

BACKGROUND

- Brachial plexus avulsion (BPA) is a traction injury that disrupts the preganglionic fibers of the plexus nerve roots originating from the spinal cord leading to significant neuropathic pain, functional impairment, stress, and poor quality of life [1,2].
- Dorsal root entry zone (DREZ) lesioning, a surgical technique that destroys afferent sensory neurons in the dorsal horn to inhibit nociception [3].

PURPOSE

- To describe cervical spinal cord stimulation (cSCS) as a possible treatment option for refractory neuropathic pain for brachioplexopathy once no other procedures or surgeries are indicated.

CASE DESCRIPTION

- Presentation:** A 39-year-old male with complete T6 spinal cord injury paraplegia and complete left brachial plexus avulsion (BPA) injury from a 2008 motorcycle accident, presented with chronic, burning, left palm pain.
- Failed interventions:** physical therapy, neuropathic and anti-inflammatory medications, opioids, epidurals, and peripheral nerve blocks.
- Surgery:** not a candidate for nerve and muscle transfer and dorsal root entry zone (DREZ) lesioning.
- Physical examination:** flaccid paralysis, muscle atrophy, and patches of numbness or allodynia throughout the entire left upper extremity.
- Imaging:** XR with inferior displacement of humerus (Figure 1)
- Electrodiagnostic studies:** absent recruitable motor units in brachial plexus innervated muscles and absent or very low amplitude sensory nerve action potentials in terminal branch nerves (Table 1).

Cervical spinal cord stimulation is a promising therapy for brachial plexus avulsion injury, particularly for patients who fail conservative measures or are unsuitable candidates for alternative surgical interventions.



Figure 1: Left Shoulder X-ray with inferior displacement of humeral head. Previous surgical hardware was intact. No available MRI.

