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Endoscopic orbital decompression for dysthyroid eye disease

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Abstract
Orbital decompression for dysthyroid eye disease is traditionally performed either through an external approach or transantrally. The introduction of endoscopic sinus surgery over the last decade has led to a better understanding of the intranasal surgical landmarks of orbital walls and the development of endoscopic orbital decompression. We have adopted the endoscopic technique as the treatment of choice for orbital decompression in dysthyroid eye disease for the last two years. The surgical technique is described and illustrated, and the results of our first series of 15 patients (30 orbits) are presented.

Key words: Graves' Disease; Orbit; Decompression; Surgery, operative

Introduction

Dysthyroid eye disease is an organ-specific autoimmune disorder characterized by inflammation, oedema, and secondary fibrosis of the orbital tissues (Weisman and Savino 1988). It is most commonly associated with Grave's disease but may also be secondary to other thyroid disorders such as Hashimoto's thyroiditis, thyroid carcinoma, primary hyperthyroidism and neck irradiation (Fries, 1992). Clinical manifestations of the disease include proptosis, lid oedema, lid retraction, conjunctival injection, chemosis, exposure keratitis, corneal ulceration, extraocular motility abnormalities, optic neuropathy and blindness.

The disease usually progresses slowly and may run a fluctuating course before stabilizing and eventually resolving. Spontaneous resolution occurs in the majority of cases but between two to seven per cent of patients may develop significant ophthalmopathy which requires medical or surgical treatments (Warren *et al.*, 1989). High dose corticosteroids are often used in the treatment of acute congestive orbitopathy but rarely provide the final resolution of eye disease (Ivy, 1972; Guy *et al.*, 1989). Prolonged treatment may be required to keep the disease under control, giving rise to unacceptable side effects (Wollheim, 1984). External beam radiation is effective in the early acute phase of the disease but is less successful once significant fibrotic changes have occurred (Kriss *et al.*, 1989).

Surgical decompression of the orbit is indicated for compressive optic neuropathy when there has been failure of or contra-indication to corticosteroids or radiation treatments (Shorr and Seiff, 1986). Other indications include excessive proptosis with exposure keratitis and corneal ulceration, pain relief, cosmesis for disfiguring exophthalmos, and as a preliminary procedure to strabismus or oculoplastic surgery.

The most commonly described surgical approaches for orbital decompression are the Walsh-Ogura transantral approach (Walsh and Ogura, 1957), the Naffziger anterior cranial fossa approach (Naffziger, 1932), the Kronlein lateral orbitotomy approach and the Sewall external ethmoidectomy approach (Sewall, 1936). Most of the largest reported series are based on the results of the transantral approach. With this technique, a reduction in proptosis of between 3 to 5.5 mm has been reported (DeSanto *et al.*, 1980; Warren *et al.*, 1989; Sang *et al.*, 1994).

Kennedy *et al.* (1990) first described the endoscopic intranasal approach and published their results in 1990. An average of 4.7 mm reduction in proptosis was achieved in five orbits. Metson (1994) decompressed six orbits endoscopically and achieved a mean reduction of 3.2 mm. We have adopted the endoscopic technique as our treatment of choice for the last two years. We present the results on our first series of 30 orbits (15 patients).

Patients and methods

Fifteen patients (five men and 10 women) with dysthyroid eye disease underwent bilateral endoscopic orbital decompressions between March 1995 and December 1996. All patients were referred to the Otolaryngology department following initial treatment and monitoring of the progress of the disease at the Oxford Eye Hospital.

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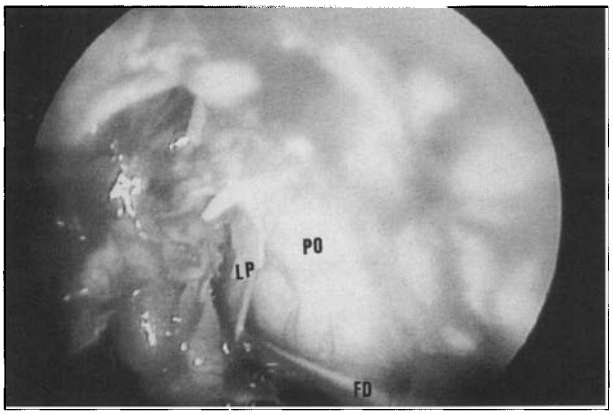


FIG. 1

Following an ethmoidectomy and skeletonization of the medial wall of the orbit, the lamina papyracea (LP) is separated from the periorbita (PO) with Freer dissector (FD). EC = ethmoidal cavity.

