Abstract

Complications during sinuses diseases may affect locoregional structures, such as the orbit. FESS (Functional Endoscopic Sinus Surgery) represents the primary approach of the sinuses so in some rare cases damage can appear involving the orbit or the eyeball. This paper aims to make a review of the management of the orbital trauma during medial meatotomy or anterior ethmoidotomy during FESS. FESS represents the main sinus approach. Due to close location, during the endoscopic procedure of the sinus, orbit trauma can occur. This can lead to bleeding, orbital inflammation, visual loss. The management of such complications should be rapid and effective in order to minimize the long-term impairments.

Keywords: functional sinus surgery, orbital complications

Introduction

Pathology involving the sinuses represents one of the most frequent presentations to the otolaryngologist. The nasal sinuses are represented by the maxillary s., the ethmoidal s., the sphenoidal s. and the frontal s. Due to the close localization of the dental arch, infections of the sinuses can have an odontogenic reason.

To have a proper diagnostic and decide what is the best surgical approach, a complete physical examination –fiberoptic examination of the nasal cavity and nasopharynx combined with a CT scan (computed tomography) of the paranasal sinuses - are recommended. In case of tumor suspicion, a CT scan with contrast is required in association with an MRI.

The surgical treatment of chronic rhinosinusitis mainly involves widening the natural ostiums of the respective sinus in the corresponding meatus, sinus drainage, removing the inflammatory lesions and, in case of suspicious lesions of the mucosa, biopptic excisions. The normal mucosa is untouched, which helps regeneration of adjacent mucosa. A proper sinus drainage represents an important element in preventing recurrent sinus inflammations, so it is crucial that the opening of the elected sinuses to be correctly performed.

Complications during FESS may occur because the orbital region and paranasal sinuses are very close one to the other. These complications are represented by tissue inflammation, lacrimal duct obstruction, bleeding, diplopia or other vision disturbances or even a reduction in the motility of the eyeball [1, 2].

Under FESS the nasal septum, nasal conchae or the lateral nasal wall may be injured, therefore, we can encounter epiphora following surgery.
Although some risks are well recognized, the surgical techniques comprising FESS are well developed and standardized and these complications rarely happen. The best results when treating complications are obtained when the problem is acknowledged and attended to as close as possible to the time of the intervention, preferably during the same surgery. This article aims to present evidence of orbital trauma during routine FESS procedures.

Discussion

During middle meatoctomy and anterior ethmoidectomy the orbital cavity is injured most frequently. Therefore, we aim to present the most essential steps during surgery that allow us to avoid the lesions. The nasal operation is performed after a proper clinic and paraclinical examination. Computed tomography of the sinuses is mandatory, so the surgeon can view the nasal septum, nasal turbinates, all the sinuses and adjacent structures. Using the imagistic investigation, we also take a closer look at the uncinate process insertion, the integrity of the lamina papyracea and position of the anterior ethmoidal artery. During surgery, we pay attention to the nasal landmarks (Figure 1).

The transnasal maxillary sinus meatotomy is performed endoscopically using sinoscopes with different viewing angles (0°, 70°). The first step represents the medial displacement of medial turbinate to create a better view of the uncinate process, followed by an inferior dissection of the process that makes a bigger maxillary sinus ostium. With a curved suction needle (Jones) we can drain the sinus. It is very important to make a proper incision, otherwise the orbital cavity can be injured. After the drainage, endoscopic examination of the maxillary sinus is indicated and, if the pathology demands it, a biopsy for suspected malignancies can be performed.

The surgery of the ethmoid requires the use of endoscopy rods (0°) that allow us to view the medial meatus. The medial turbinate is dislocated towards the nasal septum. The uncinate process is removed, keeping its superior third, with rotating movements to preserve the adjacent mucosa. The next step is represented by the dissection of the ethmoid bulla, with its wall removed. This opens the anterior ethmoid sinus (Infundibulotomy). For the posterior ethmoid sinus, the basal lamella of the medial turbinate is perforated anteriorly - 3-4mm above the dorsal third of the lamella - giving a perfect view of the posterior ethmoidal cells. The posterior ethmoid wall has bony landmarks which must be carefully preserved due to its close contact with brain structures [3].

