



OLGU SUNUMU / CASE REPORT

Amelioration of anosmia after removal of an olfactory groove meningioma via pterional approach

Olfaktör oluk meningiomunun pterional yaklaşımla çıkarılmasından sonra anosminin düzelmesi

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Abstract

Anosmia is one of the early symptoms of olfactory groove meningiomas (OGM) and the postoperative recovery of anosmia is accepted to be unexpected. A 42-year-old female patient presented with bilateral anosmia, and visual field defects. Radiological examination revealed a large OGM with significant peritumoral edema. The tumor was totally resected through the pterional approach, with the meticulous preservation of the left olfactory nerve. Visual field disturbances improved in the early postoperative period. Furthermore, olfaction recovered in the left nostril at the 6-month follow-up. Despite the common belief that anosmia persists after OGM surgery, with preservation of olfactory nerves, olfaction can be recovered in rare cases.

Keywords: Anosmi , olfactory nerve, olfactory groove meningioma, pterional approach

Öz

Anosmi, olfaktör oluk meningiomlarının (OGM) erken belirtilerinden biridir. Ek olarak, anosminin, saptanması durumunda, operasyon sonrasında düzelmesi beklenmemektedir. Olgumuzda 42 yaşında kadın hasta, bilateral anosmi ve görme bozukluğu ile başvuruyordu. Radyolojik incelemelerde belirgin peritümoral ödem ile birlikte büyük bir OGM saptandı. Tümör, pterional yaklaşımla, sol olfaktör sinirinin korunmasıyla, total rezeksiyonla çıkarıldı. Postoperatif erken dönemde görme bozukluğu düzeldi. Ayrıca, 6 aylık takipte sol burundan koku duyusu alınması sağlandı. Buna göre, anosminin OGM cerrahisi sonrasında kalıcı olacağı yaygın kabul gören bir durum olsada, olfaktör sinirlerin korunması ile nadir vakalarda koku alma duyusu geri kazanılabilir.

Anahtar kelimeler: Anosmi , olfaktör sinir, olfaktör oluk meningiomu, pterional yaklaşım

INTRODUCTION

Olfactory groove meningiomas (OGMs), which arise from the meningotheial cap cells over the cribriform plate and frontosphenoidal suture, account for approximately 10% of all intracranial meningiomas¹. OGMs are typically slow-growing, benign tumors that are often diagnosed when they reach a significant size with a compression effect². One of the early symptoms of OGM is hyposmia or anosmia³⁻⁵.

Conservation of the olfactory function after OGM

surgery is essential for ensuring the quality of life⁴. However, anosmia which was detected in the preoperative period is considered that would be permanent³⁻⁸. The case discussed below is a very rare case of regaining olfactory function after surgical removal of an OGM.

CASE

A 42-year-old right-handed female patient presented with complaints of inability to smell, headache, and impaired vision on January 18, 2018. On

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examination, the Sniffin' Sticks test revealed anosmia in both nostrils (thresholds, discrimination, and identity (TDI) scores: 8 in the left and 7 in the right; the grading of TDI scores was described functional anosmia as < 16.5 , normosmia as > 30.5 , and hyposmia as 17 to 30)⁹. Additionally, the Humphrey central threshold visual field test showed inferior and lateral restriction in the left eye and lateral restriction in the right eye. The remaining examinations revealed results that were within normal limits. Magnetic resonance imaging (MRI) demonstrated a large (4.5 x 4.1 x 3.5 cm), heterogeneously contrast-enhancing, T1-isointense, and T2-hyperintense lesion located in the anterior cranial base (Figure 1). Thin-section computed tomography of the anterior fossa revealed an intact bone structure without hyperostosis. CT angiography showed that the anterior cerebral artery complex was pushed upward but not surrounded by the tumor.

A right pterional craniotomy which extended toward the frontal bone (Figure 2) was performed under

oro-tracheal general anesthesia in the supine position. After opening the dura mater, the cerebrospinal fluid (CSF) was drained through dissection of Sylvian fissure. Subsequently, the tumor was devascularized through its border with the frontal fossa. Debulking was performed using an ultrasonic aspirator. Finally, the tumor capsule was removed. Inessential frontal lobe retraction was avoided and a sharp meticulous dissection with avoiding excessive coagulation was performed for preserving of olfactory nerves. So the contralateral olfactory nerve was accurately dissected with anatomical preservation. After the operation, the patient was transferred from the intensive care unit after 16 hours and the patient was discharged on the 6th day after the operation without any neurological or systemic complications. Pathological examination revealed transitional meningioma (WHO Grade I) with a ratio $< 1/10$ of mitotic activity/magnification area, no necrosis, no hypercellularity, and no small cell appearance. The Ki-67 index was 1% and progesterone receptor expression was observed in 60% of the tumor cells.

