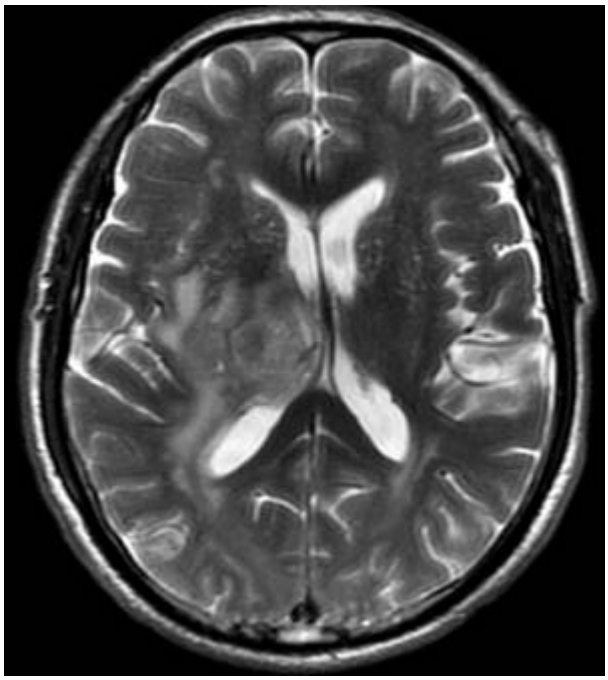
Thalamic glioma

- Cholinergic neuronal activity promotes diffuse midline glioma growth through muscarinic signaling
- Comprehensive molecular characterization of adult H3K27M mutated thalamic glioma long-term survivors
- Sustained response to trametinib in an adult patient with neurofibromatosis type 1 and high-grade glioma
- Microsurgical Endoscope-Assisted Removal of a Pulvinar Glioma Through a Supracerebellar Transtentorial Approach to the Cisternal Surface of the Thalamus: 2-Dimensional Operative Video
- Transient mRNA CAR T cells targeting GD2 provide dose-adjusted efficacy against diffuse midline glioma and high grade glioma models
- Favorable Response to Conventional Chemoradiotherapy in Radiation-induced Glioma Harboring Coamplification of PDGFRA, KIT, and KDR: A Case Report and Literature Review
- High-grade astrocytoma with piloid features: a single-institution case series and literature review
- MRI-Based Score to Recognize Thalamic Glioma Grade in Children: Morphology, Diffusion, and Arterial-Spin-Labeling Perfusion



Thalamic tumor.

Epidemiology

Thalamic gliomas are rare tumors of brain accounting about 1-1.5% of all brain tumors. Twenty-five percentage of this is reported in people of age less than 15 years. In one study incidence was reported to be 0.84 -5.2% of all intracranial tumors [1) 2) 3) 4)].

This broad discrepancy is because of the difficulty in differentiating between primary and secondary thalamic gliomas, that is, arising from adjacent structures like caudate nuclei, brain stem or pineal

gland. Primary bithalamic gliomas are rarer. About fifty cases have been reported in literature till now. In pediatric age group only 15 cases have been reported [5) 6)].

Classification

Astrocytomas are the most common tumors.

1. Common neoplasms

see Bilateral thalamic glioma

see Thalamopeduncular glioma

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1. Histopathological Classification (WHO 2021)

Thalamic gliomas can belong to different glioma subtypes based on histology and grade:

Low-grade gliomas (WHO Grade 1–2)

Thalamic Pilocytic astrocytoma (PA, WHO Grade 1) see Thalamic pilocytic astrocytoma

Thalamic Diffuse astrocytoma, IDH-mutant (WHO Grade 2)

Thalamic Oligodendroglioma, IDH-mutant, 1p/19q co-deleted (WHO Grade 2)

Thalamic High-grade gliomas (WHO Grade 3–4)

Thalamic Diffuse midline glioma H3 K27-altered (WHO Grade 4) – more common in children

Gliosarcoma (variant of glioblastoma, WHO Grade 4)

2. Molecular Classification (WHO 2021 & Pediatric/Adult Differences)

Molecular markers are crucial in defining thalamic gliomas, especially for prognosis and treatment:

IDH-mutant vs. IDH-wildtype: IDH-mutant gliomas have better prognosis than IDH-wildtype gliomas.

Diffuse midline glioma H3 K27-altered.

TERT promoter mutation: Frequently found in glioblastomas, associated with poor prognosis.

1p/19q co-deletion: Defines oligodendrogliomas and suggests better response to therapy.

MGMT promoter methylation: Predicts better response to temozolomide in glioblastoma.

3. Imaging-Based Classification

MRI findings help in classification and differential diagnosis:

Diffuse vs. Well-Circumscribed Lesions:

Diffuse lesions suggest high-grade gliomas or diffuse midline gliomas.

Well-circumscribed lesions suggest pilocytic astrocytomas or oligodendrogliomas.

Enhancement Patterns:

Ring enhancement: Suggests glioblastoma or metastases.

Heterogeneous enhancement: Often seen in anaplastic astrocytomas and glioblastomas.

Non-enhancing tumors: Often low-grade gliomas.

