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Outcome Analysis of Indirect Reduction and Decompression by Ligamentotaxis with the Help of Pedicle Screw and Rod System in Thoracolumbar Spine Injuries

Running title: Ligamentotaxis in Thoracolumbar Spine Injuries

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Abstract: ***Background: In thoracolumbar fractures which type of fixation is superior between short segment fixation ,long segments fixation, intermediate screw fixation is not very well known. But due to lack of any powerful evidence it is said that with few pros and cons some are better than others. The aim of this study is to analyse the outcome of ligamentotaxis with the help of pedicle screw and rods system. Method: A study was conducted on 40 patients of thoracolumbar burst fractures . All patients were of age range from 15 to 60 years ,among them 25 male and 15 female treated with conventional pedicle screw and rod (short segment fixation).Parameters evaluated are vertebral body height , kyphosis correction, neurological outcome, correction loss at follow up, instrumentation failure . Follow up period was from immediate post op to 3 years. Result: Patients improved in terms of vertebral body height restoration, neurological improvement (among 6 patients with grade A ,4 patients have improved upto grade C, while 2 patients improved upto grade B . Average kyphotic deformity decreased from 25.12^0 to 4.5^0. While implant failure seen in 4 patients and correction loss seen in 2 patients on follow up. Conclusion: With some implant failure, it is seen that ligamentotaxis with pedicle screw and rod is effective method in fixation of thoracolumbar injury.***

Keywords: Thoracolumbar fracture, Burst fracture, Short and long segment fixation, Ligamentotaxis

1. Introduction

Thoracolumbar burst fractures are the most common injuries of spine due to trauma and controversies regarding their conservative and surgical treatment is topic of debate [(1,2)]. Various surgical methods are used for treatment like short segment fixation,long segment fixation, Intermediate screw fixation, direct decompression by laminectomy , corpectomy, and indirect decompression [(3,4,5).]

Intact posterior longitudinal ligament is an important criteria for ligamentotaxis as it prevent retropulsion of fractured fragment[(6)]. Anterior approaches are used to decompress canal directly[(7,8,9,10)]. 60% of spinal injuries affect thoracolumbar spine[(11)]. Neurological injuries are seen in almost 20% of these patients [12]. Earlier non surgical treatment was advised but later on it was reported that surgical treatment is more beneficial[13,14].

2. Material and Method

Study is prospective and retrospective, conducted in Department of Orthopaedics, Traumacentre, IMS, BHU, Varanasi.

Inclusion criteria

- Single level of thoracolumbar fracture.
- Traumatic etiology.
- Cauda equina syndrome.
- Patient with or without neurological deficit.

Exclusion criteria-

- Fractures due to non traumatic etiology.
- Multiple level fractures.
- Chance fracture or rotational injuries.

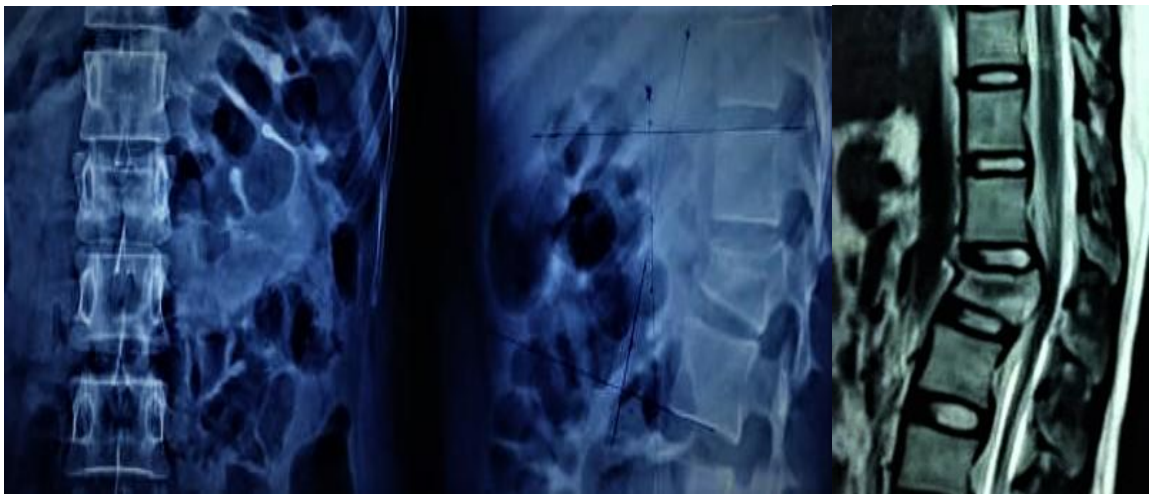
Pic 1: Giving Adrenaline injection at incision site for hemostasis

Pic 2: Incision given by marking fracture level

Pic 3: Final picture after Decompression+ instrumentation with four pedicle screw and 2 rods.

