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Original Research Article

ANATOMIC VARIATION OF SPHENOID SINUS IN MYSORE BASED POPULATION: CT SCAN STUDY

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ABSTRACT

Introduction: Sphenoid sinus is the most inaccessible paranasal sinus, enclosed within the sphenoid bone and intimately related to numerous vital neural and vascular structures.The internal structure of the sphenoidal sinus varies greatly in different skulls and on opposite sides of the same skull, and the great differences observed may be responsible for the total lack of any previous attempt to determine the arrangement and significance of the ridges and septa which are frequently found therein.

Objective : To study the sphenoid air sinus anatomy in detail in relation to its Morphology and Pneumatization.

Material and Methods: 80 macerated skulls (Males=48, Females=32) of age group 40-60 yrs are cleaned and subjected to 3D axial multislider CT scan. Axial and coronal images of slice thickness of 4mm were obtained. sphenoid sinus symmetry and pneumatisation was observed and classified. To obtain proper evaluation of the neighboring structures and their relation to the sphenoid sinus, 2-mm contiguous slice thickness will be used from anterior to posterior sphenoid sinus.

Results: The present study showed symmetry in 56 skulls(70%) , asymmetry in 18 skulls(22.5%) and presence of transverse septa in 6 skulls (7.5%). The sellar type of pneumatisation in 68 skulls (85%), presellar type in 8(10%) and post sellar type in 4 skulls (5%).

Conclusion: This study will prove invaluable in the trans-sphenoidal approach to the pituitary as this technique needs thorough understanding of the pituitary fossa and surrounding structures.

KEY WORDS: Sphenoid sinus, CT scan, Dry skulls, Morphology, Pneumatization.

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INTRODUCTION

The sphenoid sinuses are two large, irregular cavities hollowed out of the interior of the body of the bone, and separated from one another by a bony septum, which is commonly bent to one or the other side. They vary considerably in form and size, are seldom symmetrical, and are often partially subdivided by irregular bony laminæ [1]. It is neglected by disease because of its location, by the physician because of its subtle symptoms when diseased, and the surgeon because of its inaccessibility [2]. Computed tomography is currently is the modality in the evaluation of diseases affecting paranasal sinuses. [3]. Axial and coronal views may be useful for delineating the anatomical landmarks , but coronal CT gives more information which is necessary for sphenoidal

surgeries [4]. The sphenoid septum is an important landmark during transphenoid approach to important structures such as the internal carotid artery, optic canal and skull base . [5] The aim of this study is to evaluate the anatomical variations of sphenoid sinus as detected by cranial CT scans in adult dry crania.

MATERIALS AND METHODS

80 macerated skulls (Males=48, Females=32) of age group 40-60 yrs are cleaned and subjected to 3D axial multislider CT scan at Vikram Hospital Mysore. Axial and coronal images of slice thickness of 4mm were obtained. Ethical clearance was obtained from institution ethical committee to procure the skulls for the present study. Exclusion criteria were skull base fracture and damaged skulls. The septation type of intersphenoid septum and symmetry of sphenoid sinus was noted. The degree of pneumatisation presellar, sellar and postsellar was also observed.

RESULTS

Fig. 1: Showing asymmetry of intersphenoid septa with 2 loculations on both sides.

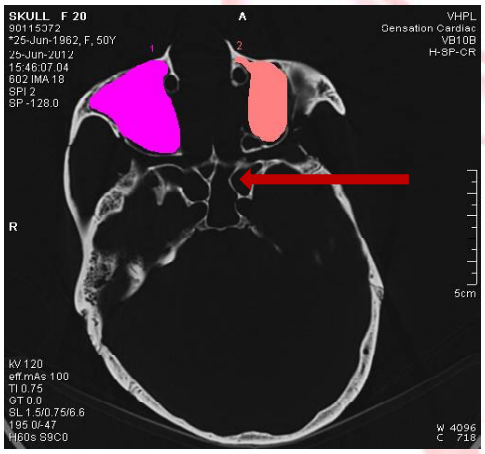


Fig. 2: Showing asymmetry of intersphenoid septa and with additional incomplete septa in right side.

