Lumbar Dorsal Hemivertebra – A Case Report

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Introduction:

Hemivertebra is one of the rare congenital vertebral anomalies commonly occurs in lumbar and thoracic spine, in which only one side of the vertebral body develops, resulting in deformation of the vertebral column such as scoliosis, kyphosis or lordosis. A hemivertebra acts as a wedge within the vertebral column, resulting in curvature away from the side on which it is present.Review of literature shows that the incidence of hemivertebra is estimated at 0.5-1.0 per 1000 births, with higher incidence for females compared with males (1&2)Hemivertebra may be associated with other congenital anomalies, which have been reported to be present in 61% of patients (3& 4).

Case Report:

A 52-year-old male presented in Accident and Emergency department with a complaint of severe low back pain. The pain was located in the lumbar area. Patient did not had any other complaints. No past surgical or medical history. Physical examination showed no significant findings, noneurological deficit and deep tendon reflexes were are all normal. A CT scan revealed a partially segmented hemivertebra of second lumbar vertebra (Figure 1).

Discussion:

A basic knowledge of development of vertebral column is important to understanding the patterns of malformation seen clinically for proper diagnosis and treatment.

In the early embryo, the paraxial mesoderm on either side of the developingneural tube differentiates into somites. The somites further differentiate into sclerotomes, groups of cells that ultimately give rise to the vertebral column and rib cage. The sclerotomal cells collect segmentally at the embryonic midline, surrounding the neural tube and the notochord, and form the precursors of the vertebral arch and vertebral body. Any deviation in the normal developmental pattern can give rise to different congenital vertebral anomalies. One of this type is hemivertebrae, result from lack of development of one of the paired chondral centers. Less commonly, posterior hemivertebrae result from failed anterior ossification (5,6&7). The defective vertebra acts as a triangular wedge-shaped ossified structure within the vertebral column, causing contralateral spine deviation at the level of the abnormal vertebra (8 & 9).Hemivertebrae are classified as Type I when there is a defect in formation,Type II when there is a defect in segmentation, and Type III is a mixed type of defect (10 &11) Based on natural history studies, Type I defectshave the worst prognosis with progressive deformityand neurological dysfunction (12-15).

The etiology of hemivertebra is unknown. Tanak et al. (16), and Forrester et al. (17), has suggested that hemivertebra may result from abnormal distribution of the intersegmental arteries of the vertebral column. In childrenshemivertebra may be seen with chromosomal abnormalities,
such as Trisomy 18 or Edward's Syndrome or chromosome deletions (18). Hemivertebra is commonly associated with other skeletal anomalies of the spine, cardiac and genitourinary system anomalies and anomalies of central nervous system. Hemivertebra may be part of syndromes including Jarcho-Levin, Klippel-

Fiel, and VACTERL (19), sometimeshemivertebra may be isolated or may occur in multiple areas within the vertebral column (20 &21).The defect in the notochord is responsible to the formation of cleft vertebrae is developmentally earlier than that which causes a dorsal hemivertebra, as the fusion of the originally two hemilateralprimodia of the vertebral body occurs before the ossification centres start their development.

References:

1. Weisz B, Achiron R, Schindler A, Eisenberg VH, Lipitz S, Zalel Y. Prenatal sonographic diagnosis of hemivertebra. J Ultrasound Med. 2004;23:853–857.

2. Wynne-Davies R. Congenital vertebral anomalies: Aetiology and relationship to spina bifida cystica. J Med Genet. 1975;12:280–288.

3. Basu, P.S., Elsebaie, H., and Noordeen, M.H.Congenital spinal deformity: a comprehensive assessment at presentation.*Spine*. 2002; 27: 2255–2259.

4. Winter, R.B., Haven, J.J., Moe, J.H., and Laggard, S.M. Diastematomyelia and congenital spine deformities. *J Bone Joint Surg Am*. 1974; 56: 27–39

5. Goldstein I, Makhoul IR, Weissmaan A, Drugan A. Hemivertebra: Prenatal diagnosis, incidence and characteristics. Fetal DiagnTher. 2005;20:121–126.

6. Moore KL, Peraud TVN. The Developing Human. 5th ed. Philadelphia, PA: W.B. Saunders; 1993.

7. Wax JR, Watson WJ, Miller RC, et al. Prenatal sonographic diagnosis of hemivertebrae – associations and outcomes. J Ultrasound Med. 2008;27:1023–1027.

8. Pilu JL. Hemivertebra. Thefetus.net 199913 Available at: (http://www.thefetus.net). Accessed on May 14, 2010.

9. Hefti F. Congenital anomalies of the spine. Orthopade. 2002;31:34–43.

10.McMaster MJ, Singh H: Natural history of congenital kyphosis and kyphoscoliosis. A study of one hundred and twelve patients. J Bone Joint Surg Am 81:1367–1383, 1999

11. Winter RB: Congenital kyphosis. ClinOrthopRelat Res (128):26–32, 1977.

12. Slabaugh PB, Winter RB, Lonstein JE, Moe JH: Lumbosacral hemivertebrae. A review of twenty-four patients, with excision in eight. **Spine (Phila Pa 1976) 5:**234–244, 1980

13. Williams F, McCall IW, O'Brien JP, Park WM: Severe kyphosisdue to congenital dorsal hemivertebra. ClinRadiol33:445–452, 1982.

