

Ophthalmic complications after surgery for nasal and sinus polyposis

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PURPOSE. *To describe ophthalmic complications after nasal and sinus surgery.*

METHODS. *Four cases with orbital complications were retrospectively selected from among more than 2000 cases of orbital pathologies.*

RESULTS. *Motility disturbances due to extraocular muscle injury occurred in two patients after intranasal ethmoidectomy and in one patient after a Caldwell-Luc procedure. In the fourth case an orbital apex syndrome was noted after intranasal ethmoidectomies.*

CONCLUSIONS. *Ophthalmic complications may occur after nasal and sinus surgery, even using an endoscopic procedure. Successful handling of these complications could be reached by on their early recognition and treatment. (Eur J Ophthalmol 2001; 11: 218-22)*

KEY WORDS. *Sinus surgery, Orbital fracture, Ocular motility disorder, Orbital injury*

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INTRODUCTION

Commonly the treatment of allergic, infectious and neoplastic sinus disease is surgical removal and drainage of the paranasal sinuses. These procedures are relatively safe, but because of the anatomical proximity of the orbit to the adjacent sinuses ophthalmic complications may occur.

Several surgical approaches to nasal sinuses may be used. An intranasal or external approach can be used for ethmoidectomy. In the last ten years endoscopy has been increasingly used for intranasal ethmoidectomy. The ethmoid sinus may also be approached using the Caldwell-Luc procedure. Ethmoidectomy, by removing the sinus mucosa and osseous air cells, improve drainage from the sinuses into the nasal cavity. Medially, the lamina papyracea of the ethmoid bone separates the ethmoidal air cells from the orbital structure, and this thin wall cannot always be properly visualised, especially with the intranasal endoscopic approach, and may be accidentally perforated (1-3).

Recognition of the anatomy in this area is also impeded by chronic infection and inflammation. The ethmoid arteries, orbital fat, superior oblique muscle, and medial rectus muscle lie close to the medial orbital wall and may be injured during surgery. Thus, an acute retrobulbar hemorrhage or extraocular muscle dysfunction may occur.

Radical surgery of the maxillary sinus by an external approach (Caldwell-Luc) is often preferred to conservative surgery (Mikulicz) by the nasal approach. The Caldwell-Luc approach provides better direct visualisation of the maxillary sinus, but chronic inflammation and possible thinness of the orbital floor due to chronic inflammation are potential risks. The infraorbital nerve, the inferior rectus muscle, the inferior oblique muscle and the inferior branch of the third nerve may be traumatised if the roof of the sinus is violated during a maxillary approach. Furthermore, the nasal lacrimal duct may be injured during a Caldwell-Luc, and this results in epiphora.

The pathological contents and mucosa of the

frontal sinus are removed by an external radical approach. Intraoperatively, the trochlea and tendon of the superior oblique muscle may be avulsed during dissection and periosteal stripping. Extensive manipulation may result in damage to the lacrimal sac or the palpebral ligament. Enophthalmos and upper eyelid retraction have been described after osteoplastic frontal sinusotomy due to orbital soft tissue prolapsing into the vacated sinus cavity (4). Sphenoidal surgery executed by the endonasal transeptal, transmaxillary, transethmoidal or transorbital approach may pose a risk for the optic nerve and for the III, IV, VI nerves.

We describe four cases with complications, three after intranasal ethmoidectomy and one after the Caldwell-Luc approach.

METHODS

The clinical records of patients with ophthalmic complications after nasal and sinus surgery examined in our department over a 15-year period were carefully reviewed and pertinent information was abstracted. In three cases a complication resulted from intranasal ethmoidectomy, in one case after a Caldwell-Luc procedure. In one case endonasal ethmoidectomy had been done endoscopically. Motility disturbances were secondary to extraocular muscle injury in three cases, and associated with orbital apex syndrome in one. All the patients were then asked about the earlier and any present symptoms and were examined for signs (Tab. I). All four cases had been operated by different surgeons in different specialised institutions.

