

EDITORIAL

Morpho-functional, evolutive and medicolegal issues in rhinosinusal endoscopic surgery

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Rhinosinusal inflammatory and allergic chronic pathology is constantly increasing in frequency. Therefore, achieving an accurate diagnosis, by detecting any anatomical malformations, presenting the limits and bone rhinosinusal landmarks with vasculo-nervous endo- and exocranial elements, and especially with those of the orbit and of the base of the skull, represent the main conditions in the approach of rhinosinusal minimally invasive endoscopic surgery.

Conventional rhinosinusal surgery, by external or endonasal approach, has represented for many years the "touchstone" of ENT surgeons, due to the risks and complications that may arise through reports of the ethmoid cells with surrounding elements.

Dangerous proximity of vasculo-nervous structures and of the orbit, their viewing difficulties and haemostasis, often led to intra and postoperative complications, difficult to be prevented and treated.

Because of these aspects, we consider useful presenting the main anatomical landmarks, the difficulties of the surgical approach, and also the complications of endoscopic surgery by their medicolegal implications.

IMPORTANT ANATOMICAL LANDMARKS IN RHINOSINUSAL ENDOSCOPIC SURGERY (FESS)

The fronto-ethmoido-spheno-maxillary complex and the lateral wall of the nasal fossa represent the most important anatomic structures when performing a rhinosinusal endoscopic surgery.

The insertion area of the middle turbinate can be considered the basic landmark, limiting the pierced lamina of the ethmoid (with the olfactory bulb), its

upper wall and the lamina papyracea (inner wall of the orbit). During the surgical intervention, dehiscence of the orbit inner wall may cause injuries of the orbital structures - internal rectus muscle, the anterior and posterior ethmoidal arteries.

Posterior ethmoidal cells are in close relationship with the sphenoid sinus and, through the latter, with the optic nerve, the optic chiasma (if it has posterior location), the vidian nerve and the internal carotid artery. There is also the possibility of bone dehiscence by bulging of the carotid artery in the sphenoid sinus, as well as the optic nerve passing through the sphenoid sinus; hence the importance of performing angio-MRI and a CT scanner preoperatively or intraoperatively^{1,2}.

SURGICAL APPROACH DIFFICULTIES IN RHINOSINUSAL ENDOSCOPIC SURGERY (FESS)

The narrow approach path, the depth of the operative field, the loco-regional anatomotopographic malformations represent surgical approach difficulties; in achieving haemostasis, they are the reason for operative complications and accidents.

Endoscopic approach, as compared to the classic one, is superior by preventing loco-regional functional and aesthetic sequelae, presenting however an increased rate of complications, especially for untrained surgeons³.

COMPLICATIONS OF RHINOSINUSAL SURGERY

Complications after rhinosinusal endoscopic surgery have a rate between 2-4% for experienced surgeons,

but this percentage can increase with beginners, less experienced. The share of severe, major complications (loss of an eye) or meningoencephalitic ones is nevertheless low^{1,4,5}.

MINOR COMPLICATIONS

1. Accidental injury to the lamina papyracea causes an eyelid bruise and protrusion of orbital fat in the nasal fossa; orbital emphysema signals bone fracture and pressure on the eyeball.
2. Closing of the meatotomy and appearance of septo-turbinary or meatus synechiae block sinusal drainage; thus, it often requires initial cutting of the synechiae and, sometimes, even partial or complete cutting of the middle turbinate.
3. Supra- and suborbital neuralgia (dehiscence of the bone channel in the superior wall of the maxillary sinus) or dental neuralgia.

SEVERE COMPLICATIONS

1. Intraorbital expansive hematoma that, by compression of the optic nerve, can cause blindness. Careful intraoperative monitoring of the eyeball and pupil is necessary in order to early detect a hematoma.
2. Cephalalgic syndrome determined by the frontal recess injury, its obstruction or fibrosis, secondary to stenosis.
3. Lesions of the internal and oblique rectus muscle which determine motility disorders of the eyeball and, secondarily, vision disorders, together with accentuation of the cephalalgic syndrome.
4. The meningoencephalitic clinical features may appear, suggesting lesions of the anterior section of the skull base, with meningitis or even cerebral lesions, and appearance of rhinoliquorrhea.

MAJOR COMPLICATIONS

The major complications are, fortunately, rare and are due either to some malformations represented by bone dehiscences or variable trajectories of the optic channel, coupled with the surgeon's lack of experience. It is worth mentioning the leptomeninges injury, CSF fistula and, very serious, amaurosis by injuries, beginning with transient vascular spasm, compression through orbital hematoma, and less often visual blindness. The supero-external manœuvres, as well as electrical haemostasis are forbidden in this region. In case of CSF fistula, the highest and most feared risk is suprainfection causing cerebral lesions. Diffuse encephalitis or purulent meningitis can occur, being hard to handle.

Cataclysmic haemorrhage can occur due to either injury of a large arterial vessel, of an aneurism, or cavernous sinus injury during sphenoidal sinus surgery.

MALPRACTICE AND MEDICOLEGAL ISSUES

All these complications can be avoided by performing a CT scanner or an angio-MRI preoperatively, coupled with caution (initially) and a correct technique of the surgeon⁶.

In order to avoid such complications, the ENT doctor needs to gradually increase the complexity of the surgery interventions, initially under the guidance of a more experienced surgeon, to assist in various endoscopic interventions, to attend postgraduate training courses, with the purpose of both acquiring surgical techniques and, especially, resolving any complications.

It is important to establish from the very beginning the surgical landmarks (if any), and in case of massive bleeding and lack of orientation in the operative field, interruption of the surgical intervention is preferred, even before its completion.

Choosing the appropriate instruments, microscope or certain endoscopic optics for adequate visualization of lesions, may limit complications or possible errors generating medicolegal implications⁷.

Obtaining the patient's informed consent is compulsory, taking into account the possibility of complications or of postoperative morphofunctional sequelae. At the end of the surgical interventions, it is absolutely necessary to draw up a complex surgery protocol, by describing the stages of the intervention, specifying the problems appeared intraoperatively, as well as the solutions adopted to solve them (especially those related to haemostasis, discovery of certain malformations or anatomical variants).

REFERENCES

1. Ilieva K. et al., Ophthalmic complications after functional endoscopic sinus surgery (FESS). *Bulletin de la Societe belge d'ophtalmologie*, 2008; 308:9-13.
2. Hemmerdinger S.A., Jacobs J.B., Lebowitz R.A., Accuracy and cost analysis of image guided sinus surgery. *Otolaryngol Clin N Am*, 2005; 38:453-60.
3. Stankiewicz J.A., Complications of endoscopic intranasal ethmoidectomy. *The Laryngoscope*, 1987;97: 1270-1273.
4. Jackman A.H., Palmer J.N., Chiu A.G., Kennedy D.W., Use of intraoperative CT scanning in endoscopic sinus surgery: a preliminary report. *Am J Rhinol*, 2008; 22(2):170-4.
5. Maniglia A.J., Fatal and other major complications of endoscopic sinus surgery. *Laryngoscope*, 1991 Apr;101(4 Pt 1):349-354.
6. Graham S.M., Carter K.D., Major complications of endoscopic sinus surgery: a comment." *British Journal of Ophthalmology*, 2003; 87:374-377.
7. Kennedy D.W., Shaman P., Han W. et al., Complication of ethmoidectomy: A survey of fellows of the American Academy of Otolaryngology. *Head and Neck Surgery*, 1994;11:589-97.