Case Report

Gross Total Resection of a Huge Olfactory Groove Meningioma via Bicoronal Subfrontal Approach Without Orbital Osteotomy: A Case Report

Fatemeh Riyahi Zaniyani[1], Milad Shafizadeh[1], Setareh Rostami Abusaeidi[1], Alireza Farhadi[1], Alireza Khoshnevisan[1*]

[1]Department of Neurosurgery, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran

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Abstract

Background: Olfactory groove meningiomas (OGMs) are slow-growing, relatively rare, and benign brain tumors that account for about 4–13% of all intracranial meningiomas. They can be demonstrated with a variety of symptoms but often present with anosmia, headaches, visual disturbances, and personality changes. Surgical resection is the treatment of choice, with various approaches described. We present a case of a huge OGM that was resected totally through a bilateral subfrontal approach without orbital osteotomy.

Case Report: A 62-year-old man with chronic headache, anosmia, and progressive personality changes over five years presented with an episode of generalized seizure and was found to have a large anterior cranial fossa mass on CT (Computed Tomography) and MRI (Magnetic Resonance Imaging), compatible with an olfactory groove meningioma. The patient underwent a bicoronal subfrontal craniotomy without orbital osteotomies. Intraoperative steps included cranialization of the frontal sinus, devascularization of the tumor, and careful extracapsular dissection under microscopic guidance. Gross total resection (Simpson Grade I) was achieved without intraoperative complications. The optic chiasm and anterior cerebral arteries were preserved. Postoperative imaging confirmed complete resection, and the patient's neurological symptoms improved significantly.

Conclusion: The bicoronal subfrontal approach provides adequate exposure and allows safe gross total resection of large OGMs without the need for orbital osteotomies in this patient. This technique minimizes operative time and blood loss and preserves the normal anatomy of the orbital rim and orbital roof, while achieving favorable surgical and clinical outcomes in our case. Hence, further studies are needed to assess the applicability of these findings to the resection of large olfactory groove meningiomas without orbital osteotomy.

Keywords: Olfactory groove meningioma, Subfrontal craniotomy, Orbital osteotomy, Gross total resection, Skull base surgery

***Corresponding Author:** Alireza Khoshnevisan, Department of Neurosurgery, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran. Email: khoshnevisanalireza@gmail.com, akhoshnevisan@tums.ac.ir, ORCID no: 0000-0001-9672-8773

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Introduction

Olfactory groove meningiomas (OGMs) are slow-growing tumors arising from the anterior cranial fossa meninges, along the olfactory nerves, representing 4–13% of all intracranial meningiomas[1-3]. Patients typically present with anosmia, visual disturbances, headaches, or personality changes. Diagnosis primarily depends on MRI, with CT providing additional information about calcification and bone involvement. Surgical resection of the tumors is the choice of treatment. Various surgical approaches have been described, including pterional, unilateral/bilateral subfrontal, and endoscopic endonasal approaches[4-6]. While some authors advocate orbital osteotomies to enhance anatomic exposure, this adds to operative complexity. Here, we describe the gross total resection of a large OGM via a bicoronal subfrontal approach without orbital osteotomies and further outcomes.

Case Report

A 62-year-old man with no significant past medical history presented with chronic headache, anosmia, and long-standing personality changes for approximately 5 years. He had been under psychiatric follow-up for these behavioral alterations during this period. He was admitted to the emergency department following an episode of generalized tonic-clonic seizure lasting three minutes. Laboratory investigations, including a complete blood count (CBC) and Blood biochemistry, showed unremarkable results. Neuroimaging, including non-contrast CT, revealed a large (6.5*6*6.2 cm), well-defined, oval mass in the anterior cranial fossa with coarse calcification and perilesional edema (Figure 1). MRI findings confirmed an isointense lesion on T1- and T2-weighted images with avid contrast enhancement, consistent with OGM (Figures 2 and 3).

