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Ossification of transverse ligament of atlas

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Abstract

The transverse ligament of is a thick, strong band which arches across the ring of the atlas and retains the odontoid process in contact with the anterior arch. It is firmly attached on either side to a small tubercle on the medial surface of the lateral mass of atlas. We have reported in present study a dry skull with ossification of transverse ligament of atlas.

Key words: Transverse ligament of atlas, Anterior arch.

Introduction

The transverse ligament of the atlas is a thick, strong band, which arches across the ring of the atlas and retains the odontoid process in contact with the anterior arch. It is concave in front, convex behind, broader and thicker in the middle than at the ends and firmly attached on either side to a small tubercle on the medial surface of the atlas. As it crosses the odontoid process, a small fasciculus is prolonged upward and another downward, from the superficial or posterior fibers of the ligament. The former is attached to the basilar part of the occipital bone, in close relation with the membrana tectoria, the latter is fixed to the posterior surface of the body of the axis hence, the whole ligament is named the cruciate ligament of atlas. The transverse ligament divides the ring of the atlas into two unequal parts of these, the posterior and larger serves for the transmission of the medulla spinalis and its membranes and the accessory nerves, the anterior and smaller contains the odontoid process. The neck of the odontoid process is constricted where the transverse ligament embraces it posteriorly, so that this ligament suffices to retain the odontoid process in position after all the other ligaments have been divided, there have been only five reports about ossification of transverse ligaments of atlas so far. In present case we have reported an adult dray skull with ossified transverse ligament of atlas.

Materials and methods

Total 125 dry adult human skulls constituted the material for the present study. The skulls belong to the Department of Anatomy, JJM Medical College, Davangere, Karnataka, India. Each was studied for the ossified transverse ligaments of a transeverse ligament of a transverse ligament of atlas ss recorded.

Case report

One skull showing the bridging between two alar tubercles close to anterior and it is dividing foramen magnum into two compartment, anterior small compartment and posterior large compartment. The transverse length of ossified ligament was 1.8cm and the thickness was 0.4cm (Fig. 1). The other skull was showing thick ossified mass lies anterior margin of foramen magnum between occipital condyles (Fig. 2).

Discussion

Symptomatic cases of ossification of the transverse ligament of atlanto-occipital or transverse ligament of atlanto-axial ligaments are extremely rare. There have been only five reports concerning ossification of transverse

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Fig.1. Skull showing ossifications transverse ligament of atlas (OSTLA)

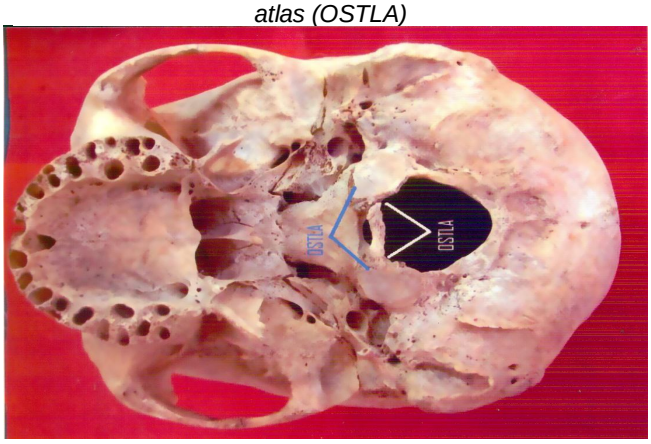
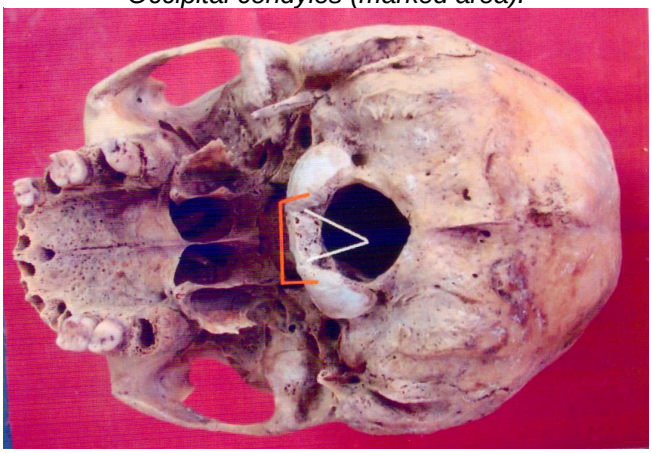


Fig.2. Skull showing thick ossified mass between two Occipital condyles (marked area).



ligament of atlas s in previous literature. In Tatsuro Sasaji (2011) case MRI images showed compressed spinal cord with high intensities within the spinal cord by the mass behind dens. The spinal cord was compressed between the mass and posterior arch of transverse ligament of atlas and there was no subarachnoid space around the spinal cord and author suggested treatment mechanism of ossification of transverse ligament of atlas as follows, hypertrophied dens and coalition of atlantooccipital joints make forward shift of the atlas leading to irreducible atlantoaxial sublaxation. Continuous stress given to transverse ligament of atlas by irreducible atlantoaxial sublaxation would result in hypertrophied and ossification of transverse ligament atlas leading to spinal cord compression.

In Takuro Hayashi (1998) case CT showed a high density mass around the dens, which contained an area of low density , author surmised that the ligament around the dens was hypertrophic and had degenerated into bony tissue and the mass posterior to the dens was the transverse ligament of atlas, author considered that the high-density area and bold line in front of the dens was the cortex of the atlas, so the distance between the anterior arch of the atlas and the dens was 5 mm and the ossified ligament was located within this space. The author explained causes for ossification of the transverse ligament of atlas may have been regressive degeneration as a result of aging, the long standing diabetes mellitus or especially the atlanto-occipital dislocation revealed by radiological examinations. The transverse ligament of atlas could have been damaged and then ossified during the healing process.

The transverse ligament of atlas is a ligament about 20 mm long and 2 mm thick and thinning towards the center, which is involved in the stabilization of the atlanto-axial joint by supporting the dens together with the cruciform ligament, the alar ligament and others. The factors favoring ossification have been widely described and include calcium phosphate metabolic disease,diabetes mellitus, obesity, old age and some growth factors(Takeuchi, 1993). Calcium pyrophosphate dehydrate crystals and hydroxyapatite have recently been reported as calcification components (Haraguchi *et al.,* 1991, Salcman *et al.,* 1994, Okazaki, 1995). The knowledge of ossification of the transverse ligament of atlas is very useful for neurosurgeons.

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