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Meningioma of the Parapharyngeal Space: Case Report

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Meningiomas account for 15% of intracranial and 25% of intraspinal benign neoplasms.[1] They originate from pia-arachnoid cells, particularly those of the arachnoid villi, and are classically attached to the dura. Most afflicted patients are women in the fourth and fifth decades of life.[2] Grossly, meningiomas are generally well-circumscribed lesions with a sharp delineation from the surrounding structures. However, firm adherence to the dural site of origin is the rule rather than the exception. Uncommonly, meningiomas show direct dural invasion. Although osseous invasion is noted infrequently, adjacent hyperostosis often is demonstrable on computed tomographic (CT) scanning. A variety of histologic variants exist; however, biologic behavior and prognosis are noted to be similar for all subtypes of benign meningiomas, making these distinctions of low clinical significance.[3]

Extracranial extension of intracranial meningioma is rarely noted to occur into the confines of the orbit, scalp, and paranasal sinuses.[4-6] Extension and primary presentation in the parapharyngeal space and infratemporal fossa is exceedingly rare, with only a handful of cases reported.[7-10] Most of these cases were treated by tumor debulking or observation. However, the application of modern principles of combined intracranial/extracranial skull base surgery now provides an effective surgical modality associated with low morbidity and rewarding results. This report describes a patient in which this approach was used successfully.

Report of Case

A 49-year-old white, nonsmoking, otherwise healthy woman originally sought treatment for left-sided otalgia and trismus. Initial physical examination indicated the presence of lateralization of the uvula to the right side, with apparent bulging of the left parapharyngeal space. An initial attempt at resection was made through a left submandibular approach and neck dissection in combination with a paramedian mandibular osteotomy. This was unsuccessful because of the limited exposure achieved with this approach, as well as the apparent extent of the lesion. Microscopic examination of the specimen showed the diagnosis to be consistent with a meningioma. No further surgery was offered to this patient, presumably because of the extensive nature of the lesion.

When the patient first presented herself to our service, CT and magnetic resonance imaging showed the presence of a well-demarcated lesion apparently originating from the base of the left middle cranial fossa and extending into the left infratemporal fossa, parapharyngeal space, and nasopharynx (Figs 1, 2). Because of the patient's young age, progression of symptoms (dysphagia, otalgia, trismus), and the lesion's apparent resectability, the patient was offered surgical extirpation, followed by planned postoperative external beam radiation therapy to control any residual microscopic disease that may remain.

After a perioperative tracheotomy and insertion of a percutaneous endoscopic gastrostomy tube, the patient underwent a total left parotidectomy with preservation of all branches of the facial nerve. Next, a mandibular osteotomy extending from the angle to the sigmoid notch was performed, and the posterior mandibular segment was disarticulated. An osteotomy was also performed at the level of the zygomatic complex extending across the zygomatic arch,

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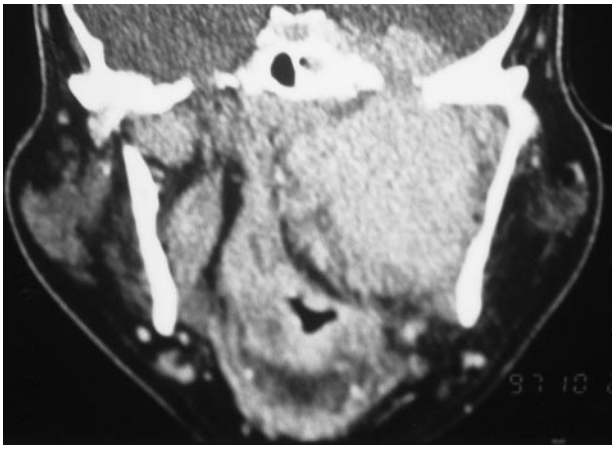

FIGURE 1. Coronal CT scan showing extensive involvement of the left infratemporal fossa and parapharyngeal space with an enhancing lesion extending from the intracranial cavity.

lateral wall of orbit, infraorbital rim, and malar eminence. Both the zygomatic complex and mandibular segments were kept in normal saline throughout the procedure (Fig 3). Inferiorly, control of the internal jugular vein, carotid artery, and spinal accessory, hypoglossal, and vagus nerves was gained. The lingual nerve was noted to be encased by tumor and was sacrificed. Superior control of the tumor was gained through the use of a frontotemporal craniotomy. There appeared to be a 2 × 3-cm osseous defect in the floor of the left middle cranial fossa. The tumor was mobilized easily from its dural attachments at this level.