![Figure 1 - 1-orbit; 2-insertion of the medial rectus muscle; 3-lamina papyracea](image)

The literature shows that during FESS procedures most complications appear due to orbital trauma. These complications usually include bleeding and ocular muscles damage. Severe vision loss is rare, but it can occur after sinus surgery. This occurs if the optic nerve is damaged directly or if there are some complications intra- or post-operatively, such as a hematoma which makes nerve compression.

Surgical procedures involving the ethmoid or sphenoid sinuses can lead to severe bleeding due to the high vascularization of these areas. During ethmoidectomy, the medial orbital wall - also known as lamina papyracea - can sometimes be mistaken for one of the walls of the ethmoid air cells and can be damaged. This can occur when dealing with an inflamed ethmoid sinus, ethmoidal polyposis or intraoperative hemorrhage. In chronic ethmoidal sinusitis, the medial orbital wall can be absent. In these cases, the inflammatory process extends to the orbit and to the orbital elements, which can prolapse into the operative zones. This causes lesions to the medial rectus muscle, orbital fat and even superior oblique muscle. The clinical examination will reveal more often
a restrictive strabismus and some positive forced duction that will suggest muscle entrapment or paralytic strabismus with negative forced duction which suggests muscle entrapment. Ethmoidal sinus surgery can damage the optic nerve too. The lateral wall of the posterior ethmoid is located in the proximity of the optic nerve. Here if the wall is destroyed, direct trauma to the optic nerve can be occur. Moreover, along with the optical nerve, the vascular supply of the nerve can be injured. If this happens, it is highly recommended to perform an ophthalmologic consult and also a CT scan to evaluate the hemorrhage and the lesion [4].

It is essential to take into consideration that during FESS intraorbital complications have a lower incidence compared to the extraorbital ones. During maxillary sinus surgery, the orbital floor can be damaged. This leads to a damage of the inferior rectus muscle, which results in a reduced eyeball motility [5].

It is essential not to forget to check the lacrimal duct because it can also be damaged, leading to obstruction. Lacrimal duct injury occurs during enlargement of the maxillary medial wall, located in the middle meatus. During FESS, a back-biting punch forceps is used to widen the maxillary sinus ostium. Thus, this surgical part ensures removing part of the lateral wall of the nasal cavity in that area. As the ostium is enlarged anteriorly, the bony canal of the lacrimal duct can be encountered, therefore during bone removal an increasing resistance could be described. This stands as an attention flag for the surgeon to stop removing more bone in that area. In case of nasolacrimal duct damage, a communication into the middle meatus can occur, or in case of severe obstruction, the patient can relate severe epiphora.

Another complication during FESS could be orbital hemorrhage. This is a result of removing the medial orbital wall and causing trauma to the orbital soft tissue that leads to secondary bleeding. Clinically, patients will have proptosis and subcutaneous crepitations. This leads to increased intraorbital pressure and vision loss due to nerve compression. Usually, these symptoms are not persistent due to self-limitation and after some days the patient is fully recovered. Ice bags placed on the eye can reduce edema and haematoma significantly. In case of severe orbital trauma and severe hemorrhage transnasal orbital decompression is performed during the initial surgical procedure. This is done by removing the lamina papyracea, identifying the haematoma and removing it. In case of intraoperative removal of the medial orbital wall, it is important to inform the patient that they must refrain from sneezing with their mouth closed or blowing their nose [6].

After FESS, practitioners should not forget to check that all the sinuses have a clear way which permits nasal sinus drainage and also check the adjacent anatomical elements to avoid possible future complications.

Conclusions

FESS represents the main sinus approach. Due to close location, during the endoscopic procedure of the sinus, orbit trauma can occur. This can lead to bleeding, orbital inflammation, visual loss. The management of such complications should be rapid and effective in order to minimize the long-term impairments.

The surgeon must check the CT scan for the position and insertion of the uncinate process, position of the anterior ethmoidal artery and the integrity of the lamina papyracea.

The surgical dissection must be performed systematically and using endoscopic landmarks. Do not continue the dissection if bleeding will affect the visibility of the surgical field. If orbital trauma occurs the surgeon must decompress the orbit immediately endoscopically and sometimes externally.

All surgical procedures should be performed with the patient's acceptance. They should be informed about all the surgical risks, intra-, peri- and postoperative complications and about the recovery period. After the patient with orbital trauma is discharged, he should come for scheduled check-ups to have best results and to avoid any further complications. The patient should also perform an ophthalmological check-up.
References