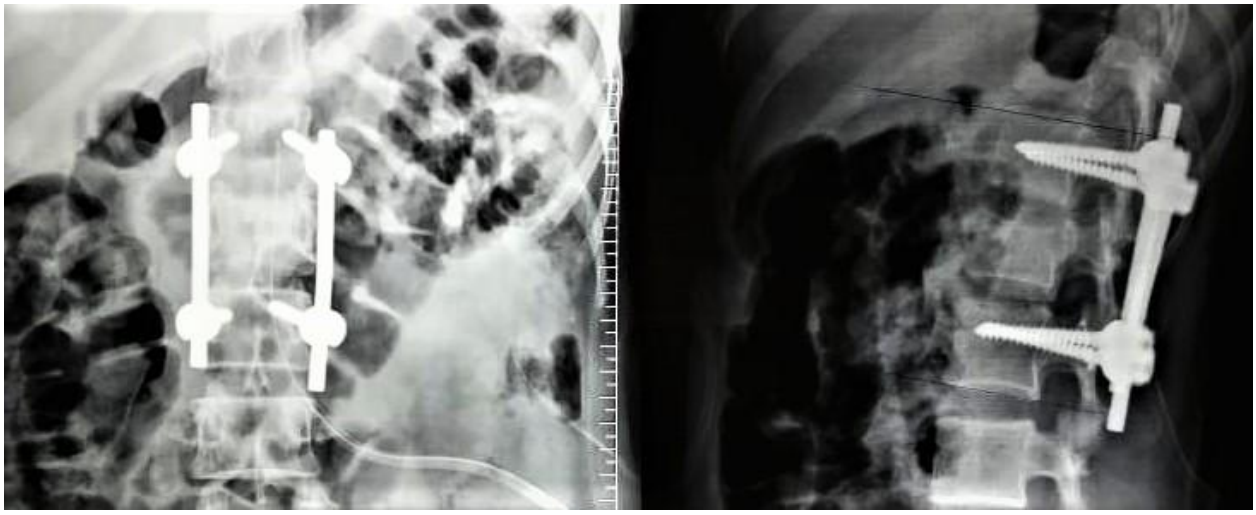
Pic 4: Neurological examination after 1 yr follow up

