

Spondylolysis, Spondylolisthesis

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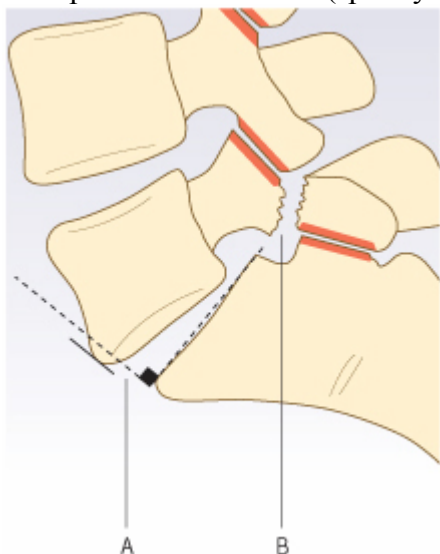
SPONDYLOLYSIS

SPONDYLOLYSIS (“vertebral loosening”) - **bony cleft in *pars interarticularis*** (segment between superior and inferior articular processes, near junction of pedicle with lamina).

- usually bilateral.
- most frequently in **L₅** (occasionally, L₄); rarely in cervical spine (C₂), usually in association with spina bifida occulta at same level.
- relatively common (PREVALENCE ≈ 7%); frequent in young patients! (50% of chronic back pain in adolescents)
- vertebral body, pedicles, and superior articular facets may slip anteriorly and leave posterior elements behind – spondylolytic **spondylolisthesis**.

Lumbosacral junction:

- A. Anterior translation of L5 on S1 (spondylolisthesis).
- B. Defect in pars interarticularis (spondylolysis).



ETIOLOGY

- 1) repeated minor injuries (**fatigue fracture**) – esp. in sports which require spine hyperextension (such as gymnastics!).
- 2) **single injury**
- 3) congenitally **failed fusion** of posterior arch ossification centers (rare)
 - often associated with other defects: absent pedicles, absent superior articular facet, hypoplastic laminae with spinous process deviation, hypertrophy of contralateral pedicle.

CLINICAL FEATURES

- **back pain** not associated with neurological symptoms (unless severe subluxation is present).

“**Stork test**” – ask adolescent to stand on one leg and hyperextend back; reproduction of pain is suggestive of spondylolysis:



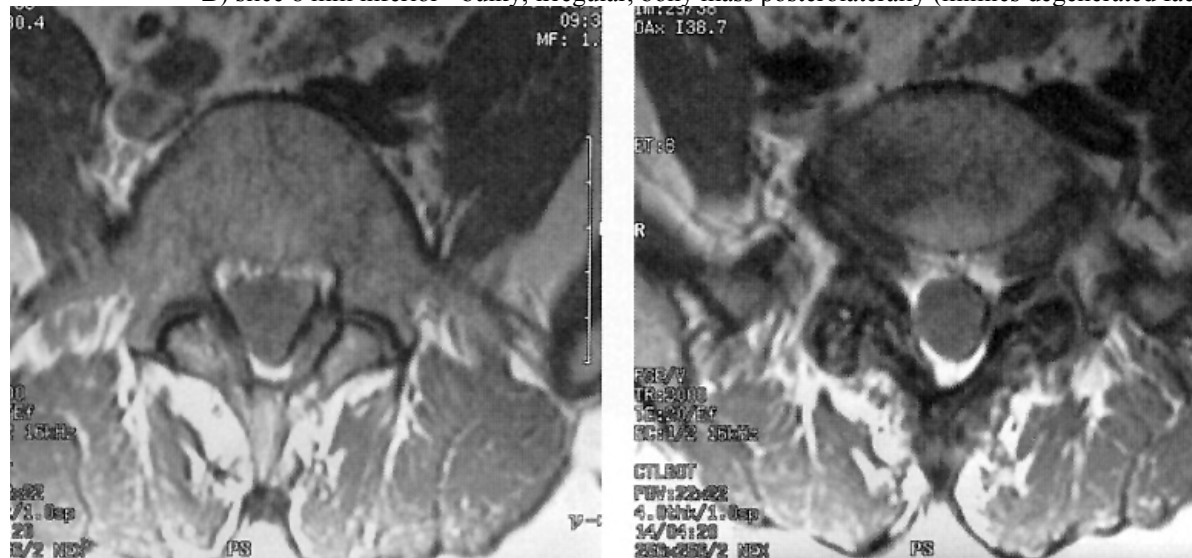
Source of picture: Edward J. Shahady “Primary Care of Musculoskeletal Problems in the Outpatient Setting” (2006); Springer; ISBN-13: 978-0387306469 >>

DIAGNOSIS

- 1) **axial CT with sagittal reformatted images** - best single test!
- 2) **plain X-ray (oblique* projection!)** - **irregular lucency** traversing *pars interarticularis*** in oblique or horizontal fashion.
 - *chronic defect often has *thick, sclerotic borders* with reactive hypertrophic bone (hypertrophic pseudarthrosis) - because of bony superimposition, AP and lateral views may not reveal defect!
 - **described as lucency across “neck of Scottie dog” (referring to appearance of posterior elements in oblique projection).

