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Outcomes After Surgical Excision of Large and Massive Orbital Tumors

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Purpose: To evaluate the outcome of surgical excision of large and massive orbital tumors. To the best of our knowledge, this is the first article to evaluate the relationship between the size of orbital tumors and the surgical outcome.

Methods: We retrospectively reviewed the charts of 34 consecutive patients affected by large or massive orbital tumors that underwent orbitotomy with en-bloc excision of the lesion. The main outcome measures included visual acuity, visual field testing, extraocular motility, pupillary function, and Hertel exophthalmometry readings. Follow-up time ranged from 1 to 4 years.

Results: Complications of the surgical intervention included 1 patient with visual loss (2.9%), 2 patients with third nerve palsy (5.8%), and 6 patients with de novo strabismus (17.6%). In this setting, enophthalmos was an expected outcome more than a true complication and occurred in 5 patients (14.7%).

Conclusions: Although this is a relatively small and retrospective series, these findings suggests that the surgical excision of large and massive orbital tumors carries significant risks of surgical complications including visual loss, enophthalmos, strabismus, and third nerve palsy. These complications may occur as consequence of excessive traction, reduced working room, blind dissection behind the increased bulk of the tumor, or release of tight adhesions between the tumor and the surrounding orbital structures.

The risks of surgical excision of circumscribed, capsulated orbital tumors depend mainly on their location within the orbit and their relationship with the normal orbital structures. We feel that the surgical excision of large orbital tumors presents additional challenges intrinsic to their size and our goal is to evaluate the outcomes of their surgical excision.

METHODS

We retrospectively reviewed the charts, operative notes, and preoperative imaging studies of 34 patients affected by large or massive orbital tumors who underwent orbitotomy with en bloc excision of the lesion. For the purpose of this study, we defined a tumor as "large" when its major axis was larger than the size of the globe as measured on CT or MRI, and "massive" when it occupied at least two thirds of the orbit. This series includes 15 female and 19 male patients whose age ranged from 2 to 72 years; the right orbit was affected in 18 cases and the left orbit in 16 cases. Follow-up time ranged from 1 week to 4 years. Histopathologic examination disclosed 20 cavernous hemangiomas, 7 schwannomas, 1 solitary fibrous tumor, 1 congenital ectopic neural cyst, 1 teratoma, 2 pleomorphic adenomas of the lacrimal gland, and 2 primary cystoadenocarcinomas of the lacrimal gland. In all, 24 tumors were defined as large and 10 were defined as massive. Among the massive tumors there were 2 schwannomas, 1 congenital cyst, and 6 cavernous hemangiomas. All the lesions involved the intraconal space and apical involvement was detected in 5 massive tumors. The tumor was excised in en bloc fashion in all patients. Nine patients required a lateral orbitotomy with bone flap, 15 patients an upper eyelid approach (eyelid crease or vertical eyelid split), and the remaining 10 patients a transconjunctival lower eyelid approach.

RESULTS

Complete surgical excision of the orbital lesion was achieved in all the patients. Complications of the surgical intervention included postoperative worsening of visual dysfunction in 1 patient (2.9%), third nerve palsy in 2 patients (5.8%), and de novo strabismus in 6 patients (17.6%). Five patients (14.7%) had enophthalmos (2 mm or more than the

