Surgical treatment of Grade I,II of isthmic and displastic spondylolisthesis in the childhood and adolescence

Robert Pflugmacher
Klinik und Poliklinik für Orthopädie und Unfallchirurgie
Universitätsklinikum Bonn
Spondylolisthesis

First described by Kilian 1854

Spondylos - Vertebra
Lysis - Loosening, coming apart
Olisthesis - To slip or to slide

These don’t necessarily co-exist  42-50% have Spondylolysis ALONE

Kilian HF (1854) De Spondylolisthesigravissimae pelvanguardiae caussa nuper detecta, Commentatio anatomico-obsterica.
Prevalence in Specific groups

- General Population  Caucasiens  6 -11.5%
- Female Gymnasts  19%  (Sward 1990)
- Weight Lifters  44%  (Dangles 1987)
- Tennis Players  10%  (Sward 1990)
Graduation Spondylolisthesis

Wiltse (1976)

Typ I: Dysplastic
Typ II: Isthmic
  (Lesion Pars interartikularis)
    a) Lyssis (Spondylolysis)
    b) Elongation Pars interarticularis
    c) Fracture Pars interarticularis

Typ III: Degenerative
Typ IV: Posttraumatic
Typ V: Pathologic
Typ VI: Iatrogen

Dysplastic Spondylolisthesis

- Presents in childhood
- 14-17% of spondylolisthesis
- 2:1- females: males
- Cause of most severe slips
- Abnormal sacral dome
- Association with Neural arch defects (Spina bifida)
Isthmic spondylolisthesis

- 5-7% incidence
- Usually Grade 1
- 2:1 M:F
- Grade 1 four times more common in females
- Most follow benign course
Level of defect

Graduation of Spondylolithesis
Severity of the Listhesis
Meyerding (1932)

- $L_5$ - 80% - 95%
- $L_4$ - 5% - 15%
- Other - 1% - 5%

Spondylolysis Presentation

- Commonly asymptomatic
- Back pain +/- leg pain
- Unusual gait
- Functional spinal deformity
- Restricted spinal movements, extension more painful than flexion
- Local tenderness
- Hamstring tightness
- Restricted Straight leg raising
Diagnosis

Radiological evaluation

- Radiograph / 45° oblique
- Flexion / Extension
- MRI
- Myelography- post MyeloCT
- Bone scan (diagnosis & ageing of lysis)
Spondylolysis - Diagnosis

- CT – Axial, Sag Recon
- SPECT
  
  *Nucl Med Comm 17(5):389-96, 1996*

  25 patients

  Not all lyses were positive

  SPECT- predictive of healing

- MRI
Spondylolysis - Management

- Conservative
- Surgical

Buck's Fusion
Scott's Fusion
Morscher Repair
Posterolateral Fusion - Wiltsie
Surgical Options in the treatment of spondylolysis

- Repair of the lysis
- Fusion
Repair of the lysis

Indications

- Surgical management for spondylolysis and low-grade spondylolisthesis (< or =50% slip) who fail to respond to nonsurgical measures
Therapy-Repair

Technique after Buck(70)
Therapy-Repair

Technique after Scott modified
Therapy-Repair

Technique after Scott (87)
Repair of Spondylolysis
Morscher Technique
Fusion

- surgical treatment
  - uninstrumented Fusion
  - instrumented Fusion
  - PLIF (Postero Lateral Interbody Fusion)
  - TLIF (Transforaminal Lateral Interbody Fusion)
  - ALIF (Antero Lateral Interbody Fusion)
Fusion

Indications

- Failure of non operative therapy

- Low-grade slip secondary to L5 pars defects or dysplastic spondylolisthesis at the lumbosacral junction

- Slippage grade II or higher high-grade spondylolisthesis regardless of symptoms
Objectives of surgery

- To restore the ventral intervertebral distance
- Reposition (antero-posterior / kranio-kaudal)
- Restoration of lordosis
- Short time fusion
Uninstrumented Fusion - Wiltse
Instrumented Fusion

I Khali, MD London Canada
Patient follow-up PLIF

Female, 20 years old

Spondylolysis L5/S1
Patient follow-up PLIF

Female, 41 years old
Spondylolisthese L4/5 Meyerding II°

Spinosan
Patient follow-up PLIF

Male, 33 years old
Spondylolysis+Spondylolisthesis L5/S1 Meyerding I°
Patient follow-up PLIF

Male, 33 years old
Spondylolysis+Spondylolisthesis L5/S1 Meyerding I°
Patient follow-up PLIF

Male, 33 years old
Spondylolysis + Spondylolisthesis L5/S1 Meyerding I°
Patient follow-up PLIF

Male, 33 years old
Spondylolysis+Spondylolisthesis L5/S1 Meyerding I°
Patient follow-up ALIF

Male, 36 years
Spondylolysis+Spondylolisthesis L4/5 Meyerding II°
Conclusions

- Diagnosis
- Understand Natural History
- Define Objective of your Treatment

- surgical treatment
  - Repair of the lysis
  - Fusion: PLIF, TLIF, ALIF
Conclusions

- Surgical management for spondylolysis and low-grade spondylolisthesis (< or =50% slip) who fail to respond to nonsurgical measures

- In situ posterolateral L5 to S1 fusion is the best option for those with a low-grade slip secondary to L5 pars defects or dysplastic spondylolisthesis at the lumbosacral junction
Pars repair for symptomatic spondylolysis and low-grade, mobile spondylolisthesis with pars defects cephalad to L5 and for those with multiple-level defects.

Screw repair of the pars defect, wiring transverse process to spinous process, and pedicle screw-laminar hook fixation are surgical options.
Conclusions

- Spinal fusion high-grade spondylolisthesis regardless of symptoms

- Pseudarthrosis and neurologic injury are the most common complications associated with surgical management of high-grade spondylolisthesis