SPONDYLOLISTHESIS

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Bones and Spine

OUTLINE

- Definition
- Classification
- Clinical presentation
- Imaging-measurement
- Natural history
- Treatment-
- Non Surg Vs. Surg
  - Decomp with fusion Vs. without fusion
  - Fusion with instrumentation Vs. without
  - Reduction Vs. In-situ fusion
- High grade

SPONDYLOLYSIS VS. SPONDYLOLISTHESIS

- Greek roots:
  - Spondylo = spine or vertebra
  - Lysis = to dissolve
  - Listhesis = to slide or slip

CLASSIFICATION
WILTSE,NEWMAN,MCNAB 1976

dysplastic

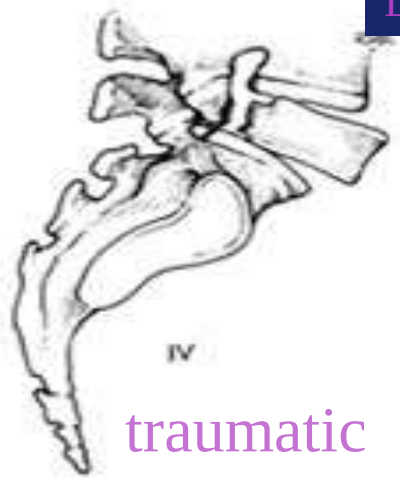
20% listhesis
2F : 1 M
Cause
L5-S1

isthmic

Most common
2M : 1F
Cause
L5-S1

degenerative

6F : 1M
Age >40
10%F>60
cause



traumatic

pathologic

CLINICAL PRESENTATION

- Mostly asymptomatic
- Back pain
- L5 root
- Claudication
- Vespers curse
- Tight Hamstrings(80%)
- High slip:
  - L/S kyphosis
  - flattening of buttocks
  - forward thrust of Abd.
  - Absence of waistline

ASSOCIATED CONDITIONS

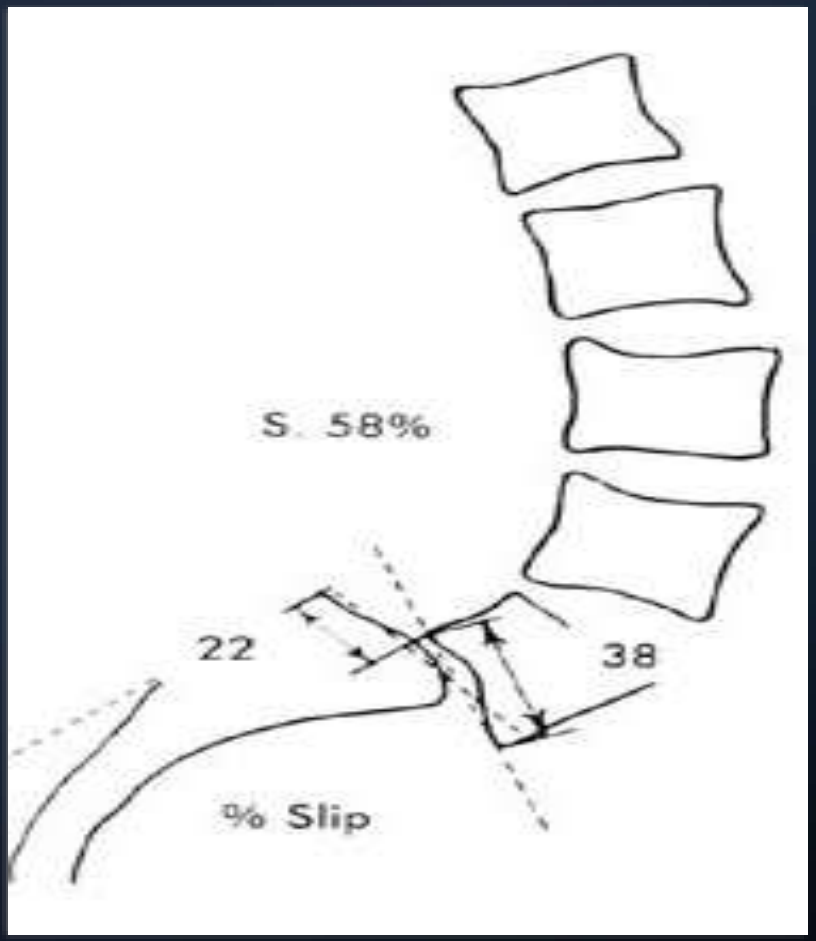
- Spinal bifida occulta (24-70%)
- Scoliosis (5-7%)
- Disk Degeneration (50%)
- Lumbarization/sacralization(7-9%)
- Osteoarthritis (11-17%)