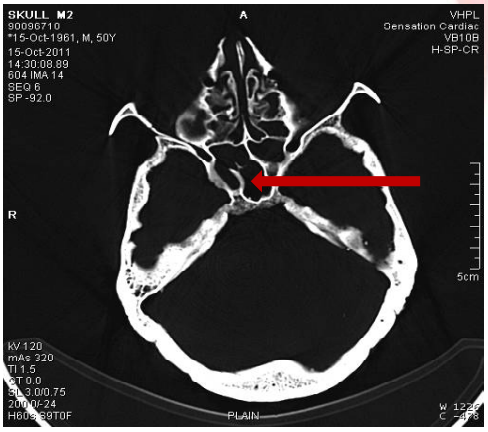


Fig. 3: Showing asymmetry of intersphenoid septa with presence of transeverse septa in left side.

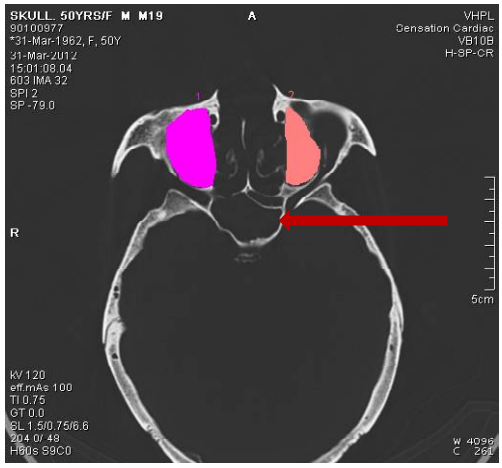


Fig. 4: Showing asymmetry of intersphenoid septa and with additional complete septa in left side.

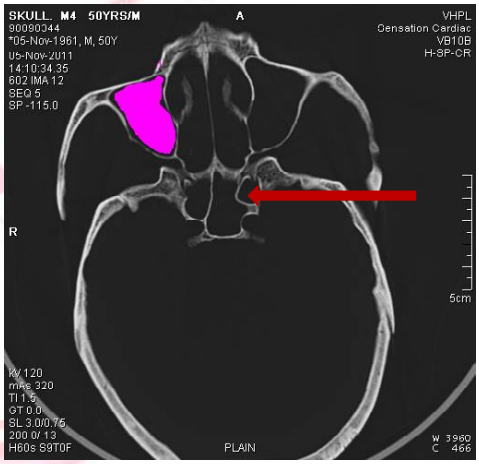


Table 1: Showing the septations of sphenoid sinuses n=80.

Morphology	Males		Females		Total	Percentage
	Right	Left	Right	Left		
Symmetry	26	6	14	10	56	**70%**
Asymmetry	6	4	5	3	18	**22.50%**
Transverse septa	6		0		6	**7.50%**

Fig. 5: Bar diagram showing types of sphenoid sinuses.

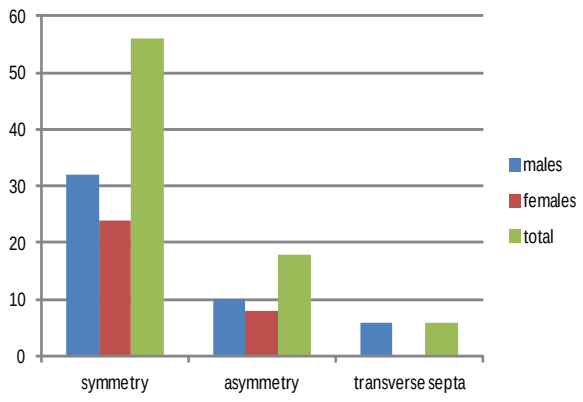
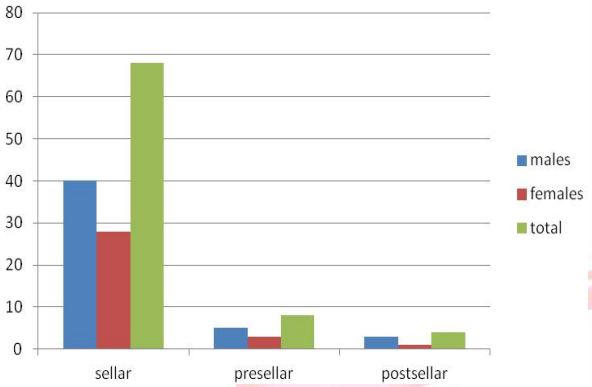


Table 2: Showing the degree of Pneumatisation.