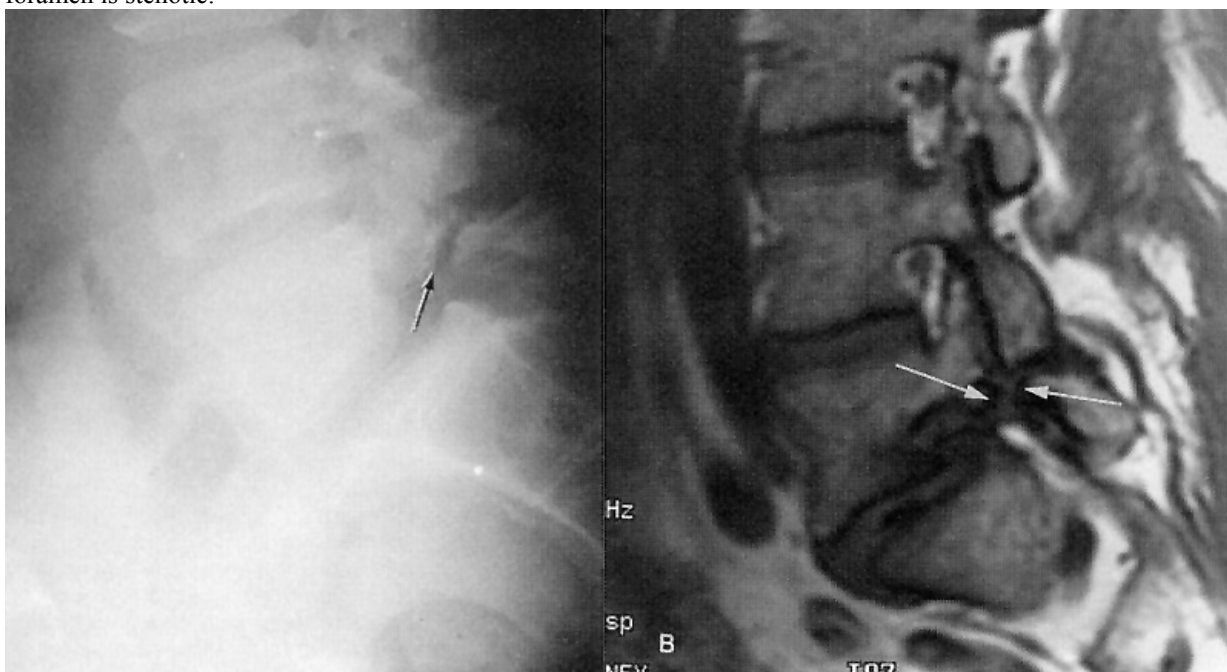
L5 spondylolysis: A) normal L4-5 facet joints.

B) slice 8 mm inferior - bulky, irregular, bony mass posterolaterally (mimics degenerated facet joint)

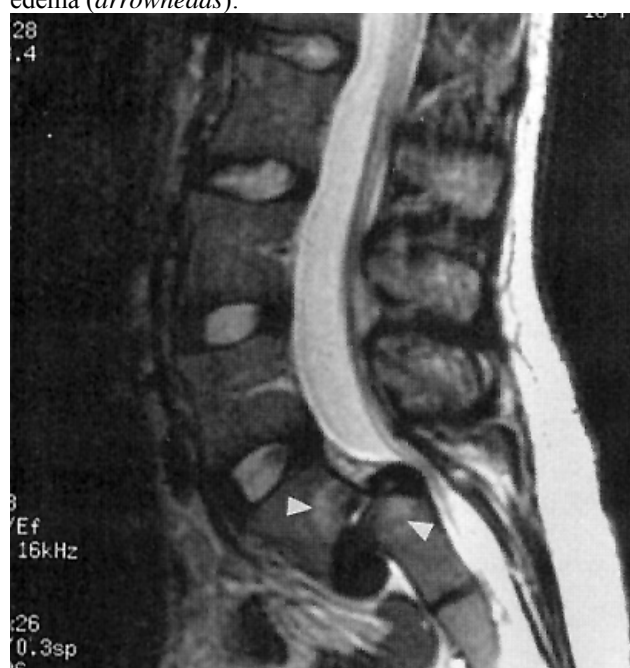


L5 spondylolytic spondylolisthesis:

- A) gap in bony isthmus (pars interarticularis) between superior and inferior articular processes; grade 2 spondylolisthesis.
- B) note hypointense borders on both sides of gap in pars interarticularis (arrows), indicating chronic spondylosis; L5-S1 foramen is stenotic.