With complete visualization of the tumor superiorly, anteriorly, laterally, and inferiorly having been achieved, meticulous dissection from the skull base was completed. Aside from involvement of the lingual nerve, all other significant neurovascular structures were easily separated from the tumor mass by following them from the neck superiorly into their foramina at the skull base. The entire specimen was removed en bloc (Fig 4) except for a small confirmatory incisional biopsy performed intraoperatively (Fig 5). No gross tumor was visible on completion of the procedure. The craniotomy flap was returned to its native position, and a slip of pedicled temporalis muscle was used for left temporomandibular joint reconstruction. The osteotomized segments of the zygomatic complex and mandible were rigidly fixed with preadapted miniplates (Fig 6). Postoperatively, the patient was kept in an occlusal splint and maxillomandibular fixation for a period of 6 weeks. Two months after surgery, the patient received 50 Gy radiation

FIGURE 2. Sagittal MRI image of the same patient showing the anteroposterior dimensions of the lesion.

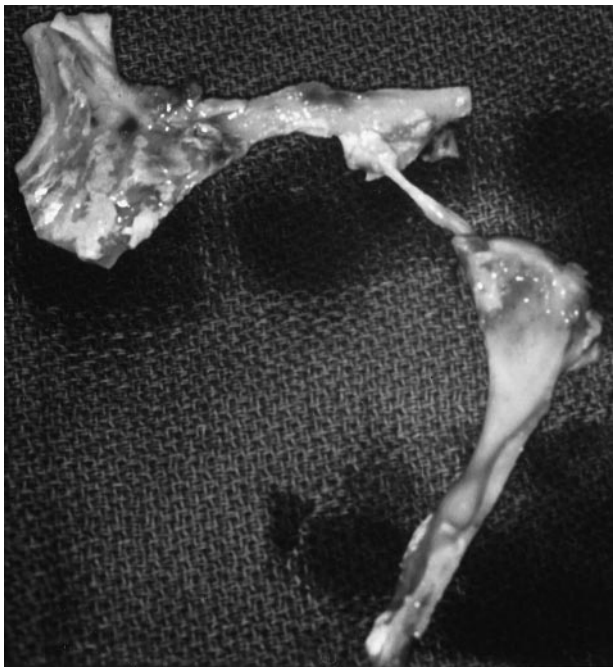

FIGURE 3. Disarticulated zygomatic complex and ascending ramus of mandible (posterior to sigmoid notch).

over a period of 5 weeks. She is tolerating a normal diet, has near normal facial nerve function, and has no evidence of persistent disease.

Discussion

Histologically, extracranial meningiomas are indistinguishable from their intracranial counterparts. Solid nests of meningothelial cells are arranged in whorls or sheets within a fibroadipose background. Occasional psammoma bodies may be seen. Meningothelial cells often show the presence of abundant cytoplasm with vesicular, occasionally vacuolated, nuclei.

Most meningiomas are primarily intracranial. Presentation as a predominantly parapharyngeal space and

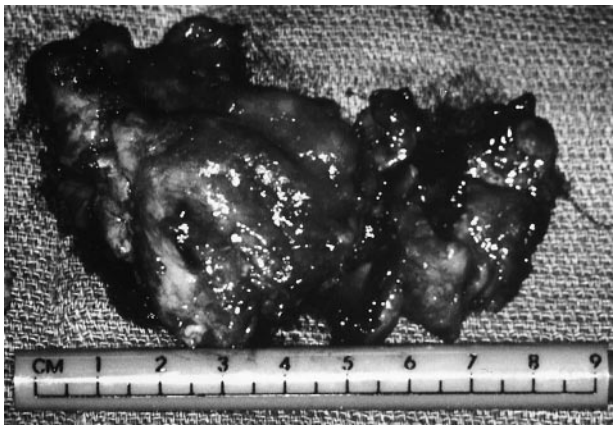

FIGURE 4. En bloc removal of 9 × 5-cm meningioma.

