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Blindness after intranasal ethmoidectomy*

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SUMMARY

Orbital haemorrhage is an unusual and frustrating complication of ethmoid surgery. A case of reversible blindness which was due to intra-operative orbital haemorrhage occurring after intranasal ethmoidectomy is presented. Prevention and management of this kind of blindness can be reversed, if treated aggressively.

Key words: blindness, intranasal ethmoidectomy

INTRODUCTION

Surgical drainage and treatment of the paranasal sinuses is frequently used by the otolaryngologist in the management of allergic, infectious, and neoplastic sinus diseases (Friedman and Katsantonis, 1989; Jafek, 1985). Several surgical approaches to the ethmoid and maxillary sinuses may be used. Ethmoidectomy refers to the removal of the sinus mucosa and osseous air cells and serve to improve drainage from the sinuses into the nasal cavity (Jafek, 1985). The intranasal approach to ethmoidectomy avoids skin incision and allows simultaneous access to involved nasal tissues, but may be technically difficult due to limited intra-operative exposure and bleeding from the sinus and nasal mucosa (Freedman and Kern, 1979); Mosher (1912) stated that "intranasal ethmoidectomy is one of the most dangerous and blindest of all surgical operations". In spite of recent developments and advances in surgical skills and technology, complications secondary to intranasal ethmoidectomy still occur.

The anatomical proximity of the orbit to the adjacent sinuses renders its contents vulnerable to trauma during surgery. Medially, only the thin lamina papyracea of the ethmoid bone separates the ethmoidal air cells from the orbital structures (Mattox and Delaney, 1985), and naturally occurring dehiscences in the ethmoid bone may potentiate the risk of inadvertent entrance into the orbit. The anterior and posterior ethmoid arteries, branches of the ophthalmic artery, traverse the peri-orbita and flow from the orbit into the sinus through the anterior and posterior ethmoidal foramina (Mattox and Delaney, 1985). The ethmoid arteries, orbital fat, superior oblique muscle, and medial rectus muscle lie adjacent to the ethmoid air cells and may be avulsed or injured during ethmoid sinus exenteration if the medial orbital wall is penetrated. This may result in the development of an acute retrobulbar haemorrhage of extra-ocular muscle dysfunction (Buus et al., 1990).

The purpose of this article is to discuss the orbital haemorrhage following intranasal ethmoidectomy which might cause irreversible blindness if it has not been treated promptly.

CASE REPORT

A 30-year-old man was admitted with nasal obstruction. His diagnosis was recurrent right nasal polyposis and allergic rhinitis. A previous bilateral transantral ethmoidectomy and nasal polypectomies had been performed six years ago. Pre-operative CT scans showed soft tissue changes within the ethmoid sinuses and right maxillary sinus. Under general anaesthesia, the patient underwent right transantral ethmoidectomy and bilateral intranasal polypectomies. Nasal packing was done because of excessive bleeding. At recovery, 30 min after the operation, he had no light perception, a deficit of the medial rectus and superior oblique muscles, and exophthalmus on the left side. The cause was thought to be a retrobulbar haematoma. Nasal packing was removed immediately. CT scan of the orbit revealed a defect on the lamina papyracea and retrobulbar haemorrhage (Figure 1). An ophthalmologist advised treatment with mannitol (1-2 g/kg of a 20% solution, infused over 20 min) and intravenous acetazolamide (500 mg). In order to decompress the left orbit a Caldwell-Luc operation was performed immediately. There was a bone defect in the superomedial wall of antrum, and a moderately sized haematoma was removed. The orbit was subsequently explored by the Lunch approach. A defect of 2×1.5 cm on the lamina papyracaea was noted. No active bleeding sites were identified. Post-operatively, light perception in the left eye was recovered, and 20 mg prednisolone was given every 6 h; six weeks after operation, the patient had normal vision, and CT scan of the orbit was normal.