L5 spondylolytic spondylolisthesis (grade 3) and disc degeneration in 18-year-old gymnast (T2-MRI): central canal stenosis at L5-S1 level; compare normally hydrated upper lumbar discs with involved level and with sub-end-plate marrow edema (arrowheads):



TREATMENT

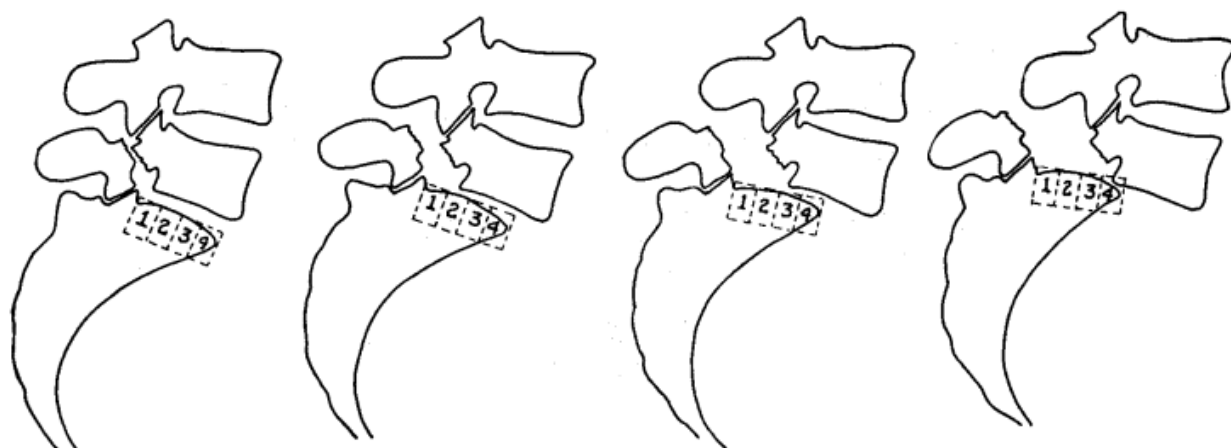
- relative rest from hyperextension, nonrigid brace, oral pain medications.
- if spondylolisthesis slips to grades III and IV, pain does not respond to conservative measures, or neurological symptoms appear → orthopedic / neurosurgical consultation.

SPONDYLOLISTHESIS

SPONDYLOLISTHESIS - displacement (slippage) of vertebra with respect to subjacent vertebra:

- a) in anterior direction (**anterolisthesis**) – most commonly!
- b) in posterior direction (**retrolisthesis**) – at level above lumbar anterolisthesis.

- most often L5 on S1 (occasionally L4 on L5).
- **MEYERDING'S classification** - **degree** of lumbar spondylolisthesis – in lateral X-ray superior surface of sacrum is divided into four equal parts:



ETIOLOGY

- Degenerative** - degenerative changes of facet joints and intervertebral disc.
 - additional cause in neck – inflammatory softening of transverse ligament of atlas (e.g. RA).
 - posterior elements are intact – subluxation degree is low (I or II).
 - women : men = 6 : 1.
 - patients > 40 yrs.
- Spondylolytic (s. isthmic)** – spondylolisthesis (most commonly in C6) can be of **high degree**.
 - patients – young adults.
- Iatrogenic** (e.g. post-laminectomy)
- Traumatic** – with fractures in structures other than pars interarticularis (e.g. posterior vertebral arch fracture, odontoid fracture); dislocation occurs gradually.
- Congenital (s. dysplastic)** - rare (strong hereditary component) - caused by thin, elongated pars interarticularis.
 - patients – children.