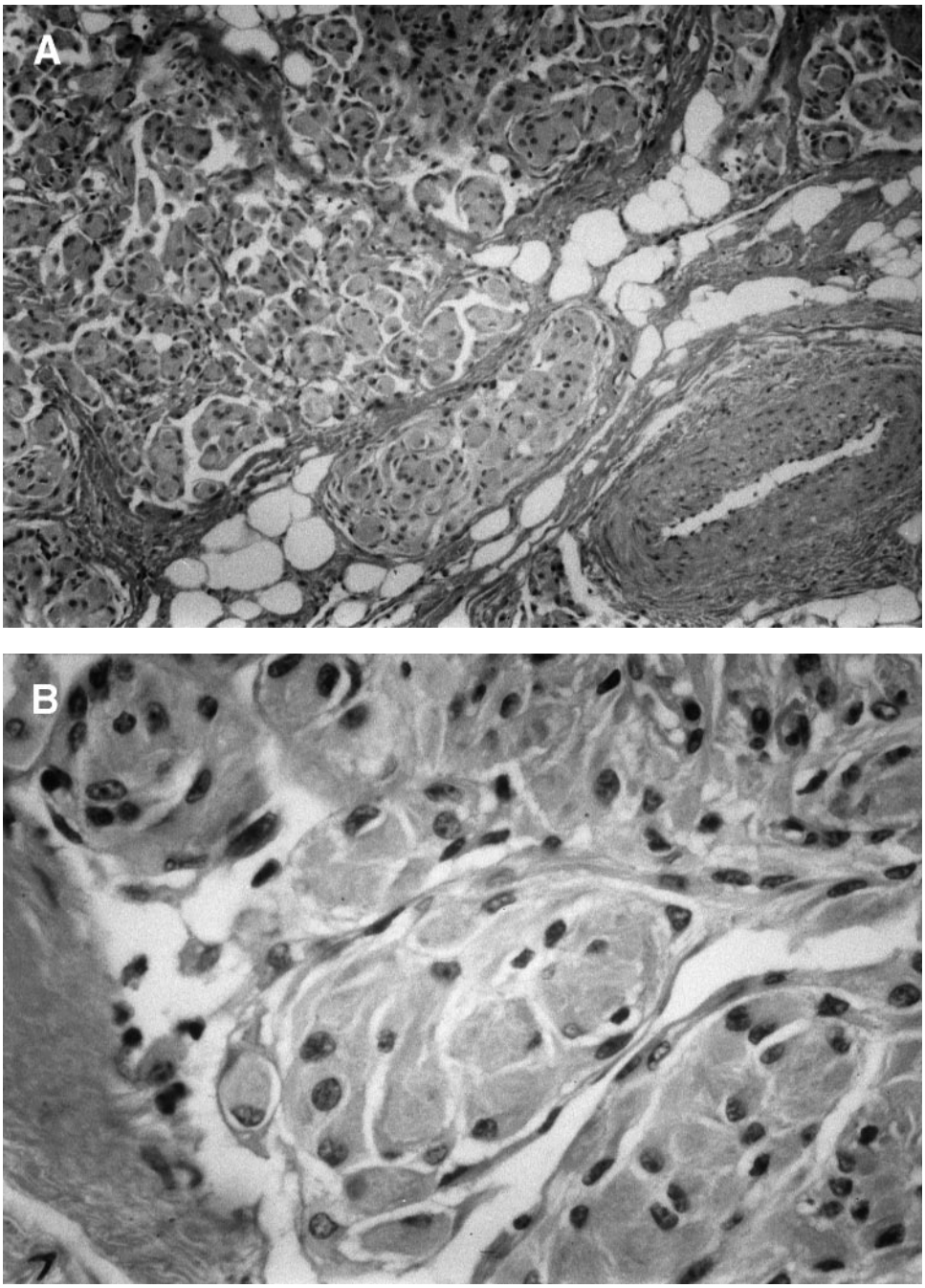

FIGURE 5. *A,* Low-power (10×) hematoxylin and eosin–stained view of the meningioma shows lobular growth of meningothelial cells with abundant cytoplasm and small, vesicular nuclei. Each micronodule of cells is invested by a thick synctium of fibrous tissue. Tumor elements proliferate within a fibroadipose tissue background and several nests approximate a thick-walled vascular channel. *B,* High-power (40×) hematoxylin and eosin–stained view of the meningioma shows occasional nuclei with a vacuolar appearance. Characteristic psammoma bodies are not observed.