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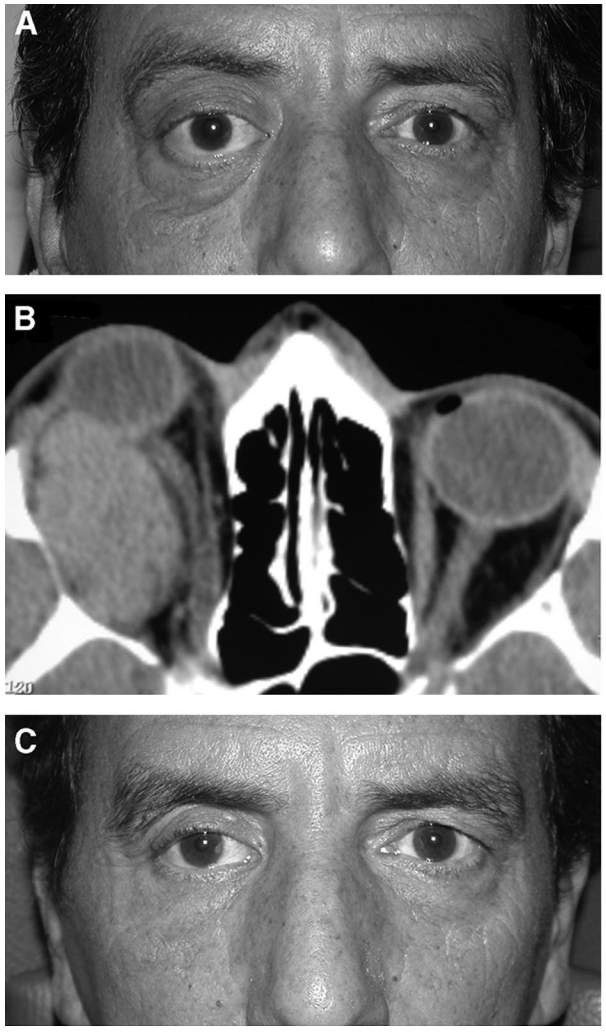

FIG. 1. **A,** Preoperative proptosis in the right eye. **B,** Axial CT shows a large intraconal cavernous hemangioma. **C,** Postoperative appearance with right exotropia and enophthalmos.

contralateral side, an anticipated outcome. Visual loss occurred in a 16-year-old boy who presented with a large medial intraconal cavernous hemangioma and whose visual acuity dropped from 20/40 preoperatively to 20/180 at the final follow-up visit. Among the patients affected by iatrogenic strabismus, 2 were affected by massive and 4 by large tumors (Fig. 1). Clinically significant enophthalmos (>2 mm of the opposite side) was an expected outcome rather than a true complication and occurred in 5 patients, 3 affected by massive tumors and 2 by large tumors (Fig. 2). Third nerve palsy occurred in 2 patients affected by massive tumors and both underwent spontaneous recovery (Fig. 3).

DISCUSSION

The surgical removal of large and massive orbital tumors is troubled by tighter tissue adhesions, reduced working room, and limited posterior view. Harris and Perez[1] found that small orbital tumors in the medial orbit are extracted more easily than large tumors. In an oral presentation, Char reported an increased risk of diplopia

