

Case Report

Complete agenesis of dorsal wall of 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. It is located on the pelvic region between the hipbones. Anatomical variations frequently occur on the sacral posterior part, such as the agenesis of the sacral dorsal wall that is characterized by a failure in the fusion of the sacral vertebrae laminae, making the meninges and the spinal nerves unprotected. During routine osteology demonstration classes at Jawahar Lal Nehru Medical College, Bhagalpur, I came across one such sacrum whose dorsal wall was open throughout its length. Knowledge of such variations is of profound importance in spinal injuries, neurosurgeries and caudal epidural anaesthesia.

Keywords: Sacrum, Sacral canal, Agenesis.

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INTRODUCTION

The sacrum is a triangular bone formed by the fusion of five sacral vertebrae and is located on the pelvic region between the hip bones. Its pelvic surface is concave while the dorsal one is convex, involving the sacral canal. The anterior wall of the sacral canal is formed by the fusion of sacral vertebrae bodies and the posterior wall is formed by the fusion of laminae, spines and by the ossification of the yellow ligament.¹ The sacral canal (SC) is the continuation of the vertebral canal in the sacrum. The SC is formed anteriorly by the fusion of sacral vertebral bodies and posteriorly is formed by the fusion of posterior elements namely the lamina, and spinous process.² It contains spinal meninges, lumbar and sacral part of spinal nerves and filum terminale. Clinically, the SC has been employed for administering the caudal epidural block (CEB).³ Sacral anatomical variations, such as agenesis of the posterior wall of the sacral canal, are frequently found.⁴ This exposure of the sacral canal is the result of a fusion failure of the sacral vertebrae laminae^{5,6}, which makes relatively unprotected the spinal nerves roots, cauda equina, terminal filament, the fibroadipose tissue, spinal meninges and the epidural venous plexus. The knowledge of this anatomical variation of the sacral

dorsal wall is important in the interpretations of sacral radiographs^{6,7}; in the congenital anomalies associated^{8,9}; and in surgical situations, especially on the administration of the caudal epidural anaesthesia¹.

CASE REPORT

During routine osteology demonstration classes at Jawahar Lal Nehru Medical College, Bhagalpur, I came across one such sacrum whose dorsal wall was open throughout its length. Remaining features of the sacrum were normal with four sacral foramina showing no features of sacralisation or lumbarisation.



Figure 1: Sacral bone showing Complete Agenesis of Dorsal Wall

DISCUSSION

Morphological variation of sacral hiatus like its shape, size, etc. has been reported several times in the literature. Among these variations, Hiatal agenesis and complete agenesis of the dorsal wall is a scarce finding. According to the literature, the incidence of pan sacral agenesis of SC ranges from 0.98% to 4.8%.^{3,10,11} This is due to failure of fusion of the lamina of the sacral vertebrae to form the median sacral crest. Embryological basis of this condition is still not clear and assumed to be multifactorial. One of the clarifications has been the faulty induction of vertebra formation by the underlying notochord during embryological development, possibly by altering sonic hedgehog signaling.¹²

Vinod kumar et al (1992) noted various shapes of sacral hiatus, most common being inverted V and inverted U in 76.23% sacra, 7.43% were dumbbell shaped.¹³

There was complete agnesis of dorsal bony wall of sacral canal in 1.8% sacra reported by Trotter et al (1944)⁴ and Vinod Kumar et al (1992) 1.49%¹³, Nagar SK 1.5%¹⁴

Nagendrappa RB et al found 3% incidence of complete spina bifida. They also reported the level of apex of sacral hiatus that varies from upper part of S2 to lower part of S5, in-which most common position was at the level of S4.¹⁵

Kiran VP et al also reported 2% incidence of complete agenesis of dorsal wall.¹⁶

Ukoha UU et al studied 83 Nigerian sacrum and found 1.3% complete spina bifida. They also explained that apex of sacral hiatus was most commonly found at level of S4.¹⁷

Shewale SN et al studied 204 sacrum and found 0.98% complete spina bifida.¹⁸

Dhananjay et al in their study of dry human sacra observed 2.91% of sacra with complete absence of the dorsal wall of sacral canal.¹⁹

CONCLUSION

The dorsal wall of sacrum has different anatomical variations, complete agenesis is among one of them. Understanding about this variation may decrease the failure rate of caudal epidural anaesthesia & minimizes the complications during surgeries.

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