Pic 5: Scar mark after suture removal

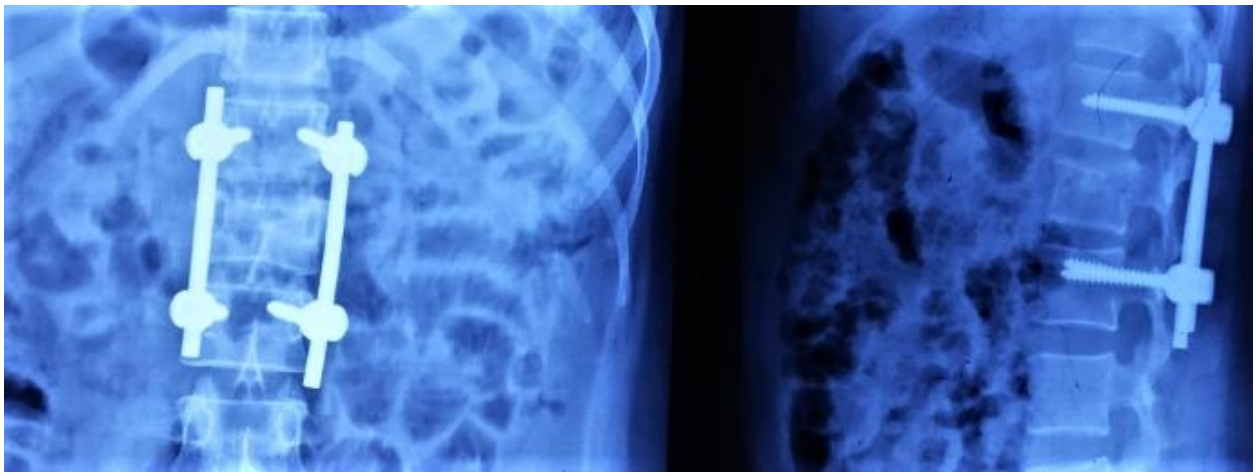


Pic 6: Preop Xray and MRI showing vertebral fracture and cord compression

Preop xray and mri -15 yr female with wedge compression fracture Of L2 vertebrae with neurological deficit

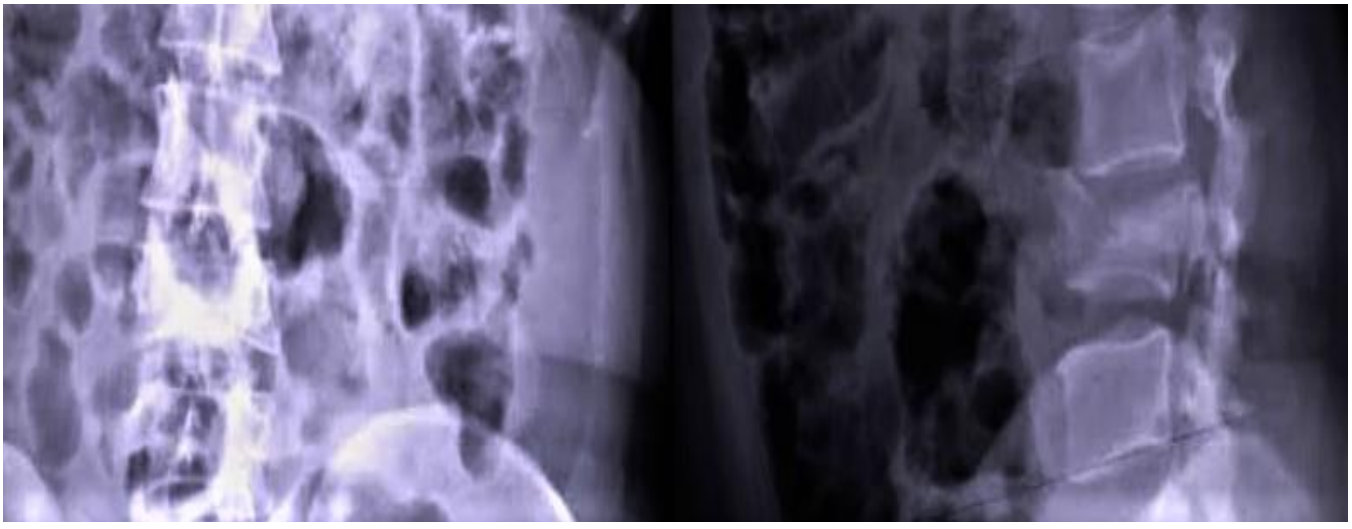


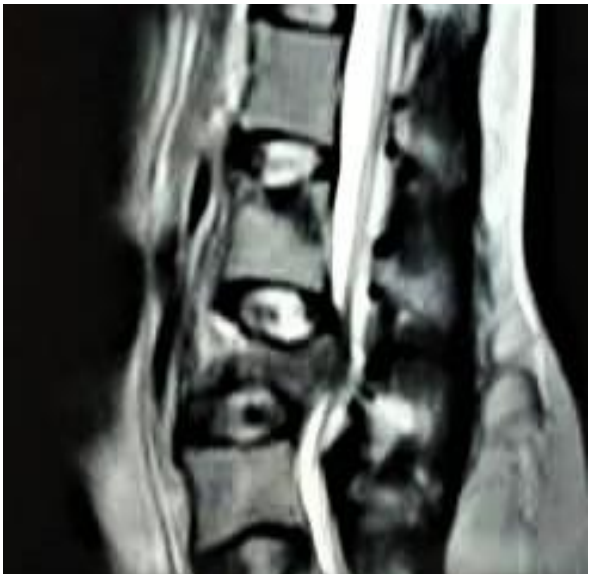
Pic7: Immediate postop xray showing restoration of vertebral height



