CASE REPORT

A CASE OF FUSION OF THORACIC VERTEBRA

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Summary:

The fusion of vertebral column is a rare anomaly usually congenital in origin. The fusion of thoracic vertebrae can present many clinical signs including congenital scoliosis. Among the 165 dry specimens of vertebrae collected in the Department of Rachana Sharira, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan. One atypical thoracic vertebra in which fusion between two typical thoracic vertebrae was found. Fusion of the vertebra can be congenital or acquired. Embryologically, failure of resegmentation of the vertebra is the cause. The condition is acquired in trauma, tuberculosis and juvenile arthritis. This can lead to wide complications affecting different systems of body.

Keywords: congenital scoliosis, atypical thoracic vertebra

Introduction:

The fusion of two or more vertebrae is a congenital anomaly of vertebral column. Such fusions may occur in the cervical, thoracic or lumbar region. The fusion of thoracic vertebrae can present clinical signs like congenital scoliosis early in life and shortening of the trunk with scoliosis and/or lordosis in older children.

The vertebral column is derived from the sclerotomes of somites. It is composed of vertebrae and inter-vertebral discs between them. It is one among the chief manifestations of body segmentation or metamerism. The fusion of two or more vertebra may occur in the cervical region (Klippel-Feil’s syndrome), atlas to occipital bone (occipitalization of atlas), fifth lumbar vertebra to the sacrum (sacralization of fifth lumbar vertebra) or in the thoracic region. The fusion of thoracic vertebra is the rarest among the three types- cervical, lumbar and thoracic. The fusion of two vertebrae can be congenital or acquired. The surgical fusion of two vertebrae is known as spondylodesis or spondylosyndesis. Acquired fusion can be due to diseases like tuberculosis, juvenile rheumatoid arthritis and trauma.

The prevalence of vertebral synostosis in Lithuanian population is 2.6% of cervical vertebra fusion, 1.6% of thoracic vertebra fusion and 0.5% of lumbar vertebra fusion.

Case report:

Methods

A study on 165 vertebral specimens collected in the Department of Rachana Sharira, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan was done on the different features of specimens. They were also checked for variations from normal anatomy. The embryological and clinical significance due to variations are discussed.

Result

In the present study, an atypical thoracic vertebra with fusion between two typical thoracic vertebrae was found. The fused thoracic vertebra is typical with symmetric fusion of the bodies (Figure 1), lamina and spinous processes of the vertebra (Figure 2). Near the junction of fusion of both laminae and spinous process,
there is a groove with over hanged linear crest on both sides (Figure 3), which demarcates the fusion. As a result of fusion, there is absence of superior facet of lower vertebra and inferior facet of upper vertebra (Figure 3). The costal facets are seen on either side of the body near its junction.

The inferior facet of the body of upper vertebra (costal facet) is raised and prominent (Figure 3). The inter-vertebral foramen is persisting, though the size is reduced. This reduction in size is due to absence of disc between them. The size of the body of lower vertebrae is increased compared to other. Transverse process of lower vertebra is large comparatively.
Table 1 showing dimensions of atypical vertebrae (in centimeter):

<table>
<thead>
<tr>
<th>Part of vertebrae</th>
<th>View</th>
<th>Upper vertebra</th>
<th>Lower vertebra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>Antero-posterior</td>
<td>1.2</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Transverse</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>Inter-vertebral foramen</td>
<td>Antero-posterior</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Transverse</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Vertebral foramen</td>
<td>Vertical</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Fused lamina</td>
<td></td>
<td>3.1</td>
<td></td>
</tr>
</tbody>
</table>

Discussion:

**Embryological significance**

The vertebral column develops from paired somites, each composed of a dermatome, myotome and sclerotome. They arise initially in the cervical region (4th week), increasing in number cranio-caudally. In the 5th week, the sclerotomic cells of the somites lose their adherence and migrate to the vertebral centrum, neural processes and costal processes. Each thoracic neural process gives rise to a cartilagenous pedicle, transverse process, and lamina. The ossification centres arise, one for the centrum and one each for the neural processes. Their timing is idiosyncratic, starting in the 4th month at T10 and L1 (centra) and C2 and T1 (neural processes) and spreading up and down the column.

The segmentation of the vertebra occurs at the time of organogenesis. The non-segmentation of the primitive sclerotome is the cause for fused vertebra or block vertebra. The embryological time period for the occurrence of synostosis can be analyzed from the anatomical features. In this case, the pedicles and transverse process are not fused indicates that the initial development was normal.

Radiologically, three types of vertebral fusion have been described: Single fused cervical segment seen in 25% of patients, multiple, contiguous fused segments seen in 25% patients and multiple, non-contiguous fused seen in 50% patients.

**Clinical significance**

Anatomically, the intervertebral discs form a fifth of the post axial vertebral column. The absence of intervertebral disc therefore leads to shortening of the column and thereby shortening of the trunk. The thoracic vertebrae and the intervening disc along with the ribs help to maintain the shape and length of the thorax. Fusion of the vertebrae and the absence of the disc will narrow the thorax and can lead to respiratory distress. Asphyxiating thoracic dystrophy is caused by narrow thorax and short ribs.

Apart from the developmental anomalies the vertebral fusion can be associated with radiculopathy and myelopathy. The other associated complications mentioned are:

1. Neural axis-diastematomyelia, tethered cord, Arnold-Chiari malformation
2. Renal-unilateral horse-shoe kidney, duplicated kidney or ureters, hypospadiasis
3. Congenital heart disease
4. Musculoskeletal-club feet, Sprengel’s deformity, Klippel-Feil syndrome, dysplasia of hip, scoliosis
5. Jaw and external deformities, cleft palate, cervical rib.

**Conclusion:**

Fusion of the vertebra can be congenital or acquired. Embryologically, failure of resegmentation of the vertebra is the cause. The condition is acquired in trauma, tuberculosis and juvenile arthritis. This can lead to wide complications affecting different systems of body.

**References:**

Diny Thomas, Kulkarni Bhagwan Gangadhar: A case of fusion of thoracic vertebra
