

Surgical Treatment of Supplementary Motor Area Lesions

Suplamenter Motor Alan Lezyonlarının Cerrahi Tedavisi

ABSTRACT

Different portions of the SMA appear to be engaged by different types of neurological functions. It is important to identify the functional activation of SMA in terms of planning the surgical strategy. Our unpublished data from M.D. Anderson suggest that resection of the site of SMA activation based on fMRI is an important parameter for predicting the postoperative neurological deficit. Also, protecting the functional SMA during tumor resection may prevent post-operative deficit. Adjunctive non-invasive intraoperative monitoring techniques such as phase reversal of somatosensory evoked potentials, motor evoked potentials monitoring and subcortical stimulation are very important to identify the eloquent cortical brain areas during tumor resection. Delineation of subcortical pathways using diffusion tensor MRI fiber tracking with intraoperative cortical stimulation may also provide improved preservation of eloquent regions during the surgery. Use of preoperative imaging studies including fMRI, diffusion tensor MRI, intraoperative monitoring techniques and awake craniotomies together in suitable cases may minimize the incidence and severity of the SMA syndrome.

KEY WORDS: Functional MRI, Resection, Supplementary motor area

ÖZ

SMA'nın farklı bölgeleri farklı nörolojik fonksiyonlarla ilişkilidir. Cerrahi stratejinin planlanmasında SMA'nın fonksiyonel aktivasyonunun belirlenmesi önemlidir. MD Anderson'da henüz yayınlanmamış verilerimize göre fMRI'de aktivasyon gösteren alanın cerrahi rezeksiyonu postoperatif nörolojik defisit oluşumunun tahmininde önemli bir parametredir. Bunun yanında, fonksiyonel SMA bölgesinin tumor rezeksiyonu esnasında korunması postoperatif defisiti önleyebilmektedir. Faz reversal-somatosensör uyarılmış potansiyel, motor uyarılmış potansiyellerin monitörizasyonu ve subkortikal haritalama gibi ilave invaziv olmayan intraoperatif görüntüleme tekniklerinin kullanılması hassas kortikal beyin bölgelerinin belirlenmesinde önemli yere sahiptir. Ayrıca, bu teknikler ile birlikte difüzyon tensor MRI kullanılması hassas beyin bölgelerinin korunmasına katkıda bulunur. Sonuç olarak, fMRI, difüzyon tensor MRI, intraoperatif monitörizasyon tekniklerinin birlikte kullanılması ve uygun vakalarda uyanık cerrahinin uygulanması SMA sendromunun oluşması riskini ve şiddetini en aza indirebilir.

ANAHTAR SOZCÜKLER: Fonksiyonel MRI, Rezeksiyon, Suplamenter motor alan

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Ulu et al. (Ulu MA, Tanriover N, Ozlen F, Sanus GZ, Tanriverdi T, Ozkara C, Uzan M: Surgical Treatment of Lesions Involving the Supplementary Motor Area: Clinical Results of 12 Patients) presented their experience on surgery of Supplementary Motor Area (SMA) lesions in their article. The authors evaluated the correlation of neurological deficit with the extent of SMA resection and concluded that there is a positive relationship between the incidence of the SMA syndrome and the extent of SMA resection. They also used invasive monitoring techniques, functional magnetic resonance imaging (fMRI), and awake craniotomy for determining the eloquent brain areas.

The authors stated that while complete SMA resection caused the SMA syndrome, incomplete SMA resection caused no neurological deficit except mutism in one patient. They found fMRI to be useful to localize the eloquent brain areas before the surgery for their patient group and they recommended pre-operative fMRI study for patients who will undergo surgery for eloquent brain area lesions. However, we wonder if fMRI studies revealed any activation in SMA, and based on that information whether or not the functional area of SMA was removed during the surgery. Different portions of the SMA appear to be engaged by different type of neurological functions (1). It is important to identify the functional activation of SMA in terms of planning the surgical strategy. Our

unpublished data from M.D. Anderson suggest that resection of the site of SMA activation based on fMRI is an important parameter for predicting the postoperative neurological deficit. Protecting the functional SMA during tumor resection may also prevent postoperative deficit.

Adjunctive non-invasive intraoperative monitoring techniques such as phase reversal of somatosensory evoked potentials, motor evoked potentials monitoring and subcortical stimulation are very important to identify the eloquent cortical brain areas during tumor resection. Delineation of subcortical pathways using diffusion tensor MRI fiber tracking with intraoperative cortical stimulation may also provide improved preservation of eloquent regions during the surgery (2).

Use of preoperative imaging studies including fMRI, diffusion tensor MRI, intraoperative monitoring techniques and awake craniotomies together in suitable cases may minimize the incidence and severity of SMA syndrome.

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