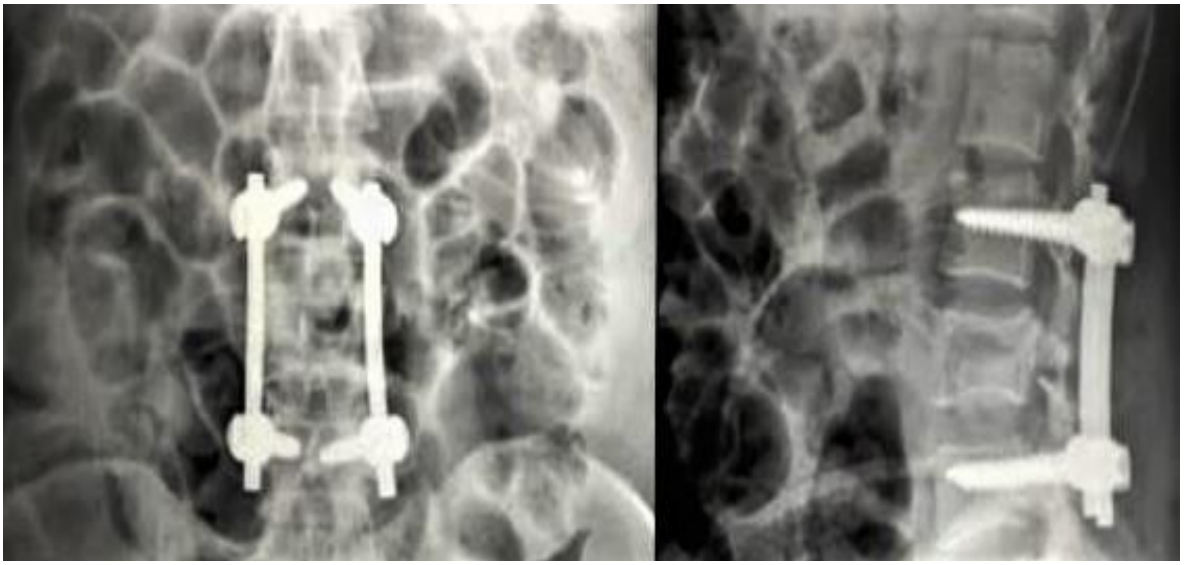
Pic 8: FOLLOWUP XRAY AT 18 MONTHS

CASE 2

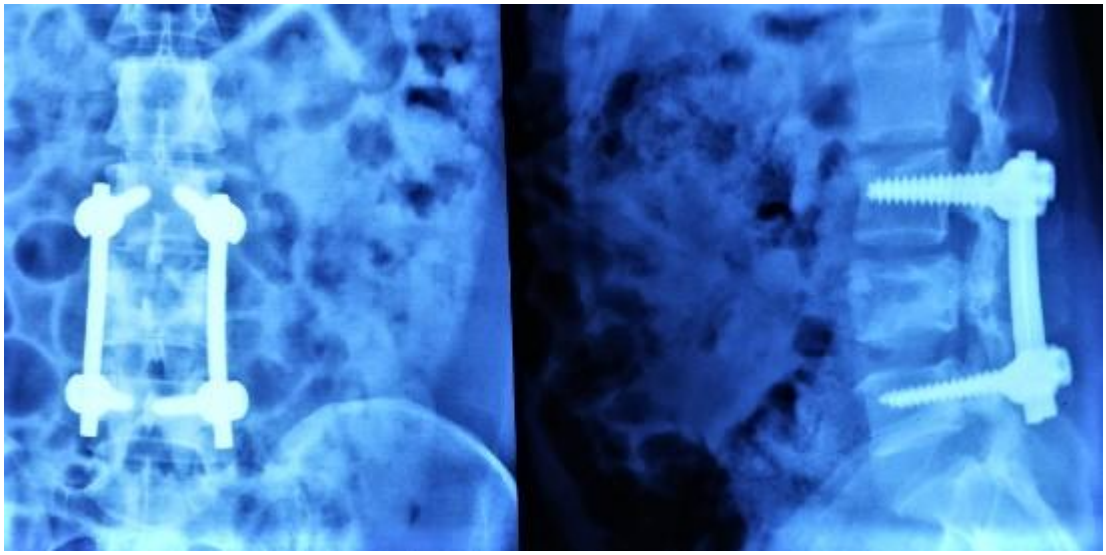




Pic 9: PRE OP XRAY AND MRI OF 25 YR FEMALE PRESENTING WITH BURST FRACTURE OF L4 VERTEBRAE

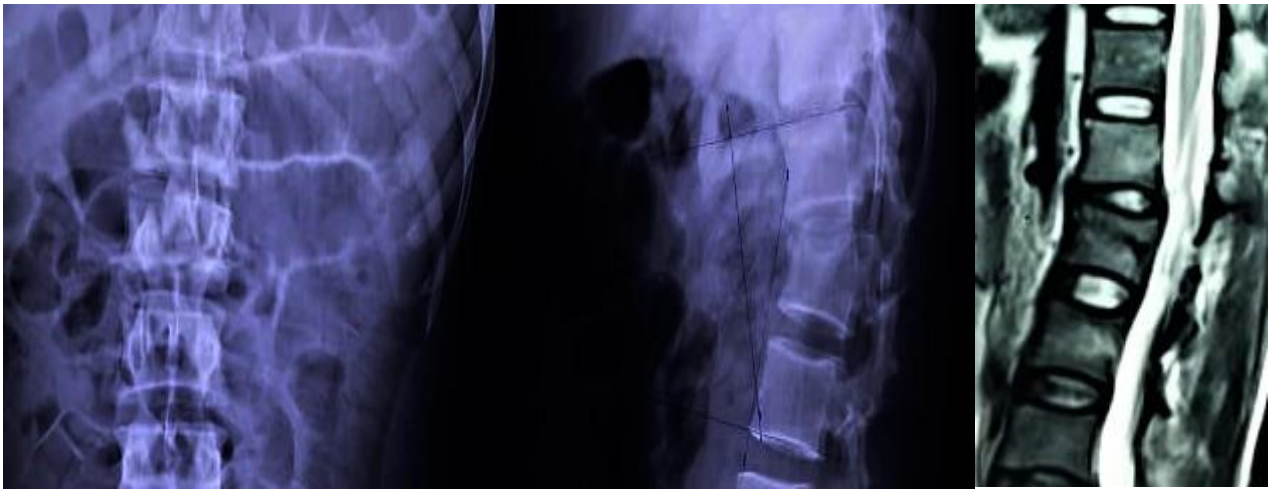


Pic 10: IMMEDIATE POSTOP XRAY

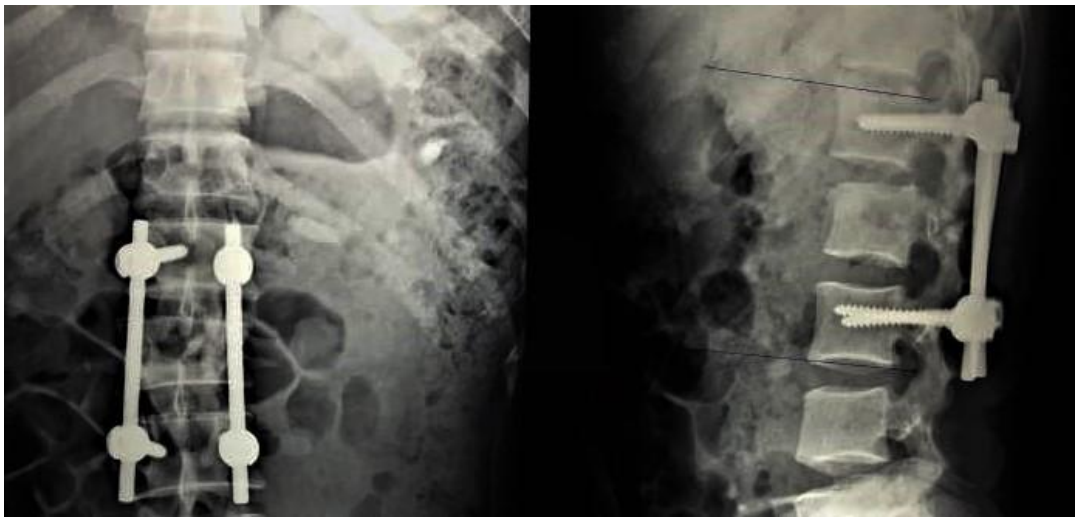


Pic 11: POST OP XRAY AT 1 YEAR

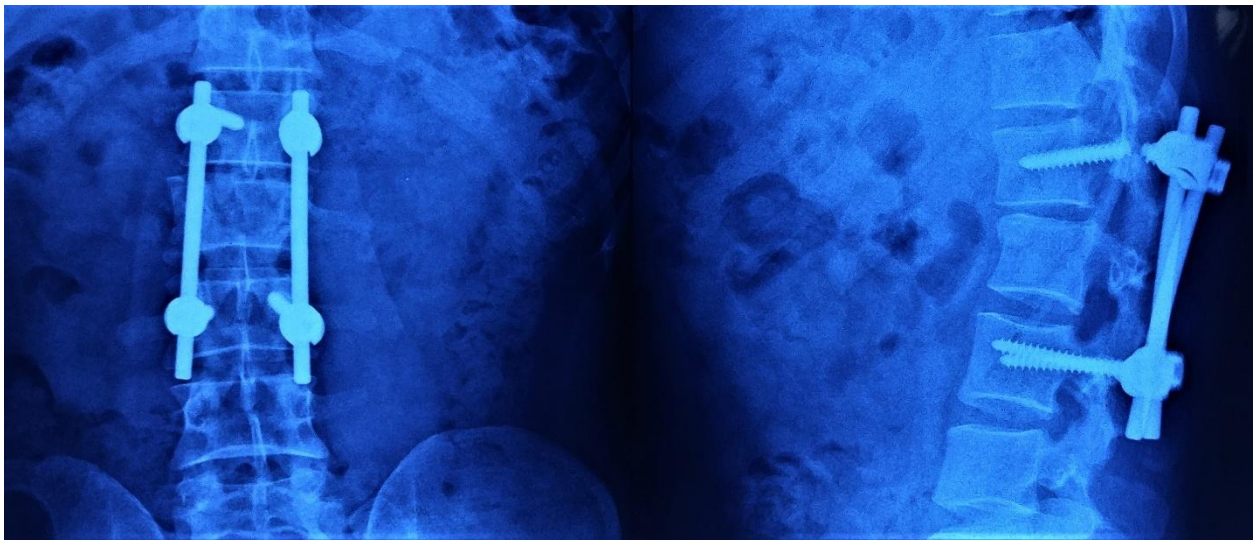
Case 3



Pic 12: PREOP XRAY AND MRI OF 22 YR OLD MALE WITH L2 VERTEBRAE FRACTURE



Pic 13: Immediate postop xray-showing height restoration and kyphotic correction



Pic 14: Followup at 18 months showing instrumentation failure and broken pedicle screws

3. Results

Pair 1	Pre-operative KA	24.38	3.894	< 0.001
	Immediate KA	4.25	2.790	
Pair 2	Pre-operative KA	24.38	3.894	< 0.001
	Follow KA	4.25	2.790	
