

A STUDY OF HIATAL LEVEL IN SACRUM: IS THIS THE CAUSE OF BACK PROBLEMS IN INDIANS

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ABSTRACT

BACKGROUND

The sacrum on the other hand is also a vertebra. It actually is formed by the fusion of the five sacral vertebrae. The lateral mass is nothing but the fused transverse processes, similarly the body is also because of the fusion of the bodies of the five sacral vertebrae. The sacral foramen is a result of the fusion of all the five vertebral foramen. The spines of the vertebra fuse posteriorly but the hiatus at the lower end lamina of the fifth sacral vertebra may be due to incomplete fusion of laminae at this level. Posteriorly, the hiatus is seen in a vast majority of cases also at the fourth sacral vertebra due to incomplete fusion of the laminae at this level. In rare incidences, there might be complete non-fusion of the median crest. Back pain is the most common complaint in the modern life. In some posterior sacra, malformations (Anatomical) seem to be the most common cause for backache. Clinically, the hiatus is very important because it is used for epidural analgesia. But if these kinds of anatomical defects are encountered, then they might lead to the total failure of epidural analgesia procedures. In fact the success of these procedures depends on the anatomical normalcy of these bones. All these conditions may result in chronic backache.

A sincere effort has been put in this study to understand the hiatal openings of the sacrum. This study is intended to help the clinicians, orthopaedicians and the general practitioners to understand and if possible intervene before the natural progression of the disease sets in. It is also important anthropologically as there might be anthropological and racial variations. This might spark an interest in the world of Forensic sciences as well as it can be used in identification. Papers have been presented and it has been ruled that in diabetic mothers, the caudal malformations are common. The link between diabetic mothers and chronic lower backache has still not been established. This study so can be taken as a base study and the study can be further studied to find the definitive cause for the above-mentioned malformations.

METHODS

The aim of the study is to find out the incidence of opening of sacral hiatus at each level of sacral vertebra and to find out any other malformations associated with it. The study has been done in the Department of Anatomy, Nalanda Medical College, Patna. The study was done from June 2015 to May 2016. One hundred sacra were studied and the level of the hiatus was noted and also the associated malformations were noted if any.

RESULTS

In the present study, in one sacrum total non-fusion of lamina was seen. This may result in complete herniation of the lower parts of conus medullaris or at least the cauda equina parts of the spinal cord. This may in turn result in the stretching of the lower fibres of the cauda equina resulting in the symptoms of lower limbs like pain and paralysis of lower limbs as well as in chronic lower backache. The hiatus is seen in more frequencies as it progresses lower down the sacral levels. It has been observed in 11 cases at the level of S3, 31 cases at the level of S4 and in 57 cases at the level of S5.

CONCLUSION

The level at which the hiatus opens is successfully studied in this study. This study is intended to help the clinicians, orthopaedicians and the general practitioners to understand and if possible intervene before the natural progression of the disease sets in. It is also important anthropologically as there might be anthropological and racial variations. This might spark an interest in the world of Forensic sciences as well as it can be used in identification. Papers have been presented and it has been ruled that in diabetic mothers the caudal malformations are common. The link between diabetic mothers and chronic lower backache has still not been established. This study so can be taken as a base study and the study can be further studied to find the definitive cause for the above-mentioned malformations.

KEYWORDS

Hiatus, Sacra, Openings, Backache, Indians.

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INTRODUCTION: In order to understand the sacrum, firstly we should understand the development of a normal vertebra from somite. The intra-embryonic mesoderm develops into paraxial, intermediate and lateral plate mesoderm by longitudinal grooves. The paraxial mesoderm develops into linear structures which extend from hind-brain vesicle to the caudal end of the developing embryo.

The period in which the somite develops is called the somite period which extends from the 20th day to about 30th day. During this period, the paraxial mesoderm develops into somites. Somites are a series of structures which develop bilaterally on each side of the notochord. The continuous paraxial mesoderm is divided into blocks like structure which are present bilaterally by transverse clefts which are called as somites. Each somite differentiates into a ventromedial part, the sclerotome and a dorsolateral part called the dermomyotome. Around 24th day, the polymorphous cells of the sclerotome migrate ventromedially around the notochord and hugs it and forms the membranous vertebra.

Actually, the vertebra will undergo three stages of development i.e. membranous, cartilaginous and bony. Then, it extends dorsally between the segmental spinal nerves and thus encloses the spinal cord. Then, subsequently the horizontal sclerotomic fissure divides the sclerotome into cephalic and caudal parts. The cephalic part of the lower sclerotome now joins with the caudal part of the adjacent sclerotome. Thus, the vertebra is intersegmental in development. The sclerotomic fissure and the mesodermal condensation around it forms the intervertebral disc and the notochordal cells almost disappear but persist in the centre called as nucleus pulposus. During the sixth week, the chondrification starts and in the seventh week ossification commences. This is the development of vertebra in short and it also holds true in case of the sacrum. The sacrum on the other hand is also a vertebra. It actually is formed by the fusion of the five sacral vertebrae. The lateral mass is nothing but the fused transverse processes, similarly the body is also because of the fusion of the bodies of the five sacral vertebrae.

