

Computed Tomographic Analysis of Sella Turcica in North Karnataka region

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Abstract

Precise anatomical knowledge of sella turcica is utmost importance for radiologist to interpret well; also for neurologist and surgeons operating in sellar region. The present study was undertaken to record the normal dimensions and to determine gender differences in sella turcica morphometry. Two hundred computed tomographic images (116 male and 84 female) of healthy Indians aged 25-70 years were collected. Radiant dicom viewer software was used to determine linear dimensions of sella turcica. Results showed that mean values (in millimeter) of length, width, sellar height anterior, sellar height median and sellar height posterior for males were 8.71, 10.85, 3.87, 8.37, 3.97 respectively; and the same for females were 8.84, 10.95, 3.86, 8.28, 3.95 respectively. There was no significant difference in the above dimensions between male and female sella turcica. The result of present study provides normal morphometric data of sella turcica in this geographic area, which may be useful for further research and clinical manifestation.

Key words: Sella turcica, Computed tomography, Linear dimensions, Morphometry.

INTRODUCTION

Sella turcica is an important structure of middle cranial fossa and is bounded by dura of cavernous sinuses bilaterally, the lamina dura and dorsum sellae posteriorly and the tuberculum sellae and planum sphenoidale anteriorly[1].

The importance of size and shape of sella turcica in connection with the occurrence of symptoms of pituitary diseases has long been recognized. The radiographic differential diagnosis of large sella includes adenomas, Rathke's cleft cyst and aneurysms[2]. Anomalies of sellar region may create confusion in evaluation of Magnetic Resonance Imaging or Computed Tomography and also in regional surgery planning. Removing the anterior clinoid process is an important step in exposing the structure in the cavernous sinus and is highly complicated due to the neuronal and vascular relationship.

The CT scan is superior option than the X-ray to study bony parameters. The purpose of this study is to determine the average size of sella turcica in Indian population that could assist in more objective evaluation and detection of pathological conditions. The study has been undertaken to establish normative reference standard of sellar morphometry and to look for sexual dimorphism of sella turcica.

MATERIALS AND METHODS

After obtaining Institutional ethical clearance, 200 Computed tomographic images of skulls covering sellar region from patients of age group between 25-70 years of both the genders (male-116 and female-84) from Department of Radiology, S. N. Medical College and HSK hospital and RC, Bagalkot, were analyzed for the sellar morphology by using radiant dicom viewer software. CT of normal brain, PNS covering sellar region and CT images having clear visualization with recognition of dorsum sellae

and tuberculum sellae were included in this study. Road traffic accident cases, head injury cases and poor quality images were excluded.

The following measurements were calculated (FIGURE 1):

- Sellar length:** was measured as the distance from the tuberculum sellae to the posterior clinoid process.
- Sellar width** (anteroposterior greatest diameter): was measured from the sellar anterior to sellar posterior.
- Sellar height :**

Sellar height anterior: was calculated by using vertical distance, as measured perpendicular to Frankfort horizontal from tuberculum sellae (TS) to sellar floor.

Sellar height median: was calculated by using vertical distance, as measured perpendicular to Frankfort horizontal from a point midway between TS and posterior clinoid process (PCLin) to sellar floor.

Sellar height posterior: was calculated by using vertical distance, as measured perpendicular to Frankfort horizontal from PCL in to sellar floor[4].

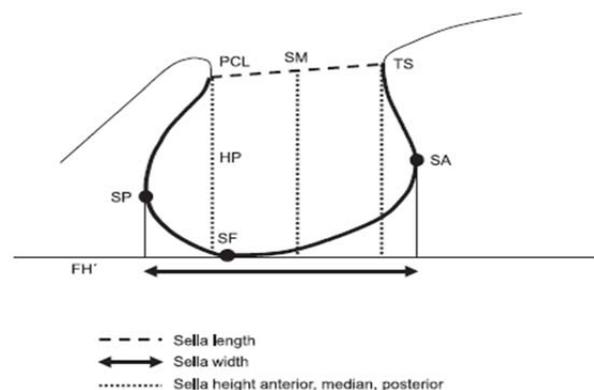


Figure 1. Schematic guide for measurements of sella turcica

Table 1. Linear dimensions of sella turcica in both genders.