CLINICAL FEATURES

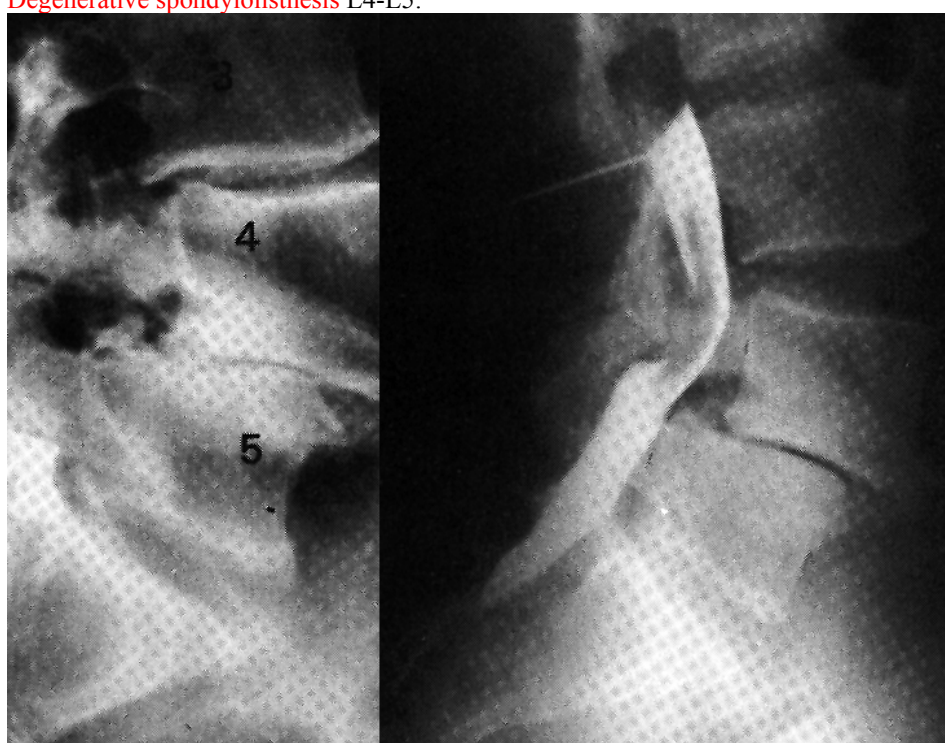
May be asymptomatic!

- **pain & tenderness** in low back.
- **"step"** on deep palpation of posterior elements.
- trunk may be shortened and abdomen protuberant.
- **radiculopathy** may develop (70% sciatica, 30% neurogenic claudication).
- in **severe degrees** of spondylolisthesis, **cauda equina syndrome** may occur.

Degenerative spondylolisthesis (T1-MRI) - anterior slip of L4 on L5 and degeneration in posterior joints at this level:



Degenerative spondylolisthesis L4-L5:



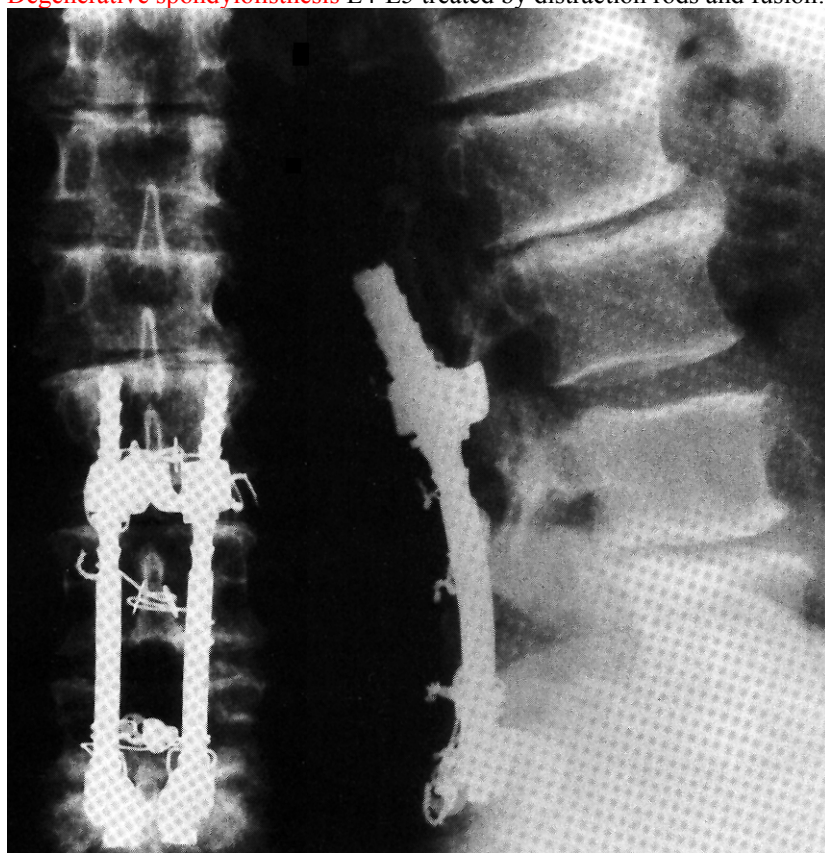
TREATMENT

Indications for therapy: pain, 3-4 degree, neurologic symptoms.

Decompression → :

- a) posterior **interbody fusion**
- b) **lateral** (intertransverse process) **fusion** – risk of progressive deformity during early post-operative period (H: return to bed rest for 6-8 weeks).
- c) **fixation with transpedicular screws** in conjunction with segmental plates or rods; screws are used to draw vertebrae into alignment.

Degenerative spondylolisthesis L4-L5 treated by distraction rods and fusion:



BIBLIOGRAPHY for ch. "Spinal Disorders" → follow this [LINK](#) >>