Olfactory groove meningiomas

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Meningiomas, usually histologically benign tumors, are originating from the arachnoidal cap cells normally present intracranially in varying sites. Olfactory groove meningiomas arise from the midline of the anterior fossa between the crista galli and the tuberculum sellae. The most common presenting symptoms are the visual field defects, epilepsy, and psychological change. They are often large before they are detected because of slowly asymptomatic growing in the interhemispheric space of the frontal lobes. This series is consisted of 29 patients suffering from olfactory groove meningiomas treated surgically between May 1992 and November 2003. The surgical results and complications are presented and analyzed, comparing them by the other reported series.

Key words: meningioma, olfactory groove, skull base, recurrence of meningioma, bifrontal approach.

INTRODUCTION

Meningiomas account for approximately 15-20% of all primary intracranial tumors. These tumors are originating from the arachnoidal cap cells normally present throughout the intracranial space. They are usually found in the arachnoid villi at the dural venous sinuses, the cranial nerve foramina, the cribriforme plate, the choroid plexus and tela chooroidea, representing the origin of extraaxial and intraventricular meningiomas.

Meningiomas of the central subfrontal region originating either from the olfactory groove, planum or jugum sphenoidale or suprasellar area. Frequently the attribution of a primary site of origin to a large tumour may be extremely difficult, especially between the olfactory groove and the jugum sphenoidale meningioma. Olfactory groove meningiomas develop at the dura of the anterior cranial fossa over the cribriform plate and frontosphenoid suture.

PATIENTS AND METHODS

We reviewed 29 cases of olfactory groove meningiomas treated surgically by the authors between May 1992 and November 2003 at the Institute of Neurosurgery, Belgrade. There were 12 men and 17 women with the mean age of 54 years (range, 36-68 yr). Preoperatively all patients underwent MRI (Fig.1) with and without contrast enhancement including axial, sagittal and coronal images, while angiography was performed additionally in 11 patients. In 19 (66%) patients there were the midline lesions. The tumor was found on both sides of the falx equally in 8 patients and with asymmetrical extension on one side of the falx in 11 patients. In the remaining 10 (34%) patients the tumor extended laterally on only one side of the falx. MRI studies revealed that nine tumors (31%) invaded the anterior skull base. On admission all patients were suffering from visual symptoms - 16 (55%) patients had bilateral temporal hemianopia, and 7 (25%) had unilateral hemianopia. Three (10%) patients were already blind in both eyes while the other 3 (10%) were blind in one eye only. Cognitive changes was revealed in 9 (31%) patients. Six patients (21%) complained to impairment of olfactory function.

Six patients (21%) having a large midline lesion (diameter 5cm) underwent bifrontal craniotomy, and at the remaining 23 (79%) patients a unilateral supraorbital subfrontal approach was used. In all of patients the total resection of the meningeoma corresponding to Simpson Grade 2 (Fig.2) was performed.

RESULTS

Postoperatively 83% (19/23) of the patients with preoperative visual field impairment experienced improvement, while in the remaining 17% (4/23) of the patients the vision was unchanged. In four cases a preoperatively blindness was retained, while in one case the improvement was obtained. Cognitive dysfunction disappeared within a two
months in all cases. Olfactory function was improved only in two cases (2/6). Postoperative complications included cerebrospinal fluid rhinorrhea (two cases), bone flap infection (one case), transient cranial nerve III and IV palsy (two cases), and early postoperative seizures (two cases). There was no operative mortality. Tumor recurrence experienced 28% (8/29) of the patients, between 7 and 9 years of the surgery. They had undergone a reoperation.

DISCUSSION

Olfactory groove meningiomas are a relatively uncommon type of intracranial meningiomas and they represent only 10% of all intracranial meningiomas and 2% of all intracranial tumors. These tumors arise from the medline of the anterior fossa between the crista galli and the tuberculum sellae. Because of their slow growth in the interhemispheric space, these tumors often are well tolerated by the patient for long periods.