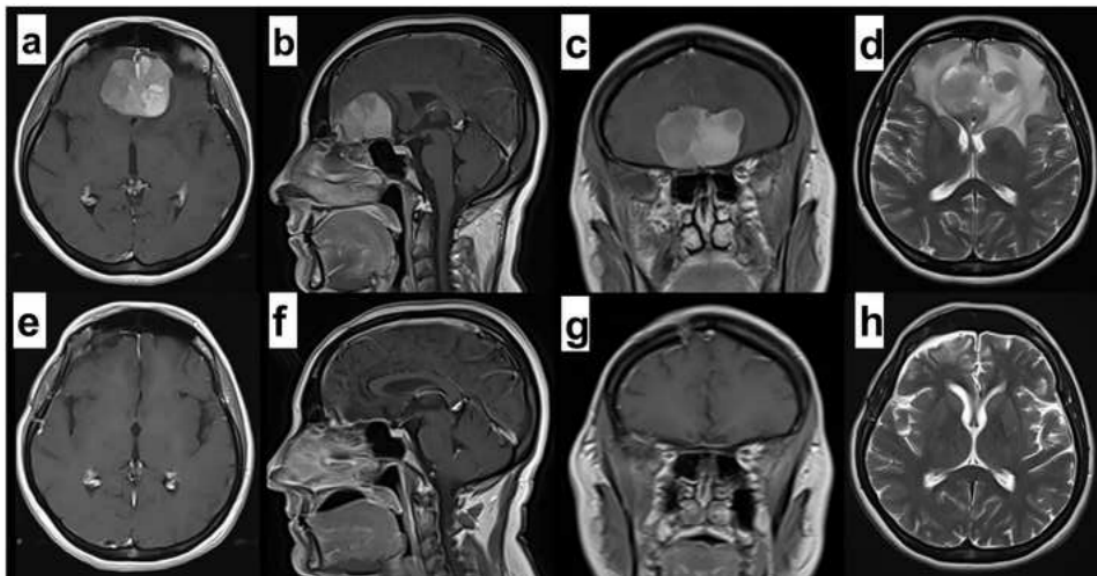


Figure 1. Radiological examinations of the patient during the treatment course : Preoperative magnetic resonance imaging shows a large, contrast-enhancing lesion located in anterior fossa on post-contrast axial (a), post-contrast sagittal (b), and post-contrast coronal (c) T1-weighted images. Significant edema in the brain parenchyma is shown on axial T2-weighted image (d). Postoperative magnetic resonance imaging shows the tumor was totally resected on post-contrast axial (e), post-contrast sagittal (f), and post-contrast coronal (g) T1-weighted images. Postoperative axial T2-weighted image (h) shows that the edema was resolved.

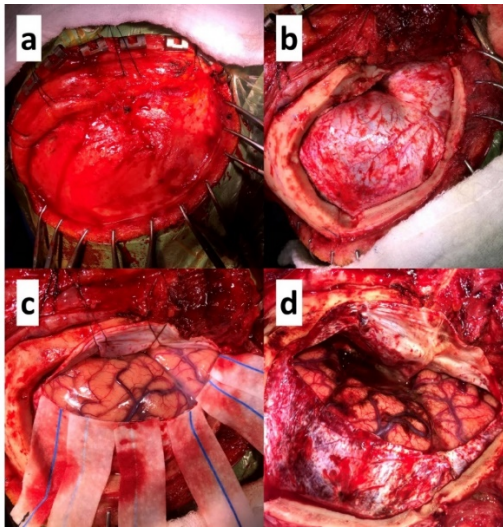


Figure 2. Images taken during operation: A curvilinear skin incision was performed with protecting the periosteum flap (a). Frontal extended pterional craniotomy was performed with preserving the frontal sinuses (b). The dura mater was opened with a curvilinear incision (c) and tumor was totally excised with avoiding excessive retraction of frontal lobes (d) and with preservation of the left olfactory nerve.

No complications were encountered during the postoperative period. The visual field and acuity tests were significantly improved at the 1-month follow-up. At the sixth month, the Sniffin' Sticks olfactory test revealed that the left nostril was normosmic, whereas the right was anosmic (TDI scores: 32 in the left and 5 in the right). No recurrence was observed on the brain MRI at 18-months follow-up. An informed consent was obtained from patient.

