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Sella turcica morphometry using computed tomography

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SUMMARY

Along the development of imaging diagnosis technology, it has become increasingly important to perform morphological research using images. Our aim here was to study the *sella turcica* using tomographic imaging in different planes of section that would reveal its shape and morphometry, correlating such data with the cranium-cephalic index, age and sex of the skulls analyzed. For this study, one hundred skulls from the Department of Anatomy at UNIFESP were used. The material, after being measured and classified, was subjected to tomography in three planes, coronal, axial and sagittal, and immediately after this, the following measurements were calculated with the images obtained: height on sagittal sections, length on axial sections and area of the *sella* on sagittal sections. The results for the *sella turcica* radiological measurements were as follows: length from 6 to 15.1 mm, with a mean of 10.31 mm; height from 2.9 mm to 11.1 mm, with a mean of 6.33 mm, and area from 8 mm? to 79 mm? with a mean of 41.21 mm?. The *sella turcica* is a constant anatomic structure, but with a variable shape.

Key words: *Sella turcica* – Morphology – Radiology – Skull – Anatomy

INTRODUCTION

The *sella turcica* is an important structure of the cranial middle fossa and knowledge of its normal appearance is needed for the diagnosis of several pathologies (Ju-Kun et al., 1996; Lang, 1977; Zecchi et al., 1983). Since this formation houses the pituitary gland and is surrounded by many other formations with of great anatomical-physiological importance, its morphological study is crucial as a support for unravelling pathological processes that may occur in the *sella turcica* itself or in its surroundings (Goldstein et al 1986; O'Rahilly, 1998).

Meschan (1975) established that *sella turcica* measurements are significant for the determination of increased intracranial pressure, as well as for the detection of intra-sella lesion expansion. The huge development of imaging diagnostic methods has made it possible to perform research that defines the morphology of the human body structures using images. CT and, MRI are imaging modalities used to study and characterize the normal anatomy

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and the majority of pathologic processes in this region (Rennert and Doerfler, 2007; Mazumdar, 2006; Elster, 1993).This has brought advantages to clinical and surgical activities, as well as to professionals involved in radiological interpretations. In this context, a deeper radiological study of the *sella turcica* has become necessary in order to better clarity certain issues involved in radiological study of this structure, of such importance in several medical specialties (Fitzpatrick et al 1999; Jablonski, 1989).

The present paper reports a morphological analysis of the *sella turcica* using tomographic imaging in different planes of section (transversal and sagittal) showing its shape and morphometry, and correlating such data with the age and sex of the skulls analyzed, assuming that the *sella turcica* bone structure may or may not be different, depending on the each skull.

Material and methods

Our sample consisted of 100 adult human skulls, properly catalogued, from the Department of Descriptive and Topographical Anatomy at UNIFESP, 53 being male skulls and 47 female skulls. Of these, 28 were from individuals of between 18 and 30 years old; 25 between 31 and 40 years old; 23 between 41 and 50 years old, and 24 between 51 and 60 years old.

The skulls were then subjected to computed tomography on the sagittal and transversal planes. On the sagittal cuts, the image used for analysis was the one closest to the medium sagittal plane, calculating the height of the *sella turcica* by means of a perpendicular line between its tubercle and its dorsum. On the axial cuts, the image used for analysis was the one best showing the *sella turcica* tubercle and the superior most dorsal region, calculating the length of the *sella turcica* through a line that superiorly connected its tubercle to its dorsum, all images being obtained with a thickness of 2 mm.

Sella turcica area was calculated by superiorly limiting it from the tubercle to the dorsum, and having the sagittal cut pass through the midline, where the area was then analyzed within this marked space, using the *Autodesk Autocad 2000* software.

Results

Regarding its height, the *sella turcica* varied from 2.9 mm to 11.1 mm, with a mean of 6.33 mm (Fig. 1). Its length varied from 6 mm to 15.1 mm, with a mean of 10.31 mm (Fig. 2). In respect of its area, this varied from 8 mm^2 to 79 mm^2, with a mean of 41.21 mm^2 (Fig. 3).

In respect of its shape, the *sella turcica* was seen radiologically shown as three different shapes: in a U shape (48%) (Fig. 4), when the dorsum and tubercle of the *sella turcica* are maintained at the same height; in a J shape (41%) (Fig. 5), when the *sella turcica* tubercle is in a lower position in relation to the dorsum; and shallow (11%) (Fig. 6), when the *sella turcica* depth is minimum.