RADIOGRAPHIC STUDY

- ***Standing*** AP/Lateral
  - Inc. slip 17%
  - Inc slip angle 5 degree
- Oblique views
  - Scottie dog's neck
- Bone scan-cold/hot
- SPECT bone scan (single photon emission CT)
- MRI/CT myelogram

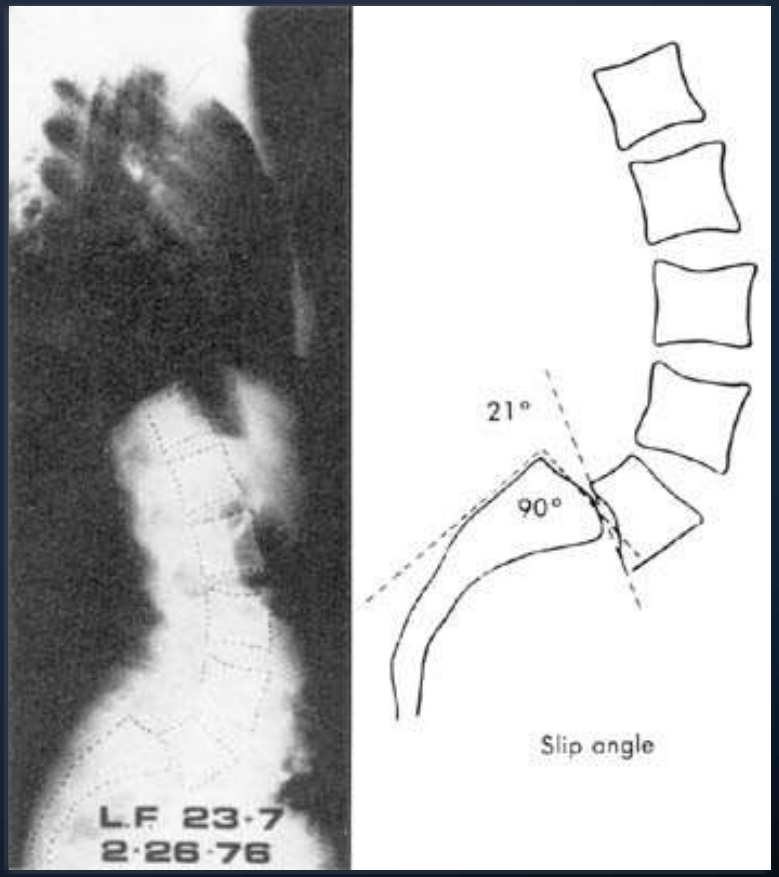
RADIOGRAPHIC MEASUREMENTS

- Percentage slip
- Meyerding
  - I 0-25%
  - II 26-50%
  - III 51-75%
  - IV 76-100%
  - V > 100%