Parameters	Male (Mean±SD)	Female (Mean±SD)
Length of sella turcica	8.71±1.73mm	8.84±1.93 mm
Width of sella turcica	10.85±1.73mm	10.95±1.91 mm
Sellar height anterior	3.87±0.92 mm	3.86±0.86 mm
Sellar height median	8.37±1.85mm	8.28±1.83 mm
Sellar height posterior	3.97±0.90mm	3.95±0.89 mm

Table 2. Comparison of sella turcica dimensions of present study with the previous studies

Author	Study population	X ray/CT scan	Sex	Sella length (mm)	Sellar width (mm)	Sellar height anterior (mm)	Sellar height median (mm)	Sellar height posterior (mm)
Chavan et al ⁽²⁾	Maharashtra	X ray	M F	11.13 10.73	- -	- -	8.10 7.91	- -
Ruiz et al ⁽³⁾	Brazil	C T	Both	10.31	- -	- -	6.33	- -
Andredaki et al ⁽⁴⁾	Greece	X ray	M F	7.1 7.0	8.9 9.1	6.7 7.2	6.6 6.8	6.6 6.5
Stefan et al ⁽⁵⁾	Norwegia	X ray	M F	8.9 8.4	11.3 11.7	- -	7.3 7.2	- -
Puja et al ⁽⁶⁾	North India	X ray	M F	7.8 7.53	7.3 8.4	15.4 7.5	5.6 7.5	3.4 5.0
Present study	North Karnataka	CT	M F	8.71 8.84	10.85 10.95	3.87 3.86	8.37 8.28	3.97 3.95

RESULTS

Two hundred images were analyzed in this study 58 % (116) of the images were male and the remaining 42% (84) were females and the range of age was 25- 70 years. The results are shown in table 1. There was no statistically significant difference in morphometry of male and female sella turcica.

DISCUSSION

Various studies were done on sellar morphometry by using lateral cephalograms. There were different opinions regarding sexual dimorphism in sella turcica morphology by various authors[3-6]. Morphology of sella turcica of present study has been compared with previous study is shown in table 2.

According to chavan et al, average mean length and depth of sella in males were 11.13 mm, 8.10mm and in females, mean length and depth were 10.73mm, 7.91mm respectively[2]. In the present study average mean length and depth of sella in males were 8.71mm, 8.37mm and in females, mean length and depth were 8.84mm, 8.28mm respectively. CT study on dry skulls by Ruiz et al revealed average mean length of sella was 10.31mm, depth was 6.33mm and the average mean area of sella was 41.12 sq.mm[3].

Andredaki et al studied morphometry of sella turcica in the age group of 6-17 years, mean length in males and females was 7.2mm and 7.0mm, the mean depth in males and females was 8.9mm and 9.2mm. Anterior height was significantly more in females[4]. A similar study done by Stefen et al does not correlate with the findings of the

above study. No difference between males and females were detected for the depth and diameter of sella turcica, but length was larger in males throughout the observation period; the female subjects had slightly more sella turcicas with abberent morphology[5]. Similar result was obtained in the present study; there was no statistically significant difference in morphometry of male and female sella turcica. Puja et al found that there was significant difference in linear dimensions between the genders in sellar height and width[6].

Increased sellar dimensions in pituitary adenomas were noted by Chang et al[7]. Gilhotra et al mentioned the sellar morphometry also changes in chronic obstructive pulmonary disorder[8]. Sanjeev et al found that sellar bridge formation were two times more common on right side than left side[9].

CONCLUSION

The result of this study will serve as a normative reference standard that could assist in more objective evaluation and detection of pathological conditions of sella turcica and pituitary gland. These findings would also help the radiologist to interpret well and also guide the neurosurgeons in planning surgical procedures involving sellar region.

SCOPE FOR FURTHER RESEARCH

This study has been done with 200 samples, the authors plan to go ahead with this study taking more samples and including other morphology parameters such as area, shape and morphological variations of sella turcica.

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