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CASE REPORT

Olfactory groove meningioma with paranasal sinuses and nasal cavity extension

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ABSTRACT

BACKGROUND. Olfactory groove meningiomas, which account for 10% of all intracranial meningiomas, arise from the cribriform plate or the frontosphenoid suture. The most important features of the meningiomas are the typical microscopic appearance, pathologic classification, and female preponderance.
MATERIAL AND METHODS. The authors present a case of a 66 years old male, admitted in our department with bilateral chronic nasal obstruction, anosmia, seromucous rhinorrhea. The patient was first diagnosed with giant olfactory meningioma and operated 20 years ago.
RESULTS. The nature of the disease, the diagnosis and treatment protocols are presented.
CONCLUSIONS. Olfactory groove meningiomas, despite being slow growing, are among the largest tumors found intracranial. These tumors are continuing to grow achieving a very large size before they are discovered, due to their location in a relatively silent brain area. The cranial base and the paranasal sinuses are the predilected sites of the recurrence of the olfactory groove meningiomas. Recurrence is the result of the direct tumor extension due to the incomplete resection of involved dura and bone. Therefore, the surgery of primary tumor should remove entire tumoral tissue, involved dura and abnormal bone to prevent recurrence.
KEYWORDS: olfactory groove meningioma, transnasal endoscopy, neuronavigation

INTRODUCTION

Olfactory groove meningiomas, which account for 10% of all intracranial meningiomas, arise from the cribriform plate or the frontosphenoid suture. Their microscopic appearance, pathologic classification and female preponderance reflect the characteristics of this kind of tumors[1]. Olfactory groove meningiomas are usually midline, but as their size increases, they may become asymmetric. The frontal lobes are always displaced superiorly and posteriorly, and in larger tumors, inferior and lateral displacement of the optic nerves and chiasma is observed. Their growth can also occur inferiorly through the cribriform plate into the ethmoid sinus, through the planum sphenoidale into the sphenoid sinus, or laterally through the orbit[2].

CASE REPORT

A 66 years old male patient, diagnosed with giant olfactory meningioma operated in 1988, was admitted in our department with bilateral complete chronic nasal obstruction, anosmia and seromucous rhinorrhea, symptoms lasting for 7 years and which presented a progressive evolution. The anamnesis has also revealed headache, personality changes, visual loss and grand-mal seizures.

Clinical examination revealed nose deformity, bilateral exophthalmia, hypertelorism and right frontal and temporal subcutaneous tumors (Figure 1).

The anterior rhinoscopic examination and nasal endoscopy pointed out the presence of a pseudopolypoid, fibrous tumor, occupying both nasal cavities, extending from limen nasi up to the rhinopharyngeal level (Figure 2).

Following the diagnosis protocol, a cranio-facial CT scan, axial and coronal slices, was performed. The CT scan revealed a bilateral sequelae lesion in the cortico-subcortical anterior frontal region, of about 10/4 cm in axial section (Figure 3); a frontal median mass with nodular calcifications destroying the internal and inferior walls of the frontal sinuses, extending into both

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ethmoid and sphenoid sinuses, occupying both nasal cavities (Figure 4); no orbital involvement was observed.

We noticed the extension of the tumor to the subcutaneous tissues of the root of the nose, two small temporal tumors with dimensions of about 20 and 10 mm each, and another one in the left frontal region with 12 mm in diameter.

The neurological exam revealed left lateral homonymous hemianopsia, anosmia, dysarthria, right pyramidal syndrome (increased deep tendon reflexes, positive Babinski reflex), left sylvian ischemic stroke sequelae and secondary epilepsy. No motor deficiency was noticed.

The management strategy consisted in transnasal endoscopic approach, performing subtotal tumoral excision (Figure 5), assisted by neuronavigation guidance (BrainLab) (Figure 6). The postoperative period was free of complications; nasal packing was removed after 24 hours.

The differential diagnosis was made with nasal polyposis, olfactory nerve/subfrontal schwannoma, esthesioneuroblastoma, dural-based metastasis.

The histopathological examination established the final diagnosis of meningothelial meningioma. Meningothelial type of meningioma is characterised by broad sheets or medium-size lobules of fairly uniform cells with round or oval nuclei, ample light pink cytoplasm and indistinct cytoplasmic borders (Figure 7).