Two days later, after preoperative evaluation, the patient underwent bicoronal subfrontal craniotomy under general anesthesia. Preoperatively, 2 gr intravenous cefazolin, 8 mg dexamethasone, 1 gr levetiracetam were administered. Prior to dural opening 200 mL of 20 % mannitol was administered intravenously to achieve cerebral relaxation (Table 1). With the patient supine and head slightly extended in Mayfield fixation, a bicoronal (Soutar-type) skin incision was made from zygoma to zygoma and 1 centimeter in front of the tragus to avoid damage to the superficial temporal artery. Pericranium was elevated with its vascular pedicle and preserved for subsequent skull base reconstruction. Burr holes were placed at the keyhole region about 6mm posterior to the frontozygomatic suture and adjacent to the superior sagittal sinus in the midline. A bifrontal 4*6.5 cm craniotomy including the frontal sinus was performed.

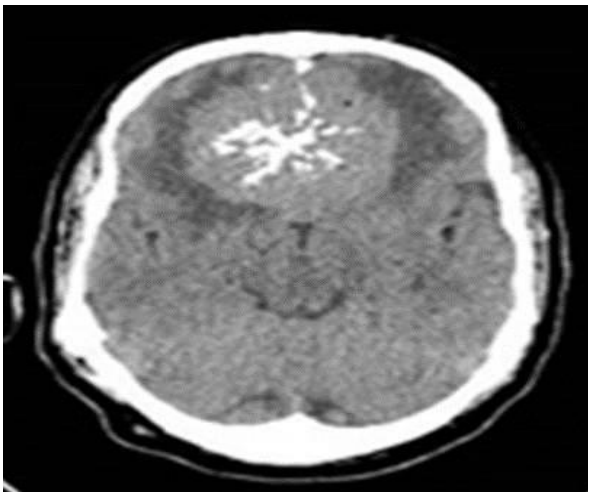

Figure 1. Axial pre-contrast cranial CT scan at the level of the midbrain, showing a well-defined, oval shaped isodense to hyperdense, located in the floor of the anterior cranial fossa with central areas of calcification within it.

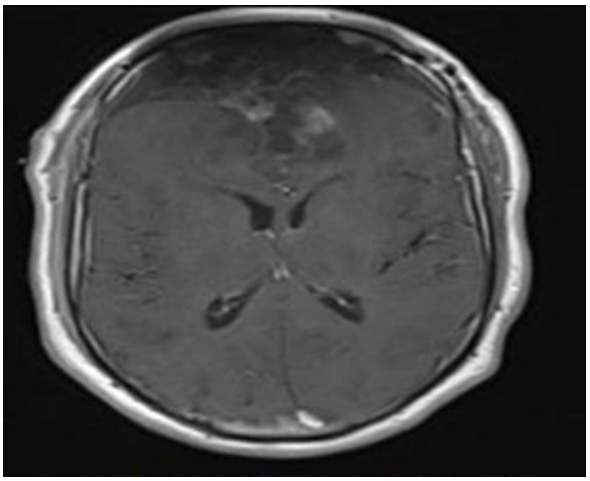

Figure 3. Axial post-contrast T1W showing avid enhancement of the mass. The sagittal images also exhibit enhancement of the dura posterior to the mass and the dural tail sign.