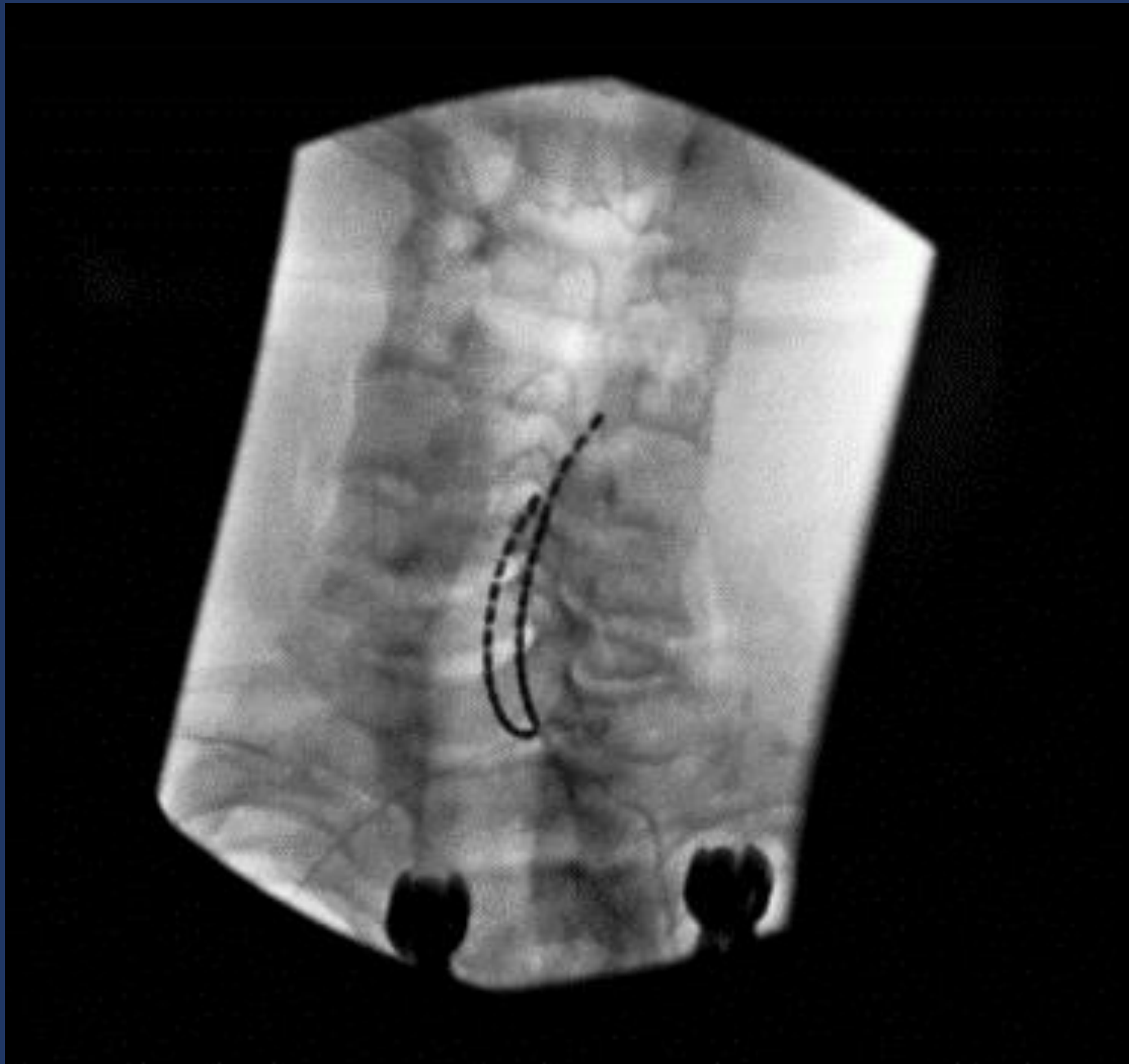


Figure 2: Fluoroscopic image of cervical spinal cord stimulation trial with dual leads placed at C4 and C5 vertebral bodies, respectively.

EMG										
Needle EMG	Spontaneous				Volitional MUAPs					
	IA	Fibs/PSW	Fasc	Other	Dur.	Amp	Poly	Recruit	Rate	Comment
L. Deltoid	Reduced	1+	None							No MUAP's
L. Biceps brachii	Reduced	None	None							No MUAP's
L. Triceps brachii	Reduced	1+	None							No MUAP's
L. Extensor digitorum communis	Reduced	None	None							No MUAP's
L. First dorsal interosseous	Reduced	None	None							No MUAP's
L. Latissimus dorsi	Reduced	None	None							No MUAP's
L. Trapezius (upper)	Normal	None	None		Normal	Normal	None	Normal	Normal	

Table 1: EMG findings with severe, chronic pan-brachial plexopathy of the left upper extremity with no recruitable motor unit action potentials



Figure 3: Fluoroscopic image of successful cervical spinal cord stimulation implantation I with dual leads placed at C4 and C5 vertebral bodies, respectively.

RESULTS

- cSCS trial was successful with 70% reduction (Figure 2).
- Permanent cSCS implant was performed epidurally via interlaminar, right paramedian approach, at the C7-T1 interspace, and two duals leads terminating at the middle of the C4 and the bottom of the C5 vertebral body levels, respectively (Figure 3).
- At 1-month follow-up, he had 70% pain reduction, improved activity tolerance more than 1 hour with ADL's, decreased opioid use reduction by half, and returned to work with full duty.

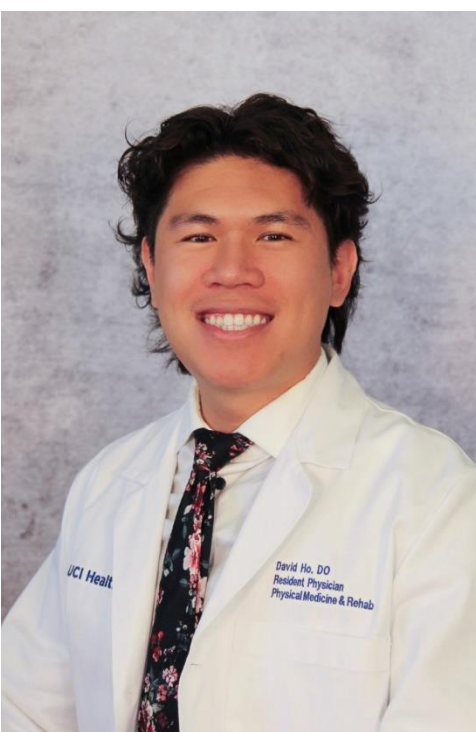
DISCUSSION

- Few cases have reported cervical SCS efficacy for treating BPA-related pain.
- Case 1: 85% pain relief after cervical SCS after 1 year with complete cessation of gabapentinoids, occasional use of anti-inflammatory drugs, and return to full-time work [4].
- Case 2: 41 patients with a mean visual analog score reduction of 4.0 post-cSCS implantation, in which two cases reported 60-80% and 30-35% pain relief with functional improvement at 5 months and 8 months post-implantation, respectively [5].
- This case reports similar pain reduction and functional recovery

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