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Case Report

HIGH SACRAL HIATUS WITH NON FUSION OF LAMINA OF FIRST SACRAL VERTEBRAE: A CASE REPORT

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Abstract:

Sacrum is a large triangular bone, forming postero-superior wall of the pelvic cavity. During the routine study of bones in the department of Anatomy, an unusual variation in the sacrum was noted. The bone showed high sacral hiatus i.e., at the level of 3rd sacral vertebrae and non-fusion of lamina of 1st sacral vertebrae. This type of anomaly is very rare, which prompted us to report the case. The knowledge about this rare variation is important for orthopaedicians and anesthetists since the high sacral hiatus may lead to clinical procedural failures. It is also important for accurate diagnosis of patients with low back pain. Non-fusion of lamina of 1st sacral vertebrae may be associated with spina bifida occulta and may lead to painful condition of back.

Keywords : Vertebrae, Sacral Hiatus, Low back pain.

Introduction:

The sacrum is a large, triangular fusion of five vertebrae and forms posterosuperior wall of the pelvic cavity, wedged between two hip bones. Its blunted, caudal apex articulates with coccyx and its superior base with 5th lumbar vertebra at the lumbosacral angle. The spines of sacral vertebrae are fused with each other median sacral crest with four or three sacral tubercles. Below the fourth tubercle there is an arched sacral hiatus in the posterior wall of the sacral canal. This hiatus is produced by the failure of the laminae of the 5th sacral vertebra to meet in the median plane [1]. If the laminas of the higher sacral vertebra are not fused, then there will be a high sacral hiatus. This kind of anatomical variation in the sacral hiatus may lead to failure of caudal epidural analgesia, trans-pedicular and lateral mass screw placement failure [2]. Sacral hiatus is used as a landmark to give caudal epidural analgesia [3]. If there is non - fusion of laminae of all the sacral vertebrae, there will be a midline gap [4]. In spina bifida occulta, the

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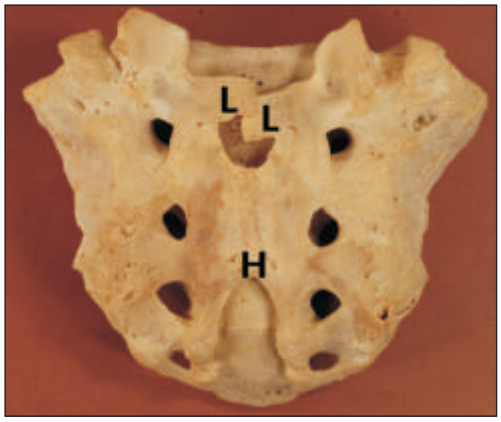
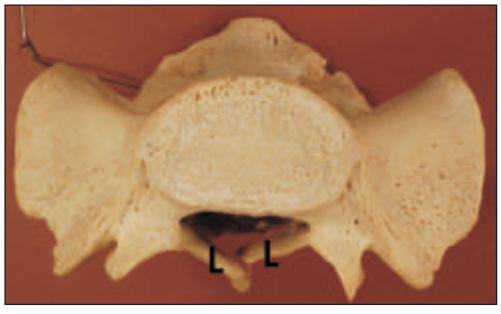
Figure-1. Posterior view of the Sacrum showing the non fusion of the lamina of the 1st Sacral vertebra (L) and high Sacral hiatus at the level of 3rd Sacral vertebra (H) .



L- Non-fusion of lamina I sacral vertebra.
H- Sacral hiatus at III sacral vertebra.

Figure-2. Superior view of the Sacrum showing overriding of the left lamina of Sacrum over the right lamina of the 1st sacral vertebra.



L- Non-fusion of lamina I sacral vertebra

posterior elements of upper sacral vertebrae fail to fuse. [5], [6]. These kind of anatomical variations will lead to painful condition of the back [5] and some clinical procedural failures [7], [8]. Thus the knowledge of this anomaly should be kept in mind especially by anaesthetists and orthopaedicians while performing surgical procedures.

Case Report:

During the routine study of bones in the department of Anatomy at K. S. Hegde Medical Academy, Mangalore, Karnataka, we observed an unusual high sacral hiatus i.e., upto level of 3rd sacral vertebra (Figure 1) and non-fusion of lamina of 1st sacral vertebra (Figure 2). The Sacral hiatus was inverted V shaped. The lamina of the 1st sacral vertebra was not fused and the sacral spine was absent. The lamina of left side was projecting over the right lamina of right side (Figure 2). No other unusual feature of the sacrum was found.

Discussion :

The development of sacrum resembles the ossification of a typical vertebrae. The secondary centers of ossification appears after puberty and all the sacral vertebrae start fusing with each other. Any defect in the formation of the primary centers (which give rise to the formation of each half vertebral arch) will lead to incomplete formation of sacral canal and incomplete ossification of the laminae [1].

The sacral hiatus is usually triangular in outline with apex at the level of body of 4th sacral vertebra and the base is at the level of 5th sacral vertebra, however the hiatus of the sacral canal is variable in extent and form. In 45% of cases, the apex of sacral hiatus is located at the level of S3 and S4 vertebra [9]. The knowledge about shape and extent of sacral hiatus is important because, it is the site where caudal analgesia is given in urology, proctology, general surgery and obstetrics & gynecology [3]. However knowledge of anatomical confirmation and common structural modification of sacral hiatus is essential for a successful procedure [9]. Sacral hiatus is the site for administration of epidural anesthesia. The reliability and success of caudal epidural anesthesia depend upon anatomical variations of the sacral hiatus [4, 7, 8, 10]. In about 12 to 15 % of the cases, the sacral hiatus starts at S3 vertebra.

The caudal epidural block is widely used for the diagnosis & treatment of lumbar & spinal disorders by orthopaedicians with success rate of 70 - 80%. In about 7.7% of cases the caudal epidural block fails due to the absence of sacral hiatus [4].

Many authors have explained the different shapes of sacral hiatus. In the present case, the shape of sacral hiatus was inverted V shaped extending upto 3rd sacral vertebra. The percentage of inverted V shaped sacral hiatus observed by different authors were Vishal Kumar et al., (39.6%)[7], Kumar et al., (60.3%)[11], Nagar SK (27%) [10]. The non-fusion of the lamina of the 1st sacral vertebra can be found in spina bifida occulta , which occurs due to a deficiency of folic acid during pregnancy [6]. It is found in about 8.5% of the cases. These kind of anomaly can lead to low back ache, due to pressure of spinous processes of the 5th lumbar vertebra on the nerve roots through the membrane closing spina bifida [12]. Additionally, lack or hypoplasia of posterior elements in spina bifida occulta can also lead to low back ache.

Conclusion:

The high sacral hiatus with non fusion of lamina of 1st sacral vertebra is a rare deformity. A comprehensive awareness and understanding of the lesion and its signs and symptoms will help the orthopaedicians dealing with the case of back pain. It is helping for anaesthestists, surgeons and gyneacologists since sacral hiatus is the site where caudal analgesia and epidural anaesthesia are given.

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