history of dysuria, vulvovaginitis, and dyspareunia
- Found to have multiple S2 Tarlov cysts (right > left) **(Figure 1)**, EMG/NCS unremarkable
- Underwent Right S2 transforaminal nerve block → near-complete symptom resolution then caudal epidural → 6 months of relief, improved quality of life

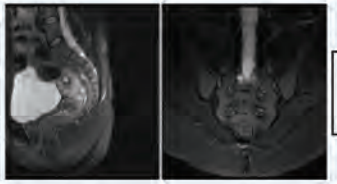

Figure 1: MRI Pelvis, sagittal and coronal view- 7mm R S3 Tarlov cyst in right lateral canal at S2

Patient 2

- 61-year-old female with 5-year history of vaginal pain, urinary frequency, post-coital pain, and interstitial cystitis
- Found to have Right S2 Tarlov cyst, EMG/NCS unremarkable **(Figure 2)**
- Underwent Right S2 block and caudal ESI → improvement in vaginal pain for 24 hours; started low-dose naltrexone (LDN) with gradual titration → 50% improvement in symptom severity

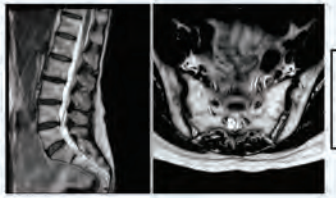

Figure 2: T2 MRI L-Spine, sagittal view and MRI Pelvis axial view - 1.4 cm R Tarlov cyst adjacent to S2

Patient 3

- 65-year-old female with >20 years of bilateral gluteal pain presented for botulinum toxin injection therapy started at a previous practice
- Recent fall prompted imaging revealing multiple bilateral S2-S4 tarlov cysts **(Figure 3)**, EMG/NCS showed possible sciatic neuropathy without identifiable lesion
- Underwent lumbar ESI remotely with temporary worsening of pain. Botulinum toxin to bilateral gluteal musculature with reported 80% relief

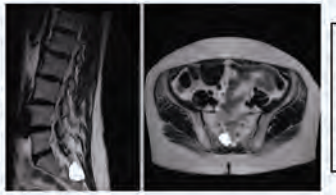

Figure 3: T2 MRI L-Spine sagittal view and MRI Pelvis axial view - 3cm Tarlov cyst at the R S2-3 segment (shown), 1.2 cyst at L S3-4, and 0.5cm at the R S3-4 segments (not shown)

Discussion

- Tarlov cysts are often overlooked as potential pain generators due to diagnostic bias, under-reporting, and limited clinician awareness
- Imaging and electrodiagnostic studies often lack objective findings secondary to limited diagnostic approaches (1)
- An emerging body of evidence highlights the growing association between chronic pelvic pain and Tarlov cysts, emphasizing the need for heightened awareness and consideration as a differential diagnosis (2)
- No universal guidelines presently exist for diagnosis or management, and treatment remains debated (3)
- Our patients experienced various interventions with differing responses, underscoring the need for further research (4)

Conclusion

- Tarlov cysts, may be significant contributors to chronic pelvic pain in select patients
- Outdated beliefs, gender and confirmation bias play a role in the continued disregard as a differential diagnosis
- Larger studies and further research are needed to help standardize effective diagnosis and treatments
- Given the broad spectrum of pain and dysfunction associated with Tarlov cysts, improved recognition and individualized treatment approaches are critical to optimizing patient outcomes.

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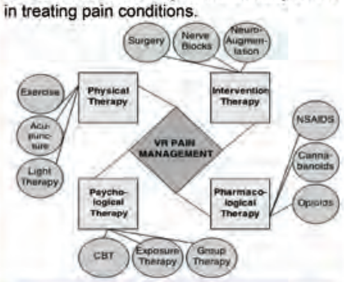
Recent Advances in Virtual Reality for Pain Management: A Comprehensive Review

Eric Xu DO, Jonathan Arias DO, Santos Martinez MS-III

Introduction

- Virtual reality (VR) has emerged as a promising non-pharmacological intervention for pain management.
- Our aim was to investigate the efficacy of VR in treating pain conditions.

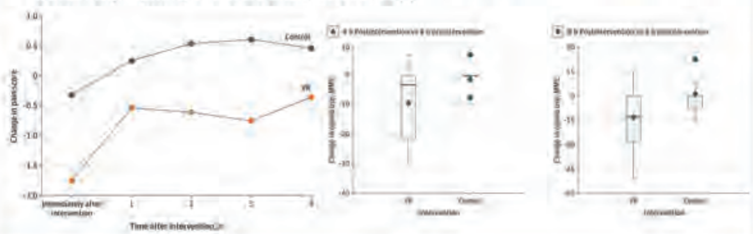


Methods

- A systematic literature search was conducted to identify studies published between 2023 and 2025 that examined the use of VR for pain management.
- We included randomized controlled trials, meta-analyses, and systematic reviews focusing on acute, chronic, and procedural pain conditions.
- Data on pain reduction, patient satisfaction, and functional outcomes were extracted and analyzed.

