Olfactory groove meningioma surgery approaches

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The most common approaches for olfactory groove meningioma surgerys are the bifrontal and pterional approaches. When using a midline transbasal approach, the surgical corridor is through either an interhemispheric or a bifrontal approach and subfrontal route. This requires ligation and division of the superior sagittal sinus, which entails some risk of venous infarction and cerebral edema.

Open approaches are still gold standard. These approaches are a modification of pterional approach. Unilateral or bilateral subfrontal approaches with or without orbital osteotomy.

Conversely, the pterional approach has the advantage of early dissection of the posterior neurovascular complex.

Individualized surgical strategy is necessary for mitigating the postoperative complication rate, and the possibility of recurrence in the management of OGMs. The exact role of less invasive, endoscopic approaches in the management of these patients remains to be defined [1)].

Systematic Reviews and Comparative Meta-analysis

Brown et al. systematically reviewed the extent literature to highlight the advantages of bilateral versus unilateral approaches and endoscopic endonasal (midline) approaches versus transcranial approaches for olfactory groove meningiomas, focusing on complications, extent of resection, and local recurrence rates. Methods Three databases were queried to identify all primary prospective trials and retrospective series comparing outcomes following endoscopic endonasal versus transcranial approaches and unilateral versus bilateral craniotomy for surgical resection of olfactory groove meningiomas. All articles were screened by two independent authors and selected for formal analysis according to predefined inclusion/exclusion criteria. Results Seven studies comprising 288

total patients (mean age 55.0 ± 24.6 years) met criteria for inclusion. In the three comparing the endoscopic endonasal (n = 21) versus transcranial (n = 32) approaches, there was no significant difference between the two with respect to gross total resection (p = 0.34) or rates of Simpson Grade 1 resection (p = 0.69). EEA demonstrated higher rates of overall complications (p < 0.01) including postoperative infection (p = 0.03). In the four studies comparing bilateral (n = 117) versus unilateral approaches (n = 118), overall complication rates (p < 0.01) and disease recurrence (p = 0.01) were higher with bilateral approaches. All surgery-related mortalities also occurred in the bilateral cohort (n = 7, 7.14%). Gross total resection (p = 0.63) and Simpson grade (p = 0.48) were comparable between approaches. Olfaction preservation was superior for unilateral approaches (p < 0.01). Conclusion Though the literature is limited, current evidence suggests that the endoscopic endonasal approach may be favorable over conventional craniotomy for select olfactory groove meningioma patients. Where craniotomy is used, unilateral approaches appear to reduce complications and the risk of olfaction loss [2)].

Strengths Dual Comparative Focus: The authors simultaneously examined two key debates in OGM surgery—endonasal vs. transcranial and unilateral vs. bilateral craniotomies. This dual-axis comparison provides a broader clinical applicability than single-focus studies.

Systematic Methodology: The use of three databases, dual-independent screening, and predefined inclusion/exclusion criteria adheres to rigorous meta-analytic standards and reduces selection bias.

Quantitative Outcomes with Clinical Relevance: The study reports meaningful surgical endpoints: gross total resection (GTR), Simpson Grade 1 rates, complications, recurrence, and olfaction preservation. These are directly translatable to neurosurgical decision-making.

Clear Message for Practice: The conclusions, while cautious, support minimally invasive strategies when appropriate: favoring EEA over transcranial routes in select cases, and unilateral over bilateral craniotomies to minimize morbidity and preserve olfaction.

Limitations and Critiques Small Sample Sizes and Limited Power: The total number of patients across all studies is only 288, with the endonasal group comprising just 21 patients—a strikingly low number for a comparative meta-analysis. This drastically limits statistical power and generalizability.

Heterogeneity and Lack of Standardization: The authors do not provide detailed assessment of heterogeneity (I^2 statistics or meta-regression), nor do they account for variability in tumor size, radiological characteristics, or surgeon experience—factors known to affect outcomes in OGM surgery.

Retrospective Data Bias: All included studies are either retrospective series or non-randomized prospective cohorts. This exposes the findings to selection bias, reporting bias, and institutional variability, which the authors acknowledge but do not adequately adjust for.

Complication Interpretation May Be Misleading: EEA was associated with higher complication rates, especially infections. However, these are likely overestimated due to publication bias, learning-curve effects, or lack of prophylactic protocols in early EEA series. The meta-analysis does not stratify results by publication year to examine this temporal effect.

