

Functional Neurosurgical Approach in Refractory Post-Traumatic Phantom Limb Pain: Case Report

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Isis Franco Martin,¹ Yasmin Utuari De Oliveira,¹ Isabela Ormond Bataglia Herrero,¹ Henrique Aguiar Lima,¹ Joao Pedro Prado Salomão,¹ Julia Alvim Lage,¹ Isadora Luiza Babinski Dias De Sou,¹ Emanuele Pires Canela Dos Santos.²

¹ Centro Universitário De Várzea Grande. Brasil.

² Universidade Do Estado De São Paulo- Usp. Brasil.

Corresponding author: Isis Franco Martin

email: isisfranco@outlook.com

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Abstract

Introduction: Phantom limb pain (PLP) is a form of chronic neuropathic pain affecting amputees, often described as burning, shooting, or electric-like sensations perceived in the absent limb. Pharmacological treatment (e.g., anticonvulsants, antidepressants, opioids) is frequently insufficient. Functional neurosurgery has emerged as a promising option for refractory PLP, with techniques such as thalamotomy, deep brain stimulation (DBS), and motor cortex stimulation (MCS) aiming to modulate dysfunctional central pain circuits.^{1,2,3}

Clinical description: A 64-year-old female presented with a 5-year history of right-SA 41-year-old male underwent left transfemoral amputation following a motor vehicle accident two years prior. Since then, he experienced severe phantom limb pain (PLP), described as burning and electric shocks, with an average pain score of 9/10 on the Visual Analog Scale (VAS). He showed minimal response to gabapentin, amitriptyline, tramadol, and ketamine. Pain significantly interfered with sleep, prosthetic use, and social life, causing emotional distress. After multidisciplinary evaluation, a functional neurosurgical procedure was indicated. A stereotactic thalamotomy targeting the right ventroposterolateral (VPL) nucleus was performed using radiofrequency thermocoagulation. The procedure was uneventful. Postoperatively, pain decreased immediately to VAS 5/10, with gradual improvement over the following weeks. At 6-month follow-up, pain remained controlled at VAS 3/10, with no need for opioids and reduced gabapentin dosage. The patient reported improved function,

resumed adapted work, and regained social engagement.

Discussion: PLP involves peripheral, spinal, and supraspinal mechanisms, including maladaptive cortical reorganization. Stereotactic thalamic lesions in sensory nuclei like the VPL have shown effectiveness in reducing pain intensity in refractory cases.² Deep brain stimulation and motor cortex stimulation are also effective options but carry higher complexity and cost.³ Proper patient selection and exclusion of psychiatric or functional pain syndromes are essential to ensure therapeutic success.

Conclusions: This case highlights the efficacy of thalamotomy as a functional neurosurgical strategy for severe, post-traumatic phantom limb pain. An individualized, multidisciplinary approach allowed for significant pain control, functional recovery, and improved quality of life.

References

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