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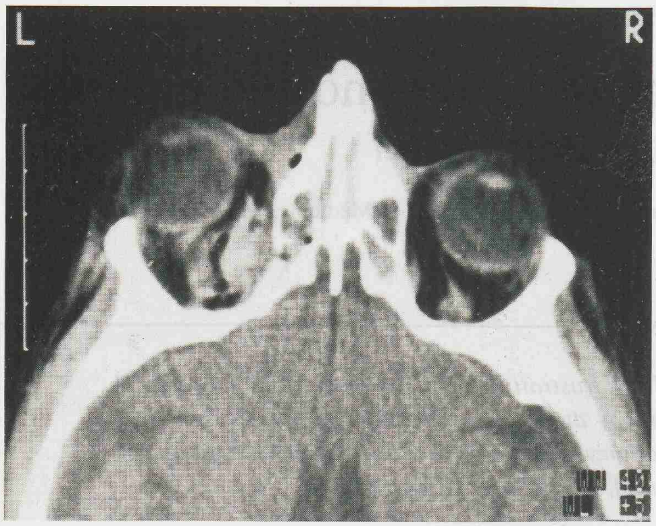

Figure 1. CT scan of the patient shows haematoma in the medial portion of the orbit.

DISCUSSION

Intranasal ethmoidectomy is one of the most difficult operations to teach residents. An accurate knowledge of the regional topographical anatomy is of the utmost importance. Although rare, complications of ethmoid surgery do occur. It may happen even in the hands of well-trained, experienced surgeons.

Ethmoidectomy performed via the intranasal route only is contra-indicated when the following findings are present: 1) radiographic evidence of bone destruction, such as: lamina papyracea, cribriform plate, fovea ethmoidealis, etc.; 2) orbital involvement consisting of proptosis, deficit of ocular mobility or optic nerve impairment (resulting in loss of vision); 3) neoplasm, benign or malignant; 4) findings consistent with mucocele or masses involving the fronto-ethmoidal complex or sphenoid sinus (Maniglia et al., 1989).

Ophthalmic complications of sinus surgery are uncommon, but when they occur, they may result in considerable morbidity. Thorough pre-operative evaluation may be helpful in minimizing the risk of sinus surgery. Intranasal ethmoidectomy, especially if performed in a patient with prior ethmoid surgery, can be hazardous since the extensive disease and previous surgery might erode the osseous anatomical landmarks (Maniglia, 1989).

A pre-operative CT scan is not only useful but even mandatory, both for diagnosis as well as for legal aspects. This procedure helps to detect the extent of sinus disease and variations that may predispose the orbital structures to injury (Stankiewicz, 1989). Dehiscences in the bony orbit and prolapse of orbital tissues into sinus may be detected pre-operatively, alerting the surgeon to be cautious when approaching these areas.

Orbital haemorrhage is the most frequently reported ophthalmic complication of sinus surgery and may result in blindness if not treated promptly (Maniglia, 1989). Two mechanisms for blindness that occur during intranasal ethmoidectomy are apparent: 1) direct injury to the optic nerve or its blood supply; and 2) retrobulbar haematoma with increased orbital pressure that compromises vascular supply and drainage to and from eye (Stankiewicz, 1989). Visual loss during a retrobulbar haemorrhage is most likely due to an interruption of ocular perfusion and resultant ischaemia of the eye (Sacks et al., 1988). As orbital pressure approaches the systolic blood pressure, central retinal artery flow may be compromised, resulting in decreased retinal perfusion. Occlusion of the posterior ciliary arteries which supply the optic nerve also has been proposed as the cause of visual loss in orbital haemorrhage (Waller, 1978). Concomitantly, elevated intraorbital pressure may contribute to retinal and optic nerve ischaemia. As the intraorbital pressure rises, obstruction of blood flow within the capillaries of the optic disc, followed by central retinal artery occlusion, may occur (Sacks et al., 1988). Recovery of vision is unlikely if retinal ischaemia persists for more than 100 min (Hayreh and Weingeist, 1980). Therefore, maximum effort should be directed at restoring retinal and optic nerve perfusion within this vulnerable period.

It is important that the eye never be covered when doing intranasal surgery so any evidence of haematoma, proptosis, increased eye tension, and vision can be observed. If these changes occur during general anaesthesia, immediate termination of procedure is necessary in order to properly treat and evaluate the eye (Stankiewicz, 1987).

Finally, we believe that orbital complications of ethmoid sinus surgery may be minimized by a thorough knowledge of the anatomy involved, appropriate pre-operative evaluation, and by the early intra-operative recognition and prompt treatment of orbital injury and haemorrhage.

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