

## Neurosurgical Intervention in Chronic Pain Secondary to Traumatic Cervical Spinal Cord Injury: Case Report

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### Abstract

**Introduction:** Refractory chronic pain remains a persistent challenge, severely impairing quality of life and often requiring approaches beyond conventional pharmacotherapy. In recent years, neurosurgical techniques such as motor cortex stimulation (MCS), deep brain stimulation (DBS), and focused ultrasound-guided thalamotomy (FUS) have shown promising results in selected patients.<sup>1-3</sup>

**Clinical description:** A 46-year-old female presented with chronic neuropathic pain secondary to traumatic cervical spinal cord injury sustained 3 years earlier. The patient described continuous burning and stabbing pain affecting the left hemibody, predominantly the upper limb, significantly limiting daily activities and sleep. Despite optimized pharmacological management, including gabapentin, duloxetine, amitriptyline, and opioid rescue therapy, pain persisted at 8–9/10 on the Visual Analog Scale (VAS). Functional assessment revealed impaired mobility, sleep disturbance, and depressive symptoms associated with chronic pain. Given refractoriness, a neurosurgical approach was proposed. After multidisciplinary evaluation, bilateral central lateral posterior (CLp) thalamotomy guided by MRgFUS was performed. The procedure was uneventful, with accurate targeting confirmed intraoperatively. Postoperatively, the patient reported partial relief, with VAS decreasing to 6/10. At 3 months, pain intensity improved to 5/10 with recovery of sleep quality. At 6 months, VAS stabilized at 4/10, reflecting >50% reduction compared to baseline, alongside improved activity tolerance and mood. Twelve months later, analgesia remained stable without neurological or cognitive adverse effects. The patient resumed light work and reported significant improvement in quality of life.

**Discussion:** This case highlights the potential of CLp thalamotomy via MRgFUS in otherwise intractable neuropathic pain. Recent studies confirm that this minimally invasive approach may provide long-term pain relief with low complication rates.<sup>1</sup> DBS and MCS remain valid alternatives, particularly in patients with multifocal or complex pain.<sup>2-3</sup> Careful selection and integration within multidisciplinary care are key to optimal outcomes.

**Conclusions:** In refractory chronic pain, CLp thalamotomy guided by MRgFUS represents a safe and effective therapeutic option, capable of achieving sustained analgesia and functional recovery. Individualized neurosurgical strategies, supported by technological advances, are essential for improving outcomes.<sup>1-3</sup>

### References

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