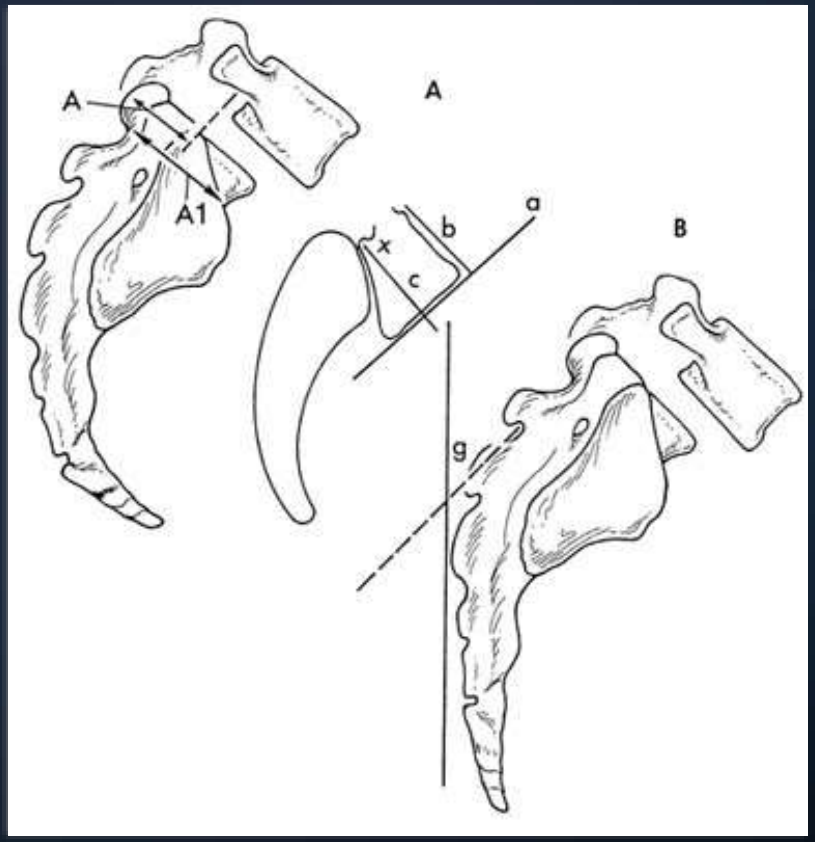
RADIOGRAPHIC MEASUREMENTS

- Slip Angle:
  - Angle between L5 inf. Endplate to line perpendicular to post surface of S1.



