

SPONDYLOLISTHESIS

DEMOGRAPHIC: Spondylolisthesis

- 500 students [Fredrickson] Incidence of lumbar spondylolysis of 4.4% in patients < 6 years.
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- For an adult incidence of 6%.
- 90% lytic defects occurred at the L5-S1
- Slippage was identified in 74% with pars defects at L5-S1 but was not at other level.
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- In a 45-year natural history study of 30 subjects with pars defects [Beutler]
Adults with unilateral pars defects tend not to develop listhesis
Adults with bilateral pars defects who did not have listhesis at the time of diagnosis had **with half showing no listhesis over 45 years and the other half slipping a mean of 24%.**
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- Subjects with slippage at the time of diagnosis went on to additional slippage of 7% to 20%.
Listhesis at the L4-L5 level constitutes approximately 10% of all slips and is associated with greater progression and symptoms.
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- The incidence of slip progression in asymptomatic adults with bilateral defects at L5 is estimated to be 5%, with the overall likelihood of progression decreasing with age.
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- Slip progression is estimated to occur in 20% of symptomatic adults, with disk degeneration at the slip level in all.
- **Progression >10 mm occurs in <5% of subjects.**

DISC DEGENERATION IN LISTHESIS

- The incidence of spondylolisthesis increased with age from 17% in the second decade to 51% in the sixth.
- The transverse process was significantly more slender in patients with advanced degeneration at L5/S1.
- There was a significant correlation between the vertical thickness of the transverse process of L5 and the ventral slip.
- The torsional and shear forces on the lower lumbar levels were considered to be a probable cause of disc failure. [Farfan *J BJS[Am]* 1970; 52-A:468-97. The defect of the pars interarticularis is thought to increase rotational and sagittal loading on the subjacent disc.
- *J Bone Joint Surg [Br]* 1999;81-B:240-4.DIS

With Listhesis; slender Transverse process and L5/S1 degeneration



With Spondylolysis; thick transverse
process and L4/5



- 1. We considered that the vertebral slip in patients with an isthmic defect may increase with ageing, and that the shape of the transverse process of L5 may affect the patterns of disc degeneration at the adjacent levels
- 2. The relative thickness of the transverse process: the RT was also significantly less in spondylolisthesis than in spondylolysis of L5 without slip. A reduced thickness was considered to represent functional insufficiency of the iliolumbar ligament. This may be accelerated by degeneration with ageing and result in degeneration of the subjacent L5/S1 disc and vertebral slip of L5.

