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COMBINED PARESTHESIA AND SUBPERCEPTION SPINAL CORD STIMULATOR THERAPY FOR MANAGEMENT OF PERSISTENT PAIN AFTER SPINAL FUSION SURGERY FOR CONGENITAL SCOLIOSIS

Background: A significant number of patients who undergo spinal fusion surgery are managed in chronic pain clinics for low back pain or what is commonly described as failed back surgery syndrome (FBSS). There are a multitude of reasons for chronic long standing back pain after surgery, and the etiology is often multifactorial involving both preoperative and postoperative risk factors. In patients with scoliosis, it has been shown that fusion with Harrington rods extending into the lumbar region is associated with increases in postoperative back pain, especially with fusions to the L4-L5 region. Spinal cord stimulation (SCS) is a recognized treatment for this condition after repeat surgery or when conservative treatments have failed.

Case Report: This case report describes the use of SCS with combination therapy in the management of severe low back pain after thoracolumbar fusion with Harrington rods in a patient with congenital scoliosis. After a failed trial of conservative medical management, a spinal cord stimulator capable of delivering combination traditional paresthesia with subperception and burst stimulation was placed. Regarding the choice of SCS therapy, there is a vast array of choices including traditional paresthesia, paresthesia-free, subperception, microburst, or combination treatment. The latter is capable of delivering multiple therapies over time designed to provide more thorough and longer-lasting relief.

Conclusion: Simultaneous traditional paresthesia and subperception waveform therapy might offer superior pain relief in comparison to therapies utilizing a single waveform. Further studies are needed to evaluate the use of combination over traditional SCS therapy for the treatment of axial back pain secondary to FBSS.

Key words: Chronic pain, combination therapy, congenital scoliosis, neuromodulation, spinal cord stimulator, spinal fusion

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BACKGROUND

Chronic low back pain is a common complaint and source of significant disability amongst patients with spine fusion surgery. An estimated 20% to 40% of patients who undergo spine surgery may present

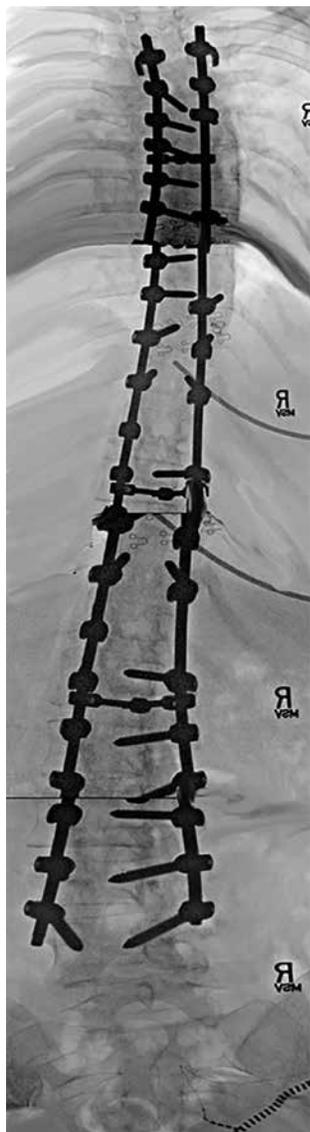


Fig. 1. A compiled anteroposterior (AP) radiograph demonstrating the patient's Harrington rod surgical fusion extending from T1-L4. Four individual AP radiographs were cropped and resized to produce this image.

with persistent low back pain or failed back surgery syndrome (FBSS) (1,2). Scoliosis patients fused with Harrington rods extending into the lumbar region show increased postoperative back pain, particularly with extension to the L4-L5 vertebral levels. One study revealed that 37% and 46% of patients had moderate to severe back pain for fusions involving L4 and L5, respectively (3). Furthermore, patients who underwent spine fusion surgery with Harrington rods had higher pain scores, more difficulties with daily activities, and required more pain medications (4).

Spinal cord stimulation (SCS) is a recognized treatment for FBSS after repeat surgery or when conservative treatments have failed (5). SCS can have a significant role in treating postoperative back pain in patients with congenital scoliosis after extensive thoracolumbar fusion with placement of Harrington rods. However, given the surgically altered anatomy, SCS lead placement can be challenging in this group of patients. SCS therapy

can be delivered in various manners including traditional paresthesia, subperception, burst, or combination treatment. The latter is capable of delivering multiple therapies over time with the intention of providing improved relief. Here we report the successful treatment of severe low back pain after thoracolumbar fusion in a patient with congenital scoliosis, using combination therapy SCS. Written consent was obtained from the patient for publication of this case report.

CASE

Our patient was a 43-year-old white woman with a history of severe low back and sacroiliac joint-related pain following a T1-L4 thoracolumbar posterior fusion with Harrington rods for congenital scoliosis (Fig. 1) (6). Her pain was chronic and a source of significant disability, disrupting her ability to ambulate, sleep, and complete daily activities. Her past medical history was uncomplicated, and her social history was unremarkable, including no tobacco use.

