

THE TRANSSINUSAL APPROACH OF THIRD, DIENCEPHALIC VENTRICLE

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Introduction

During the last decade functional endoscopic sinus surgery for both benign and malignant involvement of the ventricular cavity, cerebrospinal fluid and choroid plexuses reached new successes due to the development of transnasal and the paranasal pneumatized cavities approaches entered routine and, as well as the development of new fine, performant non-nocive endoscopic tools.

Aim

Concomitently with technical progress, became necessary the establishment of significant transsinusal endoscopic landmarks of approach the sellar and suprasellar areas, petrous apex and sphenopetroclival complex, that imposed re-evaluation of local anatomy in order to establish precise anatomical landmarks for sinusal cavity navigation [1,2].

Our study proposes to determine the topographical relations of the lateral wall of sphenoid sinus with the main surrounding neurovascular structures, to establish their endosinusal landmarks and to realize an anatomofunctional map of this wall, usefull for sinusal endoscopic navigation.

The present study is focused on:

- sinusal pneumatization;
- significant landmarks

identification;

- lateral sinus wall mapping.

Material and methods

The anatomical material studied consists of :

- 47 dry skulls sagittally sectioned (94 halves). The septal remnants or sinusal cristae were chiseled with a dental drill in order to allow the acces to the bony walls. The lateral wall of sphenoid sinus was observed directly or after transillumination by means of Zeiss surgical microscope and

the images were recorded on microscope's Sony video line or on Sony F 717 digital camera. The endosinus exploration was performed passing a thin 3,5 mm flexible Storz endoscope through the sinusal ostium.

- 10 midsagittal section of cadaveric, formaline fixed cefalic extremities;

- 100 2D CT head images from non neurological patients examined in order to

Table 1. Sinusal pneumatization on our cases:

Sinusal condition	Skulls (94 halves)		C.T.(200 halves)	
	L.	R.	L.	R.
Sinusal agenesis	1	-	2	1
Conchal	4	7	7	2
Presellar	7	5	19	17
Sellar	20	12	27	22
Postsellar	11	14	22	29
Subcortical	4	9	13	29

establish the correspondence between anatomical and imagistic data.

Results

Our study pointed out the extreme variability of the sphenoid sinus [1,2, 4] that will be presented in the first row as general table and then particularly described (Table 1)

According to sinus pneumatization degree, we have described the following anatomical situation (Fig. 1.A, B). :

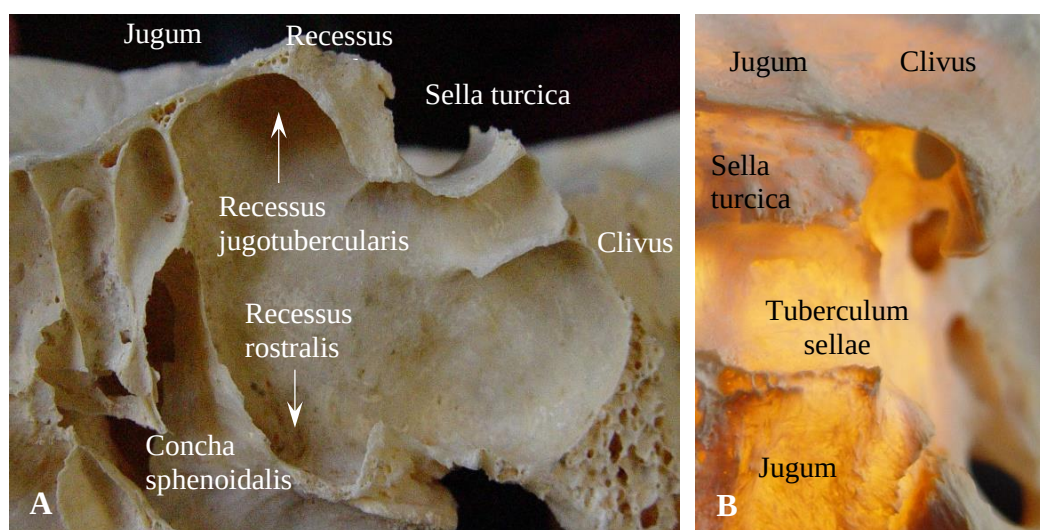


Fig. 1. A. Sagittal section of hyperpneumatized sphenoid sinus with regional extensions. B. Transilluminated sphenoid sinus viewed from above with extensions into sella turcica and jugum sphenoidale.