TABLE I - PATIENTS' MAIN CHARACTERISTICS AND CLINICAL FINDINGS AFTER OPHTHALMIC COMPLICATIONS OF SINUS SURGERY

Case no.	Age/sex	Eye	Exo/enophthalmos	Strabismus	Diplopia	Bone fracture	Others
1	43/F	Right	Middle enophthalmos	Exotropia	Yes	Medial wall	Ptosis grade 1
2	47/F	Left	Middle enophthalmos	Exotropia	Yes	Medial wall	No
3	37/F	Left	Light enophthalmos	Exotropia	Yes	Inferior and medial wall	No
4	31/F	Left	Absent	Ophthalmoplegia	No	Medial wall	Amaurosis, ptosis

TABLE II - MANAGEMENT AND RESULT OF TREATMENT OF OPHTHALMIC COMPLICATIONS AFTER SINUS SURGERY

Cases	Eye	Orbital surgery	Muscle surgery	Others	Result
1	Right	Medial wall repair	Medial transposition of IR* and SR**	Correction of diplopia with a prism	No diplopia
2	Left	Medial wall repair	LR*** recession	No	Residual exotropia
3	Left	Inferior and medial wall repair	No	No	No diplopia
4	Left	No		Corticosteroid therapy, ptosis surgery	Ptosis and amaurosis

*IR= inferior rectus; **SR= superior rectus; ***LR= lateral rectus

RESULTS

Case 1: G.A., (Fig. 1) a woman aged 43, had been operated for polyps of the right ethmoid by the endonasal endoscopic approach. After surgery she had a 60 prism diopter (PD) exotropia, 2-mm ptosis and mild enophthalmos of the right eye. Visual acuity (VA) was 20/20 bilaterally. Orthoptic examination (Hess scheme) showed reduced adduction of the right eye. Electromyography of the medial rectus revealed electrical activity without any mechanical output of the muscle. A CT scan showed a fracture of the right medial orbital wall.

She underwent orbitotomy with exploration. A graft of regenerated human cellulose[®] was placed over the medial wall fracture to leave this part free from adhesions. A laceration of the medial rectus muscle was found and repaired.

The patient was followed for two months and 50 PD exotropia remained. Three months after orbitotomy eye muscle surgery was done: the superior rectus and inferior rectus were transposed to the insertion of the right medial rectus. A prism correction (18 PD) was used for the residual diplopia.

Case 2: S.L. (Fig. 2), a woman aged 47 operated for excision of nasal polyps. After three weeks she had a mild left enophthalmos and edema of the lower lid, with diplopia. Examination found VA of 20/20 in the right eye and 20/25 in the left, with a left eye exotropia. The left eye could not adduct to the midline. The CT scan showed the medial rectus muscle was entrapped in a lesion of the medial bone. During the orbital exploration we found a fracture of the medial wall with entrapment and laceration of the medial rectus muscle. An alloplastic implant was placed to repair the fracture. The medial rectus laceration was repaired again. Two months later we performed a recession of the lateral rectus to reduce the residual exotropia.

Case 3: P.M., a woman aged 37, suffering from left sinus maxillary polyposis, was operated on by the external approach (Caldwell-Luc) to empty the maxillary sinus. Three months later, she reported mild enophthalmos of the left eye, and diplopia. The patient had 20/20 vision in both eyes, 8 PD of left exotropia in primary gaze and a limitation of upgaze to 50% and downgaze to 30%. CT scan revealed an orbital floor and medial wall fracture of the left orbit with prolapsed

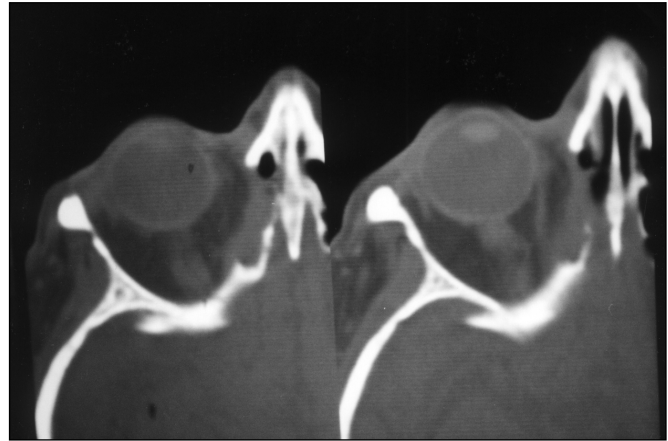


Fig. 1 - Patient 1. CT scan showing a medial wall fracture after endonasal endoscopic removal of polyps from the right ethmoid.