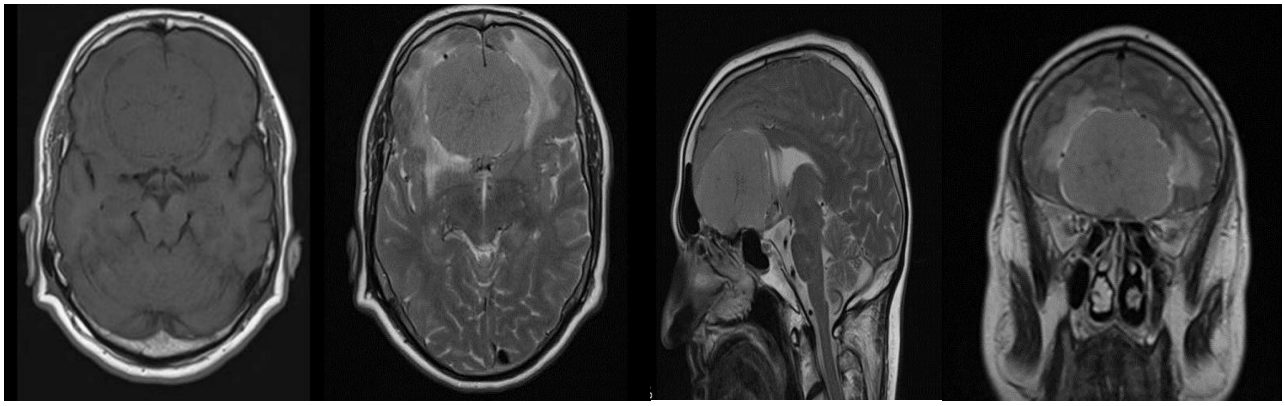

Figure 2. Axial T1W, T2W MRI, sagittal and coronal T2W MRI images showing a well-defined, large oval shaped mass, which is mainly isointense to grey matter on all the sequences, in the inferior aspect of the anterior cranial fossa and straddling the mid line. A rim of CSF intensity (C.S.F. cleft sign) is seen around the mass most notably on the T2W image.

Table 1. Summarized intraoperative and perioperative data of the presented case.

Parameter	Value
Surgical approach	Bicoronal subfrontal craniotomy
Orbital osteotomy	Not performed
Extent of resection	Gross total resection (Simpson Grade I)
Operative time	5 hr
Estimated blood loss (EBL)	550mL
Intravenous fluids	3500mL
Mannitol administration	200 mL of 20% solution
Intraoperative complications	None
Blood transfusion	None
ICU stay	3days
Hospital stay	10 days

The frontal sinus was cranialized, and the crista galli excised. After meticulous dural opening, the operating microscope was applied, and frontal lobes were retracted by gravity without application of the fixed retractors. Extradural devascularization was performed, coagulating the anterior and posterior ethmoidal arteries. Tumor debulking was carried out with preservation of the arachnoid plane. Sequential extracapsular dissection allowed safe mobilization from adjacent brain structures. The optic chiasm and anterior cerebral arteries were visualized and preserved. The frontal sinus ostium was precisely closed with autologous abdominal subcutaneous fat and overlaid with a vascularized pericranial flap. Orbital osteotomies were not required during surgical procedure. Gross total resection (Simpson Grade I) was achieved (Figures 4). The patient recovered without new neurological deficits. Postoperative imaging confirmed gross total tumor removal, and symptoms improved significantly. Over the six-month course of our follow-up, no CSF leak or infection occurred, and personality alterations were considerably improved.

Discussion

OGMs are primarily vascularized by ethmoidal branches of the ophthalmic artery, with additional supply from anterior meningeal and anterior cerebral/communicating arteries[6, 7]. Various approaches exist, most commonly modified pterional or sub frontal approaches, with or without orbital osteotomies but the bilateral sub frontal approach provides direct access with early devascularization[8, 9]. Orbital osteotomies have been advocated to expand exposure, reduce frontal lobe retraction, and facilitate control of ethmoidal vessels[10, 11]. However, they increase operative time, bony work, blood loss, and the risk of alteration of native orbital anatomy.

Overall the available literature is limited regarding the standardized comparative perioperative and outcome data for the preferred surgical approach to large olfactory groove meningioma. Table 2 summarizes published surgical series for olfactory groove meningioma by surgical approach.

In our case, complete resection was achieved via a subfrontal approach without orbital osteotomy while preserving normal orbital anatomy and major vascular structures. These findings support the feasibility of the

Table 2. Summarized published surgical series for olfactory groove meningioma based on surgical approach used.

