Surgery for orbital tumors. Part II: transorbital approaches

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Orbital tumors can be excised or biopsy samples obtained via transorbital approaches, especially those located in the anterior two thirds of the orbit. The indications and various surgical steps will be reviewed for the anterior, the anteromedial, and the lateral approaches. Some of these approaches can be combined or extended to accommodate large or deep-seated tumors.

**Key Words** • orbital tumor • transorbital approach • orbitotomy • anteromedial approach • tumor excision

Types of Transorbital Approaches

There are four primary routes by which transorbital lesions can be reached: 1) the anterior orbitotomy without osteotomy (superior [eyelid, supraorbital or subbrow incision] or inferior [transconjunctival, subciliary, or lower eyelid incision]), or with osteotomy of the superior orbital rim (for large lesions); 2) lateral orbitotomy; 3) medial orbitotomy; and 4) a combination of the lateral and medial orbitotomies.

**Orbital Approaches**

**Anterior Orbitotomy**

The anterior approach to the orbit is useful for lesions of the anterior two thirds of the orbit.5,7,8,12,14 This approach was devised by Knapp11 in 1874 and popularized by Benedict.2 The anterior orbitotomy is a misnomer because bone removal is often not required. A biopsy sample of infiltrating anterior orbital lesions is usually easily obtained by fine needle aspiration. If this technique fails or is unavailable, an anterior approach with incisional biopsy sampling can be performed. The place of incision is determined by the tumor location (Fig. 1). A superior mass, for instance, can be approached through an eyelid crease incision or a supraorbital or subbrow incision.

**Eyelid Crease Approach for Incisional Biopsy Sampling of the Lacrimal Gland.** A biopsy sample of lacrimal gland lesions, such as lymphoma, sarcoidosis, or nonspecific orbital inflammation, can be obtained through an eyelid crease incision (Fig. 2). The procedure may be performed after the patient has received a local anesthetic and intravenous sedation in some cases, although general anesthesia is usually preferred because the lacrimal gland is typically not easily anesthetized. The eyelid crease on the affected side is marked and injected with a local anesthetic. The skin and orbicularis fibers lateral to the region of the levator are incised. Hemostasis is achieved using cauterization. Blunt dissection is carried down to the level of the lacrimal gland. A biopsy specimen is then obtained using an Ellman radiofrequency unit with the loop attachment, a No. 15 blade, or blunt-tipped Westcott scissors. Because the inflamed lacrimal gland can bleed briskly, care must be taken to achieve complete hemostasis prior to skin closure. A pressure patch is placed on the wound. Biopsy samples of superior extraconal lesions are acquired in a similar fashion, usually through a supraorbital incision or subbrow incision.
Subbrow Approach to Superior Orbital Lesions. The steps highlighting this approach are shown in Fig. 3. An incision is made through the lower-brow follicles, parallel to the orientation of the brow hair, to preserve as many follicles as possible. The incision is continued to the level of the orbital bone. The skin and subdermal tissues are retracted. The periosteum (periorbita) is incised and dissected from the orbital bone, and the lesion is usually immediately visible.

A pediatric Alice clamp or cryoprobe can be used to pull the lesion forward as the blunt Westcott scissors and long cotton-tipped applicators are used to release all adhesions. Hemostasis is achieved with cauterization. The periorbital incision may be closed with interrupted No. 5-0 vicryl sutures before closing the dura. A pressure patch is placed on the wound.

Superior Approach With Superior Osteotomy. The steps of this approach are illustrated in Fig. 4. Largerextraconal superior orbital lesions cannot be removed by the more simple approach. A superior osteotomy is needed. The incision is made in a subbrow or in a supraorbital position, and its horizontal extent should be generous (at least 3 cm). A combination of No. 4-0 silk sutures and retractors is used to improve visualization of the mass. The supratrochlear and supraorbital neurovascular bundles are visualized and preserved. The superior orbital rim is removed using a sagittal saw. A cryoprobe or Alice clamp is then used to remove the tumor, and the bone is replaced and secured with titanium miniplates. In cases of posterior superior orbital lesions, a craniotomy is necessary.

A transconjunctival route may be used to approach inferior orbital lesions, through a skin incision (subciliary or lower eyelid) or via an extraorbital approach. The cryoprobe is useful for extraction of deeper orbital masses.

Lateral Orbitotomy

The lateral approach was first proposed by Kronlein in 1889, and it was later modified by Berke. In 1976 we described our modification of the Berke technique, advocated the use of the surgical microscope, and designed special microinstrumentation and a self-retaining orbital retractor.

The lateral orbitotomy is useful for retrobulbar lesions, and it can be extended for more posterior lesions. The procedure involves temporary removal of the lateral wall of
Transorbital surgical approaches

Fig. 3. Diagrams showing an anterior orbitotomy performed via a subbrow approach. Anterior orbitotomy approach to a subperiosteal mass (A) via a subbrow approach. An incision is made through the lower brow and parallel to the follicles to preserve them (B). The periosteum is exposed and incised, exposing the lesion (C). The tumor is then excised (D), and the periorbital incision closed with interrupted No. 5-0 vicryl sutures (E). The skin is then closed with interrupted sutures (F). Reprinted with permission from Kennerdell, et al., Practical Diagnosis and Management of Orbital Diseases. Boston: Butterworth-Heineman, 2001.

Fig. 4. Diagrams depicting an anterior orbitotomy and superior osteotomy. A generous subbrow incision is made (A). Retraction facilitates tumoral exposure (B). The area of bone to be removed is marked (C). The bone is removed using a sagittal saw (D), widening the exposure to the lesion. This approach is more suited to large extraconal lesions in which added exposure is needed. Reprinted with permission from Kennerdell, et al. Practical Diagnosis and Management of Orbital Diseases. Boston: Butterworth-Heineman, 2001.
tion by nonabsorbable No. 4-0 nylon sutures. The periorbita and the slip of temporalis and periosteum are attached at the lateral orbital margin with No. 5-0 nondyed vicryl sutures (Fig. 6). Vertical mattress sutures are used to close the subcutaneous tissue to approximate the wound edges, and the skin is closed with a running suture. A pressure patch is applied until the next morning.

**Transconjunctival Medial Orbitotomy**

The medial approach was described in 1973 by Galbraith and Sullivan to decompress the optic nerve and relieve papilledema. We have used the same approach to re-
**CONCLUSIONS**

Most orbital tumors can be safely approached via the transorbital routes. They require instruments and skills that are atypical for the general ophthalmologist. The presence of important neurovascular structures within the
orbital fat contents makes dissection tedious. Many of the instruments required to facilitate orbital surgery are readily available from ophthalmological and neurosurgical instrument companies. Unlike a typical ophthalmological procedure, the surgeon’s index finger is essential to palpate and occasionally provide dissection for deep masses. Cotton-tipped applicators are very helpful for performing blunt dissection and retraction when working in the orbital fat. In addition to the standard instruments that are useful in orbital tumor surgery such as the wire lid speculum, blunt Westcott scissors, the Stevens and Green hooks, other specific orbital instruments are required—malleable retractors, curved scissors and forceps with specialized 6-inch length, and a cryoprobe. There is no fixed orbital retractor system currently available that can be easily used and that is superior to manual retraction. We are currently working to develop a newer practical and efficient retractor system, which combines orbital retractors with specialized shapes and the neurosurgical Leyla system.

References

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