

Author Information

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Presenting Symptom: Burning in right foot> Chronic low back pain

Case Specific Diagnosis: Chronic low back pain and radicular pain

Learning Objectives:

1. To identify the factors affecting failure of trials (<50% pain reduction in pain for trial period).
2. Demonstrate ways to improve the success of spinal cord stimulation (SCS) trial.
3. Discuss and review literature on SCS efficacy in treating various chronic pain syndromes.

History: A 75 year old female retired librarian with a past medical history of DM, and history of L5-S1 laminotomy/microdiscectomy ten years ago who presents with chronic low back pain and right burning foot pain for the past year. In the past six months the pain has increased in intensity. She denies any recent falls or trauma. She denies any bladder or bowel incontinence, weight loss, fever, chills or weakness of her lower extremities.

She is interested in minimally invasive interventions to treat her pain and wants to avoid surgery if possible. The pain occurs daily and begins in the middle of the low back and travels to the sole of the right foot associated with a burning sensation. This pain is affecting her quality of life. She is unable to walk for more than 15 minutes due to the worsening back and leg pain. Her sleep is fragmented secondary to the burning in the right foot. Aggravating factors include bending, walking, and sitting. Alleviating factors include a TENS unit and rest. She follows with her primary regularly and states her "diabetes is under control according to her doctor."

Pertinent Physical Exam Findings

+Lumbar paraspinal muscle tenderness L2-S1

+Pain with flexion-pulling sensation as per patient

Reflexes +2 bilateral lower extremities

Equivocal straight leg raise secondary to back pain

Sensation decreased over right lateral malleoli, normal otherwise

4/5 muscle strength bilateral hip flexors, 5/5 muscle strength otherwise in lower extremities

Diagnostic Imaging and Results

Labs (CBC, CMP, Vitamin D, B12, TSH, CPK, Lyme, autoimmune markers negative), HgbA1c 7.0%
EMG: negative for any large fiber neuropathy, chronic L5-S1 radiculopathy on the right.

X ray of lumbar spine/MRI Lumbar Spine: Multilevel degenerative disc disease worse at L4-5, L5-S1 associated with ligamentum flavum hypertrophy, facet arthropathy with right neuroforaminal narrowing at L4-5, L5-S1 >left neuroforaminal narrowing and spondylosis.

Media:



Differential Diagnoses:

1. Chronic lumbar radiculopathy
2. Peripheral Neuropathy from diabetes
3. Myofascial Pain
4. Facet mediated pain
5. Piriformis Syndrome

Medications and Interventions: She has tried physical therapy focusing on gait strengthening and core strength, multiple lumbar epidural steroid injections, over the counter medications such as Tylenol, multiple neuropathic agents, and NSAIDs such as ibuprofen and meloxicam with minimal relief in her symptoms. She has had multiple epidurals and median branch blocks with mild improvement in her back pain but she continued to have the burning pain in the right foot.

The treatment modality of spinal cord stimulator was discussed with the patient to treat her low back pain and radicular symptoms. After the psychological testing was successfully completed the patient was scheduled for a SCS trial. She was eager for this treatment modality and her main goal was to decrease the burning pain in her right foot. A percutaneous trial was completed with two staggering leads placed over the T9-T10 interspace. Lateral fluoroscopy was used to verify posterior epidural placement. Testing was done during the procedure to ensure coverage of the low back to the right foot. She underwent a 7 day trial receiving tonic stimulation. She presented for re-evaluation at day 2 due to inadequate pain relief. The frequency and pulse width were changed to match a high density program. At day 7, the patient reported improvement in her back pain but <50% relief of her right burning foot pain. She is interested in other treatment modalities in the realm of neuromodulation. Other modalities were discussed with the patient such as the possibility of trialing with DRG (dorsal root ganglion) stimulation.

Discussion:

Spinal cord stimulation has been gaining support since 1967 as a method for chronic intractable pain (1). Recently there is increasing effectiveness due to improvements with patient selection criteria, accuracy in electrode placement, and multipolar and multichannel devices (2).

Despite criteria for patient selection, patients fail to achieve optimal pain relief with SCS (3). These factors include tobacco, drug use, age, and delay between onset of original pain to SCS implant (3).

Majority of failed trial patients showed unacceptable pain relief (<50% improvement) in spite of sufficient paresthesia on the pain area with trial stimulation (4). Insufficient paresthesia, painful or unpleasant sense and failure of procedure were other causes of failed trials. Most satisfying pain relief with SCS

included conditions such as FBSS, angina, CRPS, and PVD. SCS was shown to be least effective in patients with neuropathic pain of cord lesions, postherpetic neuropathy, post-amputation state(4).

There have been multiple recent studies to assess the various programming options in the effectiveness of pain control with SCS therapy. In the PROCO RCT, electrodes were placed at the sweet spot of T9-T10 interspace and adjusted according to testing of paresthesia during the trial. The investigators of this study argue achieving pain relief requires delivering the right waveform to the right target, very careful finding of this bipole to achieve best pain relief and then optimization of the stimulation by amplitude and pulse width at each frequency(5). This study showed no clinical difference in pain relief using frequencies from 1–10kHz (5).

There is now Level I evidence for newer techniques such as dorsal root ganglia stimulation which have shown effectiveness in treating failed back surgery, back pain, neuropathic leg pain, CRPS, and causalgia (6).

References:

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