The average age was 37 years (range 19–62 years). Ten patients had received previous treatment with corticosteroids or radiotherapy or a combination of both. The main indications for surgery were optic neuropathy (two patients), exposure keratopathy (two patients), acute proptosis (one patient) and congestive symptoms (10 patients).

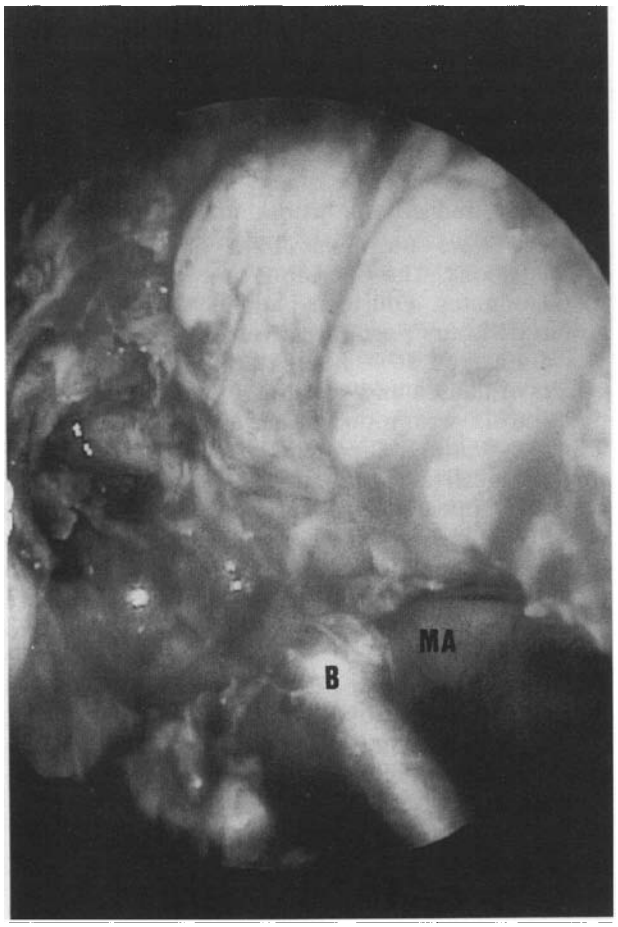


FIG. 2

An endoscopic cutting burr (B) may be used to thin the thick medial bony strut of the orbital floor to facilitate its removal with a Free dissector (FD). MA = maxillary antrum seen through a middle meatal antrostomy.

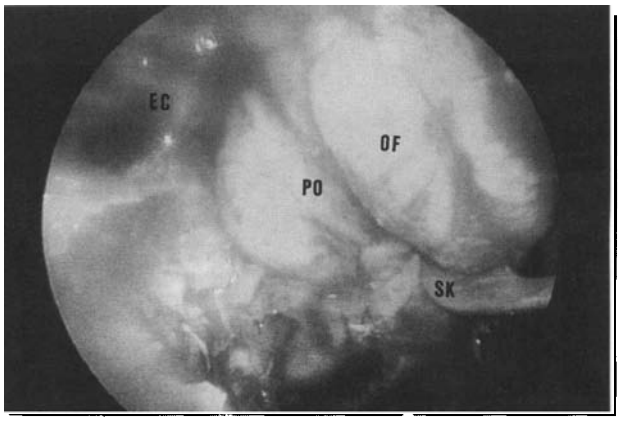


FIG. 3

Following removal of the bony medial orbital wall and floor, multiple linear incisions are made through the periorbita (PO) with a sickle knife (SK) to allow herniation of orbital fat (OF) into the ethmoidal cavity (EC).