Overreach in Conclusions: The conclusion implies favorability of EEA over craniotomy in “select patients”, yet the statistical results do not show superiority in resection quality—just differences in complication profile. The absence of survival or quality-of-life data further weakens any superiority

claim.

Summary Judgment While methodologically sound and clinically relevant, Brown et al. (2024) offer limited but suggestive evidence rather than definitive guidance. Their review supports the cautious expansion of minimally invasive techniques for OGMs, but their findings are undermined by small sample sizes, heterogeneity, and retrospective bias.

This paper should be interpreted as a call for prospective, multi-center comparative trials—not as a practice-changing meta-analysis. Surgeons must still individualize decisions based on tumor characteristics, surgical expertise, and patient comorbidities.

Bilateral olfactory groove meningioma surgery approach

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Unilateral olfactory groove meningioma surgery approach

Endoscopic Endonasal Approach

Endoscopic Endonasal Approach for Olfactory Groove Meningioma.

Transorbital Approach

Transorbital Approach for Olfactory Groove Meningioma

Systematic Review and Meta-Analysis

Consensus is limited regarding optimal transcranial approaches (TCAs) for the surgical resection of olfactory groove meningiomas (OGMs). This systematic review and meta-analysis aims to examine operative and peri-operative outcomes of unilateral compared to bilateral TCAs for OGMs. Methods: Electronic databases were searched from inception until December 2019 for studies delineating TCAs for OGM patients. Patient demographics, pre-operative symptoms, surgical outcomes, and complications were evaluated and analyzed with a meta-analysis of proportions. Results: A total of 27 observational case series comparing 554 unilateral vs. 451 bilateral TCA patients were eligible for review. The weighted pooled incidence of gross total resection is 94.6% (95% CI, 90.7-97.5%; I 2 = 59.0%; p = 0.001) for unilateral and 90.9% (95% CI, 85.6-95.4%; I 2 = 58.1%; p = 0.003) for bilateral cohorts. Similarly, the incidence of OGM recurrence is 2.6% (95% CI, 0.4-6.0%; I 2 = 53.1%; p = 0.012) and 4.7% (95% CI, 1.4-9.2%; I 2 = 55.3%; p = 0.006), respectively. Differences in oncologic outcomes were not found to be statistically significant (p = 0.21 and 0.35, respectively). Statistically significant differences in complication rates in bilateral vs. unilateral TCA cohorts include meningitis

(1.0 vs. 0.0%; p = 0.022) and mortality (3.2 vs. 0.2%; p = 0.007). Conclusions: While both cohorts have similar oncologic outcomes, bilateral TCA patients exhibit higher post-operative complication rates. This may be explained by underlying tumor characteristics necessitating more radical resection but may also indicate increased morbidity with bilateral approaches. However, evidence from more controlled, comparative studies is warranted to further support these findings [3].

1)
Fountas KN, Hadjigeorgiou GF, Kapsalaki EZ, Paschalis T, Rizea R, Ciurea AV. Surgical and functional outcome of olfactory groove meningiomas: Lessons from the past experience and strategy development. Clin Neurol Neurosurg. 2018 Aug;171:46-52. doi: 10.1016/j.clineuro.2018.05.016. Epub 2018 May 18. PMID: 29807199.
2)
Brown NJ, Pennington Z, Patel S, Kuo C, Chakravarti S, Bui NE, Gendreau J, Van Gompel JJ. Surgical Approaches to Resection of Olfactory Groove Meningiomas: Comparative Meta-analysis of the Endoscopic Endonasal versus Transcranial and Unilateral versus Bilateral Approaches. J Neurol Surg B Skull Base. 2024 Apr 30;86(2):208-220. doi: 10.1055/a-2297-9055. PMID: 40104542; PMCID: PMC11913544.
3)
Feng AY, Wong S, Saluja S, Jin MC, Thai A, Pendharkar AV, Ho AL, Reddy P, Efron AD. Resection of Olfactory Groove Meningiomas Through Unilateral vs. Bilateral Approaches: A Systematic Review and Meta-Analysis. Front Oncol. 2020 Oct 22;10:560706. doi: 10.3389/fonc.2020.560706. PMID: 33194626; PMCID: PMC7642686.