



HIGH GRADE DYSPLASTIC SPONDYLOLISTHESIS IN AN 11 YEAR OLD GIRL CHILD - A CASE REPORT

Orthopaedics

Dr. Kaiwan Randeria

Resident, Dept. of Orthopaedics, MGM Medical College, Aurangabad

Dr. Laxmikant Dragadia*

Asst. Professor, Dept. of Orthopaedics, MGM Medical College, Aurangabad.

*Corresponding Author

ABSTRACT

High-Dysplastic Developmental Spondylolisthesis (HDDS) is an extremely rare situation, comprising of around 5% of the total cases of spondylolisthesis.

Clinical Description :- A eleven year-old girl with high-grade dysplastic L5-S1 spondylolisthesis with pain in her lower back along with radicular pain to her lower limbs (right > left). Her X-rays depicted a L5 - S1 anterolisthesis leading to an abnormal kyphosis at lumbo-sacral junction, increased lumbar lordosis and reversal of thoracic kyphosis to lordosis.

Management:- A L5 - S1 posterior - spinal fixation was done along with a cage insertion at the L5 - S1 level.

Outcome:- Postural correction was achieved immediately post-op and the patient also had relief from the radicular symptoms.

KEYWORDS

High-Dysplastic Developmental Spondylolisthesis (HDDS) ; L5 - S1 posterior - spinal fixation

INTRODUCTION:

Congenital (developmental/dysplastic) spondylolisthesis comprises of 15% of spondylolisthesis presenting before adulthood^[1]. Out of these only 5% are of the High-Dysplastic (HDDS) type. Dysplastic spondylolisthesis occurs only at the L5 - S1 level and usually presents in females.^[2, 3] It has been established that there is a significant causative association of genetic factors and there is the presence of a strong familial preponderance. Congenital dysplasia of the L5 - S1 facet joints appears to be primarily responsible for HDDS. There may be poor development or elongation of the pars interarticularis. It may be associated with spina bifida occulta of L5 and / or the S1 vertebra and lumbosacral segmentation defects.^[4] There is rounding of the superior anterior aspect of the sacrum (sacral doming).

Classically, the L5 vertebra is trapezoidal in shape and acquires a kyphotic tilt in relation to the vertically oriented sacrum resulting in an increased lumbosacral angle. It can remain asymptomatic for a long time and can progress to a more severe grade of listhesis and spondyloptosis.^[5] During adolescence patients usually present low back pain and spinal stiffness. They may also present with lumbar hyperlordosis, hamstring shortening, flexed-hip and knee walking and toe gait. Patients do not always present with radicular symptoms due to adaptability of the nerves to compression or tension. Treatment of high-grade dysplastic spondylolisthesis (Meyerding grades III, IV and V) in a growing child is operative^[6].

Opinions regarding the surgical management of high-grade dysplastic spondylolisthesis in children and adolescents still remain controversial. When patients with confirmed high grade spondylolisthesis present, it is recommended to begin with trials of physical therapy and exercise except in rare cases where a cauda equina syndrome is encountered (as quoted by Sairyo K., Katoh S., Takata Y., et al.) Indications for surgical management of HGS include persistent symptoms, failure of conservative management, radiographic parameters suggestive of imminent slip progression, significant biomechanical stress, and global sagittal imbalance. More recently, it has been proposed that reduction techniques should be preferably used in individuals with evidence of abnormal posture in order to restore global spino-pelvic balance and improve the biomechanical environment for fusion^[7]. We present a case of high-dysplastic developmental spondylolisthesis (HDDS) treated operatively, with a note on the surgical technique adopted.

CASE REPORT:

A 11 year old girl was presented to us with complaints of pain in her low back along with radiation to her lower limbs (right > left) for the past 1 year. The pain was aggravated on walking and leaning forward and relieved on rest. This pain was affecting her activities of daily living. Clinically, she had an abnormal kyphosis at lumbo-sacral junction, increased lumbar lordosis and reversal of thoracic kyphosis to lordosis. Her neurology was normal with a power of 3/5 in all four limbs with normal reflexes.

Her X-rays depicted a Grade-III L5 - S1 anterolisthesis, an elongated

intact pars interarticularis, vertically oriented sacrum with doming of the sacral end plate, trapezoidal L5 and lumbosacral kyphosis, consistent with the diagnosis of a HDDS as classified by Marchetti and Bartolozzi.^[8] Magnetic Resonance Imaging (MRI) scan showed decreased spinal canal dimensions at the L5-S1 level leading to severe canal and foraminal stenosis due to a diffuse disc bulge with bilateral posterolateral protrusions of disc along with facet and ligamentum flavum hypertrophy. There was compression on intrathecal and exiting nerve roots exaggerated by listhesis.

