How I Do It

Transorbital Endoscopic Removal of Posterior Lateral Orbital Mass

Mark A. Rivkin, DO; Alan R. Turtz, MD; Kenneth E. Morgenstern, MD

INTRODUCTION

Numerous endoscopic approaches to the orbit have been described in the literature and are typically performed using a transnasal route. These techniques are especially useful for medial orbital masses. Pathology located within the posterior and posterior-lateral orbit can create additional challenges for surgical access. Approaches for these hard-to-reach lesions include more invasive surgical corridors such as anterior and lateral orbitotomy as well as orbitozygomatic or frontal keyhole craniotomy. The endoscopic approach has proven useful to biopsy masses in this location, yet complete resection using endoscopic techniques has not been undertaken to date.

We present a case of a posterior lateral orbital tumor where lesion location delivers classic surgical challenges for its removal. To avoid a craniotomy, large lateral wall orbitotomy, prolonged postoperative pain, or possible an aesthetically unappealing skin incision, we used a unique direct transorbital endoscopic approach (modified transorbital neuroendoscopic surgery [TONES]) to achieve a complete en bloc excision of this tumor. To our knowledge, this is the first time this adaptation of the endoscopic technique for a complete orbital tumor resection has been described.

MATERIALS AND METHODS

A 49-year-old female presented with a 2-year history of diplopia and intermittent blurry vision of the right eye. Over the last 6 months she noted an increase in periorbital pain. On clinical exam she demonstrated a 1-mm hypertelorism with 3 mm of proptosis in the right eye. Her visual acuity was 20/50 on the right and 20/25 on the left. Pupil and motility exam were normal bilaterally. Posterior exam showed no sign of optic nerve pallor or edema. Magnetic resonance imaging (MRI) demonstrated a homogeneously enhancing lesion emanating from the posterior lacrimal gland and extending toward the apex measuring 18 mm in length by 12 mm in width (Fig. 1). The likely diagnosis of pleomorphic adenoma coupled with the increase in double vision and pain led to the surgical excision of the tumor. The mass was removed en bloc using a transconjunctival transorbital endoscopic approach. No bone removal, craniotomy, or skin incision was required. The patient was observed for 23 hours and discharged home with marked resolution of pain and no diplopia. Complete excision was confirmed with the demonstration of an intact capsule around the tumor on the final pathology report.

Surgical Technique

The patient was induced with a general anesthetic, was placed in a radiolucent skull clamp, and an intraoperative computed tomography (CT) scan was obtained. This was fused to the preoperative MRI for the image guidance system registration. The patient was fully prepped for a standard neurosurgical approach in case the superior lateral walls of the orbit would need to be removed. The eye was prepped using diluted Betadine solution. A local anesthetic was injected in the area of the right upper lid and lateral canthal region, and a topical anesthetic was applied to the eye. A titanium corneal shield was applied, and a lid speculum was introduced (Fig. 2).

A conjunctival incision was made laterally on the bulbar conjunctiva surface just posterior to the insertion of the lateral rectus muscle (Fig. 3). A 6-0 Vicryl suture was placed through the medial aspect of the conjunctival incision and pulled medially over the corneal protective shield retraining the tissue. Sharp and blunt dissection was used to dissect laterally toward the lateral orbital rim. The dissection was angled toward the lateral orbital tubercle. The periosteum just posterior to tubercle was then incised, and a preperiosteal pocket developed. A 0° endoscope was then carefully placed into this pocket, and the periosteal plane dissection was carried posterior under direct endoscopic vision. This was performed using a bimanual technique. The mass was identified tenting the periosteum (Fig. 4). Image guidance was used to confirm the correct location of the tumor. An incision was then made in the periosteum and the tumor delivered into the periosteal pocket (Fig. 5). The tumor was dissected free from the surrounding soft tissue, kept intact, and delivered through the conjunctival incision (Fig. 6). A tract of normal-appearing tissue connected to the lacrimal gland was identified and separated from the tumor capsule outside of the orbit. An intact capsule was appreciated around the mass.
(Fig. 7). Intraoperative frozen section confirmed a diagnosis of pleomorphic adenoma. Meticulous hemostasis was obtained throughout the case using bipolar cauterization with both standard and endoscopic instrumentation.

