

EDITORIAL**Endoscopic sphenoid sinus surgery – gold standard approach or major risk technique?****Vlad-Andrei Budu, MD, PhD, Lecturer**

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In recent decades, the endoscopic surgical techniques have gained a dominant position in the field of rhinosinusal pathology. Being a type of functional and physiological surgery with all the anatomical and pathological elements in sight, the endoscopic approach has today managed to practically replace the more laborious classical surgical techniques with their unsightly incisions and multiple sequelae, with prolonged healing and decreased quality of life during postoperative recovery.

In terms of anatomy, the paranasal sinuses are air cavities developed in the bones of the face, relatively bilaterally symmetrical, and interconnected during the appearance of pathological processes.

Among the paranasal sinuses, experience has taught me that the ethmoid sinus is the key stone of the entire nasosinusal inflammatory pathology, by being located between the other sinuses of the face. The frontal sinus has a superior and anterior position, which makes it the most difficult to approach from an endoscopic point of view. The learning curve of endoscopic surgery sets the ethmoidectomy techniques as the most significant ones and leaves to experienced surgeons the endoscopic approach of the frontal sinus. The sphenoid sinus has the most posterior location among the paranasal sinuses, positioning itself in an area of maximum anatomical importance and with major surgical risks.

In this editorial, I will try to clarify a still up-to-date question: is endoscopic surgery of the sphenoid the gold-standard technique or this surgery generates major intraoperative complications?

Regarding the patient with sphenoid sinus involvement, the diagnostic algorithm relies on:

- symptoms – the retro-orbital pain and the constant cranial pressure refractory to the usual treatment are characteristic;

- nasal endoscopic examination – the sphenoid-ethmoidal recess that can be blocked by local anatomical elements, or can be bulging due to inflammatory disease or endosinusal tumor, sometimes pulsatile (pulses from the internal carotid artery) or with purulent secretions for which a culture sample is mandatory;
- computed tomography examination highlights the anatomic type of sphenoid, its extensions in the surrounding areas, the integrity of the sphenoid bony walls and decides the necessity of an MRI exam.

The indication for the endoscopic approach of the sphenoid is based on the answer to a few questions:

WHAT?

In current practice, the inflammatory pathology of the sphenoid sinus is found in almost 90% of cases, while only 10% is represented by sphenoid tumors (benign or malignant). So, we may wonder what kind of sphenoid pathology benefits from the surgical endoscopic techniques. If surgical treatment is needed, the sphenoid inflammatory pathology has a complete endoscopic approach resolution, while malignant tumor pathology has limited benefits using endoscopic techniques.

WHEN?

Once the need for an endoscopic approach of the sphenoid sinus is decided, the operative moment has to be chosen considering the sinus pathology. If there is a risk of local complications or even existing complications (orbital, intracranial), the surgical approach is immediately indicated. In practice, most of the clinical situations refer to chronic or chronically exacerbated pathology that requires endoscopic surgical treatment, taking into account both the existing pathology and the patient's co-morbidities.

HOW?

The endoscopic surgery of the sphenoid sinus can be performed through 3 different technical approaches.

The *transseptal* approach is generally used in hypopneumatized sphenoid sinuses in order to reach the anterior sinus wall and it is usually indicated in the sellar region surgery.

The *transethmoidal* approach of the sphenoid is performed when there is a complex rhinosinus pathology. To the extent that there is a pansinus inflammatory process involved, the transethmoidal approach is indicated. We perform a complete ethmoidectomy in order to discover the sphenoid-ethmoidal recess and to further proceed with an endoscopic sphenoidotomy.

In endoscopic surgery of the sphenoid sinus, the *paraseptal* approach is the most used, because of the physiological aspects and the reduced risk of intraoperative complications.

After deciding the endoscopic surgical indication for the sphenoid sinus pathology, the dilemma of the title returns: gold standard approach or major risk surgery?

I will start with the risks of this surgical technique, according to two distinct anatomical parts: the anterior wall of the sphenoid and the endosphenoidal region. The risks of approaching the anterior wall of the sphenoid can be systematized as follows:

- medial turbinate lateralization – hemorrhagic and intracranial complications;
- resection / replacement of the nasal septum with local complications;
- resection of the superior turbinate – major risk of penetration of the skull base;
- endoscopic sphenoidotomy – hemorrhagic complications (sphenopalatine artery).

Regarding the size of the sphenoidotomy, this should be enlarged as much as needed and as little as possible, in order to recover the mucociliary clearance.

During the endosphenoidal surgical approach, taking into account the pneumatization of the sphenoid bone but also the anatomic elements at this level, the risk of complications increases considerably:

- the presence of the Onodi cell on the preoperative CT exam has to be determined;

- the medial sphenoid wall is represented by the intersphenoidal septum, which is indicated not to be surgically approached because of its insertion on the carotid canal;
- the upper wall is usually approached by an interdisciplinary team during pituitary gland surgery;
- the posterior wall is part of the skull base at the level of the anterior part of the posterior cranial fossa, its penetration causing redoubtable intracranial and hemorrhagic complications;
- at the level of the lateral wall of the sphenoid, anatomic elements with a major risk of complications (some even vital) are described. Thus, on the lateral wall, often protruding endosinusally, the carotid canal and its content are discovered. Superior to this landmark, with a direction towards the optic chiasm, the optic nerve canal can be described. Between these two anatomic elements, the carotid-optic recess can be endoscopically visualized. Also, on the lateral wall in its median part, the maxillary nerve (V2) is discovered. Being aware of the complications, the endoscopic approach of the sphenoid lateral wall must be gently performed using angled endoscopes and instruments.

Therefore, after reviewing the complications that may occur during the endoscopic surgical approach of the sphenoid, the answer to the initial question will be specified by some conclusions:

- The endoscopic surgical approach of the sphenoid is based on the precise knowledge of the regional anatomy and on the experience of the surgical team.
- A good surgical result is obtained only with a correct surgical indication (we operate on patients and sphenoid pathologies, not on CT images).
- The CT exam is mandatory using sections of 0.8-1.2 mm, with meticulous follow-up of all anatomical landmarks and pathology in a triplanar view (axial, coronal, sagittal).
- The endoscopic surgery of the sphenoid sinus pathology proves to be the gold standard approach, even if there is an increased risk of intraoperative complications.