Supplementary Motor Area Syndrome : A Case Report

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Abstract:

A 56 years old man with left frontal glioblastoma multiforme (GBM), WHO grade IV, located in the supplementary motor area developed speech deficit, reduction of spontaneous movement and difficulty performing voluntary motor acts to command immediately after surgery. All of the above are becoming normal gradually. "We consider that this immediate post-operative motor and speech deficits have been due to resection of the lesion, which involved the supplementary motor area (SMA) of the dominant hemisphere". A characteristic syndrome of immediate post-operative contralateral motor and speech deficits occur following complete or incomplete resection of the SMA. One of the main characteristics of this syndrome, namely the SMA syndrome, is a complete or almost complete recovery within several weeks or months.We suggest that special attention should be given to patients who undergo resection of lesions involving the supplementary motor area (SMA).

Keywords: *supplementary, motor area, speech, dominant*

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Introduction:

Thesupplementary motor area (SMA) occupies the medial portion of Brodmann cortical area 6 and is located in the superior frontal gyrus[1]. The anatomical limits of the SMA are the primary motor cortex posteriorly, the cingulate sulcus and genu of corpus callosum inferiorly and the edge of the medial cortex laterally[2,3]. It has been shown to be involved in several aspects of motor control, including movement selection, preparation, initiation, execution, and feedback-monitoring of a motor program as well as in motor learning and planning of complex sequences of movement[4,5]. Moreover, clinical and electrophysiological studies in patients also support a role of the SMA in speech[6]. Electrical stimulation performed rostral to the supplementary motor representation of the face resulted in vocalization and speech arrest or slowing of speech[6]. Surgical resections of tumors of the medial frontal lobe may result in immediate postoperative motor and speech deficits which in most cases are reversible[7,8]. However, postoperative motor deficit is usually unpredictable, while it is more common when the resection limit extends in caudal parts of SMA [9]. Thus, it is of utmost importance for the neurosurgeon to determine the anatomical and functional limits of the surgical resection and the characteristics and the cause of the deficit. This is also important for informing the patient about the risk of its occurrence and its typical course of recovery. Here we report a case of post operative supplementary motor area syndrome.

Case report:

A 56 years old male presented to us with history of sudden seizure 18 days back with altered level of consciousness. Magnetic resonance image (MRI) of brain showed left frontal glial tumour which involved the supplementary motor area (Fig. 1). We treated him by radical tumor excision. His histopathology report showed glioblastoma multiforme (GBM) WHO grade IV (Fig. 2). On the day of surgery he was fully awake, followed verbal commands, could move all four limbs and spoke normally. On the first post operative day he had speech deficits, reduction of

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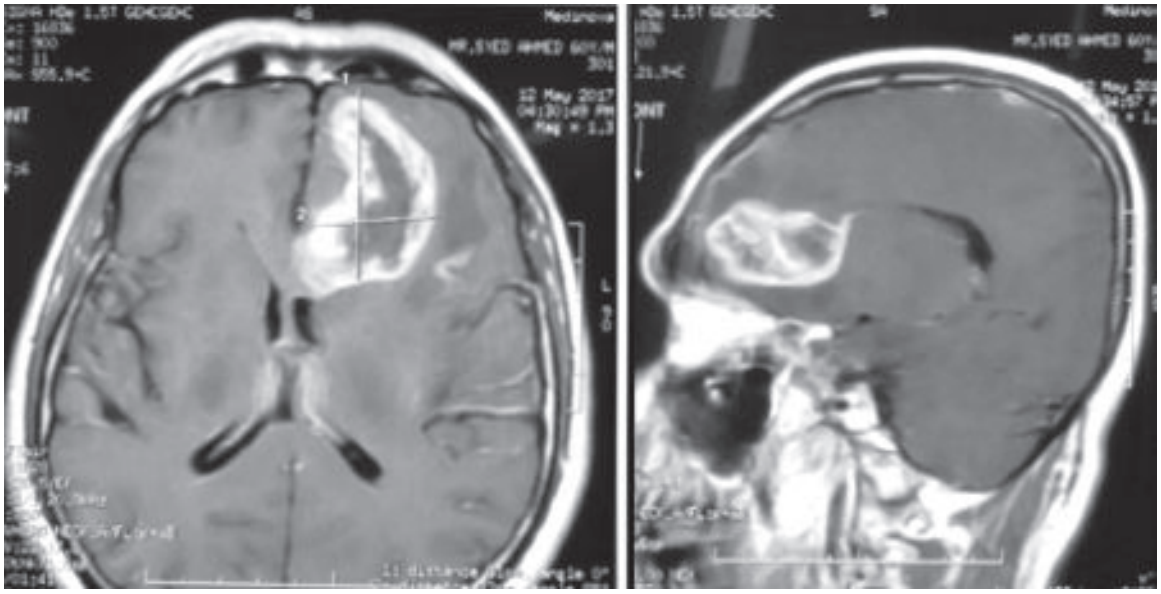

Fig.-1: *Preoperative post contrast cranial MRI section shows a lesion located in the left superior frontal gyrus.*

