OPHTHALMIC COMPLICATIONS AFTER FUNCTIONAL ENDOSCOPIC SINUS SURGERY (FESS)

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SUMMARY

The purpose of this paper is to inform the ophthalmologist about the occurrence of ophthalmological complications after functional endoscopic sinus surgery (FESS). Due to the close anatomical relationship between the paranasal sinuses and the orbit, involvement and/or injury of the orbit from processes primarily located in the paranasal sinuses, may occur.

The orbit, the extra-ocular muscles, the optic nerve and the lacrimal drainage system can be damaged during FESS. The risk of injury is correlated to the anatomical variations, the history of previous surgery, the extent and the gravity of the disease and the skill of the surgeon. We hereby present three cases, each showing a different ophthalmologic complication after FESS.

RESUME

Le but de notre présentation est d'informer l'ophtalmologiste sur les complications ophtalmologiques susceptibles de se développer au décours d'une chirurgie fonctionnelle endoscopique des sinus. En raison des relations anatomiques étroites entre les sinus paranasaux et l'orbite, certaines pathologies y ayant leur origine peuvent avoir une incidence sur un certain nombre de gestes chirurgicaux réalisés à ce niveau. L'orbite, les muscles extra-oculaires, le nerf optique et le système lacrymal peuvent être endommagés pendant une chirurgie endonasale. La survenue de complications est liée aux variations anatomiques, à d'éventuelles interventions antérieures, à l'extension et à la gravité de la maladie ainsi qu'à l'expérience du chirurgien. Nous présentons à l'appui de trois cas cliniques, trois complications ophtalmologiques différentes survenues au décours d'une chirurgie endonasale.

SAMENVATTING

Het doel van deze presentatie is de oogarts te informeren over de oftalmologische verwikkelingen na een functionele endoscopische sinus chirurgie (FESS). Als gevolg van de zeer nauwe anatomische relatie tussen de paranasale sinussen en de orbita, bestaat er een mogelijkheid tot beschadiging van de orbitale structuren door primaire pathologische processen en/of tijdens FESS.

De orbita, de extra-oculaire spieren, de nervus opticus en de traanwegen kunnen beschadigd worden tijdens FESS. Het risico op een complicatie is afhankelijk van de anatomische variaties, vorige heelkundige ingrepen, de uitbreiding en de ernst van de onderliggende ziekte en de klinische ervaring van de chirurg. We stellen drie klinische gevallen voor, die elk een andere oftalmologische complicatie vertonen na FESS.

KEY WORDS

Functional endoscopic sinus surgery (FESS), diplopia, optic nerve compression, medial rectus muscle incarceration.

MOTS-CLES

Chirurgie fonctionnelle endoscopique des sinus, diplopie, compression du nerf optique, incarcération du muscle droit interne.

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submitted: 18-01-08
accepted: 06-06-08

INTRODUCTION

Diseases of the paranasal sinuses are very common and may be caused by conditions such as infectious, inflammatory and neoplastic diseases. In cases of persistent or recurrent sinusitis, sinus surgery may be required for proper diagnosis and/or treatment. Functional endoscopic sinus surgery (FESS) has gained enormous popularity in the diagnosis and treatment of patients with paranasal sinus diseases because of the excellent visualisation of the sinus cavities without cutaneous incision (9). However, major complications may occur in 1 to 2 % of cases e.g: orbital hemorrhage, blindness, diplopia and skull base defects (1, 2, 5, 6, 7).
The ear-nose-throat (ENT) surgeon must keep in mind that anatomic landmarks may be altered by chronic inflammatory diseases and/or previous surgery. Before starting any surgery, detection of anatomic variations by pre-operative CT-scan imaging is thus very important. We report on 3 cases, which each illustrate different ophthalmic complications after FESS.