Types	Males		Females		Total	Percentage
	Right	Left	Right	Left		
Sellar	22	18	13	15	68	85%
Presellar	3	2	3	0	8	10%
Post sellar	2	1	1	0	4	5%

Fig. 6: Bar diagram showing the degree of Pneumati sation.



The present study showed symmetry in 56 skulls (70%), asymmetry in 18 skulls(22.5%) and presence of transverse septa in 6 skulls (7.5%). The sellar type of pneumatisation in 68 skulls (85%), presellar type in 8(10%) and post sellar type in 4 skulls (5%)

DISCUSSION

The internal structure of the sphenoidal sinus varies greatly in different skulls and on opposite sides of the same skull, and the great differences observed may be responsible for the total lack of any previous attempt to determine the arrangement and significance of the ridges and septa which are frequently found therein.

In a study done by BJ Abdullah in 70 patients and analyzed CT scan of sphenoid sinus in axial and coronal plane. They found in 13 patients (18.6%) septa were directly related to right internal carotid artery and in 9 patients it was related to left internal carotid artery (12.9%). The bony wall thickness of the sphenoid sinuses adjacent to internal carotid arteries ranged from 0.4mm-1.7mm [3].

Hewaidi GH did a prospective review of 300 paranasal sinus CTscans of Libyan patients. They assessed pneumatization of pterygoid process (PP), anterior clinoid process (ACP), and greater wing of sphenoid (GWS); also examined protrusion and dehiscence of internal carotid artery (ICA), optic nerve (ON), maxillary nerve (MN), and vidian nerve (VN) into the sphenoid sinus cavity. Pneumatization of PP, ACP, and GWS were seen in 87 (29%), 46 (15.3%), and 60 patients (20%), respectively. Protrusion of ICA, ON, MN, and VN were noticed in 123 (41%), 107 (35.6%), 73 (24.3%), and 81 patients (27%), respectively; dehiscence of these structures was encountered in 90 (30%), 92 (30.6%), 39 (13%), and 111 patients (37%), respectively. Statistically, there was a highly significant association between ACP pneumatization and ICA protrusion [4].

A prospective study of the sphenoid sinus morphology was carried out on the cranial tomographic (CT) scan images of 60 Nigerian adult patients by O E Idowu. The CTs were reviewed regarding the different anatomical variations of the sphenoid sinus: dimensions, septation, and pattern of pneumatisation.There was a main single intersphenoid septum in most patients (95%). The insertion of the septum was usually to theright posteriorly (38%) and in the midline anterior (65%). Although there is usually a main septum, the septa present were multiple in 29 of the sinuses studied. Sellar pneumatization was present in the majority of the patients (83%), with 4 patients having postsellar pneumatization (6.7%) and 3 patients having presellar pneumatization (5%). There were no cases with conchal pneumatization or lateral pneumatization of the greater wing of the sphenoid [5].

Amusa Y.B studied in 24 skulls of Nigerians from which the temporal bones had earlier been dissected were studied. A 0° sinus endoscopy (Telescope) was utilized to visualize the paranasal sinuses and their degree of pneumatization was noted. Vernier caliper was employed to measure the distance between the anterior and posterior nasal spine. The height, width, depth andvolume of each of the sinuses were determined. The volumes of the paranasal sinuses were significantly smaller in the studied crania. In all the paranasal sinuses, the right side was found to be larger than the left except for the maxillary sinus where the left side was found to be larger. Pre sellar pneumatization was found in 20% of the sphenoid while sellar pneumatization was found in 80% [6].

The sphenoidal bones of 70 adults were removed

at post-mortem and studied by Banna M for degree of pneumatization, number of inter-sphenoidal septa and the relationship of the septa to the lowest portion of the sellar floor. They found, in 85.7%, pneumatization was of the sellar type, in 11.4% of the pre-sellar type and in 2.8% of the conchal type, as defined here. A single septum was noted in 61%, two septa in 14%, more than two septa in 12.8% and no septum was noted in 11.4%. The insertion of the septum represented the lowest point in the sellar floor in 50% of the bones. In these the septum was located in the center of the sellar floor [7].

CONCLUSION

The anatomical variations of the sphenoid sinus in this study were remarkably common. Ct scan should be used in pre-surgical evaluation of patients under consideration of trans-sphenoid sinus surgery to minimize the damage of neural and vascular injuries. It is expected that this study will be of immense help to the neurosurgeons working on the pituitary as it will show light on morphometric variations of the sphenoid air sinus.

Conflicts of Interests: None

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