ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 10 | October - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPLETE BILATERAL SACRALIZATION OF FIRST COCCYGEAL VERTEBRA

Anatomy

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ABSTRACT

While observing anatomic variations in Sacrum it was found that only in sixteen out of two hundred sacra there was complete bilateral sacralization of first coccygealvertebra generating fifth pair of complete sacral foramina.

KEYWORDS

Sacrum, Coccyx, Coccygealvertebra, Sacralization, Socral Foramina.

INTRODUCTION

Singh, R. (2011)[1] observed Sacrum with five pairs of Sacral foramina. Nagar, S.K. et.al. (2013)[2] studied sacrum with five pairs of sacral foramina in Western India. Vanju, V.V. Laxami and Ganesh, T. Waghmode (2013)[3] reported a case of sacralization of Coccygeal vertebra. Keshaw Kumar (2019)[4] discussed incomplete sacralization of coccyx with inverted 'U' shaped sacral hiatus reaching up to the body of third sacral vertebra. Present study was conducted to observe complete sacralization of first coccygeal vertebra in dry sacra of Prayagraj (Allahabad) district of Uttar Pradesh, India.

MATERIAL AND METHODS

200 dry human sacra obtained from department of Anatomy, Moti Lal Nehru Medical College, Prayagraj (Allahabad) were examined to observe anatomic variations regarding complete sacralization of first coccygeal vertebra if any.

OBSERVATIONS

It was observed that only in sixteen out of two hundred sacra the body, cornua and transverse processes of first coccygeal vertebra were fused completely with the body, cornua and transverse processes of fifth sacral vertebra generating fifth pair of sacral foramina. (Fig.-1) Transverse diameter of fifth pair of sacral foramina was more than its vertical diameter indicating that fifth pair of sacral foramina was generated due to sacralization of coccyx.

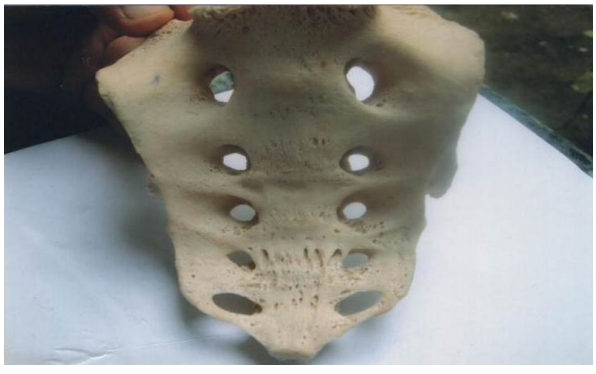

Fig.-1
Complete Bilateral Sacralization of First Coccygeal Vertebra

DISCUSSION

Prevalence of a sacrum with five pairs of sacral foramina due to complete bilateral sacralization of coccyx in present study was 8% which resembles with findings of Nagar, S.K. et.al. (2013)[2] who reported 8.9% bilateral complete sacralization of coccyx.

The fifth pair of sacral foramina is generated either due to fusion of first coccygeal vertebra with fifth sacral vertebra or due to fusion of fifth lumbar vertebra with first sacral vertebra. This pair of foramina gives passage to fifth pair of sacral nerves and first coccygeal nerves in case of sacralization of coccyx and fifth pair of lumbar nerves in case of sacralization fifth lumber vertebra. The variant is of paramount importance to surgeons and obstetricians dealing with these nerves.

Sacralization provides no advantage or disadvantage to the individual and is rarely a cause of back problems. The person may remain asymptomatic or may be present with clinical symptoms that include spinal or radicular pain, disc degeneration, L4/L5 disc prolapse and lumbar extradural defects as reported by Kubawat, D.M. et. al. (2012)[5], Kanchan, T. et. al. (2009)[6], Sharma, V.K. et.al. (2011)[7] Luoma et.al. (2004)[8] Castellyl, A et.al. (1984)[9].

The occurrence of Sacrum with five pairs of sacral foramina is linked to its embryological development and osteological defects. Vertebrae are derived from the sclerotome portions of the somites which are derived from paraxial mesoderm. Each vertebra is formed from the combination of the caudal half of one somite and the cranial half of its neighbour (Kubavat, D.M. et.al. 2012 and Sadlar, T.W. 2010)[5,10]. Thus sacralization of fifth lumber vertebra is caused by the border shifts, cranial shift resulting in the sacralization of fifth lumber vertebra. Improper formation, migration, differentiation and union of somites results into segmental vertebral anomalies (Kubavat, D.M. 2012 and Sharma, V.A. et. al. 2011)[5,7]. Patterning of the shapes different vertebra is regulated by HOX genes. The normal patterning of lumbar and sacral vertebrae as well as changes in the axial pattern such as lumbosacral transitional vertebrae results from mutations in the HOX-10 and HOX-11 paralogous genes (Kubavat, D.M. et. al. 2012, Singh R. 2011, Sadler T.W. 2010, Wellik, D.M. and Capecchi, M.R. 2003)[5,1,10,11].

Sacrum with five pairs of sacral foramina is not a contraindication to any activity, sport participation or employment, but it may predispose to the possibility of having, more back pain or coccygeal pain since this area of spine is mechanically different to normal (Nagar, S.K. et.al. 2013)[2].

It is important to identify the sacralization of fifth lumber vertebra and sacralization of first coccygeal vertebra in patients in whom a surgical or interventional procedure is planned. This is essential to avoid an intervention or surgery at an incorrect level. From a practical view point, failure to recognize and to number lumbosacral transitional vertebra during spinal surgery may have serious consequences (Bron, J.I. et. al. 2007)[12]. Incorrect numbering can theoretically lead to problems with the administration of epidural or intradural anaesthetics in patients with lumbosacral transition vertebra (Bron, J.I. et. al. 2007)[12]. In the operative treatment for disc disorder, it is essential to be alert to the possibility of transitional vertebra (Nagar, S.K. et.al. 2013)[2]

Normally coccyx is mobile and during second stage of labor, backward movement of coccyx increases anteroposterior diameter of pelvic outlet which facilitates delivery. Due to fusion coccyx becomes fixed and there is no increase in anteroposterior diameter of pelvic outlet. This may lead to prolonged second stage of labor and perineal tears (Singh, R. 2011)[1].

During Medicolegal investigations some congenital abnormalities are of vital importance in identification especially when antemortem records are available (Kanchan, T. et. al. 2009)[6]. A sacrum with five pairs of sacral foramina is one such congenital anomaly that has clinical and medicolegal implications.

Awareness of this kind of anomaly is of importance while reporting the X-ray, CT and MRI films, during surgical procedures at the lumbosacral or sacrococcygeal region and making a differential diagnosis for low back pain or coccygeal pain in patients respectively. The knowledge is vital for surgeons, clinical anatomists, forensic experts and morphologists hence this study presented such variation

emphasizing on its clinical relevance.

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