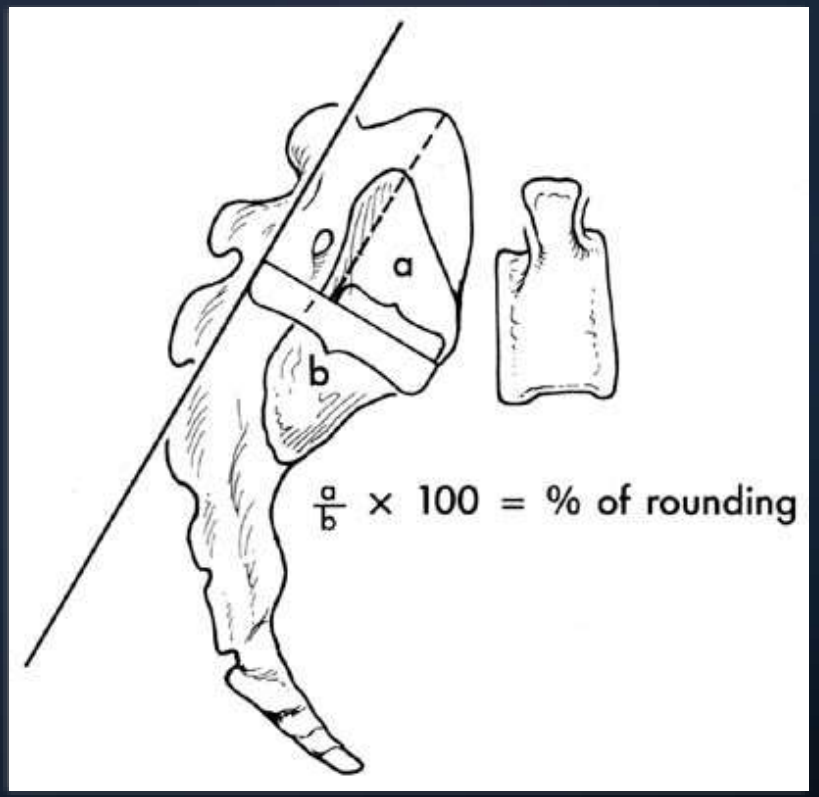
RADIOGRAPHIC MEASUREMENTS

- Sacral Inclination:
  - Angle between vertical line and back of S12



RADIOGRAPHIC MEASUREMENTS

- Rounding ratio:
  - % of round shape of sacrum

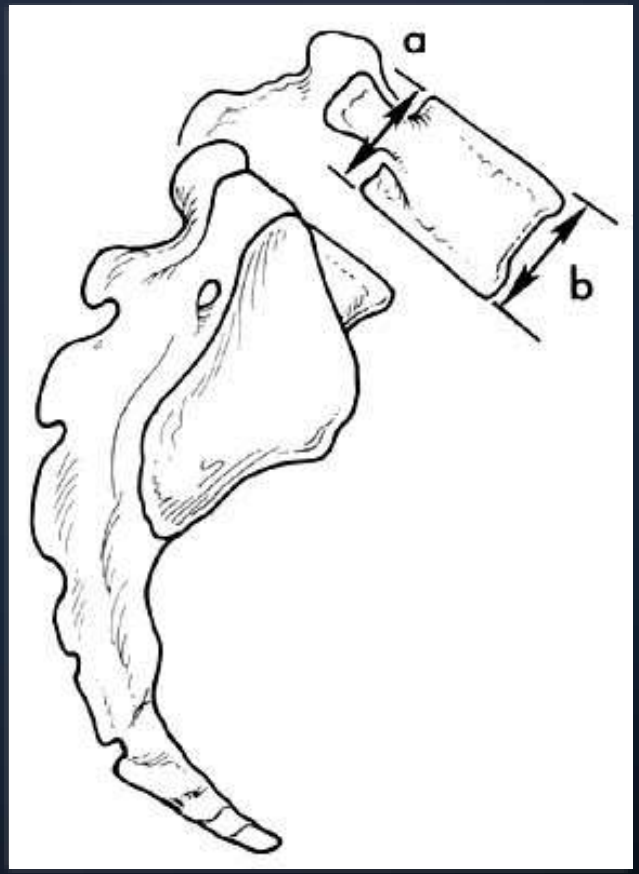


RADIOGRAPHIC MEASUREMENTS

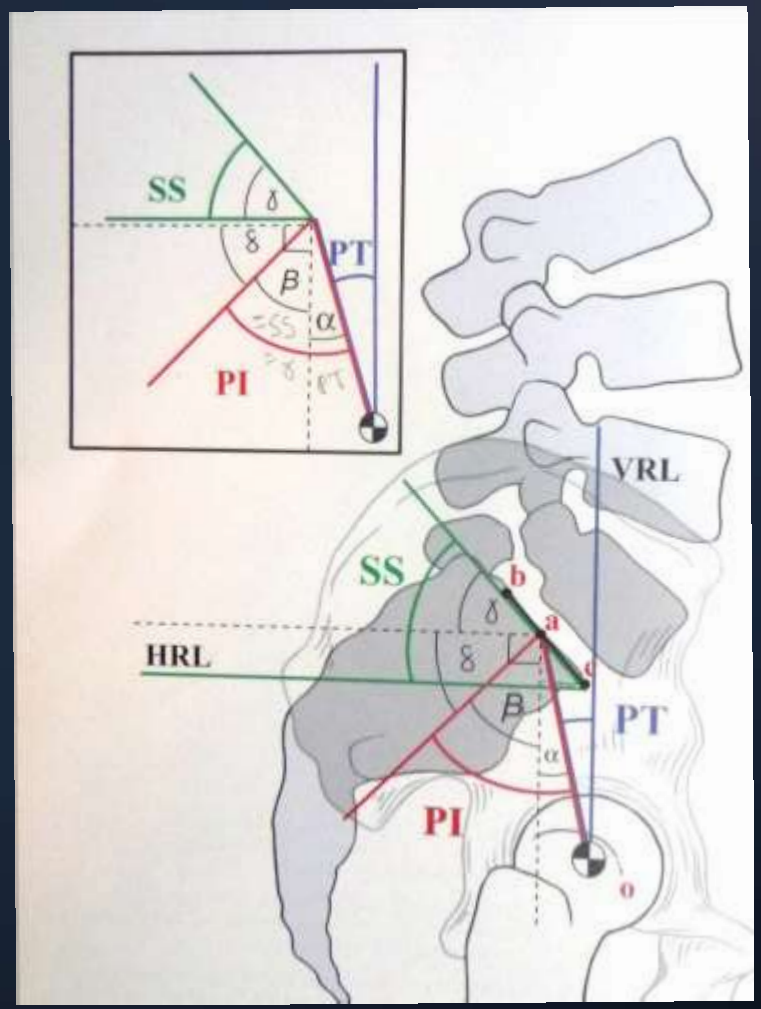
Lumbar Index =

posterior height

anterior height



PELVIC INCIDENCE



NATURAL HISTORY

Isthmic

- Spondylolisthesis does not exist at birth
- Spondylolysis 4.4% at age 6, 6% in adult
- Development of pars defect does not cause pain in most patients
- Progression is unusual.

