Journal of Clinical Anesthesia (2016) **28**, 74–77

ELSEVIER

Journal of Clinical Anesthesia

Original Contribution

Efficacy of spinal cord stimulators in treating peripheral neuropathy: a case series

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Received 27 December 2014; revised 4 April 2015; accepted 10 August 2015

Keywords:
Spinal cord stimulator;
Peripheral neuropathy;
Diabetes mellitus;
Chemotherapy;
Human immunodeficiency virus

Abstract

Introduction: Peripheral neuropathy is a common cause of pain, and it is increasing in prevalence. Peripheral neuropathic pain is very hard to treat and can be resistant to multiple pain management modalities. Our series aimed at testing the efficacy of spinal cord stimulators (SCSs) in treating resistant painful peripheral neuropathy.

Case Presentations: Case 1: A 79-year-old man presented to our clinic with long-standing history of painful peripheral diabetic neuropathy resistant to conservative management. After failure of all possible modalities, we offered the patient an SCS trial that was very successful, and we proceeded with the permanent implant that continued to help with his pain and allowed the patient to wean down his medications.

Case 2: A 60-year-old man presented with chronic peripheral neuropathy secondary to HIV, patient failed all conservative and procedural management. Patient then had an SCS trial that relieved his pain significantly. Unfortunately, we did not proceed with the implant due to deterioration of the patient general health.

Case 3: A 39-year-old woman presented with painful peripheral neuropathy secondary to chemotherapy for breast cancer. After failure of medication management and procedures, patient had a SCS trial that improved her pain and we then proceeded with performing the permanent implant that controlled her pain.

Conclusion: We presented 3 cases with chronic painful peripheral neuropathy secondary to HIV, diabetes mellitus, and chemotherapy that was resistant to conservative pain management and procedures that was successfully treated with neurostimulation.

1. Introduction

Peripheral neuropathy can be a debilitating condition that results from peripheral nerve damage. Peripheral neuropathy has an extremely diverse presentation that depends on the type (sensory, motor, and autonomic) and location of the affected nerve. Long nerves, such as the sensory nerves that extend to the toes, are most susceptible to neuropathic pain. The pain is often described as burning, sharp, jabbing, tingling, and/or electrical and can have a severe impact on a patient's quality of life [1].

Peripheral neuropathies are most prevalent in Western cultures. It has been estimated that more than 15 million people in the United States and Europe have some degree

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http://dx.doi.org/10.1016/j.jclinane.2015.08.011
0952-8180/

of neuropathic pain and approximately 2 of every 100 individuals have peripheral neuropathy [2]. Approximately 8% of primary care patients aged 55 years or older have a polyneuropathy [3].

The incidence and prevalence of peripheral neuropathy are on the rise. Two major contributing factors are: the obesity/diabetes mellitus (DM) epidemic of Western society and the aging of our population as a whole. The most common cause of peripheral neuropathy is DM [4]. Researchers project that the number of Americans with DM will increase 165% over the next 50 years. These estimations predict that the prevalence of DM will grow from 11 million in 2000 (4.0%) to 29 million in 2050 (7.2%) [5]. Furthermore, the overall incidence of peripheral neuropathy increases with age. In 1950, the elderly population (age >65 years) represented 8.1% of the total US population. By 2009, this group represented 12.8% of the population and is projected to reach 20.2% in 2050 [6]. As our nation's demographic shifts to a more elderly population with higher rates of DM, more people will inevitably develop painful peripheral neuropathy.

More than 100 different causes of peripheral neuropathy have been identified [7]. These causative agents are highly diverse and include metabolic, infectious, and pharmacologic sources [8]. The most common cause of peripheral neuropathy is DM, with approximately 50% of diabetic patients developing a neuropathy within their lifetime [4]. Different studies have determined that HIV-related painful distal sensory polyneuropathy may affect 1/3 of HIV patients being treated with highly active antiretroviral therapy and 1/3 of all AIDS patients [9]. The most common medications that induce peripheral neuropathy are the chemotherapeutic agents such as the vinca alkaloids (vincristine), taxols (taxane, taxol, and docetaxel), platinum compounds (cisplatin, carboplatin, and oxaliplatin), and suramin [10].

