Surgical approaches to the orbit

Indications and techniques

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The authors review their experience with over 300 patients with orbital tumors, and summarize their surgical techniques and indications for each surgical approach. A fronto-orbital approach is described which is used for tumors with intracranial extension and for those located in the orbital apex and deep medial orbital compartment. Lateral micro-orbitotomy is used for tumors located in the superior, temporal, or inferior compartment of the orbit and those in the lateral apex. A medial microsurgical approach is used for tumors located medial to the optic nerve but not deep in the apex. By thus approaching tumors directly, optimal exposure is obtained and functional deficits are minimized. The pertinent surgical anatomy is illustrated and the technique of fine-needle aspiration biopsy is discussed.

KEY WORDS • orbit • optic nerve meningioma • optic nerve • optic nerve glioma • orbital tumor

In 1976, we reported the results in our first seven patients with intraorbital tumors removed through the lateral microsurgical approach. Since then, we have treated over 300 additional patients with orbital tumors, pseudotumors, and dysthyroid orbital disease (Table 1). In all cases, a combined neurosurgical/neuro-ophthalmological diagnostic and therapeutic approach was used. Due to technical innovations in high-resolution computerized tomography (CT) scanning and diagnostic ultrasound, the introduction of lasers and ultrasonic aspirators, and the development of microsurgical instrumentation and self-retaining orbital retractors, the traditional techniques for orbital tumor removal have changed dramatically.

In this report, we will discuss pertinent surgical anatomy of the orbit, our orbital surgical approaches, the indications for each, and the role of fine-needle aspiration biopsy in orbital tumors.

Surgical Anatomy

The optic canal lies between the two struts or roots of the lesser sphenoid wing. It is 5 to 10 mm long and 4.5 mm wide, and the average height is 5 mm. The roof of the canal is variably 1 to 3 mm thick. The proximal opening is formed dorsally by the falciform process, a thin fold of dura which overlies the optic nerve, medially is the sphenoid sinus and laterally is the anterior clinoid process, which may be pneumatized and communicate with the sphenoid sinus.

Figure 1 illustrates several important anatomical relationships. The optic canal is narrowed distally and the medial distal wall is quite dense relative to the more proximal segment. This thickened distal optic ring must be meticulously removed in any complete optic nerve decompressive procedure. Over-aggressive decompression medially, however, may result in entrance into the ethmoid or sphenoid sinus, creating defects which must be repaired to prevent leakage of cerebrospinal fluid (CSF). Furthermore, when the high-speed air drill is used to unroof the optic nerve, awareness that the falciform process does not overlie bone will obviate direct injuries to the optic nerve.

Each optic nerve leaves the chiasm and travels about 15 mm through the intracranial subarachnoid space. Upon entering the optic canal, the nerve is invested by its pial layer. The intracranial dura mater continues through the canal as a dural-periosteal layer and then separates into a dural layer which forms the dura of the optic nerve and a periosteal layer which becomes the periorbita (Fig. 2).

At the orbital apex, the pia and the arachnoid fuse
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TABLE 1
Orbital tumors and pseudotumors evaluated between 1975 and 1983

<table>
<thead>
<tr>
<th>Type of Lesion</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>meningiomas</td>
<td>30</td>
</tr>
<tr>
<td>hemangiomas</td>
<td>21</td>
</tr>
<tr>
<td>optic nerve gliomas</td>
<td>9</td>
</tr>
<tr>
<td>neurofibromas</td>
<td>5</td>
</tr>
<tr>
<td>rhabdomyosarcomas</td>
<td>4</td>
</tr>
<tr>
<td>dermoid tumors</td>
<td>33</td>
</tr>
<tr>
<td>hemangiopericytomas</td>
<td>5</td>
</tr>
<tr>
<td>adenoid cystic carcinoma</td>
<td>5</td>
</tr>
<tr>
<td>lymphangiomas</td>
<td>7</td>
</tr>
<tr>
<td>benign mixed lacrimal gland tumors</td>
<td>4</td>
</tr>
<tr>
<td>metastatic tumors</td>
<td>75</td>
</tr>
<tr>
<td>nonspecific orbital inflammation</td>
<td>110</td>
</tr>
<tr>
<td>total cases</td>
<td>308</td>
</tr>
</tbody>
</table>

with the dura and the fibrous anulus of Zinn. The patency of the subarachnoid space is maintained throughout to its point of fusion with the pia at the posterior margin of the globe. This anatomical relationship is particularly important when dealing with optic nerve meningiomas. Early in their course, these tumors compress the arachnoid which serves as a plane for intradural dissection, much as it does for cerebral convexity meningiomas.