14. Winter RB, Moe JH, Wang JF: Congenital kyphosis. Its natural history and treatment as observed in a study of one hundred and thirty patients. J Bone Joint Surg Am 55**:**223–256,1973.

15. Zidorn T, Krauspe R, Eulert J: Dorsal hemivertebrae in children's lumbar spines. Spine (Phila Pa 1976) 19:2456–2460, 1994.

16. Tanaka T, Uhthoff HK. The pathogenesis of congenital vertebral malformations. A study based on observations made in 11 human embryos and fetuses. ActaOrthop Scand. 1981;52:413–425.

17. Forrester MB, Merz RD. Descriptive epidemiology of hemivertebrae, Hawaii, 1986–2002. CongenitAnom. 2006:46172–46176.

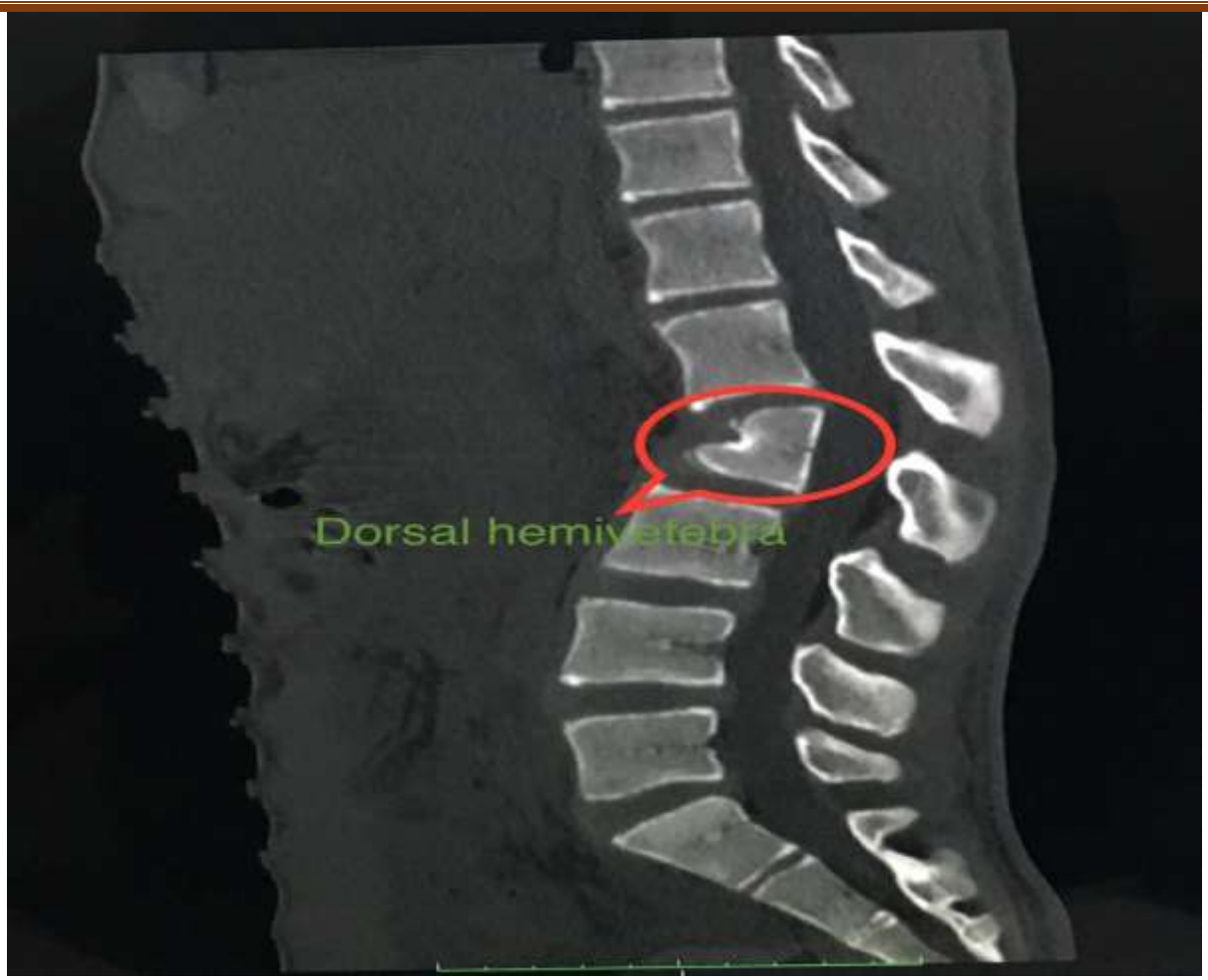
18. Cunningham FG.,Leveno KJ., Bloom SL, Hauth JC, Rouse DJ, Spong CY. Williams Obstetric, The McGraw-Hill Companies, Inc., USA. 2010.

19. Gauthier D.W., MD, Meyer W.J. MD Hemiverterbra, Department of Obstetrics and Gynecology, Division of Maternal-Fetal Medicine, University of Illinois College of Medicine, 820 South Wood Street, M/C 808, Room 250,Chicago, IL Copyrights © 1990-2010 TheFetus.net.

20. Connor JM, Conner AN, Connor RAC, Tolmie JL, Yeung B, Goudie D. Genetic aspects of early childhood scoliosis. Am J Med Genet. 1987;27:419–424.

21. David CV. Hemivertebra as a cause of scoliosis. J Bone Joint Surg. 1986;68:588–595.

Figure 1: Dorsal Hemivertebra at L_2 Level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