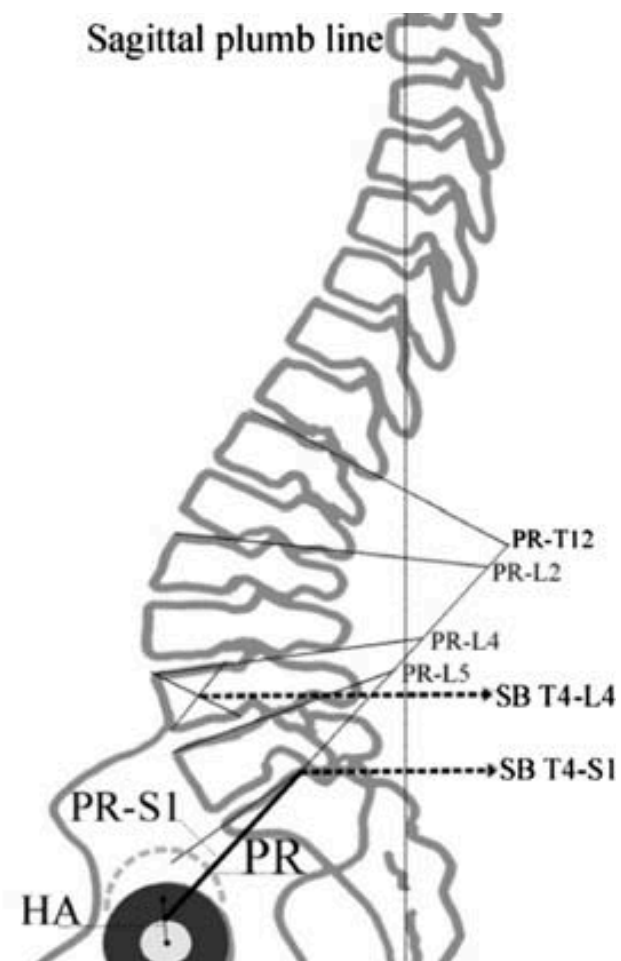
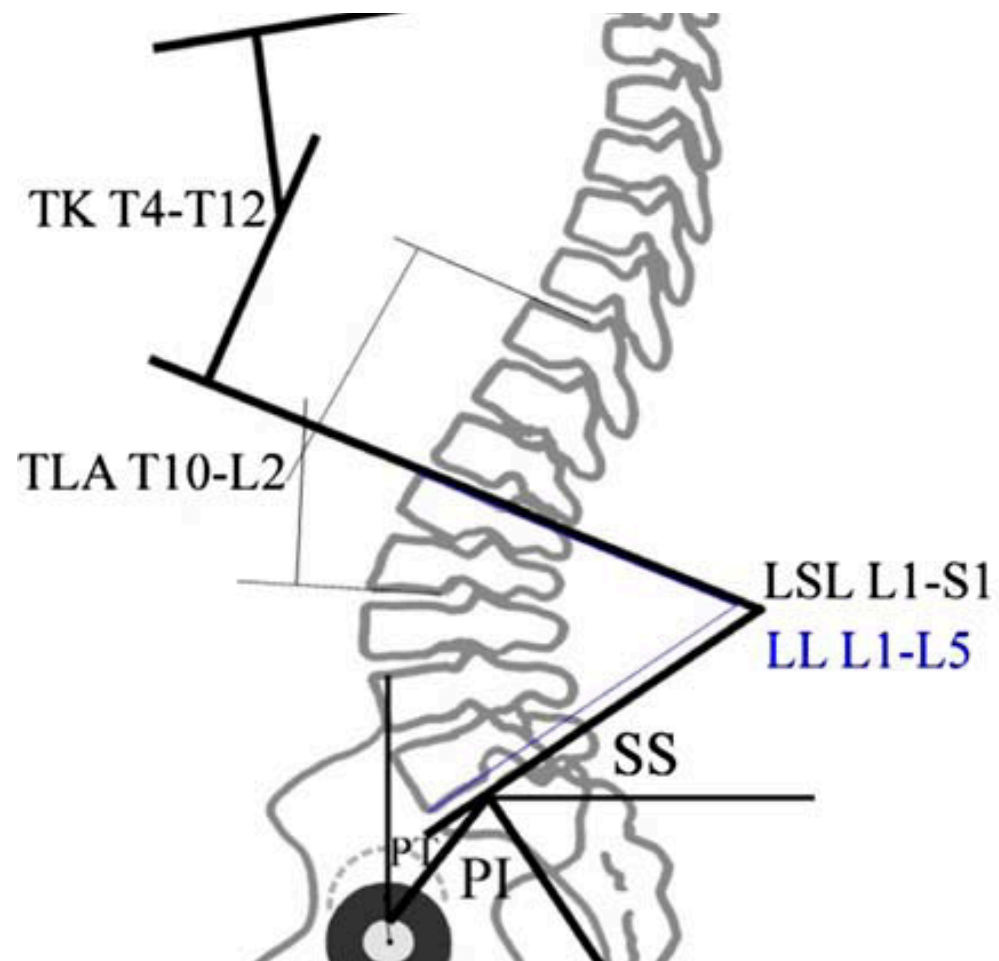
Thoracolumbar fracture with late kyphosis

1. Eur Spine J (2008) 17:1073–1095
2. Eur Spine J (2004) 13 : 101–107
3. Eur Spine J (2007) 16:1925–1933
4. Cochrane Database Syst Rev. 2006 Oct 18;(4):
5. J Bone Joint Surg Am. 2003 May;85-A(5):773-81.

- There is an increasing consensus that surgery is indicated for patients with neurological deficit and/or three-column injuries
- Therapeutical concepts include nonsurgical treatment for A1.2/A3.1 fractures with <15° of kyphosis
- Anterior-only and combined surgery in A3.1 and 3.3 fractures, respectively [41], or if kyphosis <20°
- Anterior + Posterior surgery: anterior column collapse >50% or kyphosis > 20°

- Casting was judged useful for initial pain control; it allows for early mobilization. Nevertheless, because of the mechanical limits of external orthosis, collapse of the vertebra is not prevented
- Outcome was excellent or good in 66%, and 62% in the current series. However, 34% of their series and 38% of the current had a fair or poor outcome.
- There was a strong correlation between age and a decreased outcome in terms of the VASSpine- Scores in the TLB burst fractures.
- Weinstein et al. [95] reported on minimal or no pain in 72% of 42 patients 20 years after burst fractures at T10–L5. Advanced pain was present in 28% of patients and 57% of patients never achieved painlessness. Spine 13:33–38.