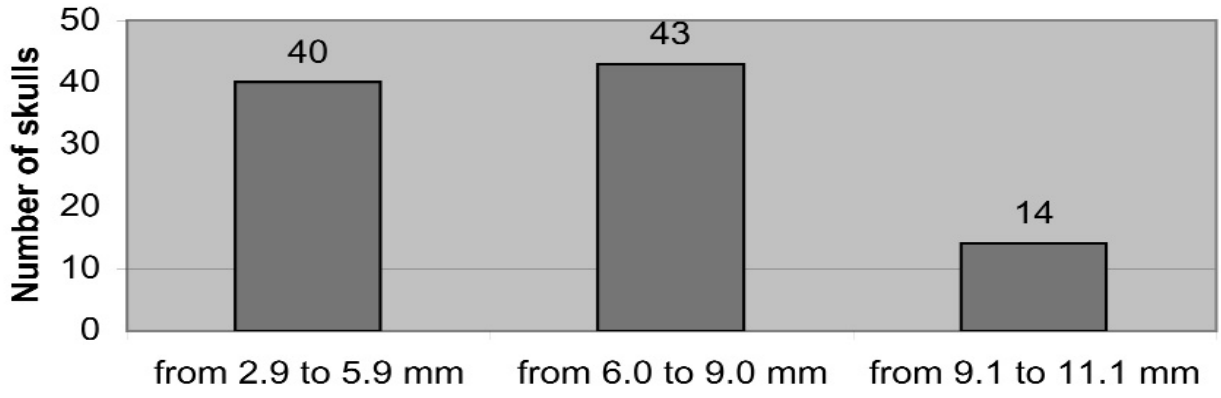

Figure 1. - *Sella Turcica* radiological height distribution in mm.

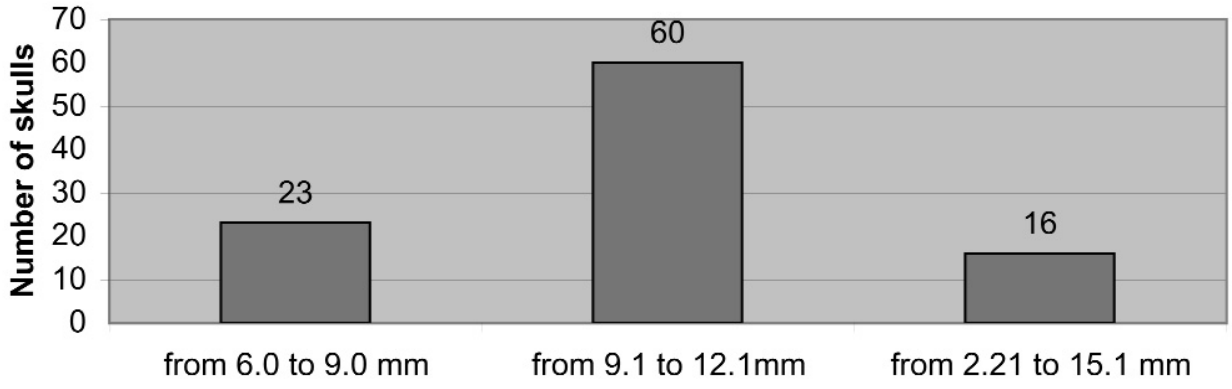

Figure 2. *Sella Turcica* length distribution in mm.

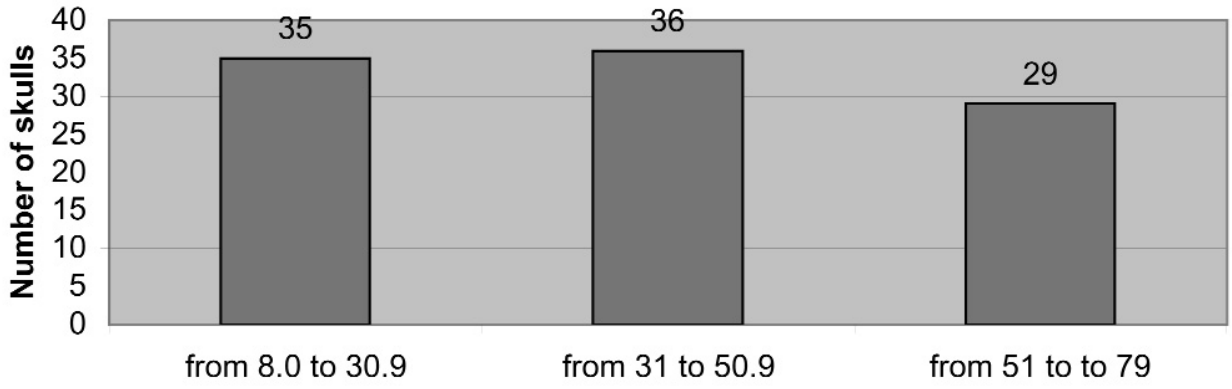

Figure 3. *Sella Turcica* area distribution in mm^2.