Results

- VR has been shown to significantly reduce pain across acute, chronic, and procedural pain conditions (standardized mean difference = −0.65, 95% CI −0.76 to −0.54, $P < 0.001$) especially patients reporting moderate to severe pain and in younger subjects (1).
- A study on hospitalized adult patients with cancer-related pain found that VR provided better nonpharmacologic pain relief compared to two-dimensional guided imagery distraction therapy (2).
- An umbrella review from July 2023 concluded that VR can be used as an alternative therapy for pain management in both children and adults. The review highlighted VR's potential in managing pain across various clinical settings (3).
- Research on historically underserved populations indicated that VR reduced levels of pain, anxiety, and distress during medical procedures (4).
- A randomized clinical trial published in *Pain* in 2024 evaluated the effects of VR neuroscience-based therapy on patients with chronic back pain. The study found that VR significantly reduced pain intensity and pain interference, with improvements persisting at a 2-week follow-up. These effects were partially mediated by reductions in kinesiophobia and pain catastrophizing and were associated with changes in brain networks linked to chronic pain (5).
- A study in *JAMA Otolaryngology–Head & Neck Surgery* in 2022 demonstrated that VR reduced postoperative pain and opioid use in patients after head and neck surgery. The VR intervention led to clinically meaningful reductions in pain scores and opioid consumption compared to a control group using a handheld smartphone device (6).



Discussion

- The reviewed studies consistently demonstrate the efficacy of VR in pain management across various conditions and patient populations.
- VR's ability to reduce pain intensity, decrease anxiety, and improve patient satisfaction suggests its potential as a valuable tool in multimodal pain management strategies.

Conclusion

- Recent studies provide strong evidence supporting the use of VR as an effective intervention for pain management.
- As VR technology continues to advance, its integration into clinical practice could offer a safe, non-pharmacological option for pain relief.
- Its use could potentially reduce reliance on opioids and improve patient outcomes.
- Further research is needed to optimize VR protocols and explore its long-term effects on chronic pain conditions.

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Patient-Identified Values as Outcome Targets for Chemotherapy-Induced Peripheral Neuropathy: Protocol and Preliminary Insights

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Background

- **Chemotherapy-induced peripheral neuropathy (CIPN)** is a debilitating side effect of common chemotherapy agents.
- **30% of CIPN patients** develop chronic symptoms that significantly impair quality of life and daily functioning.
- Chronic CIPN management may require complex medical decisions, including opioids and invasive procedures, necessitating careful consideration of patient preferences and tradeoffs.
- **Patient Priorities Care (PPC)** is an evidence-based decision support intervention shown to reduce medication burden and improve clinical outcomes in older adults.
- It is unclear whether PPC can be effective for managing chronic pain in cancer survivors.

Figure 1. Patient Priorities Care Model

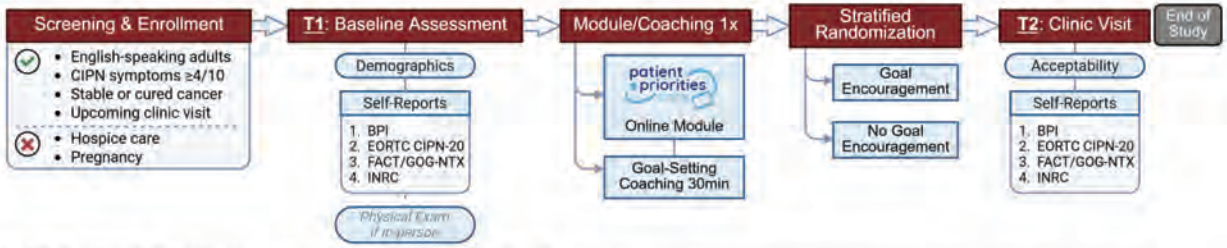

Figure 2. Feasibility and Effect Modification Pilot Randomized Controlled Trial

BPI = Brief Pain Inventory 4-item, EORTC CIPN-20 = EORTC Quality of Life-Questionnaire CIPN, FACT/GOG-NTX = Functional Assessment of Cancer Therapy-Gynecologic Oncology Group-Neurotoxicity, INRC = Individual Neuropathy Report Card (experimental measure)

Methods

This single-site feasibility trial is IRB-approved (#2024-1305). Recruitment will be performed at an academic cancer pain management clinic, targeting final enrollment of 45 participants.

Figure 2 outlines the study flow, encompassing 2 timepoints: (T1) baseline assessment and (T2) visit-triggered follow-up assessment. The study is powered to assess the feasibility of the 2-step online module and telecoaching session, with exploratory effect modification analysis for whether goal encouragement improves outcomes. Randomization is stratified by pain intensity to ensure equal severity between groups.

Successful feasibility is set at study completion of ≥80% and acceptability of ≥80% of both arms combined.

Preliminary Findings

- Members in the **Community Feedback Session (n = 10)** were strongly supportive of the study's primary intervention (PPC 2-step module and telecoaching session), expressing positivity toward eventual increased provider engagement in patients' experiences.
- Preliminary participants are on average 54 years of age, average pain of 5.5/10 (SD 0.7), with EORTC-CIPN-20 sensory burden of 22/36 (SD 1.4) and motor burden of 16/32 (SD 1.4), FACT-GOG-Ntx raw score of 23/44 (SD 5.7). On the INRC, quality-of-life domains most impacted were hand function (5.5/10, SD 0.7), health maintenance (5.5/10, SD 3.5), and temperature sensation (3/10, SD 4.2).
- Most common neuropathic symptom reported was tingling, which was rated as a 7.5/10 (SD 0.7) at worst and noted to be sometimes, but not always painful. Qualitatively, participants expressed common themes of frustration and issues with exercising and sleeping due to CIPN symptom burden.
- Updated findings will be presented as part of the Friday finalist oral presentations.

Acknowledgements

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