

LETTERS TO THE EDITOR

Motor cortex stimulation in the interhemispheric subdural space as treatment for neuropathic pain in the lower limbs[☆]

Estimulación cortical motora a nivel subdural interhemisférico para el tratamiento del dolor neuropático en el miembro inferior

Dear Editor:

Motor cortex stimulation, first described by Tsubokawa et al.¹ is an effective treatment for drug-resistant neuropathic pain. Most authors advocate placing an electrode in the epidural space over the motor cortex. Nevertheless, epidural electrode stimulation may be suboptimal in patients with neuropathic pain in the lower limbs, making it necessary to place the electrode in the interhemispheric subdural space.

We present the case of a 59-year-old man who had previously undergone surgery for C3–C4 spinal disc herniation that caused myelopathy with Brown-Séquard syndrome (Fig. 1a). Neurophysiological examination prior to surgery showed left-sided impairment of pyramidal tracts and

somatosensory pathways. After surgery, the patient experienced pain with neuropathic characteristics on the left side of the body from dermatome D7–D8 that radiated through the left lower limb. This pain was refractory to level 3 analgesics and rated as 90/100 on the visual analogue scale (VAS). We observed spinal canal decompression with residual myelopathy on the MRI scan performed after the cervical spine surgery (Fig. 1b).

A new surgical procedure entailing cerebral stimulation of the motor cortex was considered as a means of controlling neuropathic pain. Before surgery, we carried out a functional MRI scan and transcranial magnetic stimulation to target the precentral gyrus corresponding to the motor area.

Navigation-guided parasagittal craniotomy was performed over the motor cortex. Using intraoperative brain mapping to target the motor cortex (Fig. 2), we positioned a Resume II (Medtronic) surgical lead to the right side of the interhemispheric subdural space. Head radiographies (Fig. 3) show that the electrode was positioned perpendicular to the motor cortex and inserted posteriorly from the frontal area.

Stimulation was applied between electrode contacts 1 (anode) and 2 (cathode) at a frequency of 50 Hz, with pulses of 200 μ s at 5 volts, which elicited contraction of the right quadriceps. The stimulation parameters used in tests carried out during the immediate postoperative period were 210 μ s, 60 Hz, and 2.7 volts. Since the patient's pain decreased after stimulation was increased to 3.5 volts, we proceeded to

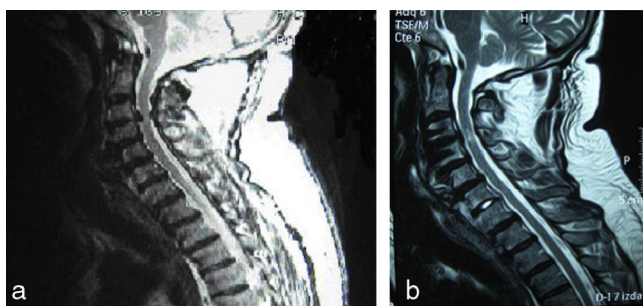


Figure 1 (a) T2-weighted cervical MRI scan before C3–C4 spinal disc herniation surgery. (b) T2-weighted cervical MRI scan after spinal disc herniation surgery.

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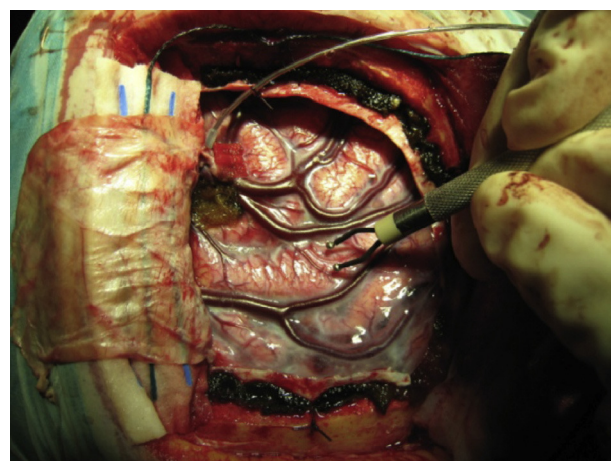


Figure 2 Targeting of motor cortex by intraoperative brain mapping.



Figure 3 Anteroposterior and lateral radiography of the head showing location of the cortical stimulation electrode in the interhemispheric space.

implant an Itrel III pulse generator in the right subclavicular area.

The patient experienced significant pain relief with a score of 30/100 on the VAS, meaning that the analgesics could be gradually reduced before use was completely discontinued. At 18 months, the patient rates his pain as 40/100 on the VAS; pain intensity has been decreased by more than 50% and he requires no analgesic treatments.

As described above, motor cortex stimulation has been shown to be effective for treating neuropathic pain of different aetiologies.^{2–6} Some authors^{7,8} advocate systematic placement of electrodes in the subdural space, rather than using the classic epidural placement described by Tsubokawa et al.¹ to increase efficacy of stimulation. However, both the Saitoh et al.⁷ series and the more recent study by Delavallé et al.⁸ show a higher incidence of postoperative complications (haemorrhage and infection) with that placement.

Neuropathic pain in the lower limbs may require placing the electrode in the interhemispheric subdural space to optimise its contact with the motor cortex. Targeting the motor area with functional MRI scans⁹ and transcranial magnetic stimulation before surgery is a helpful means of obtaining a map of the motor cortex for use in planning the craniotomy. Intraoperative brain mapping is also very useful for finding the optimal position for the electrode.

Cortex stimulation in the subdural space, despite showing a slightly higher frequency of adverse effects than epidural stimulation, is indicated for stimulating the leg area of the motor cortex from the interhemispheric space. Resulting pain control is similar to that obtained with epidural stimulation.

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