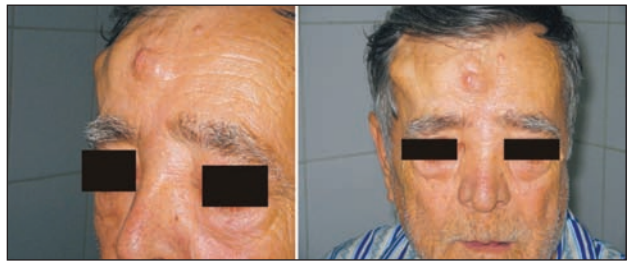

Figure 1 Right frontal and temporal subcutaneous tumors

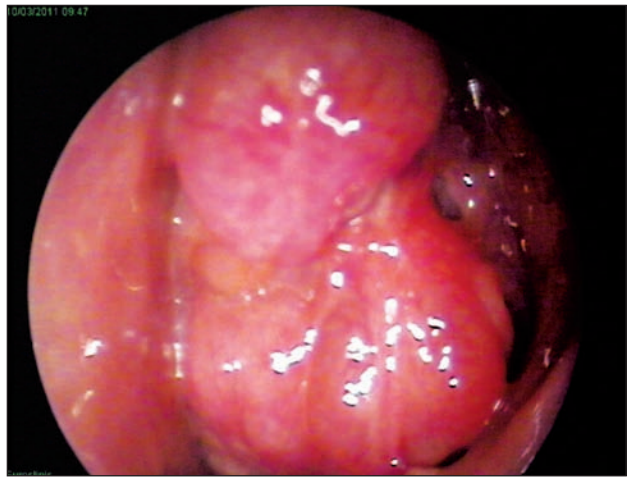

Figure 2 Endoscopic view of the tumor occupying both nasal cavities

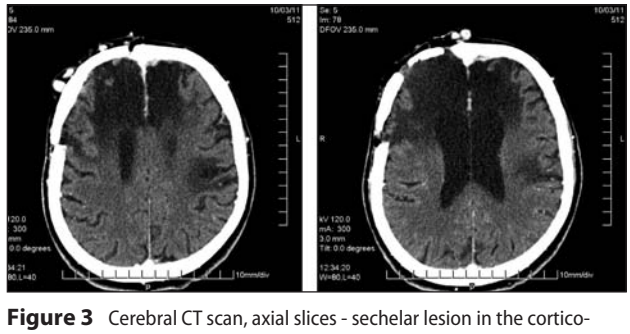

Figure 3 Cerebral CT scan, axial slices - sechelar lesion in the cortico-subcortical anterior frontal region

DISCUSSIONS

Meningiomas are a group of tumors that arise from arachnoidal cap cells of the meninges and can occur intracranial or within the spinal canal. Meningiomas are commonly found at the surface of the brain, either over the convexity of the cerebral hemispheres (40%)[3], or at the skull base. In rare cases, meningiomas occur in an intraventricular or intraosseous location. They are slow-growing tumors, representing 20% of all intracranial tumors[4]. 90% of meningiomas are benign and 10% are atypical or malignant.

Olfactory groove meningiomas arise from cribriform plate and frontosphenoid suture and comprise approximately 10% of intracranial meningiomas[1]. Although these tumors arise in the midline, they may extend predominantly to one side. Extension into the ethmoid sinuses has been reported to occur in 15% of patients[5], although this is probably an underestimation. They can occur at any age, but most commonly in middle age.

The etiology of meningiomas is still unclear, but is thought to be multifactorial. A genetic predisposition has been demonstrated in patients with neurofibromatosis type 2 who have lost part of chromosome 22. These individuals may develop multiple meningiomas and neurofibromas[6]. Sex hormones, especially estrogen and progesterone, have been implicated in the pathogenesis of meningiomas, as demonstrated by the female predominance in this disease (female:male ratio of 2:1)[3].

Cranial radiation is a definite risk factor for developing meningiomas. Patients with a history of cranial radiation therapy have a 4 times greater rate of meningioma formation compared with the general population[7].

