



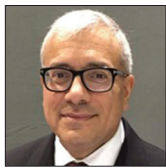
Case Report

Management of CRPS secondary to preganglionic C8 nerve root avulsion: A case report and literature review

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ABSTRACT

Background: Cervical nerve root avulsion is a well-documented result of high-velocity motor vehicle accidents (MVAs). In up to 21% of cases, preganglionic cervical root avulsion can result in a complex regional pain syndrome (CRPS) impacting the quality of life for patients already impaired by motor, sensory, and autonomic dysfunction. The optimal treatment strategies include repeated stellate ganglion blocks (SBGs).

Case Description: A 43-year-old male sustained a high-velocity MVA resulting in the left C8 nerve root avulsion. This resulted in weakness in the C8 distribution, tactile allodynia, and dysesthesias. The magnetic resonance imaging demonstrated an abnormal signal ventral to the C8–T1 level. As the patient was not considered a candidate for surgical intervention secondary to the attendant brachial plexus injury, a C7–C8 epidural steroid injection was performed; this did not provide improvement. Before placing a spinal cord stimulator, the patient underwent a series of six ultrasound-guided SBGs performed 2 weeks apart; there was 75% improvement in pain and strength. Six years later, the patient continues to do well while receiving SBGs 4 times a year.

Conclusion: A preganglionic cervical nerve root avulsion should not be a contraindication for a stellate ganglion block in a patient with established CRPS.

Keywords: Avulsion, Cervical, Complex regional pain syndrome, Nerve root, Preganglionic, Stellate ganglion block

INTRODUCTION

Neuropathic pain from preganglionic avulsion injuries (i.e., located proximal to the dorsal root ganglion [DRG]) is difficult to treat as nearly 50% develop chronic pain.^[5] There are several different effective management strategies including nerve transfer surgery (73% recovery rate), microsurgery (50–75% in postganglionic avulsion), spinal cord stimulator use, dorsal root entry zone (DREZ) lesions, and SBGs which give 57% improvement with chronic regional pain syndrome (CRPS).^[2,4] Here, we present a case where a patient with CRPS type II responded well to repeated SBGs.

CASE PRESENTATION

A 43-year-old male presented for more than 2 years of left-sided C8 root symptoms/signs following an avulsion injury sustained due to a motor vehicle accident (MVA). He

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developed a CRPS type II lesion, treated with venlafaxine, lisdexamfetamine, quetiapine, cyclobenzaprine, and lidocaine patches, multiple cervical interlaminar epidural injections, and physical therapy; none of which resulted in significant improvement. On physical examination, he had left upper extremity 3/5–4/5 motor deficits in the C6–C8 distributions, intolerable C8 dysesthesias, and tactile allodynia. He also had a 2.3° reduced temperature regionally in the left arm compared to the right arm.

Magnetic resonance imaging (MRI) and EMG findings

The MRI demonstrated abnormal signals ventral to the C8–T1 level consistent with an avulsed C8 nerve root. Electrodiagnostic tests including electromyography revealed sensory and motor conduction abnormalities for pre- and postganglionic involvement of the C8 distribution.

Treatment with SGBs

The patient met the Budapest Clinical Diagnostic Criteria for CRPS type II. The patient received an initial left-sided, ultrasound-guided stellate ganglion block 30 months after the avulsion injury; it resulted in 50% pain relief. He underwent a series of five additional SGBs performed 2–3 weeks apart, ultimately experiencing 75% improvement in pain and strength [Table 1]. Six years later, the patient continues to have significant pain relief with SGBs performed 4 times/year.

DISCUSSION

A high force traction brachial plexus injury can result in avulsion, leading to torn nerve roots and axons. These most commonly occur at the C8 and T1 levels. At present, there is no universally accepted standard of care for avulsion injuries.^[3] In our case, the neuropathic pain from the cervical nerve root avulsion was complicated by the development of CRPS type II. The prognosis for CRPS is optimized by targeted

interventional treatment.^[3] Several studies continue to demonstrate the increased efficacy of early SGB therapy.^[1,4] A study from 2017 demonstrated that patients with established CRPS and a shorter duration of symptoms needed fewer SGBs to achieve >50% pain relief.^[3] The majority of patients will require two blocks, between 1 and 3 weeks apart.^[1,3] Here, the delay in the diagnosis and treatment this patient's preganglionic avulsion injury and resultant CRPS syndrome was attributed to undertreated cervical radiculopathy 30 months after the initial injury.

Diagnostic studies confirming nerve root avulsion injuries

Although MRI is the gold standard for the evaluation of nerve root avulsion injuries, CT myelography may also be very helpful.^[3]

Treatment options

Treatment of preganglionic cervical nerve root avulsion includes conservative versus surgical approaches. Preganglionic avulsion injuries can be surgically treated by neurotization, nerve transfers, traditional spinal (dorsal) column stimulation (SCS: 50% success), peripheral nerve stimulation, DREZ lesions, and in primary motor cortex stimulation (55% success rate) (MCS).^[4,7]

Interventional strategies

In patients with coexisting CRPS, interscalene brachial plexus and/or SGBs can be therapeutic.^[6] Newer interventions include spinal (dorsal) column stimulation, peripheral nerve stimulation, DRG stimulation, as well as deep brain stimulation.^[4]

Pharmacologic therapy

Preganglionic avulsion injury is difficult to treat with strictly pharmacological therapy. First tier medications include tricyclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs), and serotonin norepinephrine reuptake inhibitors (SNRIs).^[4]

CONCLUSION

Conventionally, SGBs have been utilized to treat CRPS type I (formerly called reflex sympathetic dystrophy) and CRPS type II syndromes following nerve root avulsion injuries. As a rescue technique, these have proven safe and effective, in some cases avoiding the need for surgery (e.g., nerve transfer and/or cervical spinal cord stimulation).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Table 1: Dates of stellate ganglion injections and VAS scores. The patient underwent stellate ganglion blocks (7 in 2017, 1 in 2018, and 1 in 2019) with VAS scores ranging from 7–3 to 8–6, the latter 4 scores being 8–2 to 8–4.

Dates of stellate ganglion injections	VAS score (baseline → new score)
May 26, 2017	8 → 4
June 12, 2017	8 → 6
June 26, 2017	7 → 5
July 7, 2017	7 → 4
July 31, 2017	7 → 3
October 6, 2017	8 → 4
December 22, 2017	8 → 2
July 30, 2018	8 → 2
December 20, 2019	8 → 2

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Nil.

Conflicts of interest

There are no conflicts of interest.

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