The ophthalmic artery provides the major blood supply to the optic nerve. Branches include the pial vessels and a major intraneural branch, the central retinal artery. The ophthalmic artery is approximately 1.25 mm wide, and in over 90% of the cases arises from the carotid artery just above the cavernous sinus. In most instances, it arises anteromedially then passes into the optic canal and the orbit lateral and inferior to the nerve. As the ophthalmic artery enters the orbit, it assumes a more medial position. Eight to 15 mm behind the globe it gives off the central retinal artery. This artery traverses the dural sheath obliquely and then penetrates into the medial midportion of the optic nerve to supply the retina, not the intraorbital nerve (Fig. 2).

The intraorbital portion of the optic nerve derives most of its blood supply from the plexus in the pia mater, which is supplied primarily from the ciliary arteries. The primary venous drainage of the orbit is through the superior and inferior ophthalmic veins. This appreciation of optic nerve blood supply illustrates why dissection in the posterior medial portion of the orbit may jeopardize vision by interfering with retinal (not optic nerve) blood supply. On the contrary, dissection laterally along the entire course of the nerve is relatively safe.

The anulus of Zinn is a fibrous double-pierced tendinous funnel at the orbital apex which gives rise to five of the six extraocular muscles. As seen in Fig. 3, the anulus is firmly fused to the optic nerve dorsally, extends laterally, and is divided by a dural plane into two compartments. The more medial compartment contains the optic nerve and the ophthalmic artery. The lateral compartment or oculomotor foramen is bounded laterally by the two heads of the lateral rectus muscle. This foramen transmits the superior oculomotor, the abducens, the inferior oculomotor, and the nasociliary nerves. The trochlear nerve, frontal nerve, and lacrimal branch of the fifth nerve and the ophthalmic vein pass through the superior orbital fissure but not through the oculomotor foramen. It is recognized,
FIG. 3. Diagram showing the anatomy of the orbital apex.

however, that there can be considerable variation in the venous drainage of the orbit. The most direct surgical approach to the optic nerve, therefore, is medially between the dorsal superior rectus and levator muscles and the medial rectus muscle. This approach obviates potential trauma to the nerves passing through the oculomotor foramen.

When the optic nerve is approached transcranially, it is important to note the trochlear nerve crossing from lateral to medial above the optic nerve and immediately under the periorbita. This nerve is almost impossible to spare, even with microdissecting techniques, when the anulus is opened for tumor removal.

Choice of Surgical Approach

The precise location of orbital tumors in relation to the optic nerve and apex of the orbit is determined by a thorough history and physical examination of the patient, high-resolution CT scanning, ultrasonic scanning, angiography, and fine-needle aspiration biopsy when indicated. The most direct surgical approach to the lesion is then planned.

The transcranial approach is used for all tumors with intracranial extension, for tumors located in the apex and/or optic canal, and for tumors in the apex medial to the optic nerve. The lateral microsurgical approach is used for tumors located in the superior, temporal, or inferior compartment of the orbit and those in the lateral apex. The medial microsurgical approach is used for tumors located medial to the optic nerve but not deep in the apex. By thus approaching tumors directly, optimal exposure is obtained and functional deficits are minimized.

The transcranial surgical approaches to the orbit may be arbitrarily divided into two types. The first involves the removal of the frontotemporal bone with preservation of the supraorbital rim, as recommended initially by Dandy with subsequent modifications by others. The second approach involves removal of the frontotemporal bones as well as the supraorbital arch. In 1913, Frazier described this approach for hypophyseal surgery. Subsequently others, including ourselves, have introduced modifications of this technique which will be described below.

