



AGENESIS OF DORSAL SACRAL IN THE REGION OF SOUTH BIHAR

Dr. Nidhi*

Tutor Department of Anatomy PMCH Patna. *Corresponding Author

Dr. Dhananjay Kumar

Assistant Prof. Department of Radiology PMCH Patna

Dr. Mrityunjay Kumar

Assistant Prof. Department of Pathology PMCH Patna.

ABSTRACT **Background:** The sacral canal is the continuation of the vertebral canal in the sacrum, the sacral canal contains spinal meninges, lumbar and sacral part of spinal nerves and filum terminale. Sacral canal has been used for the caudal epidural block.

Material And Methods: Total 98 completely ossified undamaged dry human sacra of undetermined age and sex in the department of Anatomy in tertiary care college of south Bihar. Each sacrum is examined for the agenesi of the dorsal surface. Representative photographs of different sacrum having partial or complete agenesi on the dorsal surface are taken.

Result: Elongated sacral hiatus i.e. length more than 40 mm was seen in 5 (5.1%) bones. Maximum sacral hiatus length of 52.6 mm was noted. Elongated sacral hiatus were of two types i.e. inverted U and inverted V shaped. 4 (4.08%) bones showed partial dorsal agenesi of sacrum. Complete dorsal agenesi was seen in 1 sacrum. One bones with absent sacral hiatus was seen.

Conclusion: Various anomalies on dorsal surface of sacrum were seen in Indian population. Knowledge of these variations will be of help to the Anaesthetists. We conclude that, variant anatomy on dorsal surface of sacrum make administration of caudal epidural anaesthesia difficult. So ultrasound or fluoroscopic guidance leads to better patient outcome while giving caudal blocks.

KEYWORDS : Dorsal sacral agenesi, sacral hiatus, caudal spina bifida.

INTRODUCTION:

Sacrum is a triangular shaped irregular bone formed by fusion of five sacral vertebrae. Sacrum is also called 'Hieron osteon' meaning the holy or sacred bone.¹ The dorsal surface of sacrum demonstrates a lateral sacral crest, intermediate sacral crest and median sacral crest formed by the fusion of transverse processes, articular process and spinous processes of the sacral vertebrae respectively. The lamina of the fifth and sometimes the fourth sacral vertebra don't fuse to form the spinous process. This is called the 'Sacral hiatus'. The structures passing through the sacral canal are cauda equina, sacral spinal nerve roots, filum terminale externa, fibro fatty tissue, epidural venous plexus and spinal meninges.²

The normal length of sacral hiatus is around 10 to 20 mm. When the hiatus length is more than 40 mm then it is called an elongated sacral hiatus. Dorsal agenesi of sacrum is one of the variations seen in sacrum. Here the median sacrum crest show partial or complete agenesi. Caudal epidural anaesthesia is indicated in pediatric surgeries and to reduce labour pains. Caudal epidural anaesthesia is administered through the sacral hiatus. In cases of dorsal agenesi of sacrum it is difficult to locate the hiatus.

Partial blocks and complete failure of anaesthesia is seen in such patients. Other variations like absent sacral hiatus and elongated sacral hiatus also cause a problem in administering caudal epidural blocks. Spina bifida occulta is one of the situations, representing an open neural arch due to insufficient fusion of the posterior elements of the spine, despite the frequent appearance of sbo in clinical practice. There is partial or complete absence of the sacral and coccygeal bones, lumbosacral agenesi is a more severe point of the spectrum, complete sacral agenesi together with variable lumbar agenesi. Sacral agenesi and lumbosacral agenesi are occasionally referred to together as distal spina agenesi.

MATERIALS AND METHODS

This study was carried out in Department of Anatomy of Patna medical college and hospital Patna Bihar. Total 98 completely ossified undamaged dry human sacra of undetermined age and sex in the department of Anatomy. Each sacrum is examined for the agenesi on the dorsal surface. Representative photographs of different sacrum having partial or complete agenesi on the dorsal surface are taken.

OBSERVATIONS

Elongated sacral hiatus i.e. length more than 40 mm was seen in 5 (5.10%) bones. Maximum sacral hiatus length of 52.6 mm was noted.

Elongated sacral hiatus were of two types i.e. inverted U and inverted V shaped. 4 (4.08%) bones showed partial dorsal agenesi of sacrum. Complete dorsal agenesi was seen in 1 sacrum. One bones with absent sacral hiatus were seen.



Fig: Partial Agenesi Of Sacrum



Fig: Absence of sacrum hiatus



Fig: Complete Dorsal Agenesis Sacrum Bone

Pathology

General features;

- . Myelodysplasia
- . Sacral agenesis
- . Cerebral palsy
- . Traumatic spinal cord lesions

*Associated abnormalities

- . Anorectal malformations
- . Lipomeningocele
- . Caudal regression
- . Occult congenital spinal dysraphism
- . Spinal cord tethering

*Type of bladder dysfunction

Contractile bladders

-upper motor neuron lesion

-functional obstruction, deterioration

Table 1: Variations Of Dorsal Wall Of Sacrum

Features on dorsal surface of sacrum	Number of bones	Percentage (%)
Partial Dorsal agenesis	4	4.00
Complete dorsal agenesis	1	1.00
Elongated sacral hiatus	5	5.00
Absent sacral hiatus	1	1.00

DISCUSSION

Dorsal agenesis is due to failure of fusion of the lamina of the sacral vertebrae to form the median sacral crest. Moore⁴ reason this condition to the faulty induction of vertebra formation by the underlying notochord during embryological development.

Spina bifida is an inclusive term for formative defects in neurulation and succeeding vertebral formation. This presents various neural tube defects like craniorachischis (non fusion of neural tube and non formation of vertebral arch), anencephaly (non fusion of ventral part of neural tube with no occipital development) and myelocele (non fusion of posterior part of neural tube and failure of vertebral arch development).⁵

Variations in length of sacral hiatus and dorsal surface of sacrum have been reported by various studies. Arora et al⁶ in a study of sacrum in north Indian population observed a relatively higher incidence (16.85%) of elongated sacral hiatus. Other studies by Nagar⁷ in Gujarat and Nagendrappa and Jayanthi⁸ in Karnataka reported similar findings of 4.9% and 4.1% respectively. Our study in population of Eastern Uttar Pradesh observed an incidence of 5.1%.

Senuglu et al⁹ et al opine that developmental defects of the spine must be considered for the sake of patient safety. In a case report of completely bifid sacrum, authors stated that presence of anatomical variations may contribute to a high failure rate of caudal epidural block (7%) transpedicular and lateral screw placement. Total spina bifida and detection of duramater just beneath the hiatus have been observed in 1% of cases. Presence of spina bifida increases the chances of damage to the sacral nerves during internal screw fixation.

Caudal epidural anaesthesia is commonly administered in patients of radiculopathy and lower back pain. Doo et al stated that dorsal sacral agenesis can lead to unforeseen complications like intravenous injections and dural puncture. So ultrasound or flurososcopy guidance while administering caudal block is indicated for better patient outcome.

CONCLUSION

Complete agenesis of the dorsal wall of the sacral canal of these variations is important to diagnose lower back pain, sciatica caudal regression syndrome and avoid complications. Various anomalies on dorsal surface of sacrum were seen in Indian population. Knowledge of these variations will be of help to the Anaesthetists. We conclude that, variant anatomy of dorsal surface of sacrum make administration of caudal epidural anaesthesia difficult. So ultrasound or flurososcopy guidance leads to better patient outcome while giving caudal blocks.

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