Figure 1

Pre-Operative Clinical Images

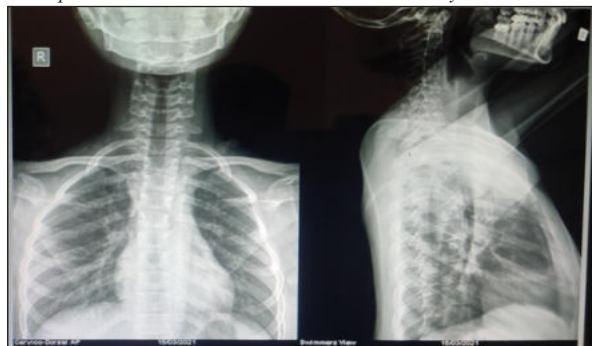
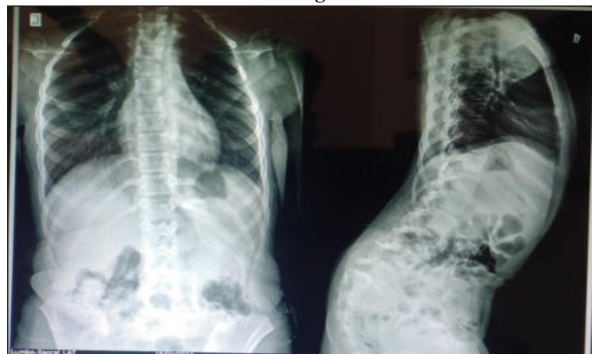
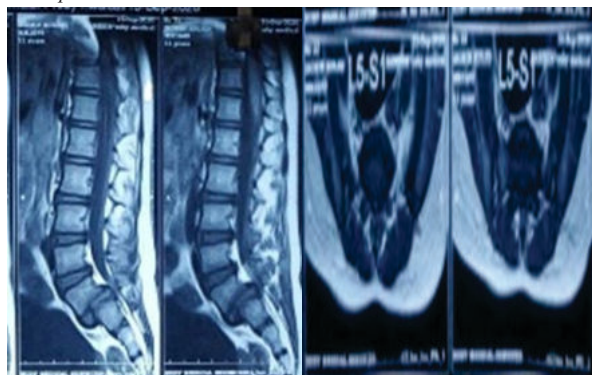
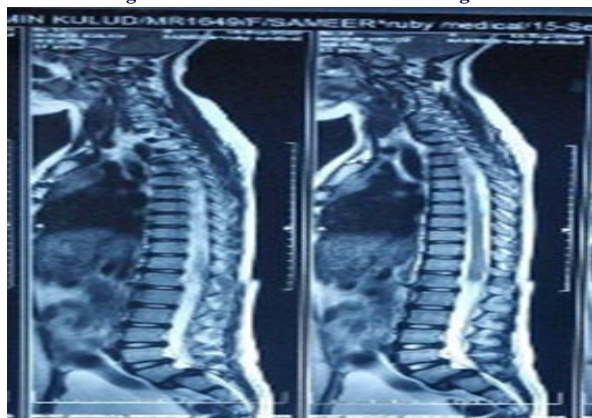


Figure 1a



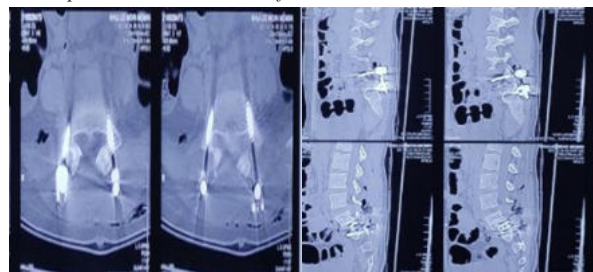
Figure 1b

Figure 1c

Figure 2*Pre-Operative Dorso-Lumbar + Lumbo-Sacral X-Ray***Figure 2a****Figure 2b****Figure 3***Pre-Operative MRI Scans***Figure 3a****Figure 3b****Figure 3c****OPERATIVE PROCEDURE:**

A mid-line posterior approach was taken, soft tissue and muscle were dissected, L5-S1 pedicles were exposed from both the sides, Rattler's fragment was excised out, bilateral L5 and S1 nerve root exposed and decompressed thoroughly; pedicle screws inserted at L5 and S1 level

on either side. Special care needs to be taken to localise and decompress bilateral L5 (exiting) nerve roots, as these are at significant risk during reduction manoeuvre. Connecting rods placed with gentle distraction on one side which helped in reduction of the listhesis. Disc space was prepared for cage placement at L5-S1 level to correct the lordosis. Local bone graft from rattler fragment was inserted in the cage and was put under image intensifier guidance which further helped in the reduction. Opposite side connecting rod was then applied. Intra-operatively the correction of lordosis was achieved after final tightening and rod placement.

