



Abstract

The treatment of peripheral nerve dysfunction with spinal cord stimulation has yielded variable results. In some cases despite excellent parasthesias of the involved nerve distribution, the patient does not experience acceptable analgesia. New interfaces are needed to treat this dilemma¹. This case demonstrates a combined use of central stimulation and peripheral stimulation.

Patient: The patient is a 44 year old male with a history of severe right lower extremity pain involving the saphenous nerve. Prior treatments also included injections, oral medications, and implantation of an intrathecal pump.

Diagnosis: Saphenous neuralgia with neuropathic pain of the right lower extremity.

Treatment: Spinal cord and Peripheral nerve stimulation using two percutaneous leads with combined but independent programming.

Outcome: Six months of paresthesia with coverage of the right leg and foot using a combination of the epidural lead and peripheral lead.

Conclusion: Complex neuropathic pain involving peripheral nerve dysfunction can be effectively treated utilizing combined stimulation techniques targeting both the neuraxis and the site of the nerve disorder.

Background

Using spinal cord stimulation (SCS) to treat Saphenous Neuralgia can be challenging secondary to lack of nerve specificity and parasthesia overlap. This can lead to unwanted areas of stimulation and failure of the therapy. The specificity of peripheral leads is a potential advantage yet may lead to painful hyperstimulation and can be impossible in areas of allodynia².

Challenges such as these have led to strategies to incorporate both central and peripheral stimulation to provide pain relief. One approach involves the use of one epidural lead in conjunction with a peripherally placed lead. Utilizing this approach can provide the desired coverage while offering the flexibility to treat pain that involves multiple dermatomes.

Methods

Patient

The patient is a 44-year old male with chronic pain involving his entire right lower extremity below the knee. He sustained a spiral fracture of the fibula which required operative fixation.

Diagnostic workup was negative for curable lesions. The patient persisted with neuropathic pain with a diagnosis of CRPS Type II involving the saphenous nerve.

Prior to the implantation of stimulation systems, the patient failed physical medicine, anticonvulsants, opioids, and sympathetic and nerve root blocks. He also failed an infusion of clonidine and Prialt.

Clinical findings included trophic changes of the muscle, skin, and bone. He also had sudomotor changes with mottling, abnormal nail bed growth, and hyperhidrosis. He developed poorly healing ulcers that did not respond to wound care.

To that end, SCS was undertaken with coverage of his pain from the knee into the foot; however the medial aspect was unable to be covered adequately despite multiple reprogramming attempts. To that end, saphenous nerve injections at the knee were performed with complete resolution of the dysesthetic pain involving the medial aspect of the lower extremity with a duration of two weeks.

Diagnosis

An examination showed that the patient had neuropathic pain in the right leg and foot. The patient was diagnosed with CRPS Type II involving the Saphenous Neuralgia

Treatment

After a favorable SCS/ PNS trial (reporting pain scores of 1/10) the patient underwent implantation of one SCS lead and PNS lead in the epidural space and at the medial tibial condyle. Two percutaneous eight contact leads (St Jude Medical) were used. The first was placed in the epidural space utilizing a right paramedian approach with the #1 contact located at the superior endplate of T-10. The second lead was placed peripherally at the medial aspect of the right knee.

The leads were inserted into an Eon Mini (St Jude Medical) rechargeable pulse generator and was implanted as the power source for stimulation. Intraoperative programming of the patient while he was alert and awake confirmed the proper coverage for the patient's pain pattern.

Post-implant the patient received multiple programs that included the use of each lead independently as well as several programs that utilized the leads in combination. The preferred program included the use of the epidural lead in combination with the peripheral lead. The lead arrays were programmed to the middle on the spinal lead at T11 with a guarded array at 4 positive, 5 negative, 6 positive. The peripheral lead was programmed with cathodes at contacts 2, 4, 6, and anodes at contact 1 and 8.

Outcome

At post-surgical office visits the patient indicated good parasthesia coverage of his painful areas. The intensity of his pain went from a pre-implant level of 6/10 to a post implant level of 1/10. Consequently he has noted 95% pain relief and significant decreased swelling and improved hair growth to the lower leg region. Currently that patient requires no oral adjuvant medication. His Intrathecal infusion has been stopped but the pump remains in situ with saline. Most importantly, he has been able to consistently engage in activities that he enjoys such as long distance walking and continues to work full time in medical sales. He has required one session of reprogramming at the peripheral lead which led to improved satisfaction.

Conclusions

SCS and PNS in combination can be an effective treatment for CRPS/ Saphenous Neuralgia. This case suggests that utilizing multiple applications of neuromodulation can result in a synergistic effect to improve pain and function.

References

1. Grill WM, Norman SE, Bellamkonda RV. Implanted neural interfaces: Biochallenges and engineered solutions. *Annu Rev Biomed Eng.* 2009;11:1-24.
2. Falco FJ, Berger J, Vrable A, Onyewu O, Zhu J. Cross talk: a new method for peripheral nerve stimulation. An observational report with cadaveric verification. *Pain Physician.* 2009 Nov-Dec;12(6):965-83.