Cervical Spinal Cord Stimulation for the Management of Pain from Brachial Plexus Avulsion

Dear Editor,

Almost 80% of patients with brachial plexus avulsion develop chronic pain. The pain can be treated medically or with more invasive surgical procedures. However, in most cases, the pain is resistant to medical treatment and has a high-recurrence rate after invasive procedures like dorsal root entry zone (DREZ) lesioning. Cervical spinal cord stimulation (SCS) is one of the underutilized treatment modalities with several reports of good outcome. We report a case of significant improvement in pain from brachial plexus avulsion injury after implanting a cervical SCS.

A 25-year-old male patient was involved in a motor vehicle accident 5 years ago. He suffered from multiple injuries including injury to his right brachial plexus. Magnetic resonance imaging (MRI) showed complete nerve root avulsion from C6 to T1. He lost sensation and motor function below the deltoid in his right upper extremity, however, his main debilitating problem was severe chronic pain. He described his pain as burning, stabbing, and sometime like an electric shock, starting at the shoulder and radiating to the arm and his five fingers, with an intensity of 7/10 on a numeric pain rating scale. On examination, he had no sensation or motor function below the deltoid. He was not interested in functional recovery and was only concerned about relieving the pain. Medical management with a combination of an antidepressant, an anticonvulsant, a nonsteroidal anti-inflammatory medication, and an opioid failed to improve his pain. Decision was made to proceed with a cervical spinal cord stimulator trial.

References
We entered the epidural space at C7-T1 level using a paramedian approach. Under fluoroscopy guidance, we advanced the lead until the tip was seen at the C3 level. The electrodes were covering the area from C3 to C6 (Figure 1). With stimulation the patient reported a decrease in his pain level with complete coverage of his right upper extremity and right shoulder. We fixed the stimulator in place and asked the patient to monitor the efficacy of the stimulator on decreasing his pain level and improving his quality of life and to return to the clinic in 3 days. On his follow-up visit, the patient reported a 50% reduction in pain intensity and was satisfied with the result. Decision was made to proceed with implantation of a permanent stimulator. An SCS with paddle-type leads was placed by a neurosurgeon covering the area from C3 to C5 (Figure 2). On 1-month follow-up, the patient continued to report a good coverage of his pain with no recurrence.

Most brachial plexus avulsion injuries are traumatic in origin, mainly caused by motor vehicle accidents or industrial injuries. One of the most serious and disabling consequences of brachial plexus avulsion is chronic pain with an incidence of 80% [1]. Most patients describe the pain as a burning sensation, or similar to pins and needles, or an electric shock. In addition to the constant pain, patients typically complain of periodic sharp paroxysms of pain lasting several seconds [2]. The pain usually begins within days of injury and generally persists [2,3].

The origin of the pain has been attributed to root avulsion and spinal cord deafferentation. It is thought that the lack of sensory input into the spinal cord leads to spontaneous activity of the neurons in the dorsal horn, thereby causing pain [2].

![Figure 1](https://example.com/f1.png)  
**Figure 1** Cervical spinal cord stimulation trial.

![Figure 2](https://example.com/f2.png)  
**Figure 2** Permanent paddle cervical spinal cord stimulation.

This pain is unfortunately very resistant to many forms of therapy. Patients are initially treated medically with a combination of anticonvulsants, antidepressants, nonsteroidal anti-inflammatory drugs, or opioids. Surgical procedures for repair of brachial plexus lesions, like repair with autologous grafts, extraplexual or intraplexual nerve transfers, are reported to help in relieving the pain in some cases [4]. If pain persists despite medical management or surgical repair, other invasive treatment modalities like DREZ lesioning and cervical SCS are indicated.

For many, DREZ lesioning is the preferred procedure for treating intractable pain due to brachial plexus avulsion. Several studies show that DREZ lesioning produces excellent pain relief in the early postoperative period with 75% to 98.2% of patients having good results immediately after surgery [5,6]. However, the rate of pain recurrence is very high in long-term follow-up [5,6], with many patients undergoing more DREZ lesioning procedures or alternative treatment modalities like SCS.

SCS has been used successfully in the treatment of chronic neuropathic pain conditions like failed back surgery syndrome, complex regional pain syndrome, peripheral nerve lesions, and phantom limb pain. Many articles reported the use of SCS for treatment of pain caused by brachial plexus avulsion. Bennet et al. reported five cases of pain caused by brachial plexus avulsion treated with dorsal column stimulation, where all five patients achieved good or excellent pain relief during 13.5 months of follow-up [7]. Piva et al. reported four cases treated with cervical SCS where all attained significant pain relief [8]. Brill et al. reported two cases...
Nummular Headache in a Patient with Craniosynostosis: One More Evidence for a Peripheral Mechanism

Dear Editor,

Nummular headache (NH) is a normally mild-to-moderate pain felt in a coin-shaped or elliptical area of the head, typically 1 to 6 cm in diameter. The affected area may show several combinations of sensory signs, such as hypoesthesia, paresthesia, dysesthesia, and tenderness [1,2]. In addition, a few patients develop local alopecia or other trophic changes [3]. NH was described in 2002 [1], and has already been reported in 238 cases according to a recent review [4]. Although NH emerged as a primary disorder, we have to pay attention to possible symptomatic or secondary cases. Here we report a case of NH associated with craniosynostosis.

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References