Commentary: Results of Transcranial Resection of Olfactory Groove Meningiomas in Relation to Imaging-Based Case Selection Criteria for the Endoscopic Approach

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The choice of the optimal surgical approach (transcranial vs endoscopic endonasal) continues to be an area of controversy for the surgical management of anterior skull base meningiomas. Although the endoscopic endonasal approach (EEA) has gained popularity in the last decade, whether it is superior to traditional open transcranial approaches remains debatable. It is important to separate olfactory groove meningiomas (OGMs) from tuberculum sellae meningiomas when discussing this issue since these are two distinct tumor locations with separate operative considerations. In a recent systematic review by Shetty et al, comparing transcranial versus EEA for OGMs, the transcranial approach had a higher rate of gross total resection (GTR, 90.9% vs 70.2%, respectively) and lower rates of cerebrospinal fluid (CSF) leak than EEA (6.3% vs 25.7%, respectively). In addition, EEA had 100% postoperative olfaction loss while the transcranial group had 61% olfaction loss (Table). In a study by Koutourousiou et al, of 50 OGMs surgically resected via EEA, GTR was achieved in 66.7% with a CSF leak rate of 30%. The inability of achieving GTR was attributed to significant lateral and anterior dural involvement, signifying the anatomic limitations of the endonasal approach where residual tumor is left behind. In addition, EEA had 100% postoperative olfaction loss while the transcranial group had 61% olfaction loss (Table). In a study by Koutourousiou et al, of 50 OGMs surgically resected via EEA, GTR was achieved in 66.7% with a CSF leak rate of 30%. The inability of achieving GTR was attributed to significant lateral and anterior dural involvement, signifying the anatomic limitations of the endonasal approach where residual tumor is left behind. In addition, the absence of a cortical cuff and the presence of calcification also negatively impacted the extent of resection via EEA. The majority of OGMs in this study were larger tumors greater than 4 cm, which were also associated with increased complications. Based on the results of this study, OGMs harboring these radiographic features have been deemed less favorable for EEA.

In the present paper by Patel et al, the authors have reported their series of 50 OGMs treated via transcranial resection that exhibited the endoscopically unfavorable features mentioned above. Their analysis showed that these unfavorable features that negatively impact EEA outcomes did not affect transcranial outcomes. GTR (Simpson 1 and 2) were achieved in 92% with a postoperative CSF leak rate of 18% (12% that required surgical intervention). It should be noted that this higher CSF leak rate is likely attributed to aggressive drilling of the hyperostotic cribiform plate resulting in a larger open defect to the nasal cavity. Also, the mortality rate was 4% due to vascular injury in larger tumors with adherence to critical vascular structures. Perhaps, settling for radical near-total resection (Simpson 4), leaving a small residual adherent to the vessel may have improved their outcomes further. Overall, the authors should be commended for their results and thoughtful analysis. Their study re-emphasizes the importance of upholding open microsurgical techniques for large complex OGMs.

We agree that large complex OGMs should be treated transcranially and can result in better outcomes than EEA. In most cases, OGMs greater than 4 cm have a higher incidence of anterior and lateral extension, lack a cortical cuff, and vascular or optic nerve adherence. We recently reported our experience with OGM resection comparing the transbasal, EEA, and combined (transbasal-EEA) approach using an individualized, tailored strategy to optimize surgical outcomes. Interestingly, EEA had higher rates of GTR (100%) than the transbasal (80%) or combined group (62.5%). This is largely explained by intentional careful patient selection. Smaller tumors less than 4 cm that had a cortical cuff and limited dural attachment were selected for EEA, while larger complex tumors greater than 4 cm that had wide dural attachment and vascular involvement (absence of cortical cuff) were selected for the open approaches. The lower rates of GTR in the transbasal and combined groups are explained by intraoperative identification of tumor adherence to important...
nerves and vessels and subsequent intentional subtotal resection. Because we felt that the volume of residual tumor can contribute to future recurrence, an effort to maximally debulk the residual tumor to the lowest volume possible resulted in near-total resection (>95%) in 100% of these remaining patients. Therefore, settling for radical near-total resection (Simpson 4), with the possibility for additional postoperative radiosurgery or radiotherapy, can avoid potential neurovascular complications. The transbasal and combined groups had the lowest rate of CSF leak (0%) while the EEA had a CSF leak rate of 20% (1 of 5 patients). Overall, the transbasal approach had the best clinical outcomes and lowest rate of complications, and remains the workhorse in our center because it provides a wide panoramic exposure of the anterior skull base and allows early access to the anterior cerebral arteries for vascular control.

Although smaller OGMs (<4 cm) tend to have radiographic features that are more favorable for EEA, many of these patients have intact olfaction, which would be eliminated invariably after EEA via transgression of the cribiform plate. The importance of preserving olfaction in these patients with smaller OGMs should not be overlooked, as postoperative anosmia can potentially negatively impact quality of life. Therefore, one should favor a trancranial approach even for smaller tumors that appear favorable for EEA in order to attempt olfaction preservation. In our series, olfaction preservation was achieved in 67.7% of patients who had smaller OGMs with salvageable olfaction using the transbasal approach.4

We also demonstrated that a combined transcranial-EEA approach (endoscopic-assisted transcranial or cranionasal approach) can be a useful strategy for recurrent OGMs that invade into the paranasal sinuses.3 Since the majority of these tumors had anterior and lateral dural extension and a higher rate of tumor adherence to neurovascular structures, we performed the tumor resection primarily through the transbasal corridor, while the EEA played an adjunctive role in secondary inspection of remaining tumor endonasally. EEA also provided a reconstruction solution with the nasoseptal flap since these patients already had a prior craniotomy and did not have an available pericranial flap.

As we continue to critically examine our surgical results and outcomes, it is becoming more evident that open transcranial approaches remain the workhorse for surgical treatment of large extensive OGMs, as well as for smaller ones with intact olfaction. Therefore, the role of EEA remains limited to smaller OGMs without vascular involvement (presence of cortical cuff), without extensive anterior and lateral dural attachment, and without intact olfaction. The use of combined transcranial/EEA should be considered for primary or recurrent OGMs that present with sinonasal invasion. Expertise in all skull base approaches (open and endoscopic) with careful patient selection using an individualized, tailored strategy is paramount to optimize surgical outcomes.4

Disclosure
The author has no personal, financial, or institutional interest in any of the drugs, materials, or devices described in this article.

REFERENCES

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