Study	Surgical approach	Orbital osteotomy	Sample size	Gross total resection	Reported outcomes (EBL / operative time / LOS)	Key remarks
DeMonte et al., 2001(3)	Subfrontal / skull base approaches	+/-	Case series	High rate of GTR	Not consistently reported	Emphasizes individualized approach based on tumor extension
Hentschel & DeMonte, 2003(6)	Subfrontal approaches	Not routinely used	20+ cases	High GTR	Limited quantitative data	Orbital osteotomy not mandatory in most OGMs
Mirimanoff et al., 1985(11)	Mixed skull base approaches	Not specified	Large historical cohort	GTR associated with recurrence reduction	No standardized perioperative metrics	Focus on long-term recurrence rather than perioperative variables

simpler approach. Our experience suggests new trend toward diminishing bony work in skull base neurosurgery in combination with gravity-assisted retraction, early devascularization and meticulous extracapsular dissection for achieving a suitable corridor for gross total tumor resection of a large OGM. Howe ever these findings arise from a single case therefore cannot be generalized to resection of all huge olfactory groove meningioma and further comparative studies are required.

Conclusion

The bi-coronal subfrontal approach without orbital osteotomy was an effective technique for resection of a large OGM in this case, providing a suitable corridor while preserving normal orbital anatomy and major vascular structures, and making orbital reconstruction more comfortable. It can be helpful in selected cases, reducing operative complexity and blood loss. This modified approach appears to be a feasible surgical option in selected cases, although no definitive conclusions regarding its superiority over other approaches can be drawn (3). Hence, these findings are based on a single case; larger series are needed to assess this technique and its generalizability.

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Ethics

Ethical approval was not required for this report. Written informed consent for participation and publication was obtained from the patien

Competing interests

Not applicable.

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References

1. De Divitiis E, Esposito F, Cappabianca P, Cavallo LM, de Divitiis O, Esposito I. Endoscopic transnasal resection of anterior cranial fossa meningiomas. Neurosurg Focus. 2008;25(12):E8. doi:10.3171/FOC.2008.25.12.E8.

2. Dehdashti AR, Ganna A, Witterick I, Gentili F. Expanded endoscopic endonasal approach for anterior cranial base and suprasellar lesions: indications and limitations. Neurosurgery. 2009;64(4):677-687. doi:10.1227/01.NEU.0000339121.20101.85.

3. DeMonte F, Marmor E, Al-Mefty O. In: Kaye AH, Laws ER Jr, editors. Brain tumor: an encyclopedic approach. 2nd ed. London: Churchill Livingstone; 2001. p. 719-750.

4. Gardner PA, Kassam AB, Thomas A, Snyderman CH, Carrau RL, Mintz AH, et al. Endoscopic endonasal resection of anterior cranial base meningiomas. Neurosurgery. 2008;63(1):36-52. doi:10.1227/01.NEU.0000335069.30319.1E.

5. Greenfield JP, Anand VK, Kacker A, Seibert MJ, Singh A, Brown SM, et al. Endoscopic endonasal transethmoidal transcribriform transfovea ethmoidalis approach to the anterior cranial fossa and skull base. Neurosurgery. 2010;66(5):883-892. doi:10.1227/01.NEU.0000368395.82329.C4.

6. Hentschel SJ, DeMonte F. Olfactory groove meningiomas. Neurosurg Focus. 2003;14(6):E4. doi:10.3171/FOC.2003.14.6.4.

7. Kassam AB, Thomas A, Carrau RL, Snyderman CH, Vescan A, Prevedello D, et al. Endoscopic reconstruction of the cranial base using a pedicled nasoseptal flap. Neurosurgery. 2008;63(1 Suppl 1):ONS44-ONS52. doi:10.1227/01.NEU.0000297074.13423.F5.
8. Kepes JJ. Meningiomas: biology, pathology and differential diagnosis. New York: Masson; 1982.
9. Mansour A. Our experience about trans-sinus frontal approach for olfactory groove meningiomas: technical note. Pan Arab J Neurosurg. 2024;19(2):87-91. doi:10.21608/pajn.2024.263972.1116.
10. Mayfrank L, Gilsbach JM. Interhemispheric approach for microsurgical removal of olfactory groove meningiomas. Br J Neurosurg. 1996;10(6):541-545. doi:10.1080/02688699646835.
11. Mirimanoff RO, Dosoretz DE, Linggood RM, Ojemann RG, Martuza RL. Meningioma: analysis of recurrence and progression following neurosurgical resection. J Neurosurg. 1985;62(1):18-24. doi:10.3171/JNS.1985.62.1.0018.