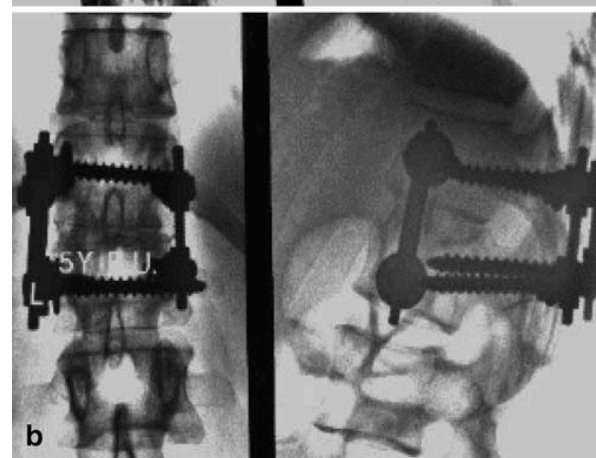
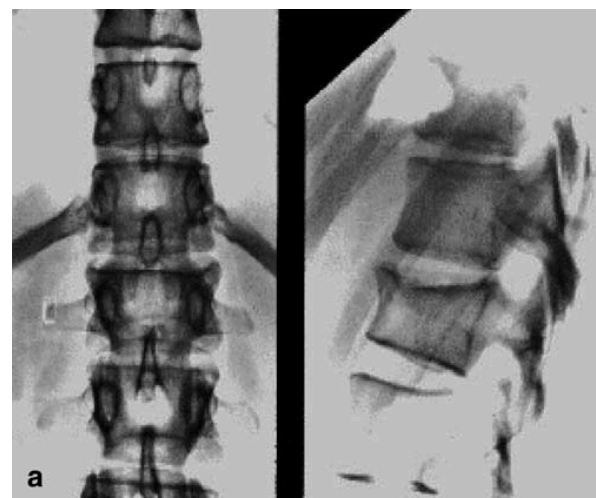
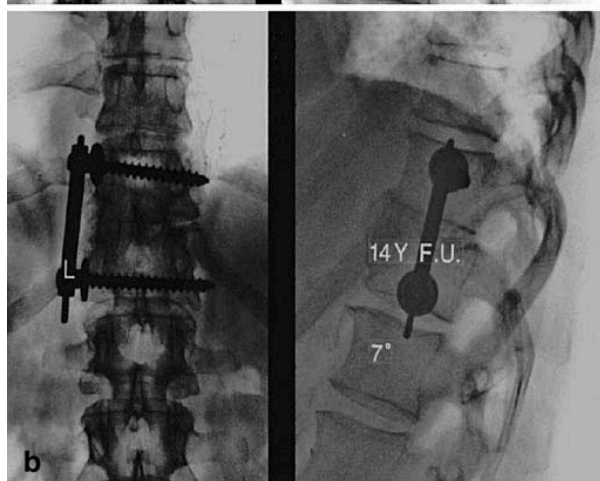
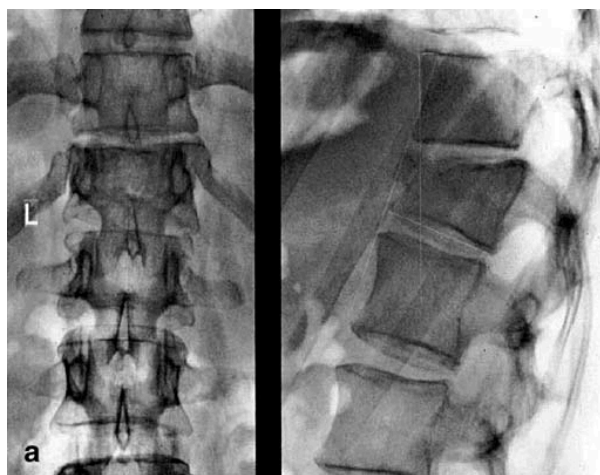
- The authors demonstrated that the global spine adjusted for the local posttraumatic kyphotic deformity within the ranges dictated by the spinopelvic geometry.
- The current findings and review of literature suggest that from an anatomical standpoint, the ideal treatment of the more severely-crushed burst fractures (LSS C6 points) is complete kyphosis correction with long-term correction maintenance
- Can result in a gradual but persistent loss of function that may lead to the development of chronic complications over time
- Whether long-standing sequelae, such as muscle fatigue and capsular insufficiencies with burned-out adjacent-level adaptabilities might be associated with a measureable spinal imbalance and alteration of the sagittal curve of the fractured spine is yet to be answered.