Pair 3	Pre-operative AVH/PVH	0.74	0.079	< 0.001
	Immediate AVH/PVH	0.8672	0.085	
Pair 4	Immediate AVH/PVH	0.8672	0.085	< 0.001
	Follow AVH/PVH	0.8672	0.085	
Pair 5	Pre-operative AVH/PVH	0.74	0.079	<0.001
	Follow AVH/PVH	0.87	0.085	

KA- KYPHOTIC ANGLE, AVH- ANT VERT HEIGHT , PVH- Post Vert Height

As seen from result that p value is less than .001 ,it is conclusive that after surgery difference is significant that is after ligamentotaxis kyphotic angle is improved, vertebral height is restored. Although neurological improvement is not seen in all patients.

4. Discussion

Although treatment modality of spine trauma between various method is controversial. Good result are seen in both conservative and surgical treatment[15,16,17,18,19,20].But with non operative treatment there are high risks of prolonged recumbency and hospital stay while operative management gives early mobilization. In thoracolumbar burst fractures in which there is intact posterior longitudinal ligament ,such patient can be treated by short segment fixation by putting pedicle screw one level above and below. Although it is difficult to decide that PLL is intact or not by seeing image, however facet joint destruction, rotational injury and retropulsed fragment in canal are indicative of torn PLL[21].although most commonly used conventional method is short segment fixation in which it is seen that patient improved in all parameters like kyphotic correction, height restoration, neurological improvement . Although few cases of instrumentation failure are seen in short segment fixation.

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