CASE REPORT 1

A 42-year-old woman underwent FESS by a referring ENT surgeon for a chronic pansinusitis in September 2006. According to the surgeon, the procedure went uneventful. One day after surgery, the patient noticed diplopia in all directions of the gaze. There are no data available of an ophthalmologic examination at that time. Following entrapment of the right medial rectus muscle in a defect of the lamina papiracea, the patient underwent a second surgery by the same surgeon, two weeks after initial surgery. Closure of the medial bony defect was performed with a PDS-plate. In November 2006 the patient was referred to the Department of Ophthalmology of the Antwerp University Hospital for evaluation and treatment of persisting diplopia. The ophthalmological examination of both eyes, including BCVA, intraocular pressure, ophthalmoscopic findings and automatic perimetry, was normal. The orthoptic examination, however, revealed the presence of an exotropia and hypertropia of the right eye at 30 cm and at 6 m. The alternate prism-cover test at 30 cm and 6 m measured 6 prism-diopters base-in and 8 prism-diopters base-up for the left eye. The angle measured on the synoptophore was 4° of exotropia and 3° of hypertropia of the right eye, 6° excyclotropia of the right eye and 1° excyclotropia of the left eye.
Examination of the ocular motility showed a limitation of the adduction and a limitation of the elevation and depression in adduction of the right eye.
Ocular motility was recorded on a Lancaster screen which is shown in figure 1.

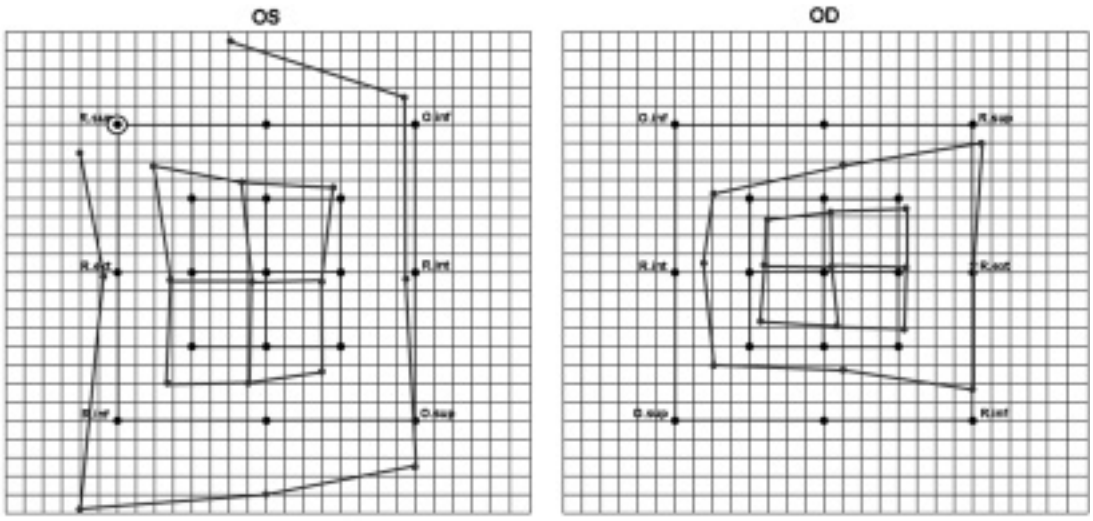


Fig. 1: Limitation of the adduction of the right eye and limitation of the elevation and the depression in adduction of the right eye.

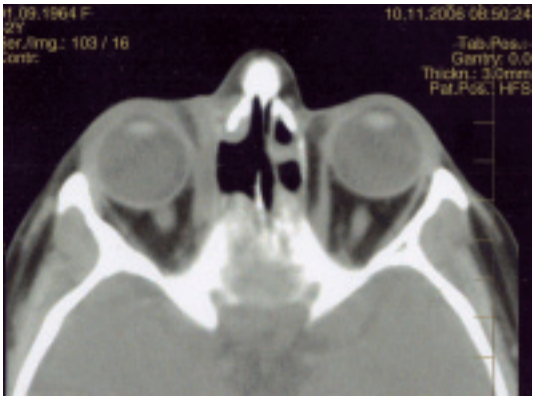


Fig. 2: CT-scan image showing the situation after placement of a PDS-plate along the defect of the medial orbital wall and the adhesions between the right medial rectus muscle and the PDS-plate.

CT-scan of the orbits revealed important fibrosis between the PDS-plate and the right medial rectus muscles shown on figure 2.
To correct the vertical diplopia in primary position, we adapted vertical prisms in the patient's spectacles (3 prism-diopters base-down for the right eye and 3 prims-diopters base-up for the left eye). The patient was last seen in June 2007. The orthoptic examination and the ocular motility remained unchanged. The patient expressed no desire for further surgery.