From the viewpoint of thickness of the bony sinusal walls, the sphenoid body is reduced to a thin lamina of compact bone [1, 2, 5] and pneumatization extends into jugum, sphenoid lesser wings and rostrum, around the optic nerve (perioptic), into the roots of greater wings and in the roots of pterygoid process as is presented in the CT images (Fig. 2. A) and on dry skull transillumination (Fig. 1.B).

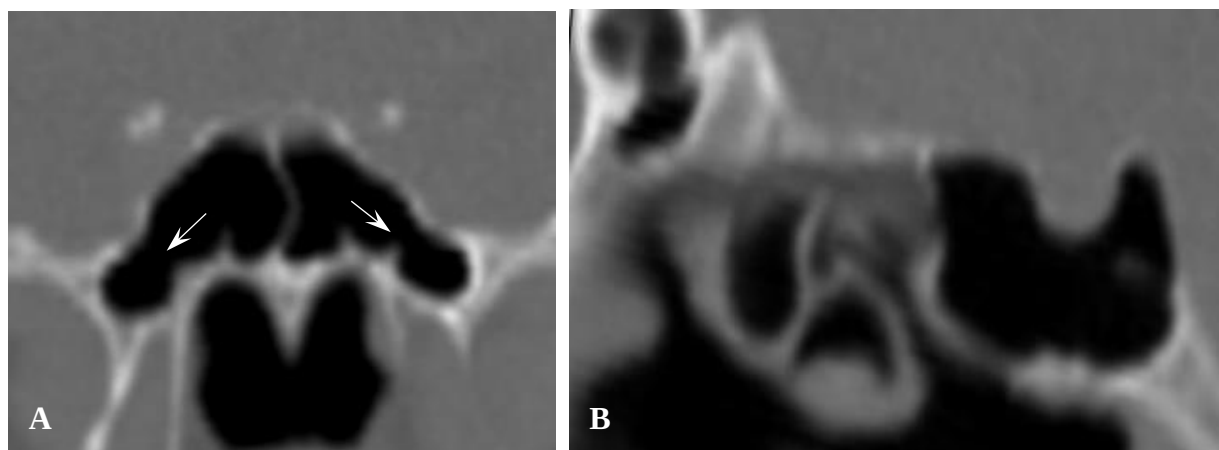


Fig. 2. A. Recessus basipterygoideus. B. The complete pneumatization of dorsum sellae and jugum sphenoidale.

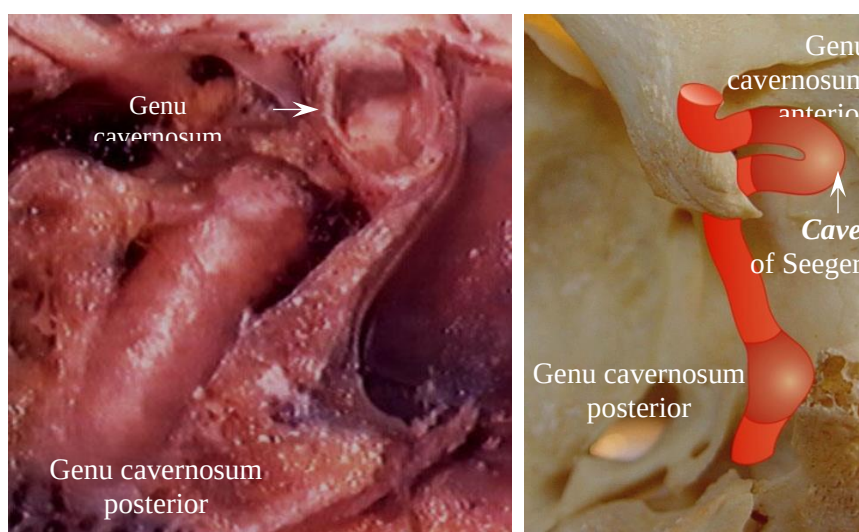


Fig. 3. A. Paramedian fresh cadaveric skull passing through cavernous sinus with dissected internal carotid artery. B. Dry skull simulation of internal carotid artery into cavernous sinus.

