Wireless Spinal Cord Stimulation for the Treatment of Chronic Abdominal Pain as a Results of Arteria Mesenterica Syndrome

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Background

Mesenteric artery syndrome is a rare gastrointestinal disorder presenting as an uncommon cause of intestinal obstruction. It is frequently associated with predisposing conditions resulting in symtomos such as vomiting, rapid weight loss and narrowing of the aortomesenteric angle. The non-specific symptoms make it difficult to diagnose (1). Conservative treatments are aimed to increase abdominal fat through diet to increase the angle between the mesenteric artery and aorta. Surgical interventions need to be considered to bypass or relieve the obstruction (2). Chronic post-surgical pain in the abdominal area are frequent given the large number of abdominal surgeries performed worldwide. The incidence varies between 15% and 30% (3). Treatments include behavioral therapies, pharmacological pain management, therapies for comorbidities and interventional diagnostic and therapeutic nerve block. When conservative therapies fail, SCS might be considered to improve analgesia and function. (4) Wireless spinal cord stimulation has been used effectively for the treatment of pain syndromes of multiple etiologies (5). An octopolar or quadripolar Implantable Nerve Stimulator (INS), is implanted percutaneously with a Touhy needle in the required area and a small, external, rechargeable wireless pulse generator (WPG) worn on the back by the patient, provides the stimulation parameters and energy to power the INS via radio frequency. The implantation of an implantable pulse generator (IPG) and the tunneling of the extensions required for traditional neurostimulation are not necessary.

Case Report

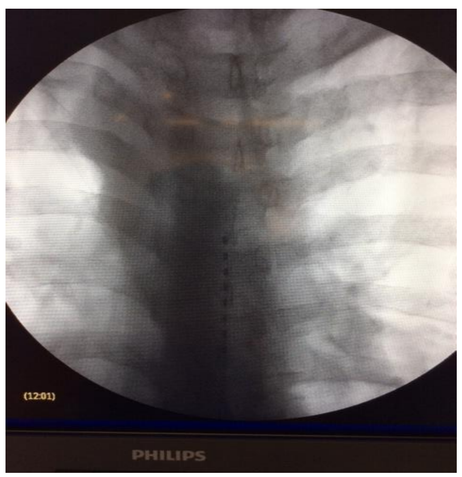
A 48-year old male presented with mesenterica syndrome and consecutive abdominal surgeries. These included laparascopy and laparotomy. The patient reported constant pain in the upper abdomen with pain scores of 8.

As a result he was taking high opioid dosages (Palexia Thapentalol 400-600 mg per day) and was not able to go to work. Other therapies tried were physiotherapy and thoracic peridural infiltration under fluoroscopy with the cathether at T8/9. Good results were noted with Naropin 0.75% (Ropivacain, 10 ml).

Methods

The permanent implant procedure was done under light sedation, with local anesthesia and in supine position. A stab incision was made for needle incision paramedian at T10/11. A Tuohy needle was advanced into the dorsal epidural space with a shallow angle to direct the needle cranially. Placement of the needle was confirmed using fluoroscopy and loss of resistance technique. An octopolar electrode array was inserted and directed towards T4/5 anatomical midline (Fig. 1). Receivers were placed into the inner lumen After functional verification of the system, the needles were removed while holding the stimulator in place.

Fig. 1: final placement at T4/5 anatomical midline



The stimulator was permanently secured at the insertion site using an injectable suture-less sandshark anchor system (fig 2.). The stimulator was subcutaneously tunneled approximately 12 cm distal from the entry point of the epidural space toward a separate receiver pocket. The distal portion of the receiver was coiled, sutured to itself and then fixated by running anchor stitches deep into the fascia, then through the tip of the distal receiver housing. The fascia and skin of the receiver pocket were closed in layers. There were no complications during the procedure nor afterward.

Fig. 2: Suture-less Sandshark Injectable anchor

Results

One hour after activation of the system, the patient was able to report a significant difference. Pain scores at 6 months with stimulation were 3 compared to 8 without stimulation. Due to his pain relief subject noticed an improvement in quality of life and felt less depressed. As a result he was able to go to work again. Self-reported improvement was a 7 out of 7 with the patient global impression of change scale. Medication was reduced with more than 50% and quality of sleep improved drastically. The patient reported neither adverse events nor side effects.

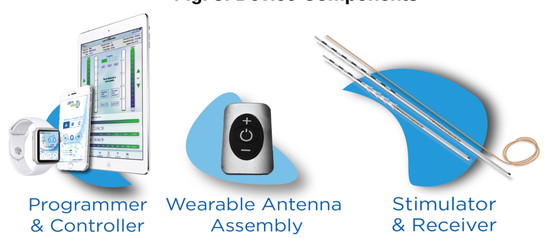
Conclusions

Wireless spinal cord simulation was a successful option for this patient suffering of debilitating abdominal pain due to arteria mesenterica syndrom. This experience hints at advantages such as significant pain relief, devoid of complications associated with the bulk of an implantable pulse generator and flexibility as related to device placement and programming protocols.

Wireless System Components

The Freedom SCS System (Fig.3) utilizes wireless technology. Each electrode array contains four or eight contacts (1.3 mm in diameter with 4 mm spacing) with embedded electronics and a separate, mated receiver component. A small, externally, wearable, rechargeable transmitter attached to a transmitting antenna worn in clothing provides the energy to power the implanted device wirelessly through the skin. The device uses pulsed electrical current to create an electrical field that acts on nerves to inhibit the transmission of pain signals to the brain.

Fig. 3: Device Components



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