DISCUSSION

Typical symptoms of OGMs include deterioration of olfaction, mental changes, and visual disturbances.^{3,6} Visual and mental recovery after surgery is quite high, with a rate >80%. However, improvement in olfactory problems is seen in only about 5% of cases, which is only observed in patients with hyposmia⁶.

Olfaction, an essential factor in the taste sensation, is significant for social and emotional life¹⁰. Anosmia can result in social isolation, disinterest in eating, and emotional blunting¹¹. Anosmia and hyposmia are the frequently observed olfactory disturbances, even though cacosmia is rare^{3,6}. Although olfactory disturbances are one of the early symptoms, most of

patients do not seek medical help for this complaint,¹² The reason for this may be due to the fact that the olfactory function decreases in elderly ages, and in most of the patient only one nostril is affected and function is continued from the other side⁶. Therefore, these tumors are usually diagnosed in larger sizes when other symptoms arise. Due to close relationship with tumor, the olfactory nerves could be sacrificed during surgery^{4,6}. The rate of damage to these nerves during surgical procedure was reported to be 45% in a series with 40 cases⁴. Furthermore, another study observed a significant deterioration in olfactory function after surgical resection, with the rate being 36.6%¹⁰.

The size of the tumor, preoperative olfactory function, and surgical approach are reported factors that affect the preservation of the olfactory tract⁴. The probability of preserving olfaction after surgery is higher in OGM with tumor size <4 cm compared with that in OGM with tumor size >4 cm, in cases of perioperative normosmic olfaction compared with hyposmic or anosmic cases, and frontolateral approach compared with the bifrontal approach.⁴

The pterional approach is one of the several surgical access routes used in the removal of OGMs. This approach allows early visualization of crucial structures, such as the optic nerves and anterior cerebral arteries, and enables brain relaxation with CSF drainage through cisternal dissection¹³⁻¹⁵. This approach also feasible to determine of the olfactory nerves that are displaced laterally by large OGMs before tumor enucleation. The frontal extended pterional approach may be preferred in larger OGM's for better cleavage between the tumor and the cerebral parenchyma¹⁴. In sharp dissection avoiding excessive coagulation around the olfactory nerves ensures the preservation of the olfactory tracts. Additionally, lesser retraction (10-15 mm) of the frontal lobe prevents nerve disruption¹⁶. In the present case, a frontal extended pterional approach was used. Cisternal dissection was performed, thereby CSF drainage allowed brain relaxation so additional frontal lobe retraction was not mandatory during the procedure. Performing sharp dissection with avoidance of excessive coagulation after delineating the olfactory nerves helped preserve the left tractus.

According to the general concept, preoperatively-detected anosmia persists after surgery³⁻⁸. However, an exception to this is available in literature¹⁷ This case had a complete resection of the OGM through

a bifrontal craniotomy. The olfactory nerves were splayed around, with meticulous dissection at the lower border of the tumor during the procedure with the avoidance of coagulation. Formal testing of olfaction at 6-month follow-up confirmed the recovery of olfaction bilaterally. And to the best of our knowledge, our case report is the second case with improvement of anosmia in the literature. In the present case, the extended pterional approach was preferred, and left olfactory nerve preservation was possible. Furthermore, amelioration in olfaction on the left side was verified during the same follow-up.

Several mechanisms have been suggested for development of anosmia. The tumoral invasion of the skull base and extension into the ethmoid sinus and nasal cavity may cause anosmia⁶. Vascular stasis owing to tumoral factors may cause a deterioration in the functions of the olfactory nerves⁵. Other causes can be atrophy of the olfactory nerves from compression by the mass or tumoral invasion of the olfactory tracts.⁶ In the present case, skull base infiltration, atrophy of olfactory nerves, or tumoral invasion of olfactory tracts was not observed. Therefore, vascular insufficiency might be the cause of anosmia. And olfactory function could be recovered with the improvement in circulation after tumor removal.

A reader likely decide that the anosmia will be permanent in cases with a larger tumor size, bilateral extension, and preoperatively-detected anosmia. This conjecture makes non-preservation of olfactory nerves inevitable. However, the present case does not support this concept. Regardless of tumor size and preoperative olfaction status, there is a chance to recover of olfaction with meticulous preserve of olfactory nerve during the OGM removal.

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