Because the subperiosteal dissection entered posterior to the lateral tubercle, the lateral canthal tendon remained intact. The periosteum was closed with a single 5-0 Vicryl suture. The Tenon’s layer was reaproximated with buried 8-0 Vicryl sutures. No conjunctival stitches were placed. The corneal shield was removed and antibiotic ointment placed on the eye.

RESULTS
There was normal pupil response during the case and full ocular motility noted after. The patient tolerated the procedure well. A postprocedural intraoperative CT scan as well as an MRI on postoperative day 1 demonstrated complete resection of the tumor. The patient experienced mild periorbital edema postoperatively but no ecchymosis. The final pathology report identified the mass as a benign mixed tumor (pleomorphic adenoma) with foci of squamous metaplasia. She was re-examined at 1 week and again at 19 months with visual acuity measuring 20/20 bilaterally, with no pupillary abnormalities and full ocular motility.

DISCUSSION
Direct surgical approaches to the lateral and superior orbital regions have been previously described, sometimes necessitating neurosurgical involvement in
the case. Typically, these approaches require skin incisions, lateral bone removal, and/or craniotomy for exposure and complete excision. Zoumalan et al. demonstrated two useful incisions; the “lazy S” brow and the upper lid crease, for lateral orbitotomy with bone window.7 These approaches require dissection of temporalis muscle, periosteum, and removal of the lateral orbital wall, with opening of the periorbita to access the lesion. The use of open approaches such as these results in postoperative discomfort, scar formation, and prolonged postoperative edema. The use of endoscopic approaches helps to avoid some of these issues.

Endoscopic approaches to the orbit have been used for the treatment of orbital fractures, nerve decompression, tumor, and foreign body retrieval.3,6 These techniques are helpful in accessing medial masses and structures. Moe et al. have described a unique direct TONES for anterior skull base pathology.2 The orbit was utilized as a working channel for direct endoscopic, minimally invasive access.3 The authors successfully treated 20 lateral and paramedian skull base lesions in 16 patients with TONES. This technique has not been used for intraorbital pathology, however.

Advantages of endoscopy include improved cosmesis, decreased surgical morbidity and pain, as well as shorter hospital stay. Upon careful review of the literature, we believe this to be the first technical report of a solely intraorbital endoscopic removal of a superior posterior-lateral orbital mass. For our patient, this unique approach attenuated the need for a skin incision and removal of the lateral orbital wall or craniotomy, as well as facilitating an expedient return home.

The technique is limited by its two-dimensional view, the bimanual technique, and the learning curve that may be required for surgeons less familiar with this instrumentation in this area. Prolapsed orbital fat, which can interfere with any orbital tumor removal, may be more obstructive with this technique. Larger tumors or masses with bone involvement may still require standard open approaches.

**CONCLUSION**

Currently, the majority of orbital endoscopic procedures are performed through endonasal/sinonasal corridors. To our knowledge, this is the first report of a solely intraorbital endoscopic complete removal of a superior posterior-lateral orbital mass. This adaptive approach has allowed us to avoid a skin incision and any bone removal. Our endoscopic technique allowed our patient to be discharged after only a 23 hours observation with no diplopia or significant discomfort.
BIBLIOGRAPHY


Fig. 6. Intact tumor is delivered through the conjunctival incision and separated from the lacrimal gland outside of the orbit. Visible is the temporal side of the right orbit (left), nose (right), and forehead (superior). A = tumor; B = lid speculum; C = corneal shield; D = tract of normal appearing tissue connected to the lacrimal gland. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

Fig. 7. Endoscopic image showing empty periosteal pocket after tumor resection. Visible is the lateral orbital wall (left) and periosteum (right). A = periosteum; B = right lateral orbital wall; C = site of attachment of tumor capsule. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]