infratemporal fossa mass is exceedingly rare, with only 4 cases reported.[7-10] Because of the small number of parapharyngeal space meningiomas available for study, it is not possible to determine their long-term prognosis. However, because they are histologically and grossly indistinguishable from meningiomas at other sites and until proved otherwise, the tenets of treatment should remain the same.

Completeness of resection is the major prognostic factor determining the outcome for patients with benign intracranial meningiomas, in terms of not only survival, but also risk of recurrence and neurologic disability.[11,12] There is also evidence to suggest that external beam radiation therapy may serve as a useful adjunct for control of residual microscopic disease after definitive surgery or as a palliative modality in inoperable or elderly patients.[13-15] However, conservative surgery that leaves gross disease in situ should be

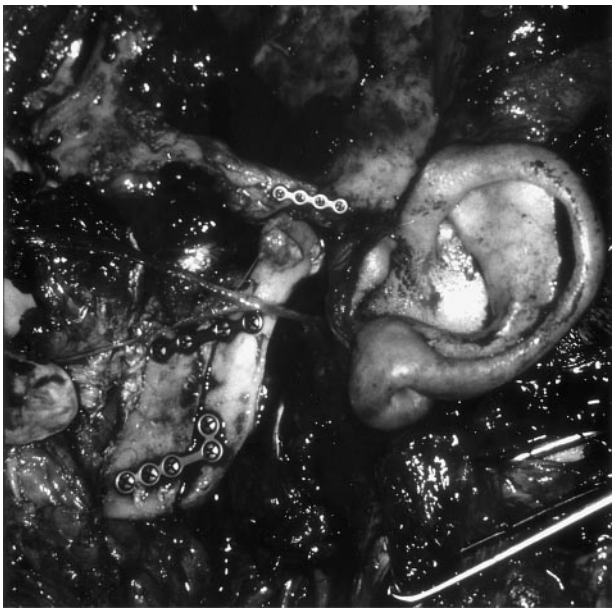

FIGURE 6. Intraoperative appearance after miniplate fixation of osteotomized segments. Note the upper division of the facial nerve coursing inferior to the condyle. The preserved lower division is coursing posterior to mandibular angle and is not pictured here.

viewed as a temporizing or palliative measure. There also appears to be a lack of significant increase in survival after tumor debulking. Thus, its role is likewise palliative.

In the past, definitive, en block resection of neoplasms extending from the intracranial compartment into the parapharyngeal space and infratemporal fossa has been associated with high rates of morbidity and mortality. The application of the modern principles of skull base surgery, with a combined intracranial/extracranial approach to these tumors, has resulted in an increased ability to extirpate previously ''unresectable'' lesions with acceptable morbidity. Completely excised benign meningiomas likely do not require adjunctive external beam radiation therapy. However, we thought it was prudent to administer postoperative radiation therapy to this particular patient, because she had had previous incomplete surgery with possible microscopic intraoperative seeding.

In the current case, the previous surgeons had noted that the tumor was adherent to the deep lobe of the parotid gland and had found that the mandibular distraction provided inadequate exposure of the entire extent of the lesion. Desiring to maximize exposure of the tumor, and anticipating adherence to the deep lobe of the parotid gland, it was thought that the most direct access would be provided by total parotidectomy followed by lateral facial disassembly. Should more medial exposure have been required, osteotomy of the medial maxilla may have easily been added. Once adequate exposure had been achieved circumferentially, en bloc resection with preservation of uninvolved neurovascular structures was greatly facilitated. In our hands, rigid fixation of disarticulated maxillofacial segments has been associated with excellent results in terms of aesthetic and functional outcomes.

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