



International Journal of Medical Research & Health Sciences

www.ijmrhs.com Volume 2 Issue 2 April-June Coden: IJMRHS Copyright ©2013 ISSN: 2319-5886

Received: 15th Jan 2013

Revised: 17th Feb 2013

Accepted: 25th Feb 2013

Case Report

COMPLETE DORSAL WALL DEFECT IN A DRY HUMAN SACRUM: A CASE REPORT

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ABSTRACT

The human sacrum is a triangular bone formed by the fusion of five separate vertebrae along with the intervertebral discs. Gross morphology of sacrum shows a concave ventral surface, a convex dorsal surface and a triangular sacral canal. The sacral canal consists of an anterior wall formed by the fusion of the posterior aspects of sacral vertebral bodies and the dorsal wall is formed by the fused laminae, spines and ossified ligaments flava. During the routine course of osteology for undergraduates one of the sacrum showed complete absence of the dorsal wall of the sacral canal. Anatomical variations frequently occur around the dorsal wall of the sacral canal especially in relation to sacral hiatus. The variations may be attributed to the dependency of the sacrum to the load related fusion of the bone structure. Knowledge of such variations is of profound importance in spinal injuries, neurosurgeries and caudal epidural anaesthesia.

Keywords: Sacrum, Sacral canal, Agenesis, Caudal epidural anaesthesia

INTRODUCTION

Sacrum is a triangular bone formed by the fusion of five vertebrae and forms the posteriosuperior wall of the pelvic cavity. Sacrum articulates with four bones, the last lumbar vertebra above via a disc space and facet joint complex, the coccyx below with a ligamentous attachment and occasional bone union, and on either side with ilium forming the sacroiliac joint. Sacral canal is a triangular canal formed by the sacral vertebral foramina. Sacral canal is bounded by the ventral wall which is formed by the fusion of dorsal aspects of sacral vertebral bodies and a dorsal wall formed by the fusion of posterior elements

which include the laminae, spines and the ossified ligamentum flava. The sacral canal consists of Cauda equina, filum terminale and spinal meninges. Sacrum resembles its lumbar counterparts in the ossification of its segments. Each sacral vertebra has five ossification centres which include a primary centre, one in each epiphyseal plate and two for the two vertebral arches. Understanding of the anatomy and development aspects of sacral canal and sacral hiatus plays an important role in surgical treatments and caudal epidural blocks.

Case Report

During routine Osteology discussion classes for undergraduates in the Department of Anatomy at Dr. PSIMS & RF, it was observed in one of the dry human sacrum that its dorsal wall of sacral canal was completely absent (agenesis of dorsal

wall) Fig 1. Remaining features of the sacrum were normal with four sacral foramina showing no features of sacralisation or lumbarisation Fig 1&2.



Fig.1: Dorsal surface of sacrum

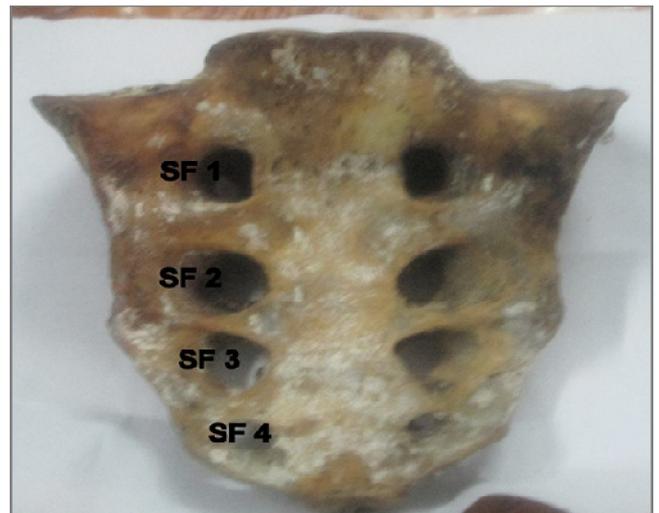


Fig .2 Ventral surface of sacrum with four sacral foramina.

* indicating complete absence of dorsal wall of sacral canal, SF- Sacralforamina.

DISCUSSION

Many studies have been conducted on the shapes of the sacral hiatus and various shapes have been described in literature. Developmental malformations occur ranging from variations in the sacral hiatus to caudal agenesis. Most commonly observed hiatal shapes include inverted U, inverted V, whereas irregular, dumbbell and bifid include variations in the shape. Rare variations include hiatal agenesis and complete dorsal wall agenesis. Stanford Helm II in their study observed 3% hiatal agenesis, while completely fused walls at apex of sacral hiatus was observed by Trotter et al in 0.74% sacrum^{1,2}. Senoglu et al have observed 2.08% of sacra to have total posterior closure defect³. Patil Dhananjay et al in their study of dry human sacra observed 2.91% of sacra with complete absence of the dorsal wall of sacral canal⁴.

Trotter et al have observed 1.8% and Vinod Kumar et al have observed 1.49% of sacra with complete absence of dorsal wall^{2,5}. Nagar SK in 270 dry human sacra has observed 1.5% of them without the dorsal wall of sacral canal⁶.

Sound knowledge of position, shape and the morphology of sacral canal are important for caudal epidural anaesthesia. Surgical treatment of sacral lesions requires understanding of the underlying anatomy and various morphometric parameters of the sacrum. Significant leaps have been made towards the understanding of the sacral region by both anatomists and surgeons, there is still much to be learned with advances in surgical methods and instrumentation in the field of spinal surgery driving a continued need to better understand the anatomy of the region.

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