CASE REPORT 2

A 49-year-old woman underwent FESS by a referring ENT surgeon because of a chronic rhino-sinusitis lasting since the summer of 2005. No complications were reported during surgery. Three months later, the patient visited the Department of Ophthalmology of the Antwerp University Hospital with complaints of marked swelling of the right upper eyelid and decreased vision of that eye. The objective findings after clinical ophthalmologic examination were the following: BCVA was 0.2 on the right eye and 1.0 on the left eye. The intraocular pressure and the ophthalmoscopic findings were normal in both eyes. After palpation of the upper eyelid a solid-like subcutaneous mass was objectivated. Pattern-reversal visual evoked potentials showed increased latencies and decreased amplitudes in the right eye.

CT-scan of the orbit revealed the presence of a preseptal swelling. On MRI-scan (figure 3), a right preseptal cellulitis was visualised, as well as an extraconal cellulitis in the right orbit. The maxillary, ethmoidal and sphenoid sinuses showed evident signs of sinusitis. The optic nerve did not seem to be involved in the pathologic process. Based on the clinical and radiological findings, a biopsy of the subcutaneous mass was performed on the upper eyelid and sent for histopathological examination. The protocol stated the presence of connective tissue, fat and of a lipogranuloma surrounding an alcohol-solvable foreign body material corresponding to Fusidine® ointment. This ointment was apparently used during surgery.
The treatment options consisted in surgical excision of the foreign body material in the upper eyelid or treatment with systemic high doses of corticosteroids. The patient preferred administration of high doses of systemic corticosteroids. After one month, the BCVA of the right eye had recovered to 1.0.

CASE REPORT 3

A 57-year-old male patient underwent FESS by a referring ENT surgeon in February 2006 because of a chronic ethmoidal sinusitis. One day after surgery, the patient presented a strongly swollen upper and lower eyelid with an acute visual loss to no light perception in the right eye. An urgent two-wall orbital decompression was performed, during which a small defect of the lamina papiracea was noticed complicated with a retroocular haematoma. Following the orbital decompression, the ophthalmologic ex-

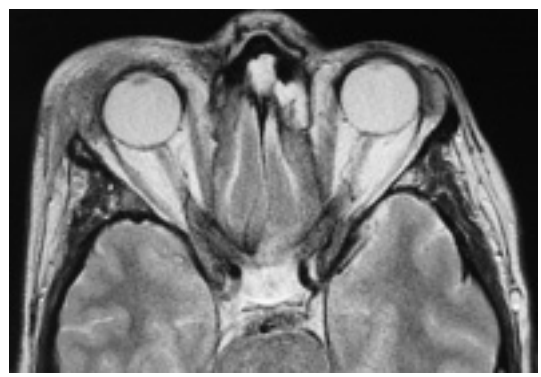


Fig. 3: MRI-scan showing right preseptal cellulitis.

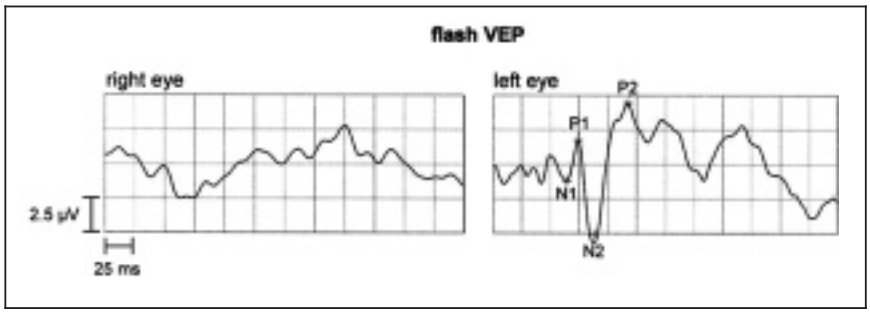


Fig. 4: Flash-VEP record showing no detectable answer from the right eye and normal answer from the left eye.

amination showed the presence of an afferent pupillary defect on the right eye and a normal light reflex on the left eye. There was a discrete hypotropia and proptosis of the right eye as well as a mechanical limitation of the elevation. Panda-eyes (haematoma around both eyes) and extensive haemorrhages were visible. The intraocular pressure and the funduscopic findings were normal, except for the presence of one small dot intraretinal haemorrhage in the posterior pole.

