

Intracranial metastases surgery indications

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Indicated in:

Solitary lesion causing mass effect

Diagnostic uncertainty

Accessible location

Good performance status

Often followed by SRS to the cavity.

Neurosurgical procedures are of central importance in the multimodal treatment of cerebral metastases. The indications for neurosurgical interventions will be refined in the light of more effective radiation techniques and systemic treatments with new targeted therapeutic approaches and immunotherapies on the horizon ¹⁾.

For [patients](#) who develop [brain metastases](#) from [solid tumors](#), [age](#), [KPS](#), primary tumor status and presence of [extracranial metastases](#) have been identified as prognostic factors. However, the factors that affect [survival](#) in patients who are deemed fit to undergo [resection](#) of [brain metastases](#) have not been clearly elucidated hitherto.

In a retrospective analysis of a [prospectively maintained database](#). All patients who underwent resection of [intracranial metastases](#) from solid tumors were included. Various patient, disease and treatment-related factors were analyzed to assess their impact on survival.

Overall, 124 patients had undergone surgery for brain metastases from various primary sites. The median age and pre-operative performance scores were 53 years and 80 respectively. Synchronous metastases were resected in 17.7% of the patients. The postoperative morbidity and mortality rates were 17.7% and 2.4% respectively. Adjuvant whole-brain radiation was received by 64 patients. At

last follow-up, 8.1% of patients had fresh post-surgical neurologic deficits. The median progression-free and overall survival were 6.91 and 8.56 months respectively.

Surgical resection of brain metastases should be considered in carefully selected patients. Gross total resection and receiving adjuvant whole brain RT significantly improves survival in these patients ²⁾.

Several prospective studies have described a subset of patients for which surgery is highly indicated and results in a prolonged survival ³⁾.

These patients most often have a single, surgically accessible metastatic lesion, absent or well-controlled systemic disease, good functional status (KPS), intact neurological function, and absence of leptomeningeal infiltration ⁴⁾.

In 1990, Patchell et al. compared surgical resection and postoperative WBRT to needle biopsy and radiotherapy for the treatment of a single brain metastasis ⁵⁾.

In this seminal work, the authors described surgically treated individuals as having a longer survival period (40 weeks, compared with 15 weeks), greater functional independence, and decreased incidence of recurrence within the original metastatic site. A similar study by Vecht et al. in 1993 yielded analogous results, but the authors noted that extended survival with surgery only applied to patients with stable extracranial disease ⁶⁾.

The presence of a single metastatic lesion in the setting of well-controlled systemic cancer is the best indicator for surgical therapy, and is predictive for prolonged survival following resection. Furthermore, patients who improve functionally after surgery tend to experience better outcomes in response to adjuvant therapy ⁷⁾.

For lesions causing significant neurological complications, the role of surgery is definitive: Tumor resection remains the only effective method of providing immediate relief to life threatening symptoms ⁸⁾.

Surgical extirpation can alleviate symptoms associated with mass effect, intracranial hypertension secondary to CSF obstruction, and peritumoral edema ⁹⁾.

Patients experiencing medically refractory seizures, as induced by a metastatic lesion, may similarly benefit from surgery ¹⁰⁾.

Because large tumors are most likely to cause significant neurological complications, lesion size greater than 3 cm is an indication for surgery ¹¹⁾.

Cerebellar lesions are also a surgical indication, as they often present with brainstem compression and obstructive hydrocephalus, necessitating immediate resection ¹²⁾.

For patients with end stage metastatic disease, surgery may represent an effective salvage therapy. Surgical intervention may be required to reduce mass effect or CSF obstruction, and may ameliorate impaired consciousness and improve neurologic function ¹³⁾.

A principle contraindication to surgical treatment of brain metastases is the presence of multiple lesions. Although some appropriately selected patients may benefit from aggressive multimodal therapy, surgery may not improve the already short expected survival, and is thus hard to justify ¹⁴⁾.

Additionally, the technical difficulties in accessing and resecting multiple lesions limit the potential benefits of surgery. In cases where there exists a large dominant lesion, however, surgery may be indicated to provide symptomatic relief ¹⁵⁾.

Reoperation for recurrent brain metastases may be indicated in certain situations. Bindal et al. reported an increased survival time for patients whose recurrent metastases were resected, versus those who did not undergo additional operations (8.6 and 2.8 months, respectively) ¹⁶⁾.

Patients with well-controlled systemic disease and high performance scores may indeed experience better survival after sequential surgeries for recurrences. Surgical resection is certainly a viable option for treating tumor recurrence after SRS, unless surgery is otherwise contraindicated ¹⁷⁾.

Proceeding with surgery depends entirely on the individual patient's clinical scenario. Patients with a single metastatic lesion and well-controlled primary cancer experience improvements in neurological function and lengthened survival time following resection. Since rates of surgical mortality and neurological morbidity are low (under 2% and 6%, respectively), ¹⁸⁾ surgery remains a feasible option for the treatment of brain metastases.

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