# **Precentral gyrus metastases**



- Treatment decisions for intermediate-sized brain metastases in or near the motor cortex among the neuro-oncology community
- Directional interactions from non-small cell lung cancer to brain glucose metabolism revealed by total-body PET imaging
- Resection with intraoperative radiotherapy vs. adjuvant radiotherapy in the treatment of eloquent brain metastases: an analysis of feasibility and safety
- Multimodal and Repeated Localization of Primary Hand Motor Function to the Lateral Postcentral Gyrus in a Case of Frontal Motor Area Brain Metastasis
- The LITT Fit in neuro-oncology: indications, imaging, and adjunctive therapies
- Association between tumor location and toxicity outcomes after stereotactic radiosurgery for brain metastases
- Surgical resection versus stereotactic radiosurgery for the treatment of brain metastases in the motor cortex; a meta-analysis and systematic review
- Tumor-Specific Alterations in Motor Cortex Excitability and Tractography of the Corticospinal Tract-A Navigated Transcranial Magnetic Stimulation Study

Two Precentral gyrus brain metastases adjacent to each other, rounded, 15 and 12 mm respectively, located in the most cranial area of the right parietal lobe. Hypointensity on T1, hyperintensity on T2 with peripheral ring enhancement and associated vasogenic edema are shown. Minimal mass effect with effacement of sulci without midline displacement.

see Magnetic resonance imaging for intracranial metastases

## Treatment

Stereotactic radiosurgery (SRS) has been advocated as a first line treatment for a single metastasis or in combination with surgical resection.

SRS has been readily accepted as a treatment alternative for cancer patients because, in theory, the risks of surgery and WBRT can be negated. The advantage of SRS is the ability to deliver focused radiation to a specified area of brain while avoiding the deleterious neurocognitive effects of WBRT.

This ability also makes SRS an attractive choice for the treatment of lesions within eloquent cortex, such as the precentral gyrus, as it removes the surgical risk of a new or worsened postoperative neurological deficit.

However, recent reports have associated this treatment modality with up to a 40% complication rate  $^{1)}$ .

see also Intracranial metastases surgery

## **Case series**

#### 2023

The outcomes of 208 patients with metastases involving the motor cortex who underwent SRS between 2012 and 2021 were analyzed. A total of 279 metastases (0.01 cm3-12.18 cm3, mean 0.74 cm3) were irradiated. The SRS margin dose varied from 10 to 20 Gy (mean 16.9 Gy). The overall tumor control rate was 97.8%. Perilesional edema was noted in 69 (25%) tumors at presentation. Adverse radiation effects (ARE) were noted in 6% of all tumors but were symptomatic in only 1.4%. The median time to appearance of symptomatic ARE was 8 months. Edema without ARE was observed in 13%. New focal seizures were noted in 5 patients (2%) and new generalized seizures in 1 patient (0.3%). Thirty-six patients (17%) presented with motor deficits. At final follow-up, 32 (85%) were improved or unchanged, 13 (41%) had a normal examination, 10 (31%) had mild deficits, and 9 (28%) still had moderate deficits. New remote brain metastases were found in 31% of patients at a median of 8 months. After treatment, the Karnofsky performance score distribution of the population showed an overall right shift and a median survival of 10 months. Patients with incidentally found brain metastases had significantly better survival than those presenting with deficits (median 13 vs 9 months) (P = .048). The absence of a neurological deficit, recursive partitioning analysis Class I and II, and dose >18 Gy were each associated with a significant survival advantage.

SRS for motor cortex metastases is safe in most patients and effective in providing tumor control. Patients treated before neurological deficits develop show better outcomes <sup>2)</sup>.

#### 2017

Thirty-three patients (19 men and 14 women) with perirolandic metastases who were treated at the authors' institution were reviewed. All participants underwent resection using a functional guided approach, which consisted of using intraoperative brain mapping and/or neurophysiological monitoring to aid in the resection, depending on the functionality of the brain parenchyma surrounding each metastasis. Motor and sensory functions were monitored in all patients, and supplementary motor and language area functions were assessed in 5 and 4 patients, respectively. Clinical data were analyzed at presentation, discharge, and the 6-month follow-up. RESULTS The most frequent presenting symptom was seizure, followed by paresis. Gross-total removal of the metastasis was achieved in 31 patients (93.9%). There were 6 deaths during the follow-up period. After the removal of the metastasis, 6 patients (18.2%) presented with transient neurological worsening, of whom 4 had worsening of motor function impairment and 2 had acquired new sensory disturbances. Total recovery was achieved before the 3rd month of follow-up in all cases. Excluding those patients who died due to the progression of systemic illness, 88.9% of patients had a Karnofsky Performance Scale score greater than 80% at the 6-month follow-up. The mean survival time was 24.4 months after surgery. CONCLUSIONS The implementation of intraoperative electrical brain stimulation techniques in the resection of central region metastases may improve surgical planning and resection and may spare eloquent areas. This approach also facilitates maximal resection in these and other

critical functional areas, thereby helping to avoid new postoperative neurological deficits. Avoiding permanent neurological deficits is critical for a good quality of life, especially in patients with a life expectancy of over a year <sup>3)</sup>.

### 2013

During a 2-year period from 2010 to 2012, 17 consecutive patients harboring a cerebral metastasis within the precentral gyrus underwent microsurgical resection. All patients were discussed at a multidisciplinary tumor board. The prerequisite for neurosurgical treatment was stable systemic disease and life expectancy greater than 6 months as determined by the patient's oncologist. Patients also were required to harbor a symptomatic lesion within the motor cortex, defined as the precentral gyrus.

Kellogg and Munoz, present the 3-month neurological outcome for this group of patients. Surgery was uneventful and without any severe perioperative complications in all 17 patients. At 3 month follow up, symptoms had improved or been stabilized in 94.1% of patients and were worsened in 5.9%.

Results have shown that surgery for cerebral metastases in the precentral gyrus can be done safely and improve or stabilize the neurological function of most patients. Microsurgical resection of precentral gyrus metastases should be a treatment option for patients with single or multiple lesions who present a focal neurologic deficit. This can be performed safely and without intraoperative cortical mapping <sup>4</sup>.

#### 1)

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Kellogg RG, Munoz LF. Selective excision of cerebral metastases from the precentral gyrus. Surg Neurol Int. 2013 May 17;4:66. doi: 10.4103/2152-7806.112189. Print 2013. PubMed PMID: 23776752; PubMed Central PMCID: PMC3683173.

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