Most neurosurgeons use the frontotemporal approach with preservation of the supraciliary arch for all orbital tumors. Usually this proves satisfactory; however, we have had considerable difficulty with this technique when dealing with large tumors deep in the apex and in particular when attempting to repair the transected anulus of Zinn. Consequently, we now use the frontotemporal approach that involves removing the orbital rim with the bone flap en bloc. We have found this permits the best possible visualization of the orbital contents with minimal brain retraction.
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**Surgical Techniques**

**Transcranial Supraorbital Approach**

No more than 2\(\frac{1}{2}\) cm of shaved scalp lies behind the incision. Drapes are sutured or stapled into place. A bicoronal skin incision is then made a few millimeters behind the hairline just anterior to the tragus of the ear on the affected side extending approximately to the superior temporal line on the opposite side. This anterior incision with minimal shaving has resulted in excellent cosmetic appearance with no wound infections to date. Subperiosteal dissection is used to elevate the entire frontal flap and the temporalis muscle (Fig. 4A). The supraorbital nerve is identified and, if encircled in the supraorbital foramen by bone, a small osteotome is used to free it. Often the nerve is not bound in the notch and is elevated with subperiosteal dissection.

With a blunt dissector, the subperiosteal dissection is carried into the orbit so that the periorbital tissue, which is continuous with the pericranium, is displaced from the superior orbital roof. This dissection is carried laterally so that the lateral periorbita is separated from the frontal portion of the zygomatic bone. The temporalis muscle is dissected from the anteriormost portion of the temporal fossa down to the zygomatico-temporal suture line (Fig. 4B).

A five-holed bone flap is then prepared. The first hole is in the temporal fossa anteriorly so that the lateral wall of the orbit, as well as the intracranial compartment, is exposed. A second hole is placed immediately above the glabella. This usually perforates the frontal sinus. Two to three additional holes are used at the surgeon’s preference.

A Gigli saw is passed from the anterior temporal burr hole into the lateral orbit above the dissected periorbital fascia, and the zygomatic arch is transected (Fig. 4C). Standard saw cuts are then made to connect the remaining burr holes. An osteotome is used to transect the anteromedial orbital ridge from the glabellar burr hole into the orbit, taking care not to go too far posteriorly thereby interrupting the trochlear strut.

With these cuts made, the bone flap is elevated in the standard way; the only bone remaining untransected is the thin superior orbital roof. This usually breaks posteriorly so that the entire supraorbital ridge, superior orbital roof, and frontal bone are removed in one piece (Fig. 4D and E).

With minimal retraction on the dura and using small bone-biting rongeurs, it is a simple matter to remove the remaining portion of the orbital roof, including the bone over the optic canal (Fig. 4F and G). The periorbita is often opened during the elevation of the bone.
For a description of the technique see text.

Lateral Microsurgical Approach

In 1889, Krönlein first proposed a lateral approach to the orbit, and Berke in 1953 modified the lateral incision from a "horseshoe" osteoplastic type to a transverse incision extending from the lateral canthus posteriorly 30 to 35 mm. In 1976, we described our modifications of the Berke technique and advocated the use of the operating microscope; we also designed special microinstrumentation and a self-retaining orbital retractor.

The skin incision for the lateral orbitotomy initially transected the lateral canthal ligament and extended posteriorly 35 mm along the line that would be covered by the arms of a pair of eyeglasses (Fig. 5). Recently, we have curved the incision superiorly up to the brow and have not transected the lateral canthal ligament or detached the lateral rectus muscle as advocated by some. With this skin incision, we are able to approach tumors in the superior, lateral, and inferior intraconal compartments as well as the apex laterally.

After the skin incision is made, the temporalis fascia (but not the muscle) is incised, beginning at the midportion of the frontozygomatic bone and extending posteriorly the length of the skin incision. A tarsorrhaphy is not required. Methyl methacrylate cranioplastic plugs are placed in all of the burr holes except those under the temporal muscle.

The cosmetic results with this procedure are excellent. Enophthalmos may be seen, but this has not resulted in diplopia, and within a week or two is unnoticeable. We have had no cases of pulsating proptosis in over 100 cases of transcranial orbital explorations. We have had no CSF leaks and no extraocular disturbances or corneal infections secondary to the surgical approach.