All patients underwent complete ophthalmological and orthoptic assessments pre- and post-operatively, including Hertel exophthalmometry and Hess charts to assess the degree of exophthalmos and oculomotility. Follow-up assessments were performed at three to six months post-operatively.

Surgical technique

A pre-operative nasal examination and coronal computed tomography (CT) scan of the sinuses were performed to provide accurate details of the variable ethmoidal anatomy and to identify any coexisting sinonasal pathology. The presence of nasal polyps or sinusitis are relative contra-indications to endoscopic decompression. A deviated nasal septum may restrict access to the ethmoidal sinuses and the patient may require a limited submucus resection or septoplasty.

The operation is performed under general anaesthesia with the patient in a supine position. The nasal cavity is instilled with a mixture of 2 ml of 10 per cent cocaine and 1 ml of 1:1000 adrenaline solution followed by infiltration of the uncinate process with a 2 ml mixture of 1:80 000 adrenaline and two per cent xylocaine.

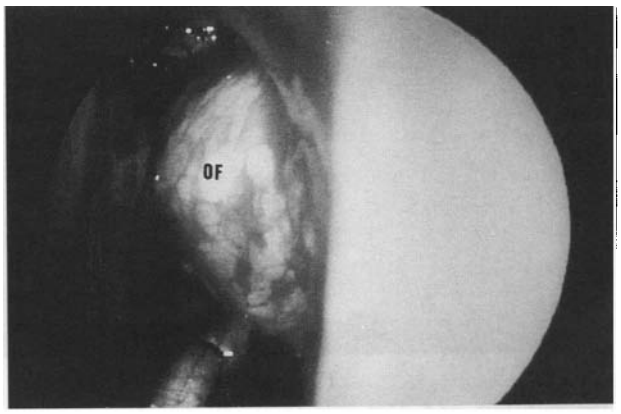


FIG. 4

Orbital fat (OF) prolapses freely into the ethmoidal cavity (EC) at completion of the decompression.

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FIG. 5

Post-operative axial CT scan of the orbit showing decompression of the orbital contents into the ethmoidal cavities being limited by the middle turbinates bilaterally.

A standard endoscopic sphenoethmoidectomy is performed and the medial wall of the orbit is carefully skeletonized to the orbital apex. The thin bone of the medial orbital wall (lamina papyracea) is removed after careful separation from the periorbita with a Freer dissector (Figure 1).

A generous middle meatal antrostomy is fashioned for access to the orbital floor. The thick medial strut of orbital floor may first be thinned with a cutting burr to facilitate its removal (Figure 2). Bony decompression of the orbital floor must not extend beyond the infraorbital nerve canal to avoid damaging the nerve. In practice, removal of the bony floor is usually limited to the medial 1 to 2 cm only due to restricted surgical access through the middle meatal antrostomy.

Once the periorbita is fully exposed, multiple full thickness parallel linear incisions are made with a sickle knife in a postero-anterior direction (Figure 3). This results in the herniation of orbital fat into the ethmoidal and maxillary cavities (Figures 4 and 5). Gentle external compression of the globe allows identification of any undivided strands of the periorbita which should then be completely incised.

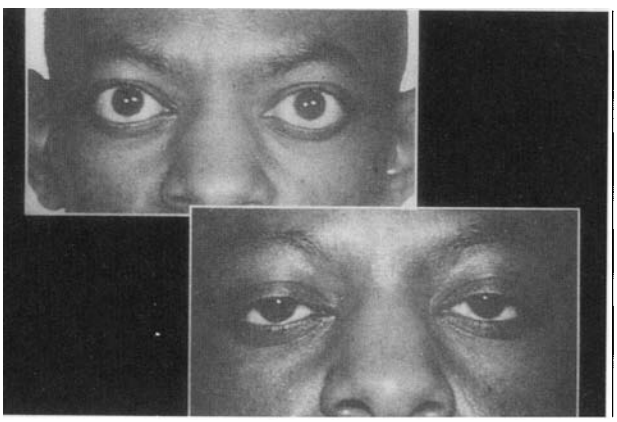


FIG. 6

Pre-operative and post-operative pictures of one of the patients who presented with congestive symptoms. The patient described a 'freeing of the eyes' and was extremely pleased by the improvement in cosmetic appearance.



