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Stellate Ganglion Block to Mitigate Facial and Upper Extremity Thalamic Pain Syndrome of an Oncological Origin

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Abstract

Stellate ganglion block (SGB) is commonly used to reduce sympathetically mediated, upper extremity pain syndromes of various etiologies. However, the efficacy of SGB in mitigating solid thalamic malignancy induced upper extremity and facial pain is unknown. We present two patients with severe, medication-resistant upper extremity and facial pain due to glioblastoma multiform involving the contralateral thalamus. Both patients had significant pain relief and satisfaction following ultrasound-guided SGB performed on the symptomatic side.

Ultrasound-guided SGB may be considered as an adjunct therapy in patients with persistent upper extremity and facial pain due to thalamic cancer, before pursuing invasive intracranial pain reduction surgeries.

Keywords: Thalamic cancer pain; Stellate ganglion block; Ultrasound guidance; Glioblastoma multiform

Introduction

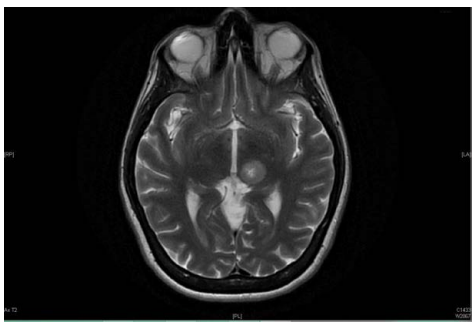
Thalamic pain syndrome (TPS) is an enigmatic and rare condition. It was coined by French neurologists, Joseph Jules Dejerine and Gustave Roussy, in their manuscript Le syndrome thalamique [1], which presented intractable pain due to thalamic ischemia. TPS is under the umbrella of central pain syndrome, which is classically associated with multiple sclerosis, spinal cord injury, post amputation, epilepsy, stroke, tumor, and Parkinson's Disease. The exact mechanism of TPS is unknown, but various investigations demonstrated multifactorial origins: 1. neuronal dysregulation that results in hyperactivities or spontaneous depolarization in the posteroventral thalamus, reticular nucleus, the medial intralaminar area, and parietal cortex has been shown to generate thalamic central pain syndrome [2-4], 2. extensive down-regulation of endogenous opioid receptor availability and binding activities in the affected thalamus, cingulate cortices, insula, and lateral prefrontal cortex [5-6], 3. sympathetic nervous system involvement [7]. The neuropathic symptomatology of TPS is highly variable, ranging from partial to complete coverage of the affected region, or differ from paroxysmal to constant, intractable pain. Due to the spinothalamic decussation, the laterality of the painful area(s) is predictably contralateral to the neurological lesion. Face, trunk, and extremities can become concurrently or individually affected with various degrees of somatosensory disturbances, allodynia, or hyperalgesia. The mainstay treatment of TPS is multimodal pharmacotherapy. In more severe cases, neurosurgical interventions such as medial gamma knife, deep brain-, and motor cortex stimulation have been described with various degrees of success. On the treatment option continuum, there is little known about the intermediate options to manage medication-resistant TPS before resorting to invasive, and often expensive, intracranial therapies. Stellate ganglion block (SGB) was shown promise in reducing TPS symptoms of the upper extremity and face following a thalamic ischemic event [8]. As far as we know, there has not been any publications on the effect of SGB on ipsilateral headache, facial and upper extremity neuropathic pain due to thalamic malignancies. We present two oncologic patients with intractable TPS treated with SGB.

HIPAA authorization has been obtained from both patients. They granted the authors permission to present their clinical scenarios to be used in this manuscript.

Case Report

Patient One

Our first patient is a female in her early forties, who was found to have a left thalamic mass on the brain magnetic resonance imaging (MRI) in 2018. She gradually developed fatigue, right-sided facial, torso, and limb pain as well as paresthesia that progressed to motor deficits of the right arm and leg over a few months. Repeat imaging, unfortunately, revealed enlargement of the left thalamic lesion (Figures 1). Stereotactic biopsy of the left thalamic mass confirmed the diagnosis of glioblastoma multiform (GBM). She subsequently underwent multiple lines of chemo- and radiation therapies. Although the left thalamic lesion size had remained stable following oncological treatments, her functional status declined due to worsening pain. She described her pain as a 10/10, unrelenting burning sensation, tightness, electric quality affecting the right-side body, including her face, torso,



Figurw 1: Patient one's brain MRI revealed glioblastoma multiforme invading the left thalamus in axial view.