Fredrickson, JBJS, 1984

Degenerative

- Less understood
- Progression of slip 30%
- Clinical deterioration 10%
- No correlation between slip progression and deterioration of Sx.
- 15% patients require surgery

Fitzgerald,JBJS, 1976
Frymoyer,JAAOS, 1994

NON SURGICAL TREATMENT

Children

- Asymptomatic:
  no activity restriction
- Frequency of x-ray
  <10 YO q4month
  11-15YO q6month
  >15 YO q1-2years
- Stop aggravating activities
- Period of brace
- Trunk strengthening

Adult

- Mild analgesics/NSAID
- Weight control
- Aerobic exercise
- Bracing
- Epidural steroids

SURGICAL INDICATIONS

- Persistence or recurrence of major symptoms for at least one year despite conservative treatment (incapacitating radicular pain or claudication)
  - Quality of life
- Progressive neurologic deficit (cauda equina, motor weakness)
- Progressive slipping beyond 50% or high slip angle above 50 degree in a growing child(even if child is asymptomatic)
- Gait or postural deformity unrelieved by therapy

SURGERY

- Decompression alone without fusion.
- Fusion
  - With decompression, without decompression.
  - Levels
  - Anterior vs. posterior vs. front&back
  - In situ vs. Reduction
  - Instrumentation Vs. no instrumentation

DECOMPRESSION WITH FUSION VS. WITHOUT FUSION (DEG. SPONDYLOLISTHESIS+STENOSIS)

- Herkowitz,JBJS,1991
- Prospective/random.
- 50 pts
- 3 year f/u
- Post op listhesis:
  - 96% non fused group
  - 28% fused group
- Op results:
  - 96% good or excelnt. (fused group)
  - 44% good or excelnt (nonfused group)

- Epstein,J.spinal disord, 1998
- Retrospective
- 290 pts with decomp. Only
  - (<4mm, 10 degree)
- 10 year f/u
- 69%excellent, 13% good.
- Only 2.7% required secondary fusion

INSTRUMENTED VS. NON-INSTRUMENTED FUSION

- Zdeblick, Spine, 1993
- Prospective, randomized.
- 124 pts.
- F/u 16 month
- Fusion rate 95% for rigid instrumt group vs. 65% for non instrumt group
- 95% good/excell. Result with Vs. 71% good/excell result without.

- Herkowitz,Spine, 1997
- Prospective, randomized
- 76 pts
- F/u 24 month
- Fusion rate 82% with instrumentation, 45% without.
- 76% good/excell. With instrumentation Vs. 85% without.

IN SITU FUSION VS. REDUCTION/FIXATION FOR HIGH GRADE SLIP

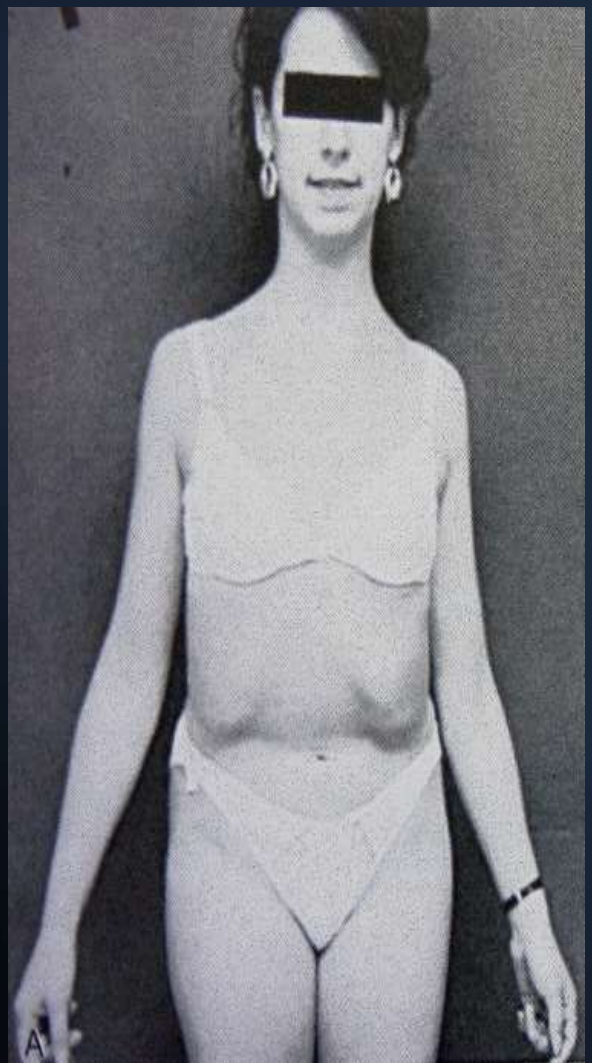
- Wiltse,JBJS, 1989
- 8 young adults with grade III or IV with marked pre-op sciatica undergone In Situ fusion without decompression
- F/u 5.5 years
- All healed. Excellent results with resolution of marked pre-op sciatica
- No neurologic complication

