



CASE REPORT

A CASE OF FUSION OF THORACIC VERTEBRA

DINY THOMAS¹, BHAGWAN GANGADHAR KULKARNI²

¹PG Scholar, ² Associate Professor, Dept of Sharira Rachana, SDMCA, Hassan

Corresponding author email: dinythomas85@gmail.com

Access this article online : www.jahm.in

Published by Atreya Ayurveda Publications, Ilkal-587 125 (India) All rights reserved.

Received on: 22/07/2013; Revised on: 09/08/2013; Accepted on: 13/08/2013

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 dept. of Shareera Rachana, SDMCA, 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, typical thoracic vertebrae

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 region¹. 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 children².

The vertebral column is derived from the sclerotomes of somites³. It is composed of vertebrae and inter-vertebral discs between them⁴. 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 region⁵. 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 trauma⁶.

The prevalence of vertebral synostosis in Lithuanian population is 2.6% of cervical vertebra fusion, 1.6% of thoracic vertebral fusion and 0.5% of Lumbar vertebral fusion⁷.

Case Report:

Methods

A study on 165 vertebral specimens collected in the dept. of Shareera Rachana, SDMCA, 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.

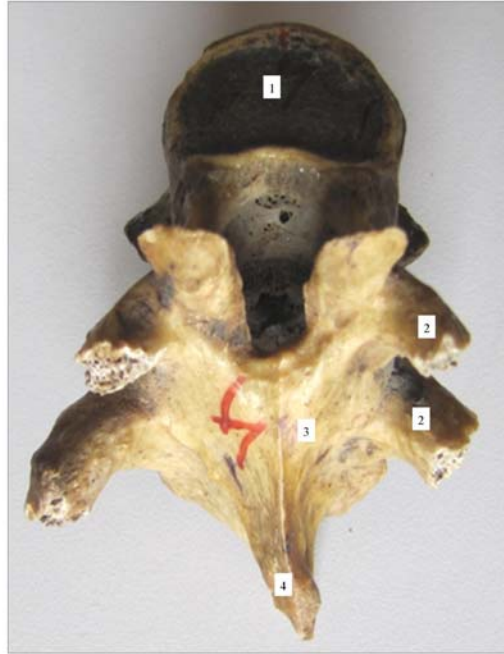
Part of vertebrae	View	Upper vertebra	Lower vertebra
Body	Antero-posterior	1.2	1.5
	Transverse	1.5	2
Inter-vertebral foramen	Antero-posterior	1	1.5
	Transverse	1	1.5
Vertebral foramen	Vertical	0.4	0.4
Fused lamina	3.1		

Table 1 showing dimensions of atypical vertebrae (in centimeter)



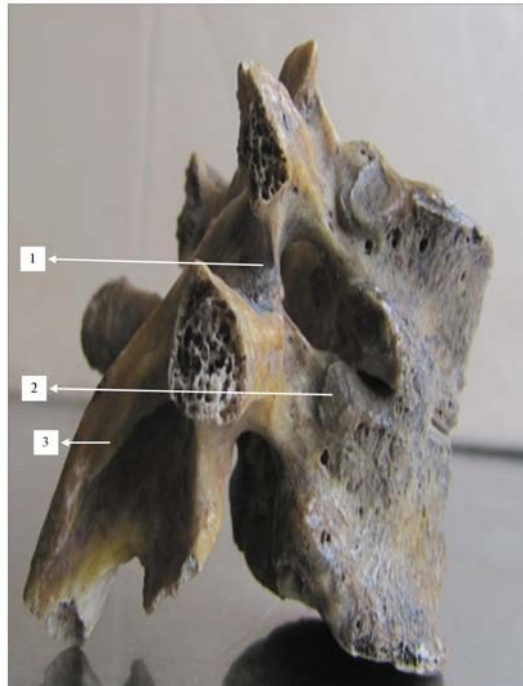
1. Fused body

Figure 1: Lateral view of vertebra



1. Body 2. Transverse process 3. Lamina 4. Spinous process

Figure 2 : Dorsal view of vertebra



1. Fused facets 2. Costal facets 3. Linear groove at fusion of laminae

Figure 3: Lateral view of vertebra



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 column⁸.

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 normal⁹.

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% patients¹⁰.

Clinical significance

Anatomically, the intervertebral discs form a fifth of the post axial vertebral column¹¹. 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 ribs¹².

Apart from the developmental anomalies the vertebral fusion can be associated with radiculopathy and myelopathy. The other associated complications mentioned are¹³:

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:

1. Seaver LH, Boyd E. Spondylocarpotarsal synostosis syndrome and cervical instability. *PubMed Am J Med Genet* 2000 Apr 24; 91(5): 340-4.
2. Al Kaissi A, Ghachem MB, Nassib N, Ben Chechida F, Kozlowski K. Spondylocarpotarsal synostosis syndrome (with a posterior midline unsegmented bar). *PubMed Skeletal Radiol* 2005 Jun; 34(6): 364-366.
3. Inderbir Singh, Pal G P. *Human Embryology*. 8th ed. India: Mac Millan Publishers Limited; 2007. p. 116.



www.jahm.in
(ISSN-2321-1563)



4. Datta A K. Essentials of Human Embryology. 6th ed. Kolkata: Current Books International; 2010. p. 278.
 5. Inderbir Singh, Pal G P. Human Embryology. 8th ed. India: Mac Millan Publishers Limited; 2007. p. 119.
 6. Erdil H, Yildiz N and Cimen M. Congenital fusion of cervical vertebrae and its clinical significance. Journal of Anatomical Society of India 2003; 52(2): 125-127.
 7. Masnicova S and Benus R. Developmental anomalies in skeletal remains from the Great Moravia and Middle Ages cemeteries at Devin. International journal of osteoarchaeology 2003; Vol.13: 266-274.
 8. Murray Brookes, Anthony Zietman. Clinical Embryology. USA: Library of Congress; 1998. p. 293.
 9. Vasudha Kulkarni, Ramesh B R. A spectrum of Vertebral Synostosis. International Journal of Basic and Applied Medical Sciences 2012; Vol. 2 (2) May-August: 71-77.
 10. Jin-Kyu Park, Han – Young Huh, Kyeong-Sik Ryu and Chun-Kun Park. Traumatic Hemiparesis associated with Type III KlippelFeil syndrome. Journal of Korean Neurosurgical Society 2007; Vol. 42: 145-48.
 11. Henry Grey, Editor. Grey's Anatomy, 38th ed, Churchill Livingstone 1995, p. 513.
 12. Satish Bhargava. Radiological Differential Diagnosis. 1sted. New Delhi: Japee Brothers; 2005. p. 528.
 13. Sameer Batra and Sashin Ahuja. Congenital Scoliosis: Management and future directions. Actaorthopeda Belgica 2008; 74: 147- 160.
- Cite this article as: Diny Thomas, Bhagwan Gangadhar Kulkarni. A case of fusion of thoracic vertebra. Journal of Ayurveda and Holistic Medicine 2013;1(5):27-31.

Source of support: Nil, Conflict of interest: None Declared