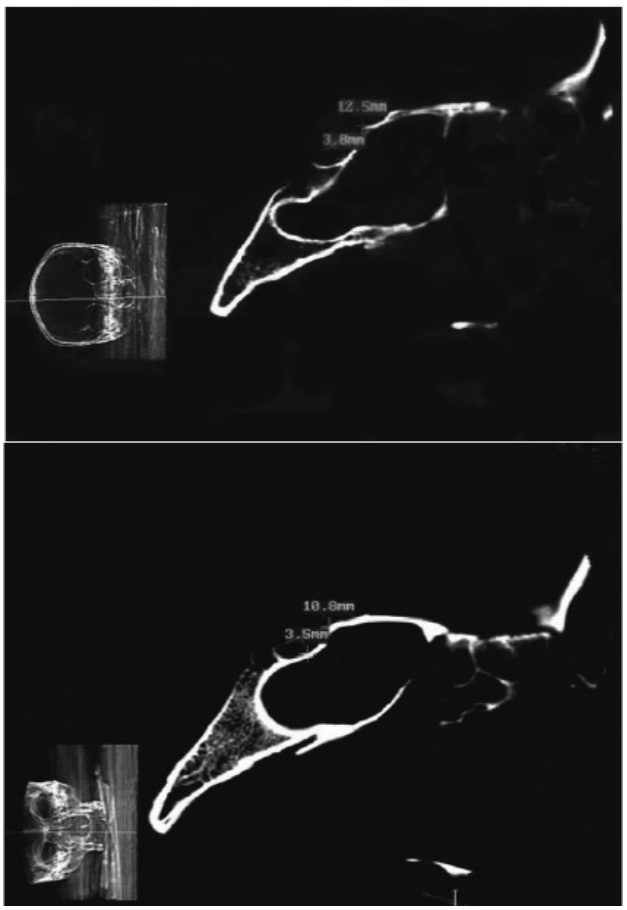

Figure 4. Examples of the *sella turcica* with a U shape.

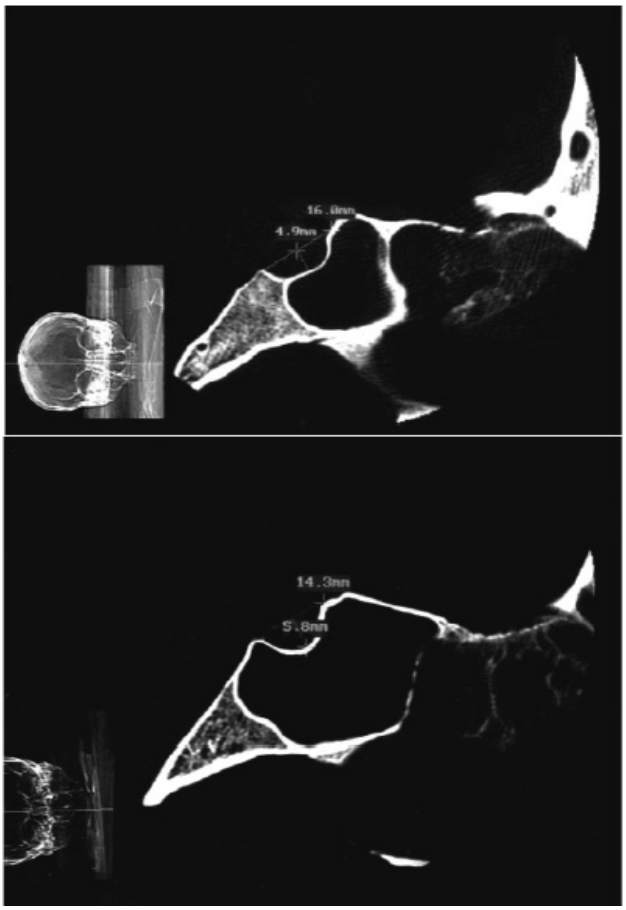

Figure 5. Examples of the *sella turcica* with a J shape.