- Measurement techniques for assessment of spinal balance and spinopelvic parameters.
- PI [pelvic incidence], PT pelvic tilt, SS sacral slope, LSL lumbosacral lordosis L1-S1, LL lumbar lordosis L1-L5, TLA thoracolumbar junction angle, T10–L2, TK thoracic kyphosis T4–T12.
- L4/S1 sagittal balance w/plumb line from T4 to reference point at center of L4 and posterior corner of S1, respectively.
- HA hip axis, PR pelvis radius, PR– S1 pelvic morphology, PRT12– L5 lumbopelvic lordosis according to pelvis radius technique

Eur Spine J (2004) 13 : 101–107

- The surgical management of post-traumatic thoracolumbar kyphosis remains controversial.
- It is concluded that in cases of post-traumatic thoracolumbar kyphosis after simple type A fractures, mono-segmental correction using an anterior procedure alone, with spondylodesis, is the surgical procedure of choice.



- 1. Post-traumatic deformities can be observed with both conservative and inadequate surgical treatment of spinal injuries. The deformity is often associated with pain.
- 2. The pain may emanate from the site of the deformity itself, the injured disc level, a bony nonunion, or from the lordotic compensation above and below the deformity site, where added stresses are placed on the respective facet joints.
- 3. In patients with associated neurological complications, posttraumatic tethered cord due to dural adhesions, myelo-degeneration and post-traumatic syringomyelia can cause severe pain
- 4. The kyphosis is often fixed and rigid, and correction is difficult. In the presence of healed and contracted anterior soft tissue. Finally, the spinal cord cannot be adequately decompressed through the posterior approach

Eur Spine J (2007) 16:1925–1933

- On the basis of biomechanical considerations such as the load sharing concept and tension band principle, reconstruction of the anterior column with dorsal compression osteosynthesis instrumentation is the treatment of choice
- Complete correction of the deformity, reaching the neutral position or a mild lordosis, was the goal of surgery.

- In summary, patients with traumatic injuries of the thoracolumbar spine studied in this investigation suffered from a reduced QoL compared to healthy controls.
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- Most of the patients were rather able to return to their previous jobs even after severe and unstable injuries requiring extensive combined posterior and anterior surgery.
- Overall, severity of injury determined the kind of treatment in our study and by this, prognosis and outcome.

Cochrane Database Syst Rev. 2006 Oct
18;(4):

- There was no statistically significant difference on the functional outcome two years or more after therapy between operative and non-operative treatment for thoracolumbar burst fractures without neurological deficit.

J Bone Joint Surg Am. 2003 May;85- A(5):773-81.

- In the operative group (twenty-four patients), the average fracture kyphosis was 10.1 degrees at the time of admission and 13 degrees at the final follow-up evaluation. The average canal compromise was 39% on admission, and it improved to 22% at the final follow-up examination. In the nonoperative group (twenty-three patients), the average kyphosis was 11.3 degrees at the time of admission and 13.8 degrees at the final follow-up examination after treatment. The average canal compromise was 34% at the time of admission and improved to 19% at the final follow-up examination.
- We found that operative treatment of patients with a stable thoracolumbar burst fracture and normal findings on the neurological examination provided no major long-term advantage compared with nonoperative treatment.

Fusion for spondylolisthesis

- In 111 patients with painful adult spondylolisthesis, 62% reported LBP and sciatica, 31% LBP only and 7% sciatic pain only
- In a study on 936 asymptomatic soldiers and 662 with LBP, the incidence of spondylolisthesis was 5.3% in the symptomatic group, and 2.2% in the asymptomatic group.[*Int Orthop* 1982;6:259-61.] Spondylolisthesis seems therefore to be associated with a higher incidence of LBP.
- Adult spondylolisthesis of minor degrees is therefore perhaps not very different from pure degenerative disc disease.
- Fusion in high grades of spondylolisthesis and of spondylolisthesis in children usually has a good outcome.
- Patient satisfaction was 100% in the children and in patients with high grades of slip and 84%, 76% and 69% in the low grade, degenerative disc disease, and post-discectomy groups, respectively.

Fusion for post discectomy

Patients with psychosocial comorbidity have a less favourable result after operative treatment of lumbar disc herniation. Nevertheless, some studies report promising results of lumbar fusion in patients who had residual symptoms after discectomy [*J Spinal Disord* 1998;11:383-8.]

Evidence based

- 1) There is no acceptable evidence (strength D) of the efficacy of any form of fusion for degenerative lumbar spondylosis, back pain, or 'instability'.
- 2) There is limited evidence (strength C) that adjunct fusion to supplement decompression for degenerative spondylolisthesis produces less progressive slip and better clinical outcomes than decompression alone.
- 3) There is limited evidence (strength C) that fusion alone may be as effective as combined decompression and fusion for patients with grade-I or grade-II isthmic spondylolisthesis and no significant neurology.
- 4) There is strong evidence that instrumented fusion may produce a higher rate of fusion (strength A), but does not improve clinical outcome (strength A).

