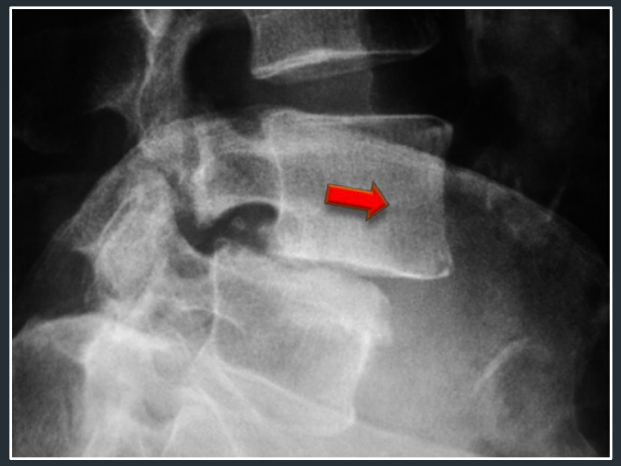
Bone School @ Bangalore

Lumbar Spondylo Listhesis

Dilip Gopalakrishnan

Non Physiological Translation



Antero listhesis

Spondylo listhesis

Retro listhesis

Lateral listhesis

38/F

Occasional short duration back pain

No neurological deficit

Spondyloptosis

No Surgical Intervention

16/M

Disabling back pain

Hamstring tightness

Approaching 50% slip

Dysplastic features

Reduction & inter body fusion

Spondylo Listhesis