The sacral foramen is a result of the fusion of all the five vertebral foramen. The spines of the vertebra fuse posteriorly but the hiatus at the lower end lamina of the fifth sacral vertebra¹ may be due to incomplete fusion of laminae at this level. Posteriorly, the hiatus is seen in a vast majority of cases also at the fourth sacral vertebra due to incomplete fusion of the laminae at this level. In rare incidences, there might be complete non-fusion of the median crest.² Back pain is the most common complaint in the modern life. In

some posterior sacra, malformations (Anatomical) seem to be the most common cause for backache.³

Clinically, the hiatus is very important because it is used for epidural analgesia.⁴ Papers have been presented and it has been ruled that in diabetic mothers, the caudal malformations are common.^{5,6} But if these kinds of anatomical defects are encountered, then it might lead to the total failure of epidural analgesia procedures.^{7,8} In fact, the success of these procedures depend on the anatomical normalcy of these bones.⁹ All these conditions may result in chronic backache.¹⁰

A sincere effort has been put in this study to understand the hiatal openings of the sacrum. This study is intended to help the clinicians, orthopaedicians and the general practitioners to understand and if possible intervene before the natural progression of the disease sets in.

It is also important anthropologically as there might be anthropological and racial variations. This might spark an interest in the world of Forensic sciences as well as it can be used in identification. Papers have been presented and it has been ruled that in diabetic mothers, the caudal malformations are common. The link between diabetic mothers and chronic lower backache has still not been established. This study so can be taken as a base study and the study can be further studied to find the definitive cause for the above-mentioned malformations. The study is also important for practising anaesthetists as epidural anaesthesia is given by this route.

The knowledge is essential because the levels of attaining the paraesthesia can vary as a result of varying levels of hiatus at different levels of sacral levels. The knowledge is also important for orthopaedicians as frequent lower backache go straight forward to these practising orthopaedicians. This knowledge may indeed help them to intervene and take necessary actions before the progression of the disease.

AIMS AND OBJECTIVES:

1. To find out the incidence of opening of sacral hiatus at each level of sacral vertebra.
2. To find out any other malformations associated with it.

MATERIALS AND METHODS: The study has been done in the Department of Anatomy, Nalanda Medical College, Patna. The study was done from June 15 to May 16.

One hundred sacra were studied and the level of the hiatus was noted and also the associated malformations were noted if any.

Inclusion Criteria: The sacrum in which the posterior features i.e., spine and posterior elements were clear were taken for the study.

Exclusion Criteria: Any artificial artifacts in the bones were discarded.

RESULTS:

Sacral Vertebral Level	Frequency
Complete Non – Fusion	One
S2 Level	NIL
S3 Level	11
S4 Level	31
S5 Level	57

Table 1: Frequency of Level of Hiatus

Sacral Vertebral Level	Malformations
Complete Non – Fusion	Bilateral Vertebral foramen incomplete
S2 Level	NIL
S3 Level	Ala very prominent in 1.
S4 Level	Sacralisation: 3
S5 Level	Nil

Table 2: Other Malformations Associated

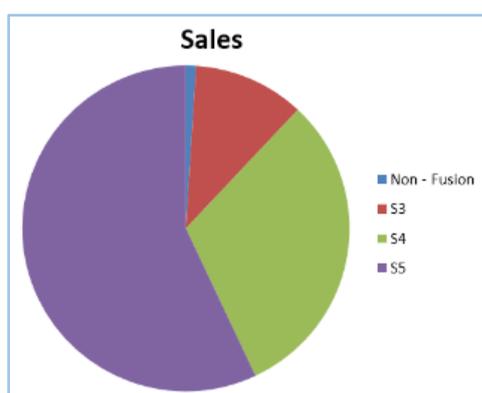


Fig. 1: Frequency of Level of Hiatus

DISCUSSION: In the present study, in one sacrum total non-fusion of lamina was seen. This may result in complete herniation of the lower parts of conus medullaris or at least the cauda equina parts of the spinal cord. This may in turn result in the stretching of the lower fibres of the cauda equina resulting in the symptoms of lower limbs like pain and paralysis of lower limbs as well as in chronic lower backache. The hiatus is seen in more frequencies as it progresses lower down the sacral levels. It has been observed in 11 cases at the level of S3, 31 cases at the level of S4 and in 57 cases at the level of S5. The study is not in agreement with the study conducted by Thejeshwari et al¹¹ Demographic and geographical variations can be the reason.

Also the fact that the population in which they conducted the study was different from the present population of the study. The sacrum has been worshipped in many parts of the world. Might be the ancient people knew of its significance and its involvement in many pathologies of lower backache. Also it is worshipped because in ancient civilisation it was thought to take part in the birth process. Number of studies has been conducted and they are trying hard to find an association between the caudal regression syndromes and the diabetes mellitus. Now the latest trend is to study and associate the lower backache and

diabetes mellitus in mothers. The knowledge of the malformations either anatomical or pathological is essential and important.

In clinical practice, it is very essential and important as the outcome of the birth of malformed baby has to be explained to the parents and that too it has to be explained within the first trimester so that necessary actions can be taken to terminate or continue the pregnancy without any major problems in the first trimester, the malformation can easily be controlled by diagnosing with an ultrasonography. The diabetes also is common in the affluent society. These malformations are to bear in mind to avoid unnecessary economic burden over the parents. The study is also important for practising anaesthetists as epidural anaesthesia is given by this route. The knowledge is essential because the levels of attaining the paraesthesia can vary as a result of varying levels of hiatus at different levels of sacral levels.

The knowledge is also important for orthopaedicians as patients with frequent lower backache go straight forward to these practising orthopaedicians. This knowledge may indeed help them to intervene and take necessary actions before the progression of the disease.

CONCLUSION: The level at which the hiatus opens is successfully studied in this study. This study is intended to help the clinicians, orthopaedicians and the general practitioners to understand and if possible intervene before the natural progression of the disease sets in. It is also important anthropologically as there might be anthropological and racial variations. This might spark an interest in the world of Forensic sciences as well as it can be used in identification. Papers have been presented and it has been ruled that in diabetic mothers the caudal malformations are common. The link between diabetic mothers and chronic lower backache has still not been established. This study so can be taken as a base study and the study can be further studied to find the definitive cause for the above-mentioned malformations.

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