Figure 4*Post-Operative X-Ray***Figure 5***Post-Operative C.T. Scan to Confirm Pedicle Screws' Placement***Figure 5a****Figure 5b****RESULTS-ANALYSIS OF OUTCOME**

The patient cited good relief of her radicular complaints post operatively. She was mobilised on post-operative day 2 and had good postural correction too. Her post-operative neurology status was normal.

Figure 6*Clinical Photos on Post-Operative Day 2***Figure 6a****Figure 6b**

Figure 7*Clinical Photos on 6 Months' Follow-up***Figure 7a****Figure 7b****Figure 7c****DISCUSSION**

The surgical management of high-grade dysplastic spondylolisthesis in children and adolescents still remains conflicting and controversial. The spectrum of available surgical options include, instrumented in-situ fusion, instrumented reduction and fusion or un-instrumented in situ fusion which may be posterolateral, anterior or circumferential and vertebrectomy (Gaines procedure)^[9].

Even though modern surgical techniques and instrumentation permit reduction or even removal of a severely slipped fifth lumbar vertebra, the benefits of reduction still remain controversial.^[10,11] Despite modern neurophysiologic monitoring (somatosensory and motor evoked potentials), these instrumented reduction procedures present the possibility of severe neurological complications.^[12] According to available literature, instrumented reduction of L5-S1 high-grade spondylolisthesis is associated with an 8–30% rate of post-operative neurological compromise, mostly consisting of nerve root injuries or cauda equina syndrome.

There is a relatively high incidence of well documented complications associated with reduction, including instrumentation failure, loss of reduction and pseudoarthrosis.^[13,14] The point of debate is whether a reduction of the spondylolisthesis should be performed along with the fusion procedure or an in-situ fusion is a satisfactory strategy in such a clinical scenario.^[15,23] In-situ fusion procedures have been associated with reports of slip progression, higher risk of pseudoarthrosis and persistence of cosmetic deformity^[18,24,26].

Laminectomy-decompression was performed since our patient had radicular complaints. This is consistent with the fact that patients do not always present with radicular symptoms due to adaptability of the nerves to compression or tension. The drawback of laminectomy is that decompression in the presence of instability will further weaken the posterior buttress with postoperative progression of slip and of lumbosacral kyphosis.

We therefore recommend decompression only when patients present with radicular symptoms. Even though reduction may improve the cosmetic appearance post-operatively, very few patients complain about their cosmetic appearance in the long-term and indeed their appearance is improved by relief of hamstring tightness and correction of sciatic scoliosis.

REFERENCES

- Nalli Ramanathan Uvaraj & Aju Bosco - Surgical Treatment of High-Dysplastic Developmental Spondylolisthesis in a Child: A case report, <http://www.ijcasereportsandimages.com> 011-2014-ijcri-
- Wiltse LL, Newman PH, Macnab I. Classification of spondylolysis and spondylolisthesis. Clin Orthop Relat Res 1976 Jun; (117):23–9.
- Lonstein JE. Spondylolisthesis in children. Cause, natural history, and management. Spine 1999 Dec 15; 24(24):2640–8.
- Wynne-Davies R, Scott JH. Inheritance and spondylolisthesis.- A radiographic family survey. J Bone Joint Surg Br 1979 Aug; 61-B (3):301–5.
- Ploumis A, Hantziadis P, Dimitriou C. -High grade dysplastic spondylolisthesis and spondylolysis: Report of three cases with surgical treatment and review of literature. Acta Orthop Belg 2005 Dec; 71(6):750–7.
- Marchetti PG, Bartolozzi P. -Classification of Spondylolisthesis as a guideline for treatment. In: Bridwell KH, DeWald RL. The Textbook of Spinal Surgery, 2nd ed. Philadelphia: Lippincott 1997.p.1211–54.
- O'Sullivan PB, Phytz GD, Twomey LT, Allison GT. - Evaluation of specific stabilizing exercise in the treatment of chronic low back pain with radiologic diagnosis of spondylolysis or spondylolisthesis. Spine (Phila Pa 1976) 1997; 22(24):2959–2967.
- ASSI-INDIAN SPINE JOURNAL-Surgical management of spondylolisthesis. Volume