* Greenberg retractor manufactured by The Codman Co., Randolph, Massachusetts.
TABLE 2

<table>
<thead>
<tr>
<th>Location of Tumor</th>
<th>Visual Acuity</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>mid to anterior</td>
<td>stable</td>
<td>observation</td>
</tr>
<tr>
<td>apical</td>
<td>progressive loss</td>
<td>lateral microsurgical</td>
</tr>
<tr>
<td>apical, large</td>
<td>near normal or normal</td>
<td>observation</td>
</tr>
<tr>
<td>intracranial</td>
<td>progressive loss</td>
<td>radiation/craniotomy</td>
</tr>
<tr>
<td>extension</td>
<td>no light perception</td>
<td>craniotomy</td>
</tr>
</tbody>
</table>

Fig. 6. Artist’s rendering of the three modes of presentation of optic nerve (O.N.) meningiomas in relation to the dura: extradural, subdural, and a combination of the two.

expose the external lateral orbital bone. Bleeding is reduced by the injection of 1 to 200,000 units of epinephrine into the muscle and temporal subperiosteal area prior to the skin incision. The zygomatic artery and the meningeal branch of the lacrimal artery, which may be encountered during the subperiosteal dissection, are easily controlled with electrocautery or bone wax.

A reciprocating saw is used to incise the lateral rim of the orbit just above the zygomaticofrontal suture line and to make another cut approximately 1 1/2 cm below this. These two cuts are made while an assistant protects the intraorbital contents with a malleable brain retractor inserted between the inner surface of the lateral wall of the orbit and the periorbital fascia. After these cuts are made, a rongeur is used to grasp the orbital rim and break the bone posteriorly at its attachment to the greater wing of the sphenoid. Additional bone is then rongeured away from the greater wing of the sphenoid.

If it is necessary to obtain proximal exposure of the optic nerve or to gain access to the deep lateral portion of the muscle cone, additional bone is removed from the sphenoid bone with a high-speed air drill and small angled rongeurs. We have frequently exposed the anterior temporal dura as well as the frontal dura through this approach for excellent visualization deep in the orbital apex. This bone may be quite vascular, and frequent applications of bone wax are required.

With the bone thus removed, the periorbital fascia and retrobulbar contents become visible. A traction suture through the lateral rectus muscle at its globe attachment allows identification of the muscle through the periorbital fascia. With gentle palpation, tumors can frequently be felt at this point. An incision can then be made in the fascia parallel to and above or below the lateral rectus muscle to gain access to the intracranial compartment. The orbital self-retaining retractor is then inserted with one blade retracting the temporalis muscle. Another two blades are used for superior and inferior retraction of the orbital fat. With one assistant aspirating any blood and holding a fourth retractor blade gently on the globe, the primary surgeon identifies the optic nerve or the tumor, using microdissecting techniques. The fine neural vascular structures in the lateral compartment of the orbit are carefully preserved. Tumors in the lateral intracranial compartment, such as hemangiomas, dermoid tumors, or neurofibromas, may be grasped with an ophthalmic cryoprobe† of the kind generally used for detached retinas or for removing cataracts. The tip of this instrument is “frozen” to the tumor capsule and allows retraction without perforating the capsule.

If the purpose is to remove a tumor attached to the optic nerve, proximal and distal exposure of the nerve is obtained. Exophytic or extradural tumors such as meningiomas are found by palpation and subsequent dissection. If the mass is large, bulk tumor reduction is accomplished either with the Cusa ultrasonic aspirating device‡ or a laser. Depending on the vascularity of the tumor, we occasionally employ both instruments. The same precautions are used with these instruments in the orbit as in the intracranial compartment. In our recent experience, the laser appears to provide a delicate controlled method for reducing the mass of such a tumor.

Once the mass is reduced in size, a plane may be seen between the normal dura and the tumor. This plane is exploited and the tumor is removed from its dural attachment with microdissecting techniques. If no plane is seen, the dura of the optic nerve is incised and an attempt is made at removal from the intradural compartment. This is done provided the CT scan does not show axial intracranial extension of the tumor.

Having now evaluated 30 patients with primary optic nerve meningiomas, we have concluded, as have others,1,22 that there are three primary modes of presentation: extradural, subdural, and combined extradural/subdural (Fig. 6). Our surgical approach to these is determined by the visual acuity and the location and extent of the tumor as determined by CT scanning. Table 2 summarizes our management based on these criteria.