After a failed trial of conservative medical management, a spinal cord stimulator capable of delivering combination traditional paresthesia with subperception and burst stimulation was placed. Her SCS trial was challenging; the epidural space was accessed through the L4-L5 and the L5-S1 disk space (Fig. 2). Two 16-contact leads were advanced to the top of T8 (Fig. 3). After a successful phase 1 trial, which was determined as more than 50% pain relief, she was implanted with 2 16-contact Boston Scientific leads and a Boston Scientific Spectra WaveWriter™ SCS system. Her generator was programmed to provide simultaneous combination therapy. This included paresthesia-based therapy at a frequency of 50 Hz, burst therapy at 450 Hz at 6 pulses per burst, and subperception stimulation therapy at 1.2 kHz.

Both subjective and objective measures were used to assess the efficacy of the SCS. At the 4-week follow-up, her reported Visual Analog Scale (VAS) score was reduced from 8 to 3, providing 60% pain relief. Her Oswestry Disability Index (ODI) score decreased from 75 to 30 (60% improvement). She reported significant improvement in her quality of life and ability to perform daily activities.

CONCLUSION

Our case demonstrated novel treatment of refractory low back pain after fusion for congenital scoliosis with combination SCS therapy. Simultaneous traditional par-

esthesia and subperception waveform therapy might offer superior pain relief in comparison to therapies utilizing a single waveform. The multicenter randomized controlled WHISPER trial demonstrated that combination subperception and paresthesia-based therapy showed an increased 62% patient response rate in regards to pain relief when combination SCS therapy was implemented in patients with chronic pain (7,8). Further studies are needed to evaluate the use of combination over traditional SCS therapy for treatment of axial back pain secondary to FBSS.

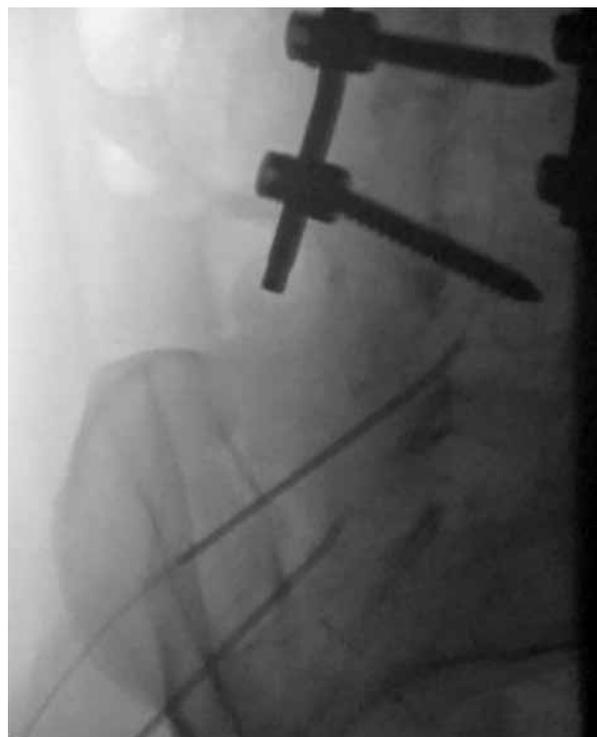


Fig. 2. Lateral radiograph demonstrating epidural access at the L4-L5 and L5-S1 disc spaces for spinal cord stimulator trial lead placement.

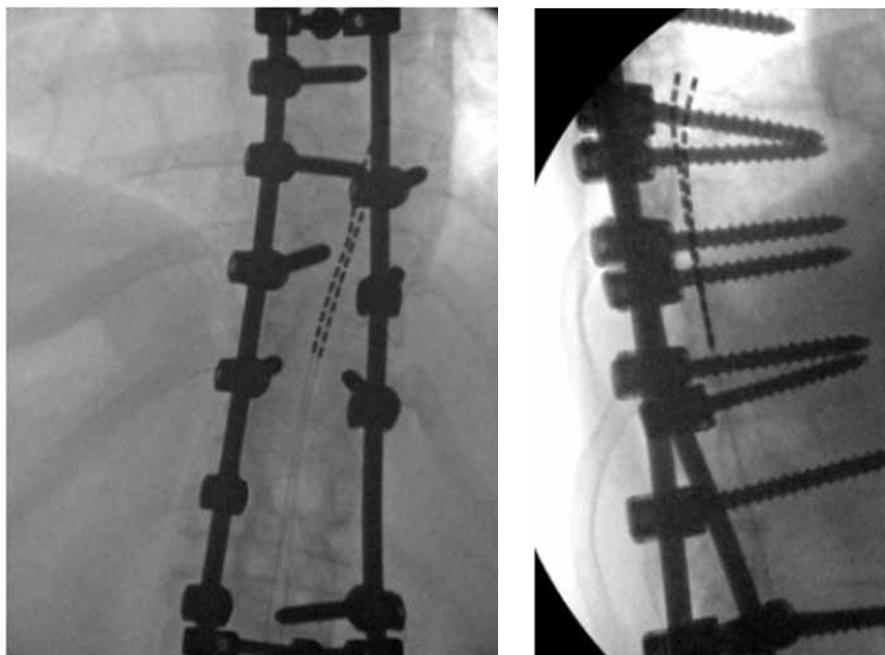


Fig. 3. Final anteroposterior (left) and lateral (right) radiographs of spinal cord stimulator trial leads placed in a patient with congenital scoliosis status post T8-L4 fusion with Harrington rods.

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