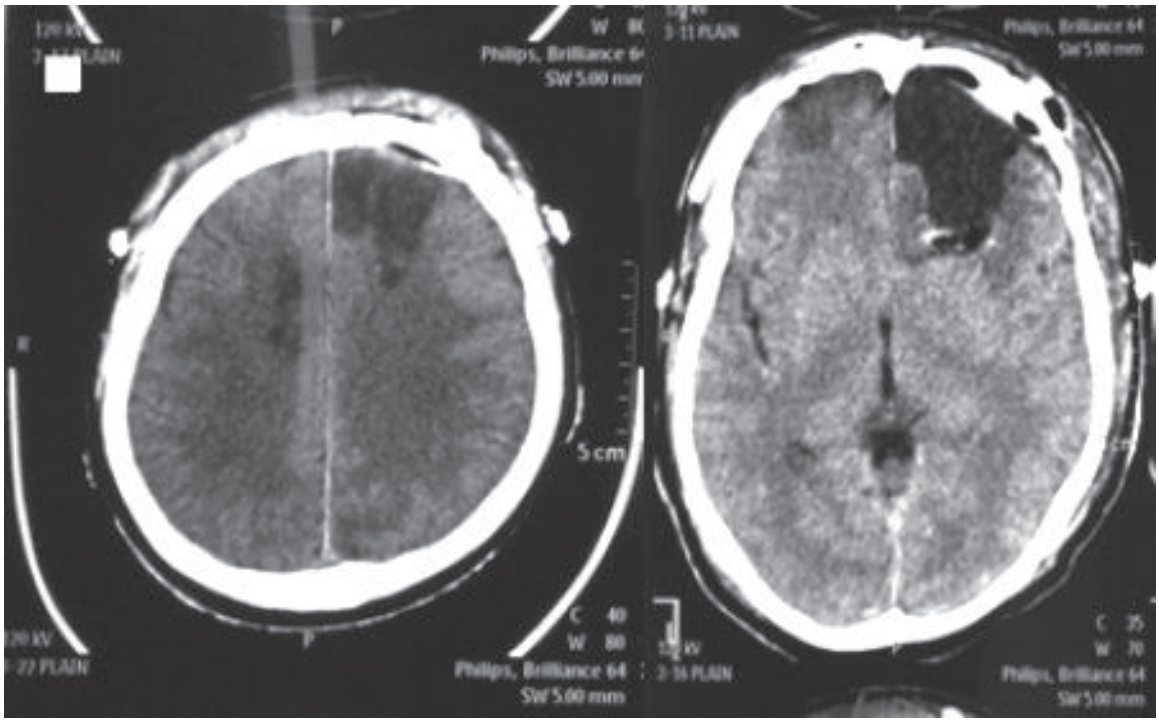

Fig.-2: *The postoperative axial CT scan shows removal of the lesion.*

spontaneous movement and difficulty performing voluntary motor acts to command. During conversation, the patient faced difficulty moving his lingual muscles for producing consonants. Patients vocal cord movements were present, characterized by vowel initiation. On his 6th post operative day patient developed left sided lower limb weakness. Speech therapy and physiotherapy were in progress. From his 9th post-operative day onward she could move his lips and tongue properly to talk without vocalising, the left lower limb movement became normal, spontaneous movement of other limbs and

performance of voluntary motor acts to command started slowly as well. From 13th post-operative day he spoke fluently over phone and was able to walk.

Discussion:

A characteristic syndrome of immediate post-operative contralateral motor and speech deficit occur following complete or incomplete resection of the SMA [9,10]. One of the main characteristics of this syndrome, namely the SMA syndrome, is a complete or almost complete recovery within several weeks or months [11,12]. The specific evolution of this syndrome has been reported to occur in three stages[13]: a) immediately after surgery there is a global akinesia, which is more prominent contralaterally with an arrest of speech; b) sudden recovery a few days later, with persistent reduction in contralateral motor activity, emotional facial palsy, and reduction in spontaneous speech; and; c) within weeks to months after operation, the only sequel is disturbance of the alternating movements of the hands. Typically, the muscle tone of the paralyzed extremities is preserved.

Our patient had speech deficit, reduction of spontaneous movement and difficulty performing voluntary motor acts to command in the contralateral limbs a day after surgery. All of these post operative deficits were becoming normalised.These features suggest that the patient had post -operative supplementary motor area syndrome.

Postoperative speech disorders as a component of SMA syndrome were observed as a transient aphasia followed by a stage of constant improvement in speech fluency. This finding is similar to the previous reports [14]. It has been suggested that only the SMA in the dominant hemisphere is involved in language function, thus aphasia occurred as a result of the resection of dominant SMA as in our case[15].

Identification of eloquent areas of the brain to avoid resection-induced damage is of utmost importance for minimizing the neurological deficit and postoperative quality of life. Thus in patients harbouring lesions associated with SMA, the anatomical and functional association must be defined and determined preoperatively. Patients who undergo resection of tumors involving the medial frontal lobe should be advised about the risk of developing postoperative SMA syndrome and its eventual outcome[9].

Conclusion:

Presurgical planning in patients having lesions involving SMA requires the proper identification of eloquent areas that are very important for minimizing the postoperative neurological deficit. The occurrence and severity of SMA syndrome is associated with the extent of SMA resection and patients should be informed preoperatively about the risks and natural course of this syndrome. Whenever possible functional magnetic resonance (fMR) image should be performed preoperatively, even in cases where invasive monitoring is required.

Conflict of interest:

Authors declare no conflict of interest.

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