Flash VEP responses of the right eye were strongly altered compared to the fellow eye (figure 4).

The patient was treated with timolol maleate 0.5 % eyedrops 2 times daily in the right eye and Diamox® 250 mg 2 times daily per os. MRI-images showed a status postorbital decompression with orbital fat herniation through the lamina papiracea of the right medial wall. Flash VEP responses of the right eye were repeated but did not improve.

One week after surgery the patient went home with the following medication: Timolol maleatel 0.5 % eye drops 2 times daily and Genteal® eye ointment one time daily in the right eye. The patient was seen one, three and six months later. The right eye had no light perception, no detectable VEP-responses and developed an enophtalmia.

RESULTS

Three cases presenting with severe ocular complications after functional endoscopic sinus surgery were observed at our outpatient clinic in less than twelve months and were summarized on table 1.

DISCUSSION

According to the literature, orbital complications after FESS such as orbital ecchymoses, retro bulbar haemorrhage, nasolacrimal drainage system injury, proptosis, extra-ocular muscle injury and damage to the optic nerve are well-known complications (1,2, 5, 6, 7). Treating patients with complaints of diplopia due to a muscle entrapment after sinus surgery can be very challenging (4).

The most frequently injured extra ocular muscle is the medial rectus muscle. Different kinds of muscle injuries like a direct laceration, neurovascular interruption or development of adhesions with adjacent tissues can develop. The mechanism of extra ocular muscle injury can either be direct or indirect. Direct injury to the muscle can occur during the sinus surgery with the operating instruments and consist in a transsection of the muscle and/or a muscle haematoma. Indirect injury to the muscle can result

Table 1: *Summary of the different observed ophthalmologic complications*

Case	*Type of injury*	*Consequences*
Case 1	Medial rectus muscles entrapped in defect of the medial wall of the orbit	Persistent diplopia in the all directions of gaze
Case 2	Appearance of granuloma tissue due to the use of Fusidine^{R} ointment peroperatively	Choice of treatment: reintervention for excision of the granuloma or systemic corticosteroids
Case 3	Optic nerve damage due to a compression from a retro-ocular haematoma	Permanent visual loss

from an orbital haemorrhage with a possible rise of the intraorbital pressure and/or (re)entrapment of the intact muscle fibres in the fractured orbital wall. Extra ocular muscle damage can result in diplopia in some or all directions of the gaze. Which muscle surgery should be performed, depends of the severity of the motility disorder and of the presence of diplopia in primary position and/or of the presence of diplopia while reading. In most of the cases, at least one or more muscle surgery procedures are necessary to give the patient a useful field of single binocular vision in primary position and at reading.

Treatment with intravenous corticosteroids did not show obvious improvement of ocular alignment or motility (7).

In cases where an orbital haemorrhage and/or optic nerve injury is present, early treatment is required (1, 3). Surgical options include lateral canthotomy with or without cantholysis, and surgical orbital decompression. Medial optic nerve canal decompression may be required. The medical treatment of an orbital haemorrhage consists in an orbital tamponade, intravenous mannitol or acetazolamide, topical intraocular pressure-lowering drugs and systemic corticosteroids administration (7). According to the literature, the efficacy of systemic corticosteroids has not been proven, although it contributes to reduce the orbital oedema. Optic nerve damage may be caused by extensive use of endosinusal cauterisation, which may indirectly damage the ophthalmic artery (2).

The risk of orbital complications during FESS can be reduced by a meticulous preoperative evaluation. Detection of anatomical variations by a preoperative CT-scan and screening for a possible blood disorder is important (3, 4).

Despite all the efforts, some patients will require an evisceration because of a blind and painful eye (3).

CONCLUSION

Despite the fact that FESS is a relatively safe procedure, minor and major ophthalmologic complications can occur. The ophthalmic complications after FESS can be divided in four groups: the optic nerve damage, the orbital damage, the extra ocular muscle damage and the damage to the lacrimal drainage system. Three out of the four complications were illustrated by these case reports.

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