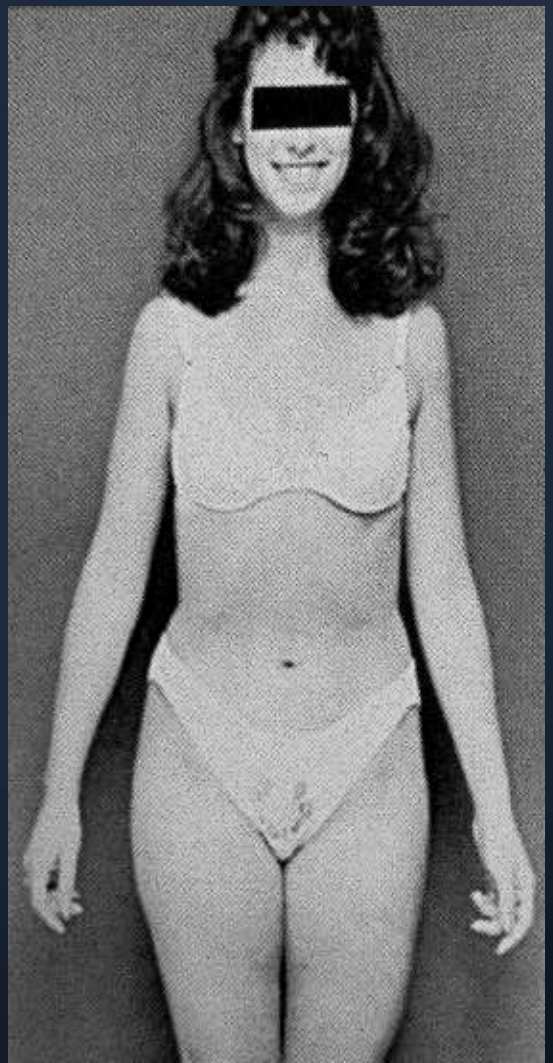
- Edward & Spinal fixation Study group
  - (Rothman-Simeone)
- 25 young adults with grade II to V undergone one stage post. Reduction /fixation.
- F/U 2 years
- 91% slip correction,88% kyphosis correction
- One nonunion. No long term neurologic complication

RISK FACTORS FOR PROGRESSION

- Slip angle > 25 degree
- Lumbar index (wedging ratio) < 75%
- Rounded sacral end plate
- Slip > 50%
- Hyperlordosis (> 50 degree) L2-S1 or vertical sacral inclination
- Female adolescents
- Lumbosacral hypermobility (> 4mm,10 degree deff. In flex. And ext. xray)
- Pelvic incidence > 68degree (low grade); 79degree (high grade)

ADVANTAGES OF REDUCTION





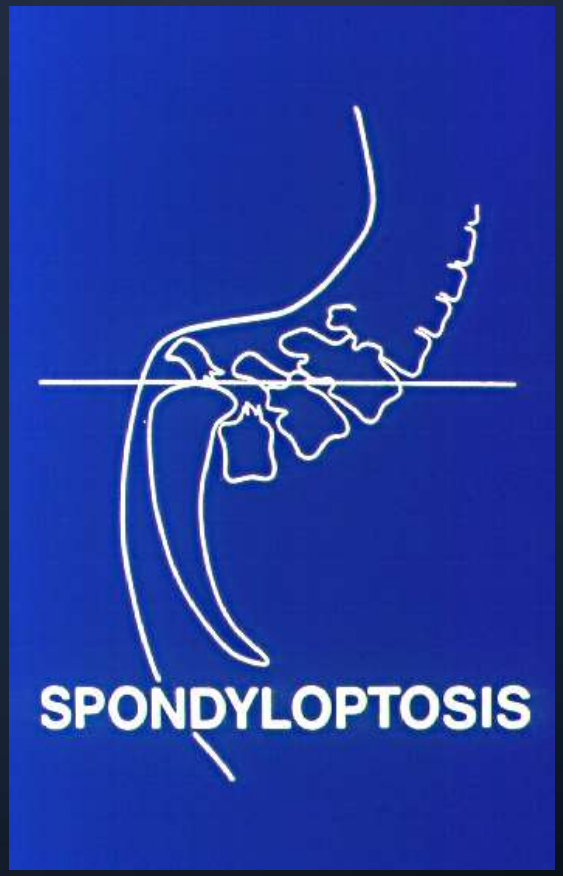
- Restore body posture and mechanics.
- Decreases 30% chance of progression despite good in situ fusion
- Permits full nerve decompression.
- Limits fusion length.