Because of their slow growth in the interemispheric space, these tumors are often well tolerated by the patient for long periods. The most common presenting symptoms are related to the anosmia, vi-

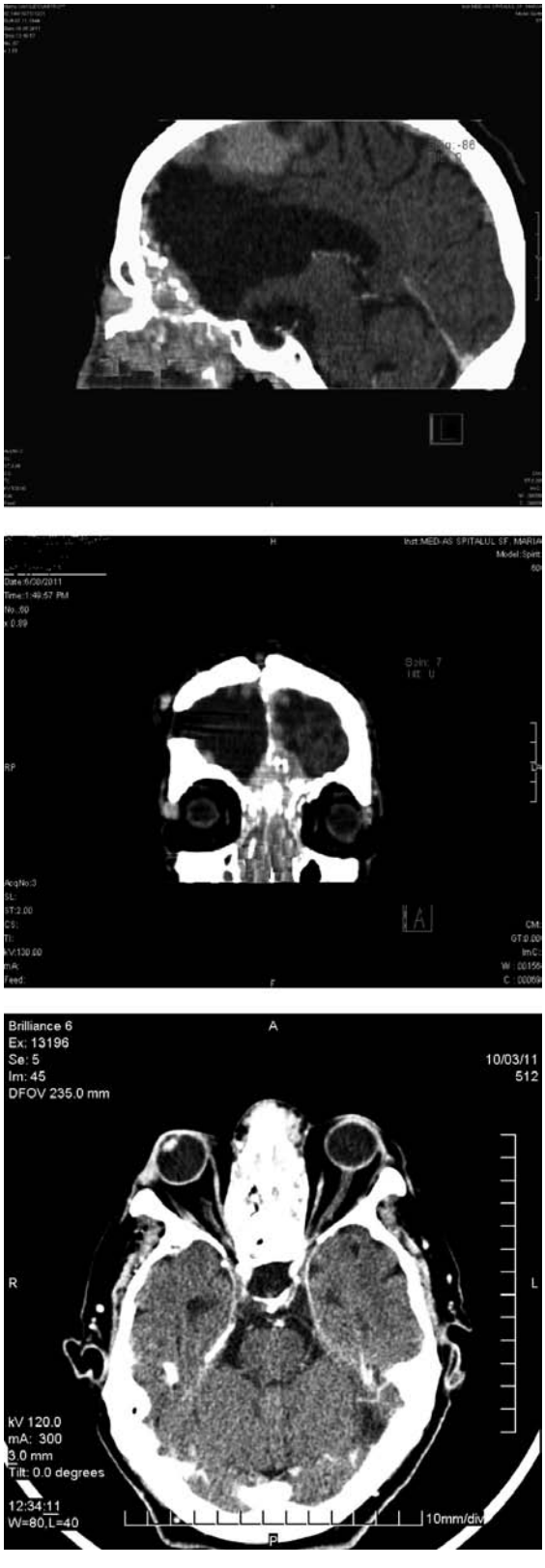

Figure 4 Cranio-facial CT scan (sagittal, coronal and axial slices) - a frontal median mass with nodular calcifications destroying the internal and inferior walls of the frontal sinuses, extending into both ethmoid and sphenoid sinuses, occupying both nasal cavities

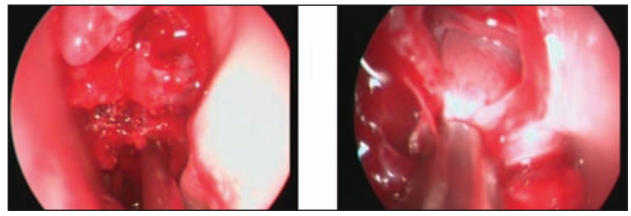

Figure 5 Intraoperatory view

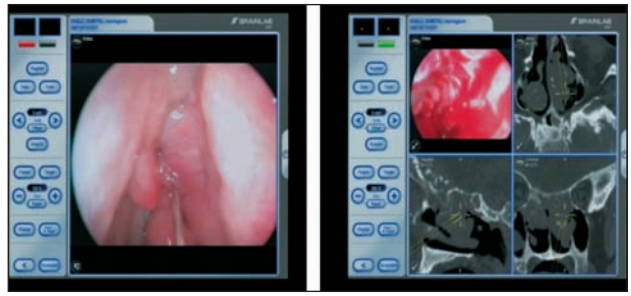

Figure 6 Transnasal endoscopic approach, assisted by neuronavigation guidance

sual field defects, epilepsy and changes in cognitive function. The impairment of visual function usually indicates a large tumor, with backwards extension to the chiasmal structures. Visual impairment almost always manifests in one eye earlier than the other. Unfortunately, such a visual deterioration has been frequently unnoticed by the patient. Therefore, on the admission of the patient in our department, he presented left lateral homonymous hemianopsia diagnosed during the neurological exam.