The most common presenting symptoms are related to the visual field defects, epilepsy, and changes in cognitive function. The impairment of visual function is the dominant feature in the clinical presentation of olfactory groove meningiomas. It usually indicates a large tumor, with backwards extension to the chiasmal structures. Early embarrassment of the optic pathways frequently presents as a central scotoma. The visual impairment almost manifests in one eye earlier than the other. Unfortunately, such a visual deterioration frequently have been unnoticed by the patient. Therefore, at the admission of the patients to the hospital usually there is an asymmetrical temporal hemianopia or even blindness. The epilepsy in these lesions is of grand mal type, if occurred. Even the very large olfactorius meningioma may be completely silent tumor. A change in mental function is frequently observed, as a loss of memory or confusion while more severe psychological disturbances are relatively rare. Anosmia is often present on examination but is not usually a presenting complaint.

A number of different approaches for surgical treatment of olfactory groove meningiomas have been described. The choice of surgical approach depends on tumor size, origin, placement according to midline and the relationship of the anterior cerebral arteries and the optic nerves to the tumor. The most common surgical approaches used are the standard fronto-temporal and either unilateral or bilateral subfrontal approaches. A bifrontal approach is used for large lesions that are located in the midline.

We used the bifrontal approach in cases of large symetrical midline lesions (tumoral diameters 5cm) because of providing an excellent view for dissection of the both anterior cerebral arteries and the optic pathways. All other patients in this series underwent the supraorbital subfrontal approach which minimizes brain retraction.

There was no mortality. In total of nine patients with cognitive changes in this series the mental restitution was completed within one month after surgery. Chee et al. noted that the altered mental status usually resolved following removal of the tumor.

Andrews at al. reported that the resection of olfactory groove meningiomas may improve visual impairment and that duration of preoperative visual symptoms affected postoperative recovery. In this series 83% of the patients with preoperative hemianopia experienced visual improvement after surgery.

However, Welge-Luessen et al. noted that the loss of olfaction does not usually recover. In this series only two patient of six with olfactory disfunction obtained partially improvement postoperatively.

Olfactory groove meningioma surgery has been associated with complications that include cerebrospinal fluid leak, meningitis, worsening vision, motor deficit, seizure, frontal lobe edema. Complications in our series are corresponding with other reports.

The recurrence rate of olfactory groove meningiomas ranges from 5 to 41%. This rate apparently depends on the extent of resection and the duration of follow-up. Mairui et al. and Piepre et al. noted that the olfactory groove meningeomas have a tendency to involve the underlying bone. Christensen et al. found that 15% of recurrent olfactory groove meningiomas invaded bone. Many reports stated that the recurrence of skull base meningioma is the result of incomplete resection of the tumor, including the involved bone. We had a recurrence of 28%. In our eight patients experiencing recurrence the tumor was initially involved the skull base. We performed a surgical resection corresponding only to Simpson Grade 2, which does not include the radical removal of underlying involved bone. We believe that these recurrences could be
avoided by complete removal of the invaded bone at the skull base.

**CONCLUSION**

Olfactory groove meningiomas can be totally resected with minimal morbidity. The postoperative improvement of visual and mental disturbances are significant. The extent of resection of tumor invading the cranial base is associated with the recurrence rate.

**SUMMARY**

**OLFAKTORNI MENINGEOMI**

Meningeomi, histolo{ki naj~e{}e{} benigni tumori, poti{tu od arahnoidalnih }elija koje se nalaze intrakranijalno na raznim mestima. Olfaktorni meningeomi nastaju u srednjem delu prednje lobanjske jame izmedju kriste gali i tuberkuluma sele. Obi~no se ogla{avaju ispadima u vidnom polju, epilepsijom i psiholo{kim smetnjama. Usled svog sporog i asimptomatskog rasta u frontalnom interhemisfe{nom prostoru oni su ~esto velikih promera u vreme kada se dijagnostikuju. Ovu seriju ~ine 29 bolesnika obolelih od olfaktornog meningeoma, hirur{ki le~enih u periodu od maja 1992. do novembra 2003. godine. Dat je prikaz i analiza dobijenih hirur{kih rezultata i nastalih komplikacija uz poredjenja sa objavljenim serijama drugih autora.

Klju~ne re~i: meningiom, mirisni 'leb, osnovica lobanje, ponovni rast meningeoma, obostrani ~eoni pristup

**REFERENCES**