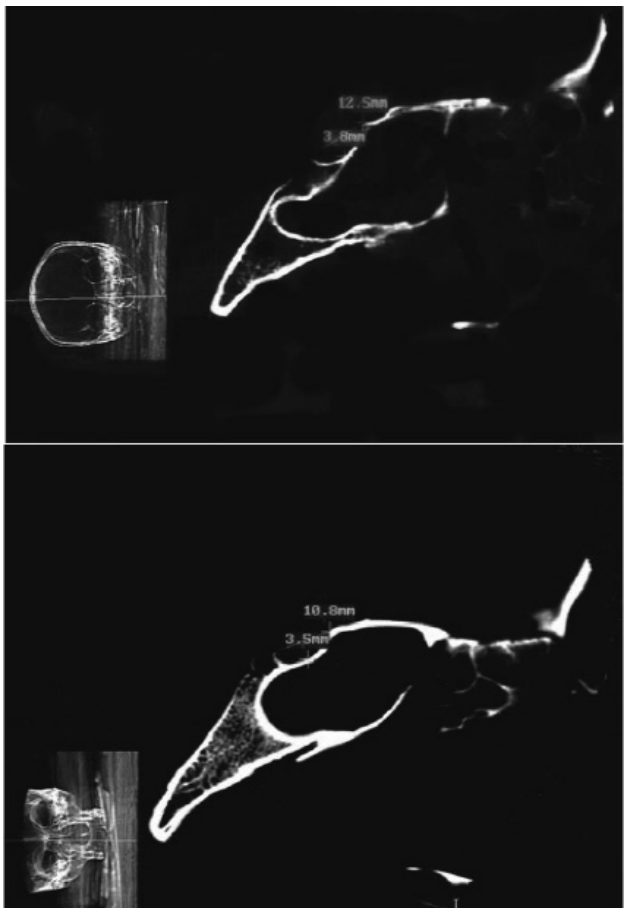

Figure 6. Examples of the shallow *sella turcica*..

Discussion

It is important to emphasize that regarding the height and length values our results are similar to those obtained in a study performed on corpses by Henriques and Pianetti (2000), suggesting that tomographic imaging is trustworthy and that it can be used as a reliable parameter for the analysis of intercranial structures.

The results obtained in this morphological and morphometric research of the *sella turcica* using computed tomography allow us to conclude that the *sella turcica* is a constant anatomical structure whose shape is predominantly similar to the letters U and J. The values referring to length, height, area and perimeter proved to be very variable, and hence, it is only possible to demonstrate them across the most frequent intervals.

References

Elster AD (1993). Imaging of the sella: anatomy and pathology. *Semin Ultrasound CT MR* 14: 182-194.

Fitzpatrick M, Tartaglino LM, Hollander MD, Zimmerman RA and Flanders AE (1999). Imaging of sellar and parasellar pathology. *Radiol Clin North Am,* 37: 101-121.

Goldstein SJ, Lee C, Carr WA, Rosembaum HD, Tibbs PA and Walsh JW (1986). Magnetic resonance imaging of the sella turcica and parasellar region: a clinical-radiographic evaluation with computed tomography. *Surg Neurol,* 26: 330-337.

Henriques JGB and Pianetti G (2000). Anatomia microcirurgica da região selar em cadaveres a fresco utilizando tecnica fotografica com fluoresceina. *Arq Neuro Psiquiatria,* 58: 1-13.

Jablonski N and Dhum B (1989). Identification of unknown human remains by comparison of antemortem and postmortem radiographs. *Forensic Sci Int,* 42: 221-230.

Ju-Kun C, Jun-Fan T, Luo-Shan D and Hui L (1996). Radiologic analysis of 540 normal Chinese sella turcica. *Chinese Med J,* 99: 479-484.

Lang J (1977). Structure and postnatal organization of heretofore uninvestigated and infrequent ossifications of the sella turcica region. *Acta Anat,* 99: 121-139.

Mazumdar A (2006). Imaging of the pituitary and sella turcica. *Expert Rev Anticancer Ther,* 6 suppl 9: S15-22.

Meschan I (1975). An atlas of Anatomy basic to Radiology. W.B. Saunders Company, Philadelphia, pp 234-348.

O'Rahilly R (1998). Crânio e osso hióide. In: Gardner E, Gray D, O'Rahilly R (eds). *Anatomia*. 4 ed. Guanabara Koogan, Rio de Janeiro, pp 563.

Rennert J and Doerfler A (2007). Imaging of sellar and parasellar lesions. *Clin Neurol Neurosurg,* 109: 111-124.

Zecchi S, Orlandini GE and Gulisano M (1983). Studio statistico sulle caratteristiche anatomo-radiologiche del seno sfenoidale e della sella turcica. *Bolletino Societá Italiana Biologia Sperimentale,* 58: 413-416.