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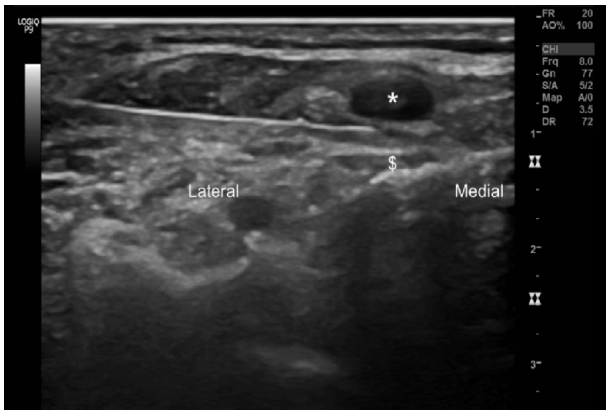
upper, and lower extremity with associated numbness and weakness. She had multiple hospital admissions for pain crises for intravenous ketamine and opioid therapies. She had moderate success while in the hospital, but when converted to oral formulations, she experienced significant sedation without achieving any justifiable pain reduction or quality of life improvement. Other concurrent pharmacological interventions yielded minimal success with intolerable drug side effects. Despite the comprehensive medical management, she was frustrated with her quality of life and described a typical day consisted of lying in bed most of the day in excruciating pain without particular triggers or palliation. By the time she came to our clinic, she already had an extensive and carefully titrated oral medication regimen managed by our palliative care service. Home hospice was considered and discussed; however, the patient was interested in potential clinical trials.

Patient Two

The second patient is an elderly woman who experienced an acute right-sided hemiparesis and cognitive decline in 2018. Her brain imaging showed a hemorrhage involving the left medial temporal lobe and thalamus extending to basal ganglia at that time. She was treated for a hemorrhagic stroke and underwent an angiogram that did not demonstrate any vascular malformation or significant stenosis. Following discharge, the right side paralysis improved with acute rehab. The serial brain imaging showed resolution of the hematoma but demonstrated a persistent soft tissue mass in the left thalamus concerning for a tumor. In the ensuing months, the patient developed pain and worsened sensory symptoms that affect the right side of her face and body. The brain MRI exhibited the thalamic lesion progressed in an expansile fashion. The diagnosis of a left thalamic grade IV GBM was confirmed on a stereotactic biopsy. From the time of her GBM diagnosis until she was seen in our clinic, she had undergone 12 cycles of chemo- and radiation therapies. She reported a constant, 8/10, numbing pain on the entire right side of her body with associated paresthesia, allodynia, pruritus, and weakness affecting the right upper and lower extremities. Her gait remained stable without needing any assistive device on the exam. She had tried gabapentin, duloxetine, and amitriptyline that resulted in minimal improvement. The current regimen of pregabalin 50mg twice daily and oxycodone 5mg every 4 hours provided limited relief. Any upward titration of the medications above caused extreme dizziness and forgetfulness.

Following ultrasound-guided SGB with injectate of 20mg methylprednisolone and 2cc 2% lidocaine (Figure 2), both patients reported immediate pain relief and ipsilateral arm temperature increase of 1.7 and 1.8 degrees celsius, respectively. On the subsequent follow up visit, patient one and two achieved satisfactory pain reduction from 10/10 to 3/10 and 8/10 to 2/10 for one month, respectively, with subjective mood and functional improvement, and social activities engagement endorsed by the patients as well as the family members. During the follow-up visits, physical exams revealed sustained allodynia reduction. Given significant pain relief at the end of life days is particularly meaningful, the decision was made to perform SGB a month later, which yielded similar outcomes and duration. There were no adverse events reported. Both patients expressed a high level of satisfaction. They conveyed the desire to repeat SGB on a routine basis, given the significant pain relief and quality of life improvement, despite approximately over a one-month period. At the time of this manuscript preparation, patient two is successfully weaned off opioid medication completely.



Figurw 2: Ultrasound-guided SGB image with needle trajectory in view. The needle is directed from a lateral to medial orientation. *: carotid artery. $: the longus colli muscle.

Discussion

GBM is the most aggressive neoplasm associated with a high mortality rate. The median survival rate is estimated to range from nine to 16 months, with oncological interventions [9]. Chronic pain is a complex experience that often simultaneously involves biopsychosocial, neuropathic, and nociceptive constituents. Among the advanced cancer patients, factors such as an individual's spirituality, psychological stressors, and views on their mortality add layers of intricacy in addressing their pain. The benefits of SGB on depression, anxiety, psychological pain, and posttraumatic stress syndrome are not unanimous, nonetheless, demonstrated in smaller studies [10]. The sympathetic nervous system has been implicated in neuropathic pain syndromes, albeit the exact extent is unknown. SGB is an accepted sympatholytic method to mitigate sympathetically maintained pain in the upper extremity, neck, and orofacial regions [11,12]. In many parts of the world, SGB application extends beyond pain management to exert autonomic control [13,14]. In addition to ameliorating headache, facial, and upper extremity pain in our two patients from disrupting maladaptive sympathetic physiologic contributions, the psychological merit of SGB cannot be negated entirely. More research is needed.

Conclusion

In summary, US-guided SGB may be considered in patients with TPS due to thalamic cancer, before pursuing more invasive intracranial surgeries to treat pain. The procedure is safe, effective, and can be efficiently performed in an office setting for the cancer patients who already are burdened by frequent hospital-based life-preserving visits and interventions.

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