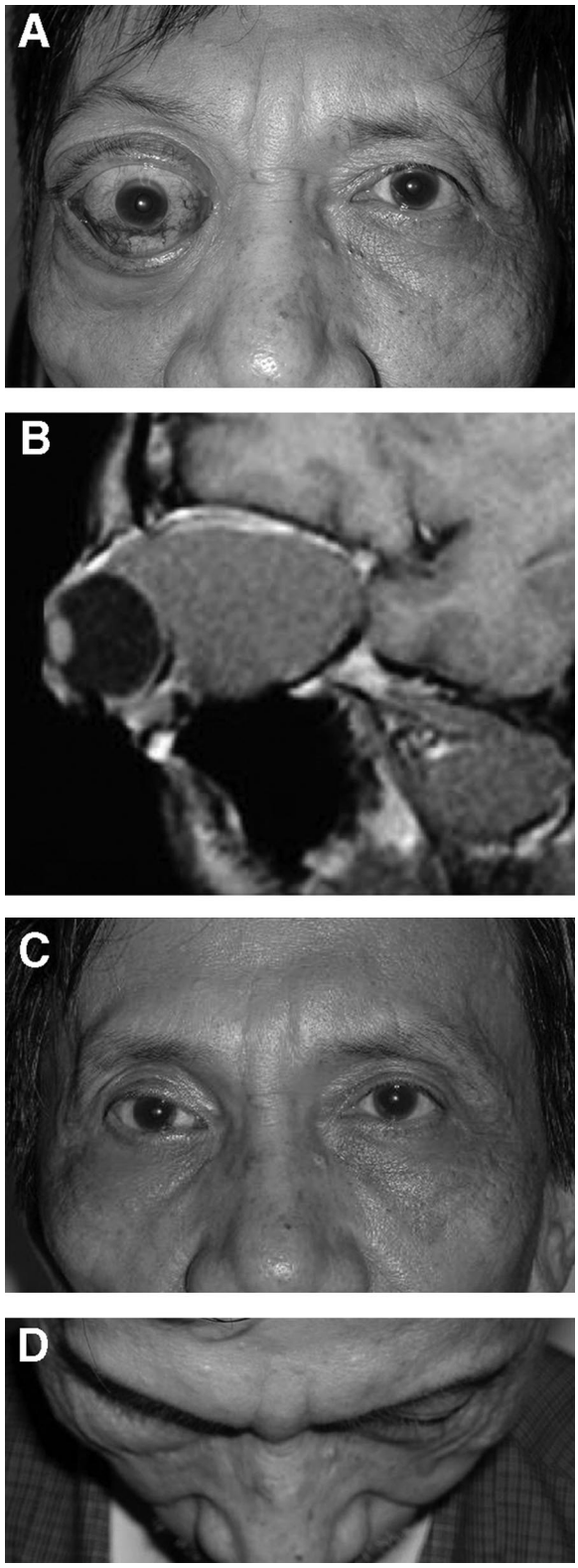

FIG. 2. **A,** Preoperative proptosis of the right eye. **B,** MRI shows a massive cavernous hemangioma invading the orbital apex. **C,** Postoperative appearance in primary gaze. **D,** Right enophthalmos postoperatively.

FIG. 3. **A,** Preoperative right proptosis. **B,** MRI shows a massive cavernous hemangioma extending to the orbital apex. **C,** Complete ptosis and third nerve palsy. **D,** Spontaneous recovery (3-month postoperatively) with mild exotropia and mydriasis.

following the surgical excision of large tumors (Char DH. *Strabismus after orbital tumor surgery*. Chicago, IL: American Academy of Ophthalmology, 2005), while Rose reported an increased incidence of visual loss after the removal of massive orbital tumors (Rose G. *The devil's touch—blindness in orbital disease*. London, United Kingdom: European Society of Ophthalmic Plastic and Reconstructive Surgery Meeting, 2006). In contrast, in a large series of patients that underwent orbitotomy, Bonavolontà[2] found that visual loss was not associated with the size of the orbital tumor. Our series encompasses a wide spectrum of histopathologic entities, including 2 primary cystoadenocarcinomas of the lacrimal gland (one of which has been previously reported elsewhere),[3] but they all had in common the clinical behavior (indolent, slowly enlarging mass), the radiologic features (well defined, capsulated, no bony erosion), and the surgical approach (excisional biopsy) of benign lesions. Visual loss is a potential severe complication of orbital surgery and its incidence has been estimated to be 0.2% by Bonavolontà.[2] The 3% incidence reported in this series reflects the higher risks that orbital surgeon face when dealing with extra-large tumors and is in line with what was reported by Rose (oral presentation ESOPRS meeting, London, 2006).

Strabismus was the most common complication, occurring in 6 patients (17.6%), but it was mild, did not affect the primary position of gaze, and did not require surgical correction in any of our patients. Also, no statistical difference was noted between large and massive tumors in causing postoperative strabismus. Clinically significant enophthalmos occurred in 5 patients (14.7%) and it was felt to be due to a combination of progressive atrophy of the intraconal orbital fat and expansion of the bony orbit. Salem and Qahtani[4] reported enophthalmos as a complication in children that underwent orbitotomy for space-occupying lesions or decompression. Although it may not be considered a true complication in this setting, enophthalmos may cause significant facial asymmetry and this possibility should be discussed beforehand with patients. Third nerve palsy has been reported following endoscopic sinus surgery and neuro-endoscopic surgery in children, but we were not able to find previous reports describing its occurrence following surgical excision of orbital tumors.[5,6] In our series, temporary third nerve palsy was felt to be due to the surgical dissection in the orbital apex. Its occurrence and duration is difficult to predict, but the lack of direct visual control of dissection at the orbital apex in case of massive tumors may increase the risks of its occurrence. Mydriasis can result as part of third nerve palsy or as consequence of the surgical trauma of the ciliary nerves located on the lateral aspect of the optic nerve.

In conclusion, our study has many limitations, being retrospective in nature, representing a small, noncomparative case series, and reflecting the personal surgical experience of 4 different surgeons. However, it suggests that the surgical removal of large and massive orbital tumors is associated with risks of postoperative complications, including visual loss.

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