The critical relations of the internal carotid artery with the sphenoid sinus are classical described. Our study pointed out that on sinusal lateral wall there are two carotid prominences:

- anterior, corresponding to *genu cavernosum anterior*;

- posterior, corresponding to *genu cavernosum posterior*

According to Seeger [1,2,9,10] the dolicho-ectasia of genu cavernosum anterior determines a deep, cave-like depression on superolateral aspect of sphenoid body. On dry skull (Fig. 4) we present such a fossa that

extends on inferior aspect of anterior clinoid process that becomes “hawk head” shaped

deep. For this depression we have proposed the name : *fossa clinocarotica*.

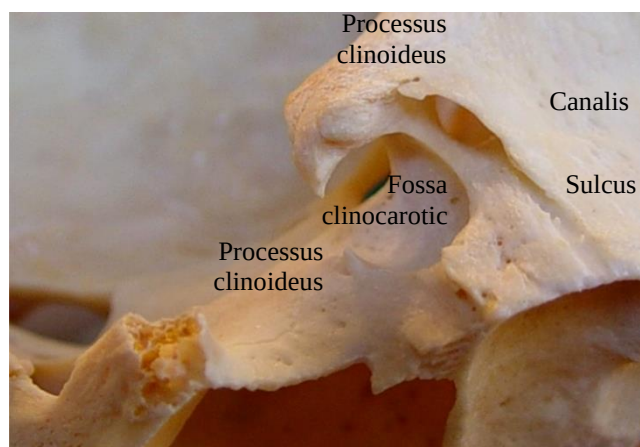


Fig. 4. “Hawk head” shaped anterior clinoid process and fossa carotica.

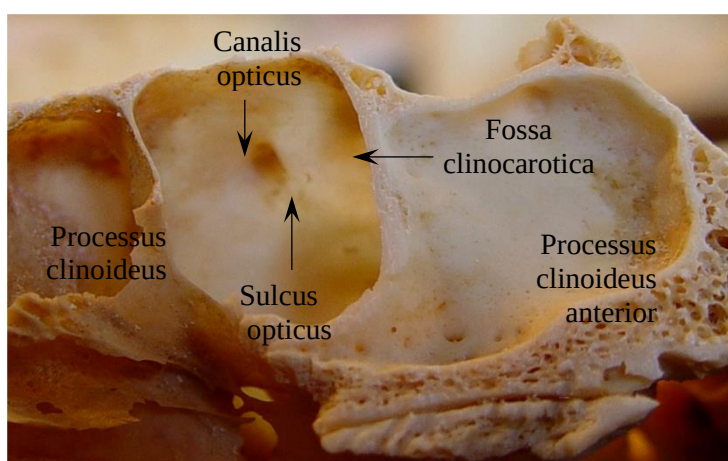
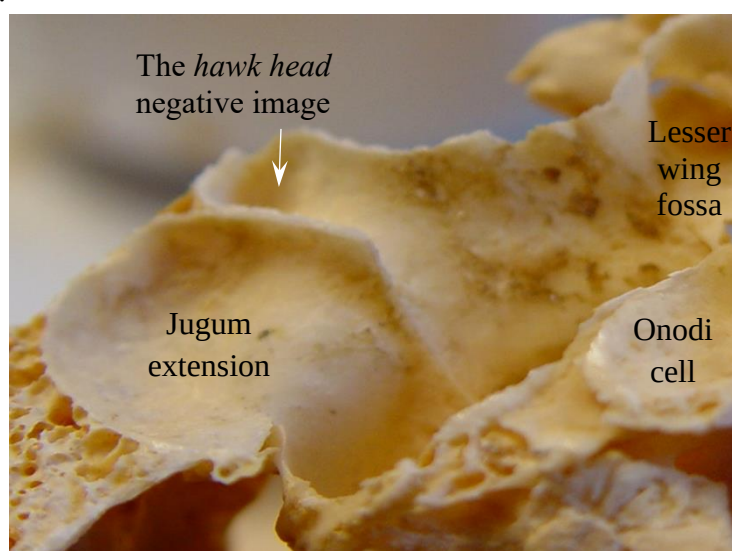


Fig. 5. The landmarks of inner surface of sphenoid lateral wall.

In the sinusal cavity, fossa carotica is prominent and determines a vertical swelling, slightly oblique anterior and inferior. We propose to be named *eminentia carotica anterior*. We have found it on 69 (64,8%) sinusal cavities on dry skulls and in 62% cases of CT sphenoid sinus examination.