4, year 2021

- Nalli Ramanathan Uvaraj1, Aju Bosco2- Surgical treatment of high-dysplastic developmental spondylolisthesis in a child: A case report
- Fairbank JCT, Pynsent PB. - The Oswestry Disability Index. Spine 2000; 25:2940–53.
- Helenius I, Lamberg T, Osterman K, et al. -Posterolateral, anterior, or circumferential fusion in situ for high-grade spondylolisthesis in young patients: A long-term evaluation using the Scoliosis Research Society Questionnaire. Spine 2006 Jan 15; 31(2):190–6.
- Poussa M, Schlenzka D, Seitsalo S, Ylinkoski M, Hurri H, Osterman K. -Surgical treatment of severe isthmic spondylolisthesis in adolescents. Reduction or fusion in situ. Spine 1993 Jun 1; 18(7):894–901.
- Muschik M, Zippel H, Perka C. - Surgical management of severe spondylolisthesis in children and adolescents. Anterior fusion in situ versus anterior spondylodesis with posterior transpedicular instrumentation and reduction. Spine (Phila Pa 1976) 1997 Sep 1; 22(17):2036–42.
- Poussa M, Remes V, Lamberg T, et al. -Treatment of Severe Spondylolisthesis in Adolescence With Reduction or Fusion In Situ: Long-term Clinical, International Journal of Case Reports and Images, Vol. 5 No. 11, November 2014. ISSN – [0976-3198] Int J Case Rep Images 2014; 5(11):784–789.
- Freeman BL 3rd, Donati NL. -Spinal arthrodesis for severe spondylolisthesis in children and adolescents. A long-term follow-up study. J Bone Joint Surg Am. 1989; 71(4):594–598.
- Molinari RW, Bridwell KH, Lenke LG, Ungacta FF, Riew KD. - Complications in the surgical treatment of paediatric high-grade, isthmic dysplastic spondylolisthesis. A comparison of three surgical approaches. Spine (Phila Pa 1976). 1999; 24(16):1701–1711.
- Muschik M, Zippel H, Perka C. - Surgical management of severe spondylolisthesis in children and adolescents. Anterior fusion in situ versus anterior spondylodesis with posterior transpedicular instrumentation and reduction. Spine (Phila Pa 1976). 1997; 22(17):2036–2042; discussion 2043.
- Cheung EV, Herman MJ, Cavalier R, Pizzutillo PD. - Spondylolysis and spondylolisthesis in children and adolescents: II. Surgical management. J Am Acad Orthop Surg. 2006; 14(8):488–498.
- DeWald CJ, Vartabedian JE, Rodts MF, Hammerberg KW. - Evaluation and management of high-grade spondylolisthesis in adults. Spine (Phila Pa 1976). 2005; 30(6 Suppl):S49–59.
- Harris IE, Weinstein SL. - Long-term follow-up of patients with grade-III and IV spondylolisthesis. Treatment with and without posterior fusion. J Bone Joint Surg Am. 1987; 69(7):960–969.
- Lonstein JE. - Spondylolisthesis in children. Cause, natural history, and management. Spine (Phila Pa 1976). 1999; 24(24):2640–2648.
- Sailhan F, Gollogly S, Roussouly P. - The radiographic results and neurologic complications of instrumented reduction and fusion of high-grade spondylolisthesis without decompression of the neural elements: a retrospective review of 44 patients. Spine (Phila Pa 1976). 2006; 31(2):161–169; discussion 170.
- Seitsalo S, Osterman K, Hyvärinen H, Schlenzka D, Poussa M. - Severe spondylolisthesis in children and adolescents. A long-term review of fusion in situ. J Bone Joint Surg Br. 1990; 72(2):259–265.
- Helenius I, Lamberg T, Osterman K, et al. - Posterolateral, anterior, or circumferential fusion in situ for high-grade spondylolisthesis in young patients: a long-term evaluation using the Scoliosis Research Society questionnaire. Spine (Phila Pa 1976). 2006; 31(2):190–196.
- Shufflebarger HL, Geck MJ. - High-grade isthmic dysplastic spondylolisthesis: monosegmental surgical treatment. Spine (Phila Pa 1976). 2005; 30(6 Suppl):S42–48.
- Ruf M, Koch H, Melcher RP, Harms J. - Anatomic reduction and monosegmental fusion in high-grade developmental spondylolisthesis. Spine (Phila Pa 1976). 2006; 31(3):269–274.