INDICATIONS FOR REDUCTION

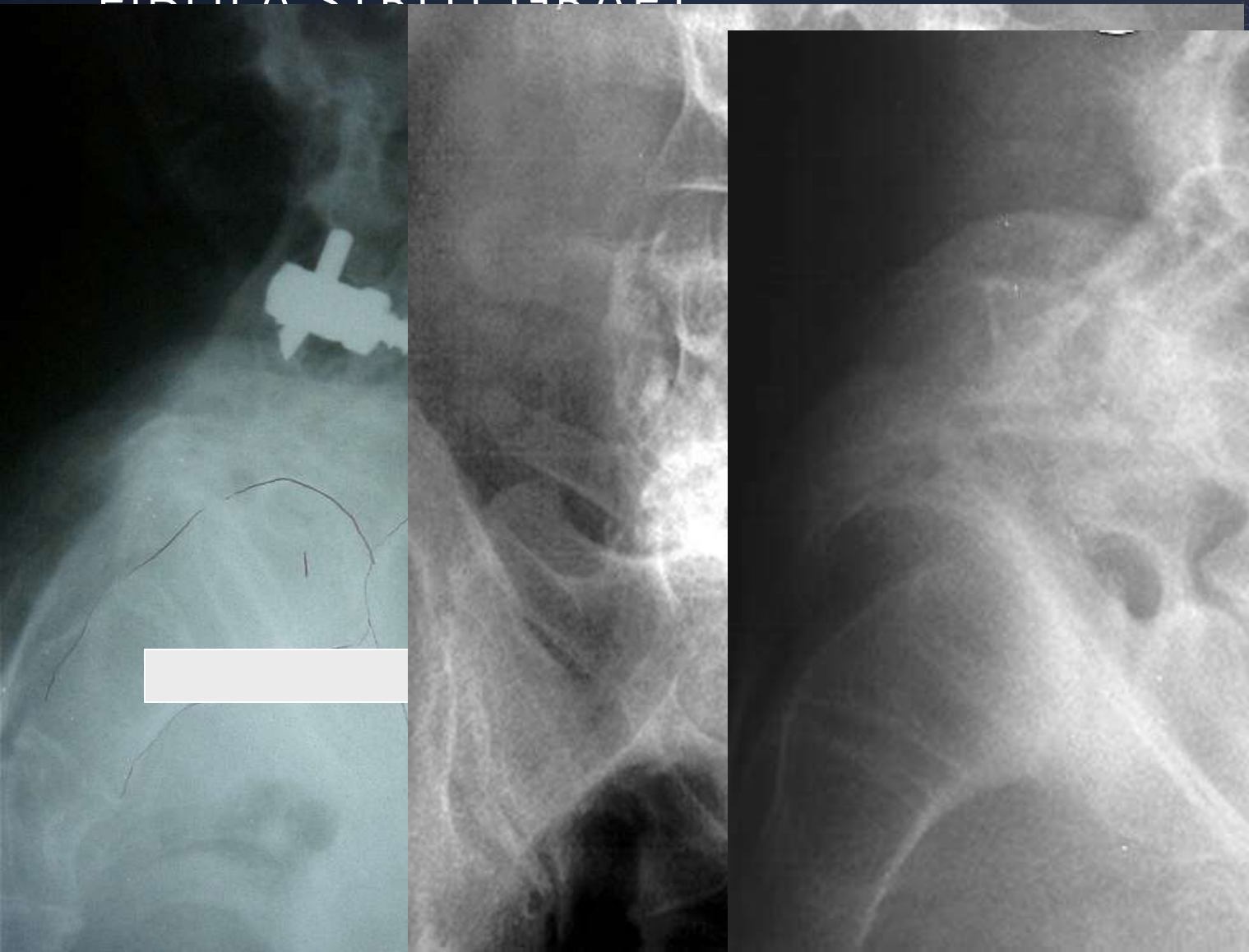
- Cauda Equina Syndrome
- Progressive Slip surpassing 50%
- Severe deformity causing decompensation or distress
- Major pain plus two or more risk factors

SPONDYLOPTOSIS

- Posterior gradual instrumented reduction/fixation
- Anterior resection + posterior fixation (Gaines procedure)
- Fibula Strut graft

