

Morphological and Morphometric Study of Dry Human Sacra in Jammu Region

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Abstract

Sacral dimensions are known to vary from region to region and also within the same population. Therefore sacral morphometric studies of the population are of utmost importance to ensure proper fixation during orthopaedic operative procedures in trauma patients. The current study was undertaken to evaluate morphometric parameters of sacrum so that a data base can be generated from the local population. Present study was done on 50 dry sacral bones, length & width of sacrum, midventral curved length, transverse & anteroposterior diameters were recorded. The mean values of sacral length were 10.61 cm (straight) and 11.41 cms (curved), width 10.35 cms while the mean transverse and Antero-Posterior diameters of body of 1st sacral vertebra were 4.8cm and 2.94 cm respectively. The mean values of sacral index, curvature index and index of body of the 1st sacral vertebra were 99.8, 94.92 & 66.19 respectively. The various parameters studied majority of sacra (58%) were narrow and longer (Dolichohieric), 24% of the sacra were wider (Platyhieric), while 18 % were sub Platy

Key Words

Sacrum, Morphometry, Indicis

Introduction

The sacrum is a complex anatomical structure & understanding of its anatomy is critical if surgeons are to obtain proper fixation and avoid neurovascular injury (1). The sacrum is a large triangular bone placed between two innominate bones to form postero-superior wall of the Pelvic Cavity. (2,3).

Though, studies on the sacral morphometry are available from other regions of the India, there is hardly any population specific data from its northern part. Moreover, within the general population mean value of morphometric evaluation show significant differences in the bones from different zones, (4). Degenerative diseases and instability in the lower lumbar spine may necessitate

fusion and stabilization supplemented by instrumentation to the sacrum, (5).

Therefore present study was undertaken to examine the morphological parameters of Jammu region to generate the data. The various parameters of the bones were studied to make it useful to orthopaedic and neurosurgeons for screw fixation surgeries.

Material and Methods

50 adult dry human sacral bones were included in present morphological & morphometric study. Bones with any deformity, pathology or any wear & tear were excluded from the study. The parameters measured were maximum length & width of sacrum, midventral curved

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length, transverse & antero-posterior diameters and pedicle height & width of the body of first sacral vertebra. Based on these parameters different sacral indices namely sacral index, curvature index and the index of body of 1st sacral vertebra. were calculated as described by Mishra S R *et al* (6).

Results

The maximum length of sacrum ranged from 6.8 to 14.0 cm (mean value 10.61 cm +1.53). The maximum width of sacrum ranged from 9.1 to 11.4 cm with mean value was 10.31 cm +1.61 . The mid-ventral curved length ranged from 8.9 to 15.2 cm with mean value was 11.41 cm +1.58. The transverse and anteroposterior diameter of the body of first sacral vertebra ranged from 3.0 to 6.4 cm with mean value was 4.8 cm +0.55 and 2.2 to 4.8 cm with mean value 2.94 cm +0.46. The height of the first pedicle ranged from 1.5 to 2.6 cm with mean value of 2.13 cm +0.27. The width of the first pedicle ranged from 1.7 to 2.8 cm with mean value being 2.3cm +0.2 .

After obtaining these parameters various indices were calculated as follows -

The sacral index ranged from 72.5-132.05 having a mean value 99.8+1.26. The curvature index ranged from 87.64-105.82 having mean value 94.92+0.4. The index of body of 1st sacral vertebra ranged from 51.16-100.33

Table 1. Sacral Index

Classification	Sacral Index	No. of Sacra	Percentage
Dolichohieric (Narrow & Long Sacra)	Upto 99.9	29	58
Sub Platyhieric	100-105.9	9	18
Platyhieric (Wide Sacra)	>106	12	24

Table.2 Showing Various Parameters of Sacrum In Cms

S.No.	Parameters	Mean ± Sd	Range
1.	Straight length of sacrum	10.61± 1.53	
2.	Width of sacrum	10.31 ± 1.61	9.0 - 11.4
3.	Mid Ventral curved length	11.41 ± 1.58	8.9 - 15.2
4.	Transvers diameter of the body of 1 st Sacral Vertbra	4.8 ± 0.55	3.0 – 6.4
5.	Antero-Post. Diameter of 1 st Sacral Vertebra	2.94 ± 0.46	2.2 – 4.8cm
6.	Sacral index	99.8 ± 1.26	72.5 – 132.05
7.	Curvature Index	94.92 ± 0.4	87.64 – 105.82
8.	Index of body of 1 st Sacral Vertebra	66.19 ± 0.9	51.16 – 100.33

having mean value 66.19+0.9. based on these sacral indices dolichohieric (narrow sacrum) was observed in 58%, subplatyhieric in 18% while platyhieric (wide sacrum) in 24% .

Discussion

In the present study a total of 50 sacra were studied in the department of Anatomy, GMC Jammu

In the current study the majority of bones had mean straight length ranging from 9.1 and 11 cm (56%), mean curved length 11.1 to 13 cm (48%), mean maximum sacral width observed was 9.0 to 11.0 (74%), mean maximum transverse diameter was 3.1 to 5.0 cm (76%), mean maximum AP diameter was 1 to 3 cm (56%).

These findings are in agreement with Patel ZK. *et al*, (7) who conducted examination of 50 dry human sacra from Gujarat region. They reported mean straight length ranging from 9.1 to 11 cm in majority (53%), mean width, 9.1 to 11 cm (56 %), transverse dimensions between 3.1 to 5 cm(92%), AP dimension between 1 to 3cm (56%) .

Similar observations to the current study have also been reported by Sinha *et al* (8). In their study sacral length ranged between 8.5 to 11.1 cm, width between 8.5 to 11.2 cm.

Various sacral indices are of immense clinical utility. Depending on these the sacra are identified as

dolichohieric, sub-platyhieric and platyhieric which are of vital to orthopaedicians, obstetricians during pelvic operative procedures and to forensic experts for medicolegal purpose.

In the current study the mean sacral index was $99+1.2$ and ranged from 72 to 103 and majority were dolichohieric, the mean curvature index was $94+0.4$ and ranged from 87 to 105 and the mean of index of body of 1st sacral vertebra was $66+0.9$ and ranged from 51 to 100.

Shree Krishna *et al* (9) has also evaluated various sacral indices and their findings concurr with current study. They observed sacral index ranging between 93 to 131, curvature index between 90 to 98 and index of body of first sacral vertebra from 56 to 76.

Mishra *et al* (2003) has also examined various sacral indices for sex determination and found that no single parameter alone could identify gender with certainty. Their study revealed range of sacral index from 90 to 131, curvature index 83 to 98 and index of first sacral vertebra ranged between 56 to 76.

Conclusion

From the current study conclusion drawn is that most sacra are dolichohieric (58%) followed by platyhieric (24%) and rest of sacra are subplatyhieric. Outcome of this study may be useful to orthopaedic surgeons to carry out fixation surgeries among local population.

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