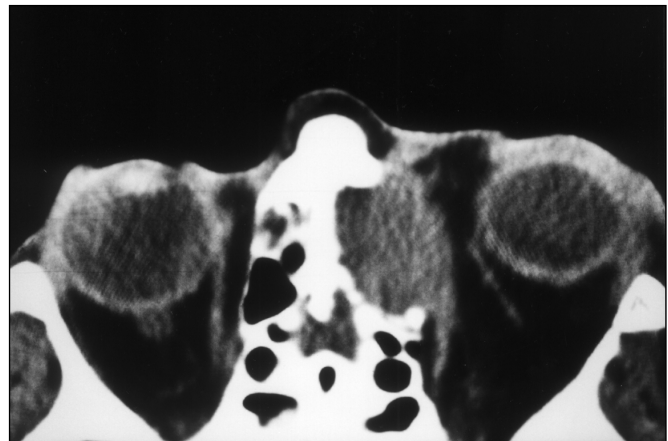


Fig. 2 - Patient 2. CT scan showing a medial wall fracture after endonasal excision of nasal polyps.

orbital fat. A lower left orbitotomy was done and the maxillary sinus was packed with regenerated human cellulose[®] (®Tabotamp Ethicon, c/o European Logistics Centre, Brussels, Belgium) with a silicone sheet inserted to restore the bone defect. Motility improved and diplopia persisted only in downgaze. Four months later the diplopia receded and no further surgery was required.

Case 4: F.F., a woman aged 31, suffering from ethmoidal bilateral maxillary polyposis, underwent trans-maxillary ethmoidectomy. Immediately after surgery she had left eye ophthalmoplegia, amaurosis, midriasis and ptosis (orbital apex syndrome). She was referred to us. She was found to have 20/20 VA in the right eye, a pale optic disk and no light per-

ception in the left eye, where a mass of fibrin was found in the parapapillary zone. The CT scan showed a large fracture of the left ethmoidal sinus, interruption of the medial maxillary sinus wall and a diffuse area of hemorrhage. Corticosteroid therapy was planned in order to obtain left orbital decompression. Motility improved but left eye vision did not. One month later ptosis surgery was planned, with aesthetic intent.

DISCUSSION

The four cases reported are examples of uncommon ophthalmic complications that may cause severe injuries to the orbital structures. There are multiple reports of orbital complications secondary to sinus surgery. In one series (5) of 1000 consecutive intranasal ethmoidectomies, four cases of orbital hemorrhage were described. Griffiths (6) encountered orbital complications in 3 of 61 patients undergoing Caldwell-Luc procedures: infraorbital nerve hyperesthesia occurred in two cases, and hemorrhage in one. Involvement of the medial rectus muscle, or the superior oblique and inferior rectus after sinus surgery have also been reported (7, 8).

Injury of the medial rectus muscle occurred in two of the cases reported here (nos 1 and 2). In the first case there was a direct laceration of the muscle itself, whereas in the second case an entrapment was also found at surgical exploration. Injuries of the medial wall should be treated similarly to traumatic orbital wall fractures, but the treatment of extraocular muscle injuries may be difficult. We repaired the medial rectus injury in both cases, but the improvement in motility was limited by loss of tissue, scar tissue and initial fibrosis. Thus, residual diplopia remained after the first procedure and additional strabismus surgery was required.

Orbital hemorrhage is the most frequently reported ophthalmic complication of sinus surgery (9-11) and may result in blindness if not managed promptly. Visual loss during a retrobulbar hemorrhage is most likely due to an interruption of ocular perfusion and resulting ischemia of the eye.

Case number 4 here had orbital hemorrhage and wide bone injury, and was referred to our institute six days after maxillary external surgery. We achieved phar-

macological decompression of the orbit with high doses of intravenous corticosteroids. It did not seem useful to practise orbital decompression to facilitate the removal of blood from the orbit because the retinal ischemia had persisted too long for the vision to be preserved. However, this is the first-choice measure to be taken immediately when blindness occurs after sinus surgery (12). A preoperative CT scan is very important to assess the extent of sinus disease and to detect anatomical variations that may predispose the orbital structures to injury (12). Furthermore, it is recommended to leave the eye uncovered during sinus surgery so that eyelid retraction may indicate a breach in the wall of the orbit (12).

Several different factors may cause orbital involvement during sinus surgery. Sometimes they are difficult to detect preoperatively or to control intraoperatively, as is the case with conspicuous bleeding caused by an artery retracted into the orbit, or when anatomical landmarks have been altered by chronic inflammatory disease.

The involvement of the orbital region and its contents after nasal polyps disease is always possible because of the close anatomical relations between the sinuses and the nasal and orbital cavities. The removal of nasal polyps may be dangerous and it is important to proceed with the greatest caution so as to preserve the integrity of the bordering zones and prevent them being injured. It is clearly always important to diagnose the complications of the sinus surgery as soon as possible to allow timely treatment (13).

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