Olfactory Groove Meningioma: Surgical Outcomes Following Excision via the Subcranial Approach

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OBJECTIVES

1. Describe surgical outcomes and radiographic features of olfactory groove meningiomas treated by excision through the subcranial approach.
2. Demonstrate that a multidisciplinary approach is the preferred treatment method for olfactory groove meningiomas, particularly those involving the sinus and the optic apparatus.

REFERENCES


INTRODUCTION

Olfactory groove meningiomas (OGM) originate from the anterior cranial base. Overall, they account for approximately 8-13% of the total of intracranial meningiomas [1]. Surgery is the preferred method of treatment, with radiation being withheld for recurrent cases or high grade lesions. The extent of primary surgery is thought to be the critical determinant of long-term cure rates. Surgical trends emerging over the past three decades have favored radical resection, including removal of dural attachments and any involved bone. This is tempered by the delicate adjacent anatomy, and despite efforts at complete resection the recurrence rates of OGM over 10 year follow-up periods have been as high as 41%.

Caudal extension into the paranasal sinuses is thought to be important in the pathogenesis of recurrent OGM, but there is debate as to the best surgical approach [1,2]. Orbit invasion has also been described, and when present will alter the planned approach. Inadequate resection of unrecognized bone invasion is thought to lead to higher rates of recurrence. Reoperation is more challenging, and often entails delicate decompression of the optic nerve in an area with poor tissue planes [2]. In the case of an OGM involving the sinuses and/or the orbit, radical resection entails resection of the involved bony structures. This creates a communicating defect between the intracranial space and the sinonasal cavity, and may increase the risk of postoperative CSF leakage.

We present a case series of 19 patients with OGM treated via the subcranial approach. Special focus is given to the sinonasal extension and ophthalmologic outcomes following surgery.

METHODS

Retrospective review based on hospital and outpatient clinical records of a consecutive series of patients (n=19) who underwent excision of olfactory groove meningiomas via the subcranial/transglabellar approach between 1995 and 2009.

Invasion of the paranasal sinuses, orbit, or brain was determined based on review of imaging, operative notes, and pathology reports. Cerebrospinal fluid leak arising within 30 days of surgery was classified as a perioperative complication.

Ophthalmologic function was assessed at an outpatient clinic and documented by Neurology, Otolaryngology, or Ophthalmology services. Particular focus was placed on visual acuity changes and long-term diplopia.

Overall and disease free survival estimated by the Kaplan-Meier method.

IRB approved research.

RESULTS

Tumor histology included 3 WHO grade III lesions, 1 WHO grade II lesion, and 15 WHO grade I lesions. 14 patients had evidence of extension into the paranasal sinuses; the most commonly involved sinus was the ethmoid. Kaplan-Meier estimates of mean overall and disease free survival were 121.45 months and 95.3 months, respectively [Figs. 2A, 2B]. The mean follow up interval was 41.0 months. At the time of data analysis three patients had recurrent tumors. There were no perioperative mortalities.

Three patients (15.8%) experienced CSF leak as a perioperative complication. Orbit invasion and optic nerve impingement were seen in 4 and 11 patients, respectively. Of these, 3 patients had long term diplopia [Fig. 3]. No patients experienced worsening of preoperative visual acuity.

DISCUSSION

The high rate of sinonasal involvement in this series likely reflects both the large number of recurrent tumors and the influence of a referral bias to our multidisciplinary skull base team. No patients experienced a postoperative decrease in visual acuity. Three of the 15 patients with preoperative tumor involvement of the optic apparatus experienced long-term diplopia. Overall, preservation of the preoperative visual acuity was excellent, which is a credit to effective microdissection following good exposure.

Despite the wide exposure of the cranial base, the CSF leak rate was 15.8%, similar to a comparable series which employed various standard craniotomies. Overall survival was expectedly high given that OGM may exhibit indolent growth. Three tumors demonstrated evidence of recurrence. It should be noted, however, that this series includes 1 atypical (WHO grade II) and 3 malignant (WHO grade I) lesions, 9 tumors were recurrences, and the high rate of paranasal sinus extension reflects extensive tumor spread. In our opinion, this attests to the effectiveness of the subcranial approach in these cases.

CONCLUSIONS

• The subcranial approach offers excellent access for resection, particularly in cases with extension to the paranasal sinus and orbit.
• Despite a significant number of recurrent or aggressive histologic subtypes, surgical outcomes over the period of follow up were comparable to other recent series.
• Vision preservation was a notable and important benefit.
• As a whole, this underscores the value of the otolaryngologist-head and neck surgeon in the multidisciplinary management of these tumors.