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Application of awake craniotomy and intraoperative brain mapping for surgical resection of insular gliomas of the dominant hemisphere

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INTRODUCTION

Gliomas are the most common primary tumours of brain. Currently, the optimal management of gliomas are based on maximal safe resection. Nevertheless, owing to the infiltrative nature of gliomas, it is not always possible to achieve gross total resection (GTR) of tumour while preserving the function of the eloquent structures of cerebral cortex and subcortical white matter tracts. Radical resection of insular gliomas can be associated with major morbidity. Brain mapping techniques can be used to detect the eloquent areas of the brain with acceptable precision intraoperatively; so that the extent of tumour removal is maximized and postoperative morbidities are minimized.

MATERIALS AND METHODS

Patients at Department of neurosurgery, SVIMS, Tirupati with newly diagnosed gliomas of dominant insula from January 2022 to December 2023 were enrolled. The exclusion criteria were severe cognitive disturbances, communication difficulty, older than 75 years, severe obesity, difficult airways for intubation and severe cardiopulmonary diseases. All were evaluated by contrast enhanced brain MRI and diffusion tensor tractography of language and motor systems preoperatively. All were operated under awake craniotomy with the same anaesthesiology protocol. Intraoperative monitoring included continuous motor evoked potential, electromyography, direct electrical stimulation of cortex and subcortical tracts. They were followed with serial neurological examination and imaging.

DISCUSSION

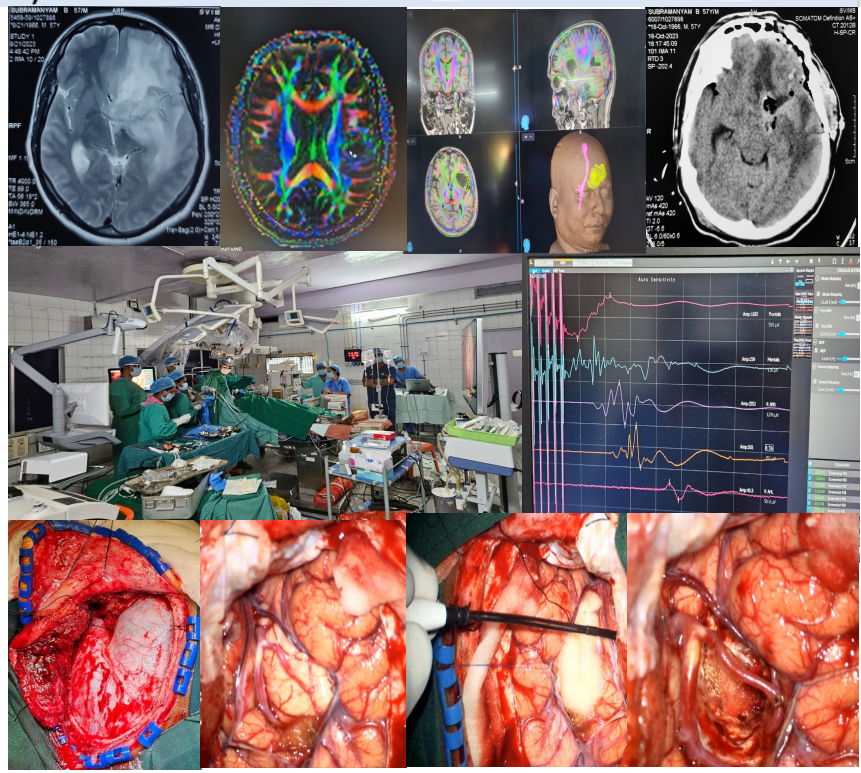
The use of awake craniotomy combined with intraoperative brain mapping has become an increasingly valuable approach for the surgical resection of insular gliomas in the dominant hemisphere. This technique offers several advantages, particularly in preserving neurological function while achieving maximal tumour resection

Advantages and Outcomes:

Preservation of Neurological Function: Intraoperative brain mapping enables the surgeon to identify and avoid critical functional areas, reducing the risk of postoperative deficits. **Maximal Safe Resection:** By accurately mapping the functional areas more extensive tumour removal while minimizing damage to essential brain regions. **Patient Cooperation:** Proper patient selection and preparation are essential to ensure the success of the surgery and the safety of the patient. **Technological Integration:** Provide detailed information about the tumour's relationship with surrounding functional areas

RESULTS

5 patients were enrolled with mean age of 43.6 years and all are male patients. The most common clinical presentation was seizure followed by speech disturbance, hemiparesis and memory loss. Extent of tumour resection ranged from 85 to 95%. No mortality or new major postoperative neurological deficit was encountered. Seizure control improved in 3/4 of patients with medical refractory epilepsy



CONCLUSION

Awake craniotomy with intraoperative brain mapping represents a significant advancement in the surgical management of insular gliomas in the dominant hemisphere. This approach not only enhances the extent of tumour resection but also prioritizes the preservation of neurological function. Continued research and technological innovations will further refine this technique, ultimately improving patient outcomes and quality of life.