An aperture in the sagittal plane of the dorsal wall of the sacrum

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The dorsal wall of the sacrum presents various anatomical variations, while the dorsal bony wall of the sacral canal suffers more. We report a case of a sacrum with a series of variants in the midline due to abnormal ossification and a bizarre aperture on the sagittal plane between the 1st and the 2nd sacral spinous processes. A failure of the ossification pattern during embryological life, or an ossification of the supraspinous ligament may result in such an aperture. Sacrum variety is of great importance for the daily proper medical practice. (Folia Morphol 2020; 79, 1: 179–181)

Key words: sacral canal, agenesia, ossification, supraspinous ligament, midline

INTRODUCTION

Sacrum depicts the most variable part of the vertebrae column in human anatomy. It is a triangular bone formed by the fusion of five sacral vertebrae. It presents a concave anterior or pelvic surface and a convex posterior one, placed as a wedge between the two innominate bones at the upper and posterior part of the pelvic bone. Various foramina (sacrals and variation openings) and a canal supplement its anatomy. The opening present at the caudal end of sacral canal is known as sacral hiatus which is formed due to the failure of fusion of laminae of the 5th (occasionally 4th, or 3rd, and 2nd as variations) sacral vertebra [2, 4].

The sacrum is formed during a complex developmental process by the fusion of 58 to 60 ossification centres. The osseous maturation spans a period which starts from the end of the first trimester of the foetal life and lasts until the mid-adult life [1]. A disturbance in ossification process may result a plethora of anatomical variations, especially in the dorsal wall of the sacrum [4].

CASE REPORT

The sacrum in report belongs to a human skeleton of Caucasian (Hellenic) origin which was examined during educational study among the skeletons newly donated at the Anatomy Department of the Medical School of the Democritus University of Thrace. The donated skeleton belonged to a female of unknown age. The skeleton derived from skeleton donation with informed consent (with signature authenticity) by the donator himself.

Our bone has a base presenting a transverse diameter of the sacral segment of 70.8 mm and an anterior-posterior diameter of the sacral segment of 32.9 mm, with a 98.2 mm anterior breadth of the sacrum. It has an anterior height of 111.5 mm and a posterior length from the base to the apex of 140.5 mm. There is a failure of fusion of laminae of the 4th vertebra, while the spinous process of the 3rd is partially formed. An agenesia of the dorsal wall of the sacral canal in the level of the 2nd to 3rd vertebrae 24.7 mm in length, alongside with two smaller apertures (right and left) in the level of the...
1st–2nd with a diameter of approximately 5.1 mm each, cause a longer sacral hiatus, an abnormal sacral canal and a deformed median sacral crest (Fig. 1). The right aperture had a distance of 2.5 mm from the midline, 3.6 cm from the sacrum base and 4.7 cm from the middle of the right auricular surface. Respectively, the left aperture was located 4 mm from the midline, 3.7 cm from the sacrum base and 4.5 cm from the middle of the left auricular surface. However, the most peculiar bony variation is this of a round aperture formed in the sagittal plane between the 1st and the 2nd spinous process. This aperture has an inner diameter of 10.8 mm with an outer one of 28.3 mm and was located 2.2 cm from the sacrum base and 5.8 cm from its top (Fig. 2), exactly at the median line of the dorsal surface of the sacrum.

The sacral promontory had a normal form and pattern. Four pairs of pelvic sacral foramensts at the pelvic surface and four pairs of dorsal sacral foramensts at the dorsal surface were observed as expected. The dorsal sacral foramensts were placed lateral to the fused laminae and at each side of the aperture described above. Auricular surface, attachments of interosseous sacroiliac ligaments and transverse ridges presented no variations.

**DISCUSSION**

The variations in the canal and spinous process of the sacrum in current case description most belong...
to a series of alternations known as midline birth defects [5]. Smaller apertures as the ones we describe in each side of the bone have been reported at the literature [2]. However, the discovered in our case aperture between the 1st and the 2nd vertebrae needs more discussion. Although as a variation is located in the midline, implying an abnormal pattern during embryological life, an ossification of the supraspinous ligament is also possible.

The supraspinous ligament is a strong fibrous cord like entity, which connects apices of spinous process from C7 to sacrum. Several times, at the cord like entity, which connects apices of spinous ligament is also possible.

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CONCLUSIONS
Whatever the case may be, abnormal ossification or ossification/calcification of the supraspinous ligament, our case depicts a unique image of a sacrum with a peculiar aperture. Any variation in skeletal anatomy could create a difficulty for healthcare professionals in their daily practice.

REFERENCES