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Reality of the SMA Syndrome in Tumor Surgery: Frequency, Severity and Long-Term Outcomes

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Introduction

The supplementary motor area (SMA) is an area integral to motor function. Lesions of this area cause weakness, language dysfunction and difficulty with motor initiation. Initial estimates of the syndrome may have been confounded by injury to the primary motor cortex and lack of intraoperative mapping and advanced neuronavigation. Here we present a series of resections of tumors of the SMA, and report a low frequency of any deficit at time of discharge, and no significant long-term disability.

Methods

The patient data from all resections involving the SMA over a twelve-year period (2005-2016) was reviewed. Patient demographics, presenting symptoms, use of awake or asleep mapping techniques, extent of resection, pathology, surgical morbidity, post-operative deficits and follow-up out to 3 months post-operatively were recorded.

Results

Twenty-four patients underwent resection of a tumor involving the SMA during the recorded period (12 males/females; Average age 48 years). Seizures (58%) and weakness (42%) were the most common presenting symptoms. Awake craniotomy (33%) or asleep motor mapping (33%) were used in 16/24 (67%) patients. Primary motor cortex was infiltrated by tumor in 21% of patients. Surgery was stopped due to detected function in 3/16 (19%) patients in which mapping was used. In all of these cases this occurred at the posterior most margin of the SMA region. A gross total resection was achieved in 21/24 (87.5%) patients. The most frequent pathology was glioblastoma (42%). An SMA syndrome occurred in only 5/24 (21%) patients. Of these five, 2 of the lesions involved motor cortex. All 5 were mapped either awake (3/5) or asleep (2/5). In two cases, the weakness warranted inpatient rehabilitation, but at 3 months, only one had a mild detectable weakness on exam.

Conclusions

SMA syndrome occurred in approximately 20% of our patients, but these deficits were generally mild and reversible. With the use of awake or asleep mapping techniques, the rate of disabling, long-term deficits was very low, and a high rate of total resection can be achieved. Based on our intraoperative mapping, encountering functional tissue in the SMA when a tumor has displaced or damaged this area is relatively rare.

Learning Objectives

By the conclusion of this session, participants should be able to:

1)Understand the location of the SMA and describe what an constitutes an SMA syndrome

2)Understand the true risk of the syndrome in tumor surgery

3)Describe how mapping techniques can mitigate the risk of a permanent neurologic deficit when operating in this area

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