Regardless of the cause, neuropathic pain is usually not successfully managed with pharmaceutical treatment. Recommended first-line medications include antidepressants, calcium-channel ligands (gabapentin and pregabalin), and topical lidocaine [11]. Other commonly used medications are opioid analgesics, tramadol, and antiepileptics. Randomized controlled trials have proven that these medications are not overwhelmingly effective. A systematic review of evidence-based recommendations for pharmaceutical management of neuropathic pain determined medications only provide 40% to 60% of patients with partial pain relief [11]. For this reason, it is time to consider a more lasting and efficacious treatment such as SCS.

Literature about SCS is focusing mostly on using it for the treatment of failed back surgery syndrome (FBSS), complex regional pain syndrome, and radicular pain. This case series is unique in that it illustrates SCS ability to successfully manage 3 extremely diverse etiologies of neuropathic pain: DM, HIV, and chemotherapy. An informed consent was obtained from all patients for publishing this case series.

2. Case presentation

2.1. Case 1

A 79-year-old man presented with lumbar and bilateral lower extremity pain for 11 years secondary to diabetic peripheral neuropathy. In addition to DM type II, the patient had a significant medical history for coronary artery disease, hypertension, and multiple failed back surgeries. His pain was not well controlled with medications (Neurontin, Robaxin, Tramadol, and Naproxen), physical therapy, epidural steroid injections, or transcutaneous electrical nerve stimulation. Upon initial presentation, the patient was mostly concerned with the pain in his feet, which he reported to be 9/10 on the visual analog scale for pain (VAS). He described this pain as nonradiating, constant, sharp, burning, and tingling in nature. The patient opted for an SCS trial that was performed and was associated with decreased pain scores down to 3/10 with improvement in the ability to perform daily activities. The SCS trial was performed using 2 octad leads to provide bilateral coverage and was performed for 1 week. We decided to proceed with the permanent implant. The SCS implantation leads were threaded under fluoroscopic guidance to T7 vertebral body, resulting in stimulation coverage of all painful areas. At 1-month postoperation, the patient was very happy with the 60% overall reduction in pain and a VAS score of 2/10. His oral pain medications were successfully weaned down, and he no longer needed breakthrough pain medications. Patient also reported increase in his ability to perform his daily activities as walking and grocery shopping and marked improvement in his sleep. Patient had the SCS 3 years ago and continues to do well.

2.2. Case 2

A 60-year-old man had been seen in our pain center for HIV-induced peripheral neuropathy for 15 years. He has a significant medical history of coronary artery disease, aseptic necrosis of the hip, cytomegalovirus colitis, pancreatitis, seizures, HIV, and herpes zooster virus infection of the lower extremities. He presented with a 15-year history of bilateral lower extremity pain that had a strong temporal correlation with his diagnosis of HIV in 1990. His HIV is currently treated with darunavir, emtricitabine-tenofovir, and ritonavir. He described his lower extremity pain as burning, stinging, and stabbing with a VAS pain score of 9/10. The pain was affecting his sleep at night (self-reported 4 hours per night) and his ability to ambulate without a walker. He had tried numerous pain medications with minimal success: methadone, morphine, hydromorphone, fentanyl, dilaudid, baclofen, ziconitide, gabapentin, pregabalin, amytryptyline, and duloxetine. An intrathecal drug delivery system implanted in 2005 provided variable relief with VAS scores ranging from 4/10 to 10/10. The patient failed many attempts to wean off his narcotic pain medications, and just before the SCS trial in 2013, he was heavily medicated with amitriptyline, buproprion,