† Ophthalmic cryoprobe manufactured by the Frigatonic Co., Cincinnati, Ohio.
‡ Cusa ultrasonic aspirating device manufactured by Cooper Medical, Mountain View, California.
If the tumor is primarily intradural, exposure of the optic nerve from the lateral approach reveals only a slight elevation of a few millimeters or so above the more proximal or distal normal nerve (Fig. 7 left). A careful longitudinal incision can be made in the lateral dura of the optic nerve without injuring the underlying nerve. With tumors located primarily anteriorly, such an incision exposes the entire tumor, which may be circumferentially removed from the optic nerve (Fig. 7 right). If the tumor extends posteriorly and medially, we have found it impossible to remove the tumor without sacrificing the central retinal artery which enters the dura 8 to 15 mm behind the globe on the nerve’s medial surface. Two of our patients have developed blindness following such an attempt.

On the other hand, perforating arteries arising from the posterior ciliary arteries and seen on the lateral surface of the dura may be sacrificed if necessary since, as described above, the blood supply to the retrolaminar portion of the optic nerve is primarily through the rich anastomotic vascular network located in the pia. With meningiomas, we have usually found a plane between the subdural and the arachnoid, much like that occurring with convexity meningiomas of the brain. With careful tedious dissection these tumors may be traced proximally and distally, and may be removed, in some cases entirely.

We have not hesitated in situations with large tumors to establish a diagnosis, debulk the tumor, and terminate the operation if the primary problem is cosmetically disturbing proptosis. This may, however, allow the tumor to infiltrate the intracanal compartment upon regrowth, and we share Alper’s apprehension in this matter. Radiation therapy then becomes an important consideration.

Having completed the intraorbital procedure, the periorbital fascia is reaproximated and the lateral orbital rim is simply reinserted in its correct position. We do not wire or suture the bone into place but merely close the periorbital fascia and the fascia over the temporalis muscle to maintain the lateral rim of the orbit in position. The skin is closed in a subcuticular fashion and a firm compressive dressing is applied for 48 hours and then removed. Corticosteroids are used for 24 hours preoperatively and 2 to 3 days postoperatively.

We have operated on seven patients with optic nerve meningiomas through the lateral approach. Three of these have had grossly complete tumor removal and have maintained useful vision without evidence of recurrence for 7, 6, and 3 years, respectively. All three had tumors located on the anterior half of the optic nerve. Two recent patients with severely compromised vision and tumors located subdurally extending into the posterior medial third of the orbit were blinded by the operation. Blindness was due to interruption of the central retinal artery at its point of medial penetration of the optic nerve sheath. Two further patients underwent a major decompression of exophytic tumor, followed by radiation therapy. Although the follow-up period is short, useful vision has been preserved for 3 and 2 years, respectively, in these patients.

From our present limited experience, we believe small anteriorly located optic nerve tumors should be surgically approached laterally before severe visual compromise occurs. Although these tumors are rare, the best chance of removal is in the earliest stages. Once the tumor reaches the apex and the intracanalicular portion of the orbit, the lateral approach is unsatisfactory and the transcranial operation is required. To date, we have been unable to reverse visual loss or completely
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FIG. 8. The medial microsurgical approach to the orbit illustrating use of the self-retaining medial orbital retractor. For a description of the technique see text.

remove apical meningiomas transcranially or laterally without severely compromising vision.

Anterior Medial Micro-Orbitotomy

In 1973, Galbraith and Sullivan \(^7\) described a surgical procedure for decompressing the perioptic meninges to relieve papilledema. They approached the optic nerve along the medial side of the globe, using a modified three-bladed tracheal dilator as a retractor and the operating microscope for controlled incision of the nerve sheath. Using the same approach, we found that anterior and medial tumors within the muscle cone could be conveniently removed by this technique. Additional exposure, if necessary, can be obtained by concurrently performing a lateral orbitotomy to obtain increased lateral retraction of the globe. As with the lateral approach, it is essential to have precise self-retaining retraction. A special medial orbitotomy self-retaining retractor has been designed that has greatly facilitated the operation.\(^8\)

After the usual ophthalmic preparation of the orbit and periorbital area, a small eyelid speculum is inserted to begin the operation (Fig. 8 upper left). A 360° periectomy is performed around the cornea. Conjunctival relaxing incisions are made superior and inferior to the medial rectus muscle, which is freed from its inner septa and checking ligaments distally. The muscle is imbricated near its insertion site with 6-0 double-arm Vicryl suture and doubly locked at both borders. The muscle is then severed from the insertion site. A hemostat is placed on the suture and the muscle is retracted medially (Fig. 8 upper right).

