



A Study of Sacral Hiatus in Dry Human Sacra of Southern Population

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ABSTRACT

Sacral Hiatus is an opening present at the lower end of sacral canal. The anatomy of sacral hiatus and its variations are clinically important during administration of Caudal Epidural Block (CEB) in Obstetrics and Gynaecology (OBGY) and General surgery practices. The success and reliability of CEB depends upon the sound knowledge of anatomical variations of sacral hiatus. Thus the present study was undertaken to find the variations in dry human sacra of southern region. Aim: To study the morphometry variations of sacral hiatus. Methods: 64 adult, grossly normal dry human sacra of southern origin were collected from anatomy department of various medical colleges in Chennai. Results: Inverted U was the most common observed shape. The most common site of apex and base was observed at S4 and at the level of S5 respectively. Conclusion: The knowledge of variations in the shape, level and measurements of sacral hiatus will help in the effective and successful caudal epidural block (CEB) practices which are commonly used in surgical procedures.

KEYWORDS : Morphometry; Sacral hiatus; Shape, Apex, Base

Introduction

Sacrum is a large triangular bone, formed by fusion of five sacral vertebrae along with the intervertebral discs. It is present at the base of vertebral column, wedged between the two hip bones forming the postero-superior wall of pelvic cavity. Sacral canal is formed by sacralvertebral foramina. The sacral canal contains cauda equina, filum terminale, CSF and meninges. The caudal opening of the canal is the sacral hiatus. It is identified in the posterior wall of the sacral canal, due to the failure of fusion of the fifth pair of laminae, exposing the dorsal surface of the fifth sacral vertebral body^[1]

The fifth inferior articular processes project caudally and flank the sacral hiatus as sacral cornuae. The filum terminale, the 5th sacral and 1st coccygeal pairs of nerves emerge from the sacral hiatus. It is roofed by the firm elastic membrane, the sacrococcygeal ligament^[2] Anatomical variations occur frequently making the sacrum the most variable portion of spine. Developmental malformations occur ranging from variations in the sacral hiatus to caudal agenesis^[2] Considerable variations occurs in sacral hiatal anatomy among individuals of seemingly similar backgrounds, race and stature.

Sacral approach to epidural space has been utilized for giving anaesthesia and analgesia. Sacral hiatus has been widely used for administration of Caudal Epidural Block (CEB) in OBGY and Orthopedic practices for treatment as well as diagnosis. The success and reliability of CEB depends upon anatomical variations of sacral hiatus as observed by many authors^[2,3] The practical problems related to caudal anesthe-

sia are mainly attributable to wide anatomic variations in size, shape, and orientation of the sacral hiatus.

Aim:

The aim of present study is to study the variations of sacral hiatus in southern population which will be useful during administration of Caudal Epidural Block (CEB).

Materials and Methods

The present Morphometric study was done on 64 grossly normal dry human sacra of southern origins, collected from anatomy department of various medical colleges.

Two Sacra were excluded from the measurements as typical sacral hiatus was not present in them and showed complete agenesis of the dorsal bony wall. The measurements were recorded by digital Vernier caliper accurate to 0.1 mm.

The following parameters were measured:

1. Shape of hiatus
2. Level of apex of hiatus in relation to sacral vertebra.
3. Level of base of hiatus in relation to sacral vertebra

Results

Parameters were studied and analysis was done. The analyzed data

was tabulated as follows:

Photograph 1: Showing shapes of sacral hiatus

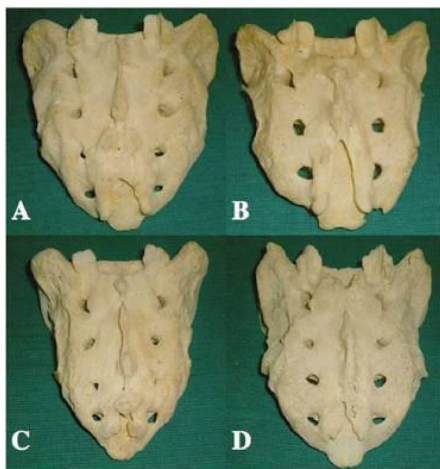


Table 1: Shows shape of Sacral Hiatus

Shape of the Hiatus	No of bones	Percentage in present Study (%)
H	1	1.6
Inverted U	32	50
Inverted V	27	42.9
W	4	6.2
Total	64	100

Table 2: Shows level of apex and base of sacral hiatus

Vertebral level	Level of apex		Level of base	
	No	P (%)	No	P (%)
S2	01	1.6	0	0
S3	22	34.4	2	3.12
S4	31	48.4	5	7.81
S5	10	15.6	57	89.06
Total	64	100	64	100

Inverted U and V were most common observed shapes. 'U' was found in 32 (50%) and 'V' was found in 27 (42.9%). The most common site of apex was observed at S4 i.e. at fourth sacral spine in 31 sacra (48.4%) where as base of hiatus was most commonly present at the level of S5 i.e. at fifth sacral spine in 57 sacra (89.06%).

Discussion

Caudal epidural block (CEB) is a procedure which involves injection of a drug into the epidural space through the sacral hiatus for anaesthesia. Study on the anatomical variations of the sacral hiatus and the dorsal wall of sacral canal are related to successful caudal epidural block. Caudal epidural block (CEB) has 25 % failure rate^[4] In the present study, 2 Sacra were excluded from the measurements as typical sacral hiatus was not present in them and showed complete agenesis of the dorsal bony wall. In the present study the shapes of sacral hiatus were variable and were found to be predominantly of either inverted 'U' (50%) or inverted 'V' (42.9%). The most common "V" shape of sacral hiatus was inverted 'U' in 69(%) and findings were similar to Nagar and Seema^[5,7] Vinod Kumar^[6] also noted various shapes, most common being inverted 'V' (46.53 %).

The level of apex of the sacral hiatus was most commonly seen at S4 in 31 sacra (48.4%), which was similar to Sekiguchi M and Nagar (65 %) ^[2,5] and other researchers. All studies including the present study noted that the location of apex can vary from upper part of S3 sacral vertebra to S5 vertebra. The knowledge of distance from the apex

of sacral hiatus to the lower lumbar spinous process is important to develop the technique to prevent the neurological injuries associated with then euraxial injections^[8] In the present study the level of base of the sacral hiatus was most commonly seen at S5in 57 sacra (89.06%). The findings were similar to previous researchers like Nagar, Seema ^[5,7].

Conclusion

For caudal epidural block (CEB) to be successful identification of sacral hiatus is mandatory. Variations in the shape and level of hiatus may lead to failure of CEB. The sacral hiatus has anatomical variations and knowledge of these variations may improve the success of caudal epidural block (CEB). Hence detailed knowledge of sacral hiatus with its variations and its surrounding anatomy is essential.

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