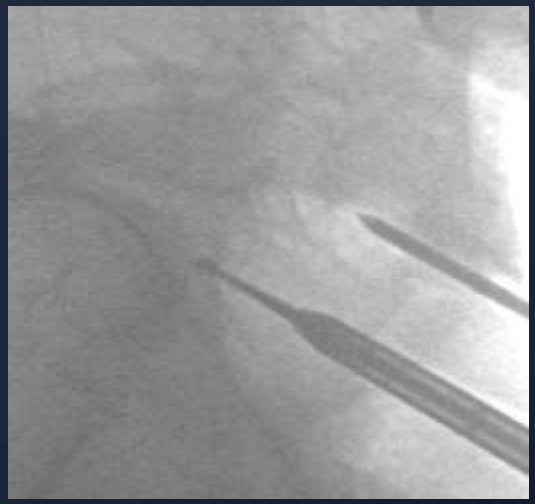


FIBULA STRUT GRAFT



16 YEAR OLD GIRL WITH BACK PAIN AND SOME L5 RAD.

INTRA-OP



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SPONDYLORTOSIS


S81
GE MEDICAL SYSTEMS LightSpeed16 Loma Linda Univ. Med Ctr
04/29/2008
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LightSpeed16
1.3mm
DFOV
ALG:BONEPLUS
A
5
1
kV:140
mA250
2014msec
TILT:
21:57:17
LOC:
21:55:17
23011
KIRK,STACY,
01549510
027Y Sex:F
08/13/1980
P
1
8
9
04/29/2008 CONTRAST:
BCT L-SPINE WITHOUT CON [SP] 04/29/2008
I159


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mA250
2014msec
TILT:0
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21:55:17
23011
KIRK,STACY,
01549510
027Y Sex:F
08/13/1980
L
7
7
04/29/2008 CONTRAST:
BCT L-SPINE WITHOUT CON [SP] 04/29/2008
P154

CONCLUSION
PERSONAL PREFERENCE

- 80% of patients:
  - Good trial of conservative treatment.

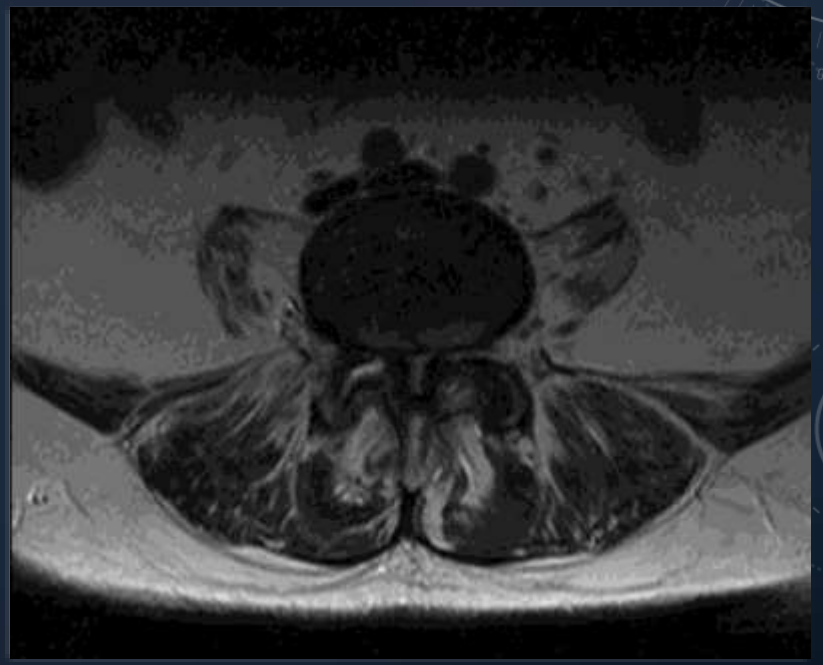
INDIVIDUALIZE TO EACH PT'S NEEDS

- 20% of patients:
  - Adolescent without neuro. Deficit
    - In situ fusion with or without instrumentation
  - Adults with unstable degenerative spondylolisthesis
    - Post. Decompression, in situ fusion ± instrumentation
  - High Grade Slip

2006 OSAE

- A healthy 70 YO man has back and leg pain in an L5 distribution that is increased with standing and walking, relief by sitting. Neurological and pulse exam Normal. X-ray reveals spondylolisthesis, MRI with stenosis. Management should be:
- A. Laminectomy
- B. Hemilaminectomy
- C. Laminectomy and fusion
- D. Anterior interbody fusion
- E. Posterior fusion

CASE DISCUSSION



CASE DISCUSSION

THANK YOU