FIG. 7

Pre- and post-operative pictures of a patient with exposure keratitis showing complete resolution of the symptoms and signs, and an improvement in cosmetic appearances of the eyes.

If decompression of the optic nerve is required such as in cases of optic neuropathy, the thick bone over the orbital apex may first be thinned down with cutting burr and then removed with a Freer dissector. The aim is to expose the nerve on its medial half from orbital apex to the chiasma. It remains controversial whether the optic nerve sheath should be opened. In our opinion, it should not be opened because of a risk of infection.

Packing of the nasal cavity is usually not necessary. The patient is allowed home within 24 hours post-operatively and is maintained on broad spectrum antibiotics for five days post-operatively, and advised to avoid nose blowing for a week.

Results

There were no major intra or post-operative complications. The operating time ranged from 40 to 60 minutes. Fourteen patients were discharged within 24 hours post-operatively. The other patient was discharged at 48 hours due to anaesthetic side effects of nausea and vomiting.

Proptosis was reduced an average of 3.9 mm (range 2–8 mm). All patients experienced a relief of their congestive symptoms and an improvement in cosmetic appearance (Figure 6). The patient with acute subluxation of the globe experienced no further episodes. Visual acuity improved in the two patients with compressive neuropathy. Exposure keratopathy resolved completely in the other two patients (Figure 7).

Two patients had pre-operative diplopia with minimal post-operative changes. Both underwent corrective strabismus surgery. One patient experienced transient diplopia which resolved after three months.

Discussions

The endoscopic approach allows a maximum decompression of the medial orbital wall which is difficult to achieve with any other approach. It also provides the best access to the orbital apex for optic nerve decompression. However, decompression of the orbital floor by the endoscopic route compared

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to the transantral route is limited. Nevertheless, the reduction of proptosis by the endoscopic approach is comparable to the transantral route, probably because the limited orbital floor decompression is offset by a good decompression of the medial wall (DeSanto, 1980; Warren *et al.*, 1989; Kennedy, 1990; Metson, 1994; Sang *et al.*, 1994). In our opinion, it is essential to aim for maximum medial wall decompression and avoid excessive orbital floor decompression which increases the risk of infraorbital nerve injury, post-operative diplopia and recurrent maxillary sinusitis (Hansbury *et al.*, 1984; Bough *et al.*, 1994).

Kennedy *et al.* (1990) described the presence of a thick bony orbital floor on pre-operative CT scan as a contra-indication to endoscopic decompression and advocated the transantral approach for these cases. We have been able to overcome the problem in all cases by the use of an endoscopic cutting burr to thin the bony floor down first to facilitate its removal. A deviated nasal septum which may restrict surgical access to the ethmoidal sinuses was also listed by Kennedy as a contra-indication to the endoscopic approach. In our experience, a limited submucous resection of the nasal septum or a septoplasty can be easily carried out at the time of the procedure without adding any significant morbidity. In our opinion, the main contra-indication to the endoscopic approach is coexisting sinonasal disease which needs to be treated before endoscopic orbital decompression.

The results of our series and other reported series of endoscopic orbital decompression for dysthyroid eye disease suggest that it is as successful as the external and the transantral approaches. Morbidity such as facial swelling, scars, infraorbital nerve injury, trauma to the nasolacrimal system and dental problems are avoided (Lund, 1997).

Rehabilitation of dysthyroid eye disease is a complex process which requires a team effort between endocrinologists, ophthalmologists and where appropriate, otolaryngologists. Ophthalmologists are in the best position to treat and monitor the progress of the eye disease. Otolaryngologists are usually involved when surgical decompression is indicated. In our opinion, the endoscopic approach should be the treatment of choice. However, extensive experience in endoscopic sinus surgery should be a prerequisite for any one wishing to undertake the surgery, and the otolaryngologist should be guided by his ophthalmology colleagues for the best timing for surgical intervention.

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