

Spinal Cord Stimulation for Brachial Plexus Injury Pain: A Case Report and Review of Literature

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Abstract

Severe neuropathic pain after injury to the brachial plexus is quite common. Patients can be managed with drugs, physiotherapy and other supportive measures. But some patients develop severe pain resistant to all conservative measures. Spinal cord stimulation in these patients can be very effective. This is the report of one such patient.

Introduction

Brachial plexus injury occurs commonly in road traffic accidents. These are of three types, preganglionic, postganglionic and mixed types. Pain is much more common in preganglionic type of injury [1]. The incidence of neuropathic pain is very high even up to 95% [2]. These patients need a multidisciplinary team. Most patients benefit from drugs, physical therapies, psychological therapies and nerve reconstruction. For patient's refractory to the initial measures, spinal cord stimulation is a good treatment technique. We present our experience of such a case.

Case Report

A 52-year civil engineer had a brachial plexus injury of his left hand about 20 years back. That time he was treated conservatively. He had relatively well-preserved elbow flexion (C5) but not elbow extension. He was able to continue with his life in spite of the disability. A few years later he started having severe pain involving the left little finger. The pain was severe dull aching type brought on by some activity of the left hand. That time he had undergone wrist arthrodesis and initially ascribed the pain to the surgery. But later the pain persisted. He initially managed with home remedies but the pain was progressive and started involving the wrist region on the medial side. It also changed in character and became burning type, more severe and frequent. The patient was then put on analgesics including NSAIDs and pregabalin but he had no relief. Later other features like swelling, hyperalgesia and change in colour was noticed and pain became continuous and also lancinating so much so that the patient contemplated suicide. For the last two years his pain has been persistent, burning and severe and affecting his daily

activities including dressing, driving, work etc.

Clinical examination showed wasting of muscles of hand and palm with allodynia, discolouration and swelling. Elbow flexion was possible with no sensation in the hand and palm. MRI done recently showed only changes of cervical spondylosis. He underwent hemilaminotomy (left side) and insertion of the permanent spinal cord stimulation. He did not undergo a trial earlier as it was thought that cervical epidural trial may be risky and there was some fibrous changes in the epidural space at D6 to D8 levels. He however underwent peroperative trial stimulation which was very effective. Post operatively he started getting pain relief slowly from the distal areas. Now at about one year follow up he has about 85% pain relief, he is getting only occasional NSAID pain medications, the CRPS features have disappeared and he is back to work full time. A post operative X ray (Figure 1) at one year showed the electrode in very good position.



Discussion

Pain after brachial plexus injury is very well known. Parry [3] reported 108 patients with avulsion injury out of a total of 275. Of these 108, 98 suffered significant pain. Drugs are of very limited use and there remains a significant number of young men with severe pain who may expect to suffer such pain indefinitely. There is urgent need for new methods to be developed to control this pain.

Levaglio and coworkers [2] had written a detailed note on brachial plexus injury pain. They opined that spinal cord stimulation might act via the gate control theory of pain proposed by Melzack and Wall but its true mechanism of action is not completely known. They felt that when complete root avulsion occurs, this approach generally is relatively ineffective due to the degeneration of target fibers up to the brainstem. This method is an option for pain due to non avulsive brachial plexus injury, and could be an option in those patients with persisting pain despite the performance of DREZ lesioning.

Piva and others [4] did a retrospective study of four patients suffering from brachial plexus root avulsion of traumatic origin. Spinal cord stimulation was used to treat pain in all patients. A significant difference of more than three points in the pain between the first

and the last follow-up (0-9 months) on the Visual Analog Scale was obtained with a steady and progressive decrease of the pain scores. Bennett and Tsai [5] reported on their experience with 5 patients who underwent dorsal cord stimulation. The patients had significant pain relief at 13.5 months of follow up. Abdulaziz and Ghalib [6] reported a 25 year old male with severe brachial plexus injury pain. The patient experienced upto 50% of pain relief after trial as well as after permanent stimulator. The surgical placement of the paddle stimulator at C3–C5 level as it appears that spinal cord stimulation primarily affects the dorsal column, the spinothalamic tract and the descending pain inhibitory pathway, In conclusion, cervical SCS can be an effective treatment modality for patients with neuropathic pain from brachial plexus avulsion. Brill and Aryeh [7] also described two patients who had very good pain relief at 6 and 18 months. Floridia et al [8] reported on a 32 year old lady who had a SCS placed producing paraesthesia but she had no pain relief. So she underwent high frequency (10 khz) stimulation. The patient reported 100% paresthesia-free pain relief, a consistent improvement of QoL, and a complete discontinuation of her previous pain treatment at T1 and T6. This is the first report to illustrate the usefulness and safety of HFSCS for treating root avulsion in a patient with failed tonic SCS. Another study [9] showed that SCS was effective in patients who had failed DREZ lesioning. Hong and Jang [10] presented a patient who was suspected to have both preganglionic and postganglionic brachial plexus lesion by EMG and NCV study, he showed favorable response after spinal cord stimulation.

Our patient had developed features suggestive of complex regional pain syndromes (CRPS) two years back. He had continuous burning/throbbing pain in the left hand and palm, increased sensitivity to touch, swelling of the painful area with discolouration of the painful area and changes in temperature and loss of hair in the painful area. There are one study which have mentioned very good relief for pain and CRPS in these situations. This study [11] described a 42 year old female with left upper extremity brachial plexopathy and complex regional pain syndrome (CRPS) type 2 following a motor vehicle accident. Electrophysiologic studies demonstrated upper and middle trunk lesions. Previous unsuccessful interventions included repeated stellate ganglion blockade, transcutaneous electrical nerve stimulation (TENS), and opioid medication. After a successful trial of cervical spinal cord stimulator leads, she went on to an uneventful permanent implantation procedure. At two-week follow up her mood and sleep were both 90% improved and her average pain report decreased to 1/10. Spinal cord stimulation is an effective treatment for neuropathic pain secondary to brachial plexopathy refractory to pharmacotherapy and conventional interventional attempts to modulate pain.

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