Also, we have described other endosinusal prominences:

Eminentia canalis rotundi (the swelling of round canal) was found: 58 (61,7%) on dry skulls and 63% of cases at CT slices [1,2,8,9,10].

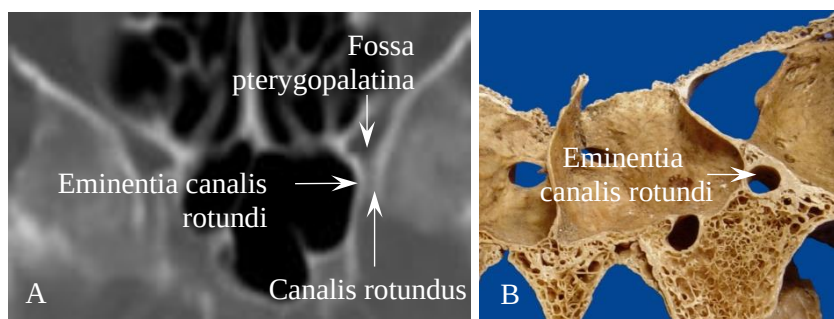


Fig. 7.A. From foramen rotundum starts postero-anteriorly the canalis rotundus whose medial wall swells into sphenoid sinus and opens anteriorly into pterygopalatine fossa. B. Posterior aspect of bony slide showing the relations between sinus inferior wall and canalis rotundus.

Antero-superiorly, the optic canal determines other swelling more oblic anterior and inferior, we have named it *eminencia canalis optici* (51 cases dry skulls, 54,2%, 33% on CT slices). In between the two described prominences, corresponding to inferior root of lesser wing, we have described *fossa radiculo-allaris* (Fig. 6).

Genu cavernosum posterior promined into the sinusal cavity in 63 (67,1%) cases on dry skulls and 74% of cases on CT slices. We have named this swelling *eminencia carotica posterior*. Frequently (45%) incomplete septal cristae are attached on carotic swelling.

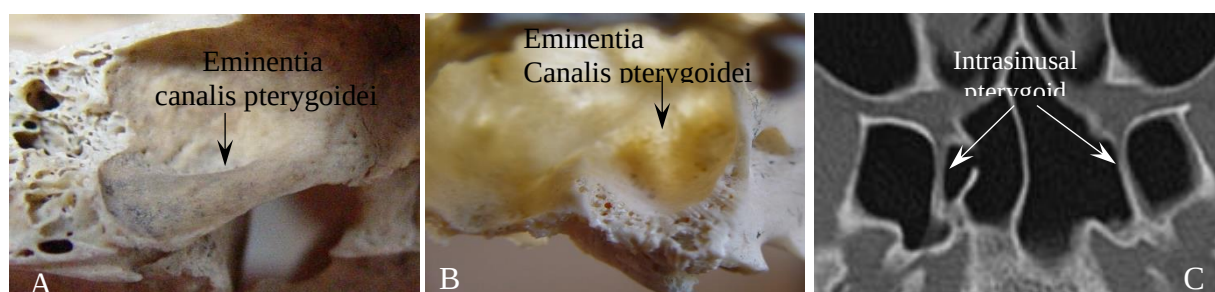


Fig. 8. A/B. The aspect of *Eminentia canalis pterygoidei* on the roof of bony sphenoid sinus. C. The aspect of *Eminentia canalis pterygoidei* on a frontal CT slice; on the left side the canalis pterygoidei is dehiscant into sinus lumen

