Motor Cortex Stimulation for Intractable Neuropathic Facial Pain Related to Multiple Sclerosis
—Case Report—

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Abstract

A 33-year-old man presented with ongoing severe right facial pain and sensory disturbances caused by multiple sclerosis (MS). Neuroimaging demonstrated demyelinating lesions in the right dorsal pons and medulla oblongata. The pain was refractory to carbamazepine at 800 mg/day, gabapentin at 1800 mg/day, morphine at 30 mg/day, amitriptyline at 60 mg/day, and diazepam at 4 mg/day, along with twice-monthly ketamine (60 mg) drip infusions. The patient underwent motor cortex stimulation (MCS), resulting in >60% pain relief, reduction in the required doses of pain medications, and discontinuation of ketamine administration. MCS is effective for MS-related neuropathic facial pain.

Key words: motor cortex stimulation, facial pain, multiple sclerosis, intraoperative magnetic resonance imaging, ketamine

Introduction

Neuropathic facial pain syndromes remain difficult to treat medically, and the causes can be divided into peripheral and central. Peripheral neuropathic pain can result from postherpetic neuralgia, nerve injury from facial trauma, dental surgery, and surgical trigeminal root injury during treatment for trigeminal neuralgia (TN). Central neuropathic pain can occur as sequelae of stroke. Multiple sclerosis (MS) occasionally manifests as neuropathic facial pain, and demyelination of the pontine trigeminal pathways can contribute to the trigeminal neuropathic pain associated with MS.10,16) Motor cortex stimulation (MCS) provides good pain relief for neuropathic facial pain,3,6,13,18) although the effectiveness for neuropathic facial pain caused by MS remains unclear. We describe a case of neuropathic facial pain originating associated with MS which was successfully treated with MCS.

Case Report

A 33-year-old man presented with right facial numbness including the 2nd and 3rd divisions of the trigeminal nerve, right facial palsy, and gait disorder 3 years previously. No past or family history of demyelinating diseases was elicited. T2-weighted magnetic resonance (MR) imaging revealed hyperintense areas in the right dorsal pons and medulla oblongata (Fig. 1), suggesting demyelinating disease but not sufficient for definitive diagnosis. MR imaging revealed shrinkage of the lesions (Fig. 2), but the

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Fig. 3 Intraoperative T1- (upper) and T2-weighted (lower) magnetic resonance images taken immediately after placing the electrode on the epidural space, confirming localization of the central sulcus (arrow) and electrode (arrowhead).

Discussion

TN is well known to occur more commonly in MS patients than in the general population. The frequency of MS patients with TN is 0.9–4.9%.4,7,16) TN consists of paroxysmal attacks of electric shock-like sensations, and typical TN is defined as a pain syndrome that arises without clinical manifestations of any sensory deficit. MS-related neuropathic facial pain can be divided into two groups: typical TN (TN group); and trigeminal sensory disturbances other than TN (non-TN group).4) The present patient suffered ongoing facial pain and facial sensory disturbances rather than typical TN, so was classified as non-
MR imaging revealed that abnormal signals in brainstem areas were more often detected in patients with trigeminal disturbances. Alternative medical therapies such as anticonvulsants (phenytoin, baclofen, clonazepam, or gabapentin), antidepressants, and morphine can be used. In the present case, these medical therapies were somewhat effective, but the doses were gradually increased and the pain became intractable. The management of TN in patients with MS remains uncertain. Conventional surgical treatments for MS-related TN include procedures such as trigeminal rhizotomy, microvascular decompression (MVD), and radiosurgery. MVD was effective for TN in 148 consecutive patients, including 10 patients with MS. Good results were achieved in five of 10 patients with MS, although the rate of recurrence was higher than in TN patients without MS. Complications of MVD for TN included hearing loss (6.8%), cerebrospinal fluid leakage (4.8%), and facial weakness (1.2%). No patients with severe neurovascular contact were found among eight patients with MS who underwent posterior fossa exploration due to surgical treatment of TN. Therefore, neurovascular compression is not central in the etiopathogenesis of TN in patients with MS, so only MVD is never justified for treatment of TN with MS. Stereotactic radiosurgery is a conventional treatment for TN used in 262 patients presenting with TN, including 21 patients with MS. The initial pain-relief rate was 89%, although MS and atypical TN were risk factors for reduced pain.

MCS is a relatively new technique, but has been used to treat difficult central and peripheral neuropathic pain syndromes. Poststroke pain responds to MCS, with 50–70% of patients achieving relief. Excellent results have also been reported in the treatment of trigeminal neuropathic pain, with 75–100% of patients achieving pain relief. A prospective study used MCS to treat 10 patients with neuropathic facial pain attributed to surgical trigeminal root injury, poststroke, postherpetic, or no cause. Immediate pain relief was achieved in 88% of patients, with 75% pain relief at a mean follow-up period of 10 months. Mean reduction in pain medication dose was >50%. Our present patient also required reduced doses of oral medications, but also no longer needed ketamine infusion immediately after MCS.

MVD and stereotactic radiosurgery appear more effective for patients in the TN group with peripheral neuropathic facial pain. Conversely, MCS is effective for peripheral neuropathic pain syndromes, and for central neuropathic pain. The present patient showed atypical TN with sensory disturbance classified as central neuropathic facial pain. Thus, MCS was selected as the first surgical treatment. The mechanisms of MSC remain unclear. Regions of the thalamus that have lost the normal somatosensory inputs exhibit abnormal spontaneous and evoked activity. MCS might affect the thalamocortical pathways and modulate the abnormal activities of the pain-processing network.

Appropriate electrode placement is crucial to obtaining pain relief. Various methods have been attempted for placement of appropriate targets, such as combining functional MR imaging with intraoperative cortical brain mapping and neuronavigation systems. These methods were useful for placing the electrode at the correct target both topographically and somatotopically. We installed MR imaging in the operating room in 2006. In this case, we electrophysiologically confirmed correct placement of the electrode by SEP, and obtained topographic confirmation by intraoperative MR imaging.

In the present case, the pattern of facial pain caused by MS was ongoing pain with facial sensory disturbances, defined as central neuropathic facial pain. MCS achieved >60% pain relief, and reduced the required doses of pain medications. MCS for MS-related neuropathic facial pain is a useful choice in surgical treatment. Intraoperative MR imaging was useful for confirming the appropriate topographical placement of the electrode.

References


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