4. Pediatric vs. Adult Thalamic Gliomas

Pediatric gliomas: More likely to be Diffuse midline glioma H3 K27-altereds or pilocytic astrocytomas.

Adult gliomas: More frequently IDH-mutant astrocytomas or glioblastomas.

5. Prognostic Classification

Good prognosis: IDH-mutant gliomas, low-grade gliomas, MGMT-methylated glioblastomas.

Treatment

see Thalamic glioma treatment.

Case series

2007

Seventy-two patients with thalamic pilocytic astrocytomas underwent stereotactic volumetric resection by the senior author (PJK) at the Mayo Clinic between 1984 and 1993 (44 patients) and at New York University Medical Center between 1993 and 2005 (28 patients). Patient demographics, presenting symptoms, surgical approaches, neurological outcomes, pathology, initial postoperative status, and long-term clinical and radiographic follow-up were retrospectively reviewed.

On preoperative neurological examinations, 54 of the 72 patients had neurological deficits; of these, 48 had hemiparesis. Postoperative imaging demonstrated gross total resection in 58 patients and minimal (<6 mm) residual tumor in 13 patients. Tumor resection was aborted in one patient. On immediate postoperative examination, 16 patients had significant improvements in hemiparesis. Six patients had worsening of a preexisting hemiparesis and one had a new transient postoperative hemiparesis. There was one postoperative death. After 13 to 20 years of follow-up in the Mayo group (mean, 15 +/- 3 yr) and 1 to 13 years of follow-up in the New York University group (mean, 8 +/- 3 yr), 67 patients were recurrence/progression-free, one had tumor recurrence, and three had progression of residual tumor. There were two shunt-related deaths. On long-term neurological follow-up, 27 patients had significant improvements in hemiparesis; one patient with a postoperative worsening of a preexisting hemiparesis remained unchanged. There were no patients with new long-term motor deficits after stereotactic resection.

Gross total removal of thalamic pilocytic astrocytomas with low morbidity and mortality can be achieved by computer-assisted stereotactic volumetric resection techniques. Gross total resection of these lesions confers a favorable long-term prognosis without adjuvant chemotherapy and/or radiation therapy and leads to the improvement of neurological deficits [7].

2000

The purpose of a study was to investigate the feasibility of maximum microsurgical removal in a series of intrinsic thalamic astrocytomas. 14 patients with intrathalamic astrocytomas grades I to 4 as diagnosed by previous stereotactic biopsy or intra-operative frozen section were selected for maximum microsurgical removal. The infratentorial supracerebellar approach from the contralateral side was used for 4 limited neoplasms of the pulvinar. For the other 10 larger and more extensive processes a parieto-occipital transventricular approach was chosen. Final histology gave the result of astrocytoma grade 1 or 2 in 4 patients, and of astrocytoma grade 3 or 4 in 10 patients. Postoperative MRI confirmed reduction of the tumor mass by 80 to 100% in 11 of 14 cases. Regional ancillary radiotherapy with 60 Gy was administered postoperatively for astrocytomas grades 3 and 4. Two patients operated on via the posterior transventricular approach had new postoperative partial hemianopsia. Five of the 14 patients finally needed a ventriculoperitoneal shunt. During the follow-up time of 6 to 52 months, tumor progression/recurrence was observed in 6 of the 10 high grade and none of the low grade neoplasms. The present pilot series demonstrates the feasibility of the microsurgical concept. Comparison with other treatment modalities, such as brachytherapy, requires future consideration [8].

1989

In a study of 72 patients who had histologically verified thalamic astrocytomas, 44 patients underwent stereotactic serial biopsy, 22 underwent stereotactic resection of the neoplasm, and an additional 6 patients underwent stereotactic biopsy followed by stereotactic resection of the tumor at a later date. Of the 50 patients who underwent stereotactic biopsy, 3 were neurologically worse after the procedure (morbidity, 6%), and 3 additional patients with Grade 4 astrocytomas who preoperatively were rapidly deteriorating neurologically, died within 30 days of the procedure. Of the 28 patients who underwent stereotactic resection, 14 were neurologically improved after the procedure, 10 were unchanged, and 4 were worse. One additional patient died 10 days postoperatively. Thirty-four patients had Grade 4 astrocytomas: 27 underwent stereotactic biopsies. The mean survival after biopsy and irradiation for patients with Grade 4 astrocytomas was 21.4 weeks. The mean survival was 62 weeks in 7 patients with Grade 4 astrocytomas who underwent stereotactic resection and radiation therapy. The mean survival time after biopsy and radiation therapy for patients who had Grade 3 and Grade 2 lesions was 54.4 weeks and 91 weeks, respectively. Twenty-three patients had pilocytic astrocytomas; 8 underwent stereotactic biopsies, and 19 underwent stereotactic resection of the tumor (4 of these underwent biopsy prior to resection). There was no neurological morbidity, but one patient died after resection. Many of those who underwent resection were deteriorating due to an enlarging tumor mass or recurring cyst, and had undergone more conservative therapies such as biopsy and radiation. Even though stereotactic biopsy is appropriate in many patients harboring thalamic astrocytomas, selected patients with significant mass effect from solid tumor or recurring cyst can benefit from stereotactic resection [9].

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