At this point, the standard lid retractor is removed and the specially designed medial orbital self-retaining retractor is inserted (Fig. 8 lower left). This retractor has an enucleation spoon which is placed into the medial orbital compartment. The teeth of the retractor are inserted superiorly and inferiorly under the conjunctiva. The handle of the retractor is angled so that it rests on the temporalis muscle lateral to the eye. The enucleation spoon is placed over the globe in a medial position so that retraction from medial to lateral is carried out. Next, the dissecting blades, similar to those used on the lateral orbital retractor, are inserted and

\(^7\) Instrument designed in conjunction with Mr. Paul Rehkopf, Storz Co., St. Louis, Missouri.
used to dissect the intraorbital fat and identify the tumor. With this retractor in place, the operating microscope with a 300-mm objective is brought into use. As dissection proceeds deeper in the intraconal compartment, the orbital fat is retracted superiorly and inferiorly with cottonoids, and additional malleable retractors are attached to the base of the self-retaining retractors as needed (Fig. 8 lower right).

If additional exposure is required, a lateral orbitotomy may be carried out so that the globe can be retracted even further laterally for excellent visualization. When the intraconal dissection is completed, complete hemostasis is obtained and the medial rectus muscle is reattached to the globe with a double-armed 6-0 absorbable suture. The conjunctiva is closed with purse-string sutures, which are inserted through the conjunctiva near the limbus at the area of the superior and inferior conjunctival relaxing incision. An antibiotic ointment is applied, and the eye is firmly patched. Morbidity during this procedure is minimal and can be compared with extraocular muscle surgery, provided that surgical manipulation was not excessive.

Fine-Needle Aspiration Biopsy

In 1980, Kennerdell, et al., 12 introduced the technique of CT-guided fine-needle aspiration biopsy for optic nerve tumors. Since then, he and his associates have percutaneously biopsied approximately 125 patients with various forms of orbital pathology. Their results have been extremely good in identifying metastatic tumors, pseudotumors, and tumors of the optic nerve. In many cases, definitive or palliative treatment results have been extremely good in identifying metastatic tumors, pseudotumors, and tumors of the optic nerve. In many cases, definitive or palliative treatment could be carried out without major operative surgery.

The procedure is performed usually on an outpatient basis using a pistol-grip syringe connected to a No. 22 3.75-cm long needle. Axial and coronal CT views are used to localize the tumor. A needle is then introduced into the lesion under CT guidance. Strong negative suction is applied to obtain the specimen, and cytologic slide preparations are made immediately following withdrawal of the needle with the slides fixed in 95% alcohol. The slides are then stained with a Papanicolaou and hematoxin and eosin stain, and read by a cytologist.

With this technique, one may obtain preoperative confirmation of the histopathology of tumors, which may significantly contribute to the planning of a surgical procedure. Complications have included minor intraorbital hematomas but no visual or extraocular movement disturbances in the last 125 cases.

Discussion

The choice of a surgical approach to the orbit depends on the following criteria: 1) the location of the tumor relative to the optic nerve; 2) the size of the lesion; 3) the vascularity and ultrasonic characteristics of the tumor; and 4) the probable pathology anticipated. Computerized axial tomography, diagnostic ultrasound, angiography, and fine-needle aspiration biopsy provide such information.

The transcranial and, in particular, the fronto-orbital approach provide the best exposure of the optic cavity. This approach is indicated for tumors that may extend intracranially, or those located in the orbital apex and deep medial orbital compartment. The lateral micro-orbitotomy provides excellent exposure of the superior lateral and inferior anterior intraconal compartments. This approach is contraindicated for resection of optic nerve gliomas or for tumors that extend into the optic canal. The majority of orbital tumors, however, can be removed in this cosmetically acceptable manner. Anteromedial micro-orbitotomy is ideal for patients with tumors in the anterior two-thirds of the medial intraconal compartment. Circumscribed tumors may be completely removed, and diffuse lesions, such as lymphangiomas, may be reduced in bulk or simply biopsied.

Fine-needle aspiration biopsy has markedly reduced the number of exploratory operations for lesions in the orbit. This technique has proved to be safe and reliable, and in many cases definitive.

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