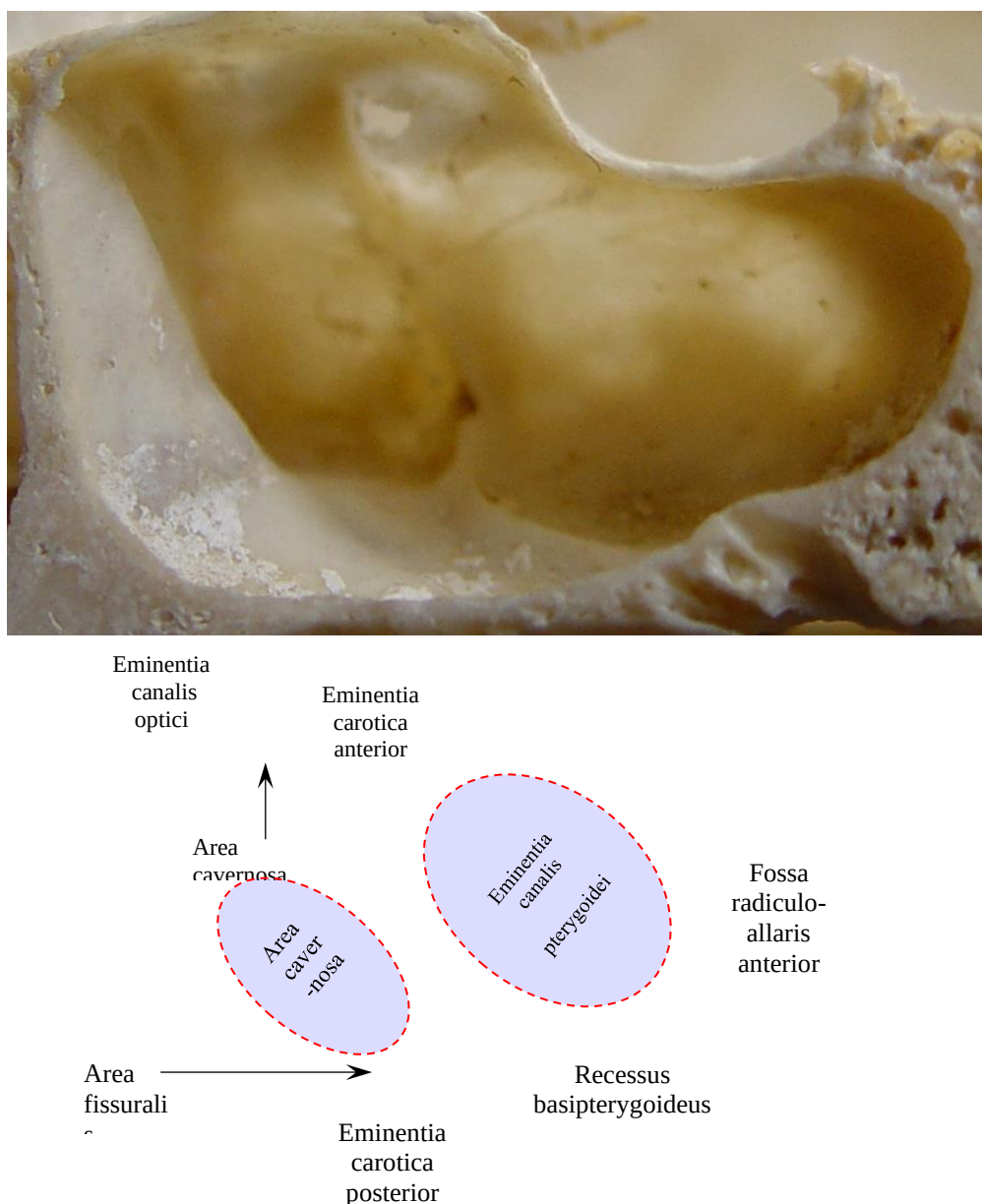


Fig. 9. The sinusal wall map for endoscopic navigation

Eminentia canalis pterygoidei (the swelling of pterygoid canal) was found: 51 (54,2%) on dry skulls and 47% of cases at CT slices. In figure 8 is presented a rare case of pterygoid canal opened into sphenoid sinus (arrow) [1,2,6,7].

In order to facilitate the sinusal navigation with the endoscope, we have established landmarks, together forming the

lateral sinusal wall mapping. Our study illustrates the following swellings, called by us *eminientiae* (Fig. 9):

- *eminientia carotica anterior* that corresponds to *genu cavernosum anterior* of the internal carotid artery

- *eminentia carotica posterior* corresponding to *genu cavernosum posterior*
- *eminentia canalis optici* determined by medial wall of the optic canal
- *eminentia canalis rotundi* determined by the canal of maxillary nerve
- *eminentia canalis pterygoidei* determined by the pterygoid canal

Conclusions

The landmarks were classified as eminentiae, fossae, recessus and areae.

Our study identified 10 anatomical landmarks on inner surface of sphenoid sinus lateral wall.

We have elaborated an original nomenclature that might be proposed to be included in Nomina Anatomica

We have elaborated a map of the described landmarks of sphenoid sinus lateral wall

The map might be useful in order to elaborate a software to conduce the endoscopical sinus navigation.

The incidence of the landmarks we have described is sufficiently high to consider them as constant anatomical details.

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