Olfactory groove meningiomas usually require surgical treatment at time of diagnosis because of their size and associated mass effect. Several surgical approaches are commonly used when treating olfactory groove meningiomas: the subfrontal, pterional or interemispheric approaches. Cases with extensive paranasal sinus involvement require a craniofacial approach. The trans-sphenoidal approach is also an option in selected cases[8]. Good visualization of the optic nerve, optic chiasm, anterior cerebral arteries, as well as the anterior skull base floor is necessary to limit morbidity and optimize the chances of a complete resection.

In this article, the authors present the case of a 66 years old male patient with a recurrence of olfactory groove meningioma, operated (right frontal craniotomy) 20 years ago. The recurrence of this kind of tumors is mostly discovered incidentally on yearly follow-up imaging. After the surgical treatment, the recurrence rates of 0 to 41% have been reported[9]. The ranges observed in the recurrence rates are influenced by the degree of initial resection, length of follow-up, the histopathological type of menin-

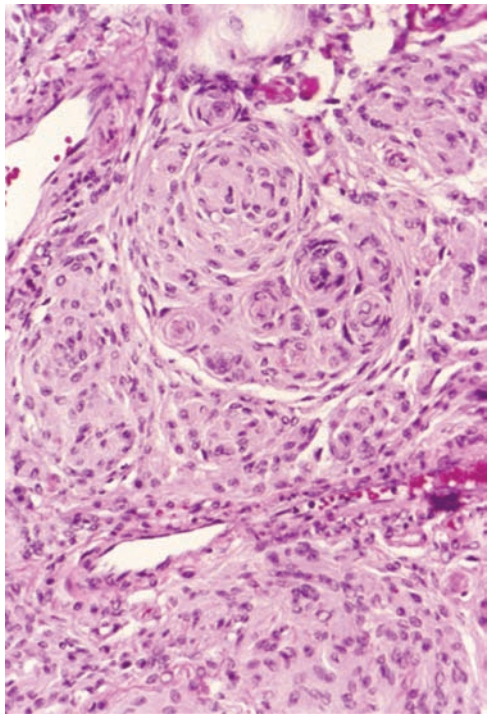

Figure 7 Histopathological appearance of meningothelial meningioma

gioma, and the degree of orbital and paranasal sinuses involvement. The recurrence rate of olfactory groove meningioma is higher than those of meningiomas affecting cerebral convexities.

The best treatment option depends on the location and the size of recurrence. Surgery may be mandatory in cases of large tumors and meticulous resection of the involved dura, abnormal bone and paranasal disease should be undertaken.

In our case, neuronavigation - assisted subtotal tumoral excision was performed by transnasal endoscopic approach. The rationale for this type of surgery was influenced by the slow growing rate of the tumor, the high risk of CSF leak, associated pathology and morbidity (AHT, recent diagnosed insulin-dependent diabetes). The combined surgical approach with mixed surgical teams (otorhinolaryngologist and neurosurgeon) will not improve the anosmia and personality changes because of the missing part of the right frontal lobe after the first surgery, and it will create a large bone defect of the anterior skull base, difficult to cover with known methods. We also took into account the patient's option for limited surgery. We considered that this kind of surgery will restore the permeability of the nasal cavities and will improve therefore the patient's quality of life.

Radiosurgery may be necessary in cases of tumor recurrence after resection for tumor control in patients who do not wish to undergo further surgery and it is useful to prevent the development of further recurrence.

The particularity of this case is represented by the large extension of the tumor to the paranasal sinuses, occupying both nasal cavities, and to the subcutaneous tissues, destroying bony structures. CT scan revealed the association of multiple meningiomas, a real "meningiomatosis", and intratumoral nodular calcifications, suggesting long-term evolution of the meningioma.

CONCLUSIONS

Olfactory groove meningiomas, despite being slow growing, are among the largest tumors found intracranially. These tumors continue to grow, achieving very large size before they are discovered, because they are located in a relatively silent brain area. The skull base and the paranasal sinuses are the predilection sites of recurrence of olfactory groove meningiomas. Recurrence is the result of direct tumoral extension due to the incomplete resection of involved dura and bone. Therefore, surgery of the primary tumor should remove the entire tumoral tissue, involving dura and abnormal bone to prevent recurrence.

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