Butterfly glioblastoma

see also Butterfly glioma.

- Butterfly glioblastoma: trends in therapeutic modalities, extent of resection and survival in the temozolomide era. a SEER-based study
- Glioblastoma Masquerading as Metastasis in a Routine Follow-Up of a 79-Year-Old Woman
- Tissue Is the Issue: The Diagnosis of Butterfly Brain Lesions
- Radiological, clinical, and molecular analyses reveal distinct subtypes of butterfly glioblastomas affecting the prognosis
- The Impact of Extensive Surgical Resection of Butterfly Glioblastomas on Outcomes in the Presence of TERT Mutation and EGFR Amplification: A Retrospective Cohort Study
- Extent of Resection and Outcomes of Patients with Primary Malignant Brain Tumors
- Not without Context-A Multiple Methods Study on Evaluation and Correction of Automated Brain Tumor Segmentations by Experts
- Bilateral Laser Interstitial Thermal Therapy for Butterfly Gliomas Compared With Needle Biopsy: A Preliminary Survival Study

Outcome

In a meta-analysis, resection was associated with an increased rate of postoperative neurologic deficit (OR 2.05, 95% CI 1.02-4.09). Resection offers greater OS up to 1-year postintervention than biopsy alone; however, this comes at the cost of higher rates of postoperative neurologic deficits [1)].

The prognosis of glioblastoma multiforme (Glioblastoma) is poor even with aggressive first-line therapy, which includes surgery, radiation therapy, and adjuvant chemotherapy. Although the ideal course of treatment for elderly patients with newly diagnosed Glioblastoma is still undecided and requires further studies, the new chemotherapeutic agents administered with or without concomitant radiation therapy have shown promising results. However, in our setting, where resources are limited and newer treatment options are expensive, it is often difficult to deliver the best care to the patient [2)].

Systematic Reviews

52 studies comprising 683 patients. Most patients experienced headache (33%), cognitive decline (18.7%), and seizures (17.7%). Tumors mostly infiltrated the corpus callosum genu (44.2%) with bilateral extension (85.4%) into frontal (68.3%) or parietal (8.9%) lobes. Most G-I-CC were glioblastomas (84.5%) with IDH-wildtype (84.9%) and unmethylated MGMT promoter (53.5%). Resection (76.7%) was preferred over biopsy (23.3%), mostly gross-total (33.8%) and subtotal (32.5%). The tumor-infiltrated corpus callosum was resected in 57.8% of cases. Radiation was delivered in 65.8% of patients and temozolomide in 68.3%. Median follow-up was 12 months (range, 0.1-116). In total, 142 patients (31.8%) experienced post-surgical complications, including transient supplementary motor area syndrome (5.1%) and persistent motor deficits (4.3%) or abulia (2.5%). Post-treatment symptom improvement was reported in 42.9% of patients. No differences in rates of

complications (p = 0.231) and symptom improvement (p = 0.375) were found in cases with resected versus preserved corpus callosum. Recurrences occurred in 40.9% of cases, with median progression-free survival of 9 months (0.1-72). Median overall survival was 10.7 months (range, 0.1-116), significantly longer in low-grade tumors (p = 0.013) and after resection (p < 0.001), especially gross-total (p = 0.041) in patients with high-grade tumors.

G-I-CC shows clinicopathological patterns comparable to other more frequent gliomas. Maximally safe resection significantly improves survival with low rates of persistent complications [3].

A systematic review of the literature was conducted using PubMed, EMBASE, and Cochrane databases through March 2021 in accordance with the PRISMA checklist. Pooled hazard ratios were calculated and meta-analyzed in a random-effects model including an assessment of heterogeneity. Out of 3367 articles, seven studies were included with 293 patients. Surgical resection was significantly associated with longer overall survival (HR 0.39, 95%CI 0.2-0.55) than biopsy. Low heterogeneity was observed (I2: 0%). In further analysis, the effect persisted in the extent of resection subgroups of both ≥80% and <80%. No statistically significant difference between surgery and biopsy was detected in terms of postoperative complications, although these were numerically larger for surgery. In patients with bGBM, surgical resection was associated with longer survival prospects compared with biopsy [4]

Meta-analysis

A meta-analysis was designed to determine whether there are significant differences in overall survival (OS) and postoperative neurologic deficits (motor, speech, and cranial nerve) following intervention in patients who underwent tumor resection as part of their treatment, compared to patients who underwent biopsy without surgical resection. A literature search was conducted using PubMed (National Library of Medicine) and Embase (Elsevier) to identify articles from each database's earliest records to May 25, 2021, that directly compared the outcomes of biopsy and resection in bGBM patients and met predetermined inclusion criteria. A meta-analysis was conducted to compare the effects of the two management strategies on OS and postoperative neurologic deficits. Six articles met our study inclusion criteria. OS was found to be significantly longer for the resection group at 6 months (odds ratio [OR] 2.94, 95% confidence interval [CI] 1.23-7.05) and 12 months (OR 3.75, 95% CI 1.10-12.76) than for the biopsy group. No statistically significant differences were found in OS at 18 and 24 months. Resection was associated with an increased rate of postoperative neurologic deficit (OR 2.05, 95% CI 1.02-4.09). Resection offers greater OS up to 1 year postintervention than biopsy alone; however, this comes at the cost of higher rates of postoperative neurologic deficits [5].

Case series

2023

Medical records of all consecutive patients diagnosed with bGBM by a single surgeon at a single institution from January 2014 to August 2022 were reviewed. Clinical, safety, and radiographic volumetric data were obtained. In addition, an exploratory analysis of survival was performed.

Results: A total of 25 patients were included; 14 underwent biopsy only, and 11 underwent biopsy +

LITT (7 underwent bilateral and 4 underwent unilateral LITT). No (0%) intraoperative or postoperative complications were recorded in the treatment group. Tumor volume negatively correlated with extent of treatment (r 2 = 0.44, P = .027). The median progression-free survival was 2.8 months in the biopsy-only group and 5.5 months in the biopsy + LITT group (P = .026). The median overall survival was 4.3 months in the biopsy-only group and 10.3 months in the biopsy + LITT group (P = .035).

Conclusion: Bilateral LITT for bGBM can be safely performed and shows early improvement of the progression-free survival and long-term survival outcomes of these patients [6].

2022

Patients with newly diagnosed glioblastoma from 2010 to 2019 were included. Corpus callosum infiltration was assessed in contrast-enhanced T1-weighted preoperative magnetic resonance imaging. The extent of resection, adjuvant treatments, and overall survival was evaluated. Corpus callosum involvement was found in 96 (26.4%) out of 363 patients with newly diagnosed glioblastoma. Bilateral corpus callosum infiltration was found in 27 out of 96 patients (28%), and 69 patients had unilateral corpus callosum infiltration. Glioblastoma with corpus callosum affection had significantly lower median overall survival compared to glioblastoma without corpus callosum involvement (9 vs. 11 months, p = 0.02). A subgroup analysis of glioblastoma with unilateral corpus callosum infiltration revealed a significant difference in median overall survival dependent on the extent of resection (6.5 without gross total resection vs. 11 months with gross total resection, Log-rank test p = 0.02). These data confirm a shorter overall survival in the glioblastoma subpopulation with corpus callosum involvement, especially for glioblastoma with bilateral corpus callosum infiltration. However, patients with partial corpus callosum infiltration undergoing gross total resection exhibited a significant survival benefit compared to their counterparts without gross total resection. Whenever reasonably achievable gross total resection should be considered an integral part of the treatment strategy in glioblastoma with partial corpus callosum infiltration [7].

In a retrospective, population-based cohort study included patients diagnosed with butterfly glioblastoma in Western Norway between 01/01/2007 and 31/12/2014. We enrolled patients with histologically confirmed glioblastoma and patients with a diagnosis based on a typical MRI pattern. Clinical data were extracted from electronic medical records. Molecular and MRI volumetric analyses were retrospectively performed. Survival analyses were performed using the Kaplan-Meier method and Cox proportional hazards regression models.

Among 381 patients diagnosed with glioblastoma, 33 patients (8.7%) met the butterfly glioblastoma criteria. Median overall survival was 5.5 months (95% CI 3.1-7.9) and 3-year survival was 9.1%. Hypofractionated radiation therapy with or without temozolomide was the most frequently used treatment strategy, given to 16 of the 27 (59.3%) patients receiving radiation therapy. Best supportive care was associated with poorer survival compared with multimodal treatment [adjusted hazard ratio 5.11 (95% CI 1.09-23.89)].

The outcome from butterfly glioblastoma was dismal, with a median overall survival of fewer than 6 months. However, long-term survival was comparable to that observed in non-butterfly glioblastoma, and multimodal treatment was associated with longer survival. This suggests that patients with butterfly glioblastoma may benefit from a more aggressive treatment approach despite the overall poor prognosis [8].

Case reports

report two cases of Butterfly glioblastoma that was safely and maximally resected using brief and exact awake mapping after general anesthesia. Two patients had butterfly tumors in both the frontal lobes and the genu of the corpus callosum. Tumor resection was first performed on the non-dominant side under general anesthesia to shorten the resection time and maintain patient concentration during awake surgery. After that, awake surgery was performed for the lesions in the dominant frontal lobe and genu of the corpus callosum. Tumor resection was performed through minimal cortical incisions in both frontal lobes. Postoperative magnetic resonance imaging showed gross total resection, and the patients had no chronic neurological sequelae, such as akinetic mutism and abulia.

bGBM could be safely and maximally resected by a combination of asleep and brief awake resection, which enabled patients to maintain their attention on the task without fatigue, somnolence, or decreased attention. The bilateral approach from a small corticotomy can avoid extensive damage to the cingulate gyrus [9].

[1] , [5]
Soliman MA, Khan A, Azmy S, Gilbert O, Khan S, Goliber R, Szczecinski EJ, Durrani H, Burke S, Salem AA, Lubanska D, Ghannam MM, Hess RM, Lim J, Mullin JP, Davies JM, Pollina J, Snyder KV, Siddiqui AH, Levy EI, Plunkett RJ, Fenstermaker RA. Meta-analysis of overall survival and postoperative neurologic deficits after resection or biopsy of butterfly glioblastoma. Neurosurg Rev. 2022 Dec;45(6):3511-3521. doi: 10.1007/s10143-022-01864-7. Epub 2022 Sep 29. PMID: 36173528.

[2]
Agrawal A. Butterfly glioma of the corpus callosum. J Cancer Res Ther. 2009 Jan-Mar;5(1):43-5. PubMed PMID: 19293489.

[3]
Palmisciano P, Ferini G, Watanabe G, Ogasawara C, Lesha E, Bin-Alamer O, Umana GE, Yu K, Cohen-Gadol AA, El Ahmadieh TY, Haider AS. Gliomas Infiltrating the Corpus Callosum: A Systematic Review of the Literature. Cancers (Basel). 2022 May 19;14(10):2507. doi: 10.3390/cancers14102507. PMID: 35626112; PMCID: PMC9139932.

[4]
Chawla S, Kavouridis VK, Boaro A, Korde R, Amaral Medeiros S, Edrees H, Mezzalira E, Sala F, Mekary RA, Smith TR. Surgery vs. Biopsy in the Treatment of Butterfly Glioblastoma: A Systematic Review and Meta-Analysis. Cancers (Basel). 2022 Jan 9;14(2):314. doi: 10.3390/cancers14020314. PMID: 35053478; PMCID: PMC8773472.

[6]
Daggubati LC, Ramos-Fresnedo A, Merenzon MA, Bhatia S, Morell AA, Berry KM, Chandar J, Shah AH, Komotar RJ, Ivan ME. Bilateral Laser Interstitial Thermal Therapy for Butterfly Gliomas Compared With Needle Biopsy: A Preliminary Survival Study. Oper Neurosurg (Hagerstown). 2023 Nov 1;25(5):435-440. doi: 10.1227/ons.0000000000000850. Epub 2023 Aug 14. PMID: 37846139.

[7]
Hazaymeh M, Löber-Handwerker R, Döring K, Abboud T, Mielke D, Rohde V, Malinova V. Prognostic differences and implications on treatment strategies between butterfly glioblastoma and glioblastoma with unilateral corpus callosum infiltration. Sci Rep. 2022 Nov 10;12(1):19208. doi: 10.1038/s41598-022-23794-6. PMID: 36357498; PMCID: PMC9649706.

[8]
Bjorland LS, Dæhli Kurz K, Fluge Ø, Gilje B, Mahesparan R, Sætran H, Ushakova A, Farbu E. Butterfly glioblastoma: Clinical characteristics, treatment strategies and outcomes in a population-based cohort. Neurooncol Adv. 2022 Jul 1;4(1):vdac102. doi: 10.1093/noajnl/vdac102. PMID: 35892046; PMCID: PMC9307095.

[9]

Hosoya T, Yonezawa H, Matsuoka A, Ohno M, Miyakita Y, Takahashi M, Yanagisawa S, Tamura Y, Kikuchi M, Nakano T, Oishi Y, Manabe S, Sato T, Narita Y. Combination of asleep and awake craniotomy as a novel strategy for resection in patients with butterfly glioblastoma: Two case reports. Surg Neurol Int. 2022 Oct 28;13:492. doi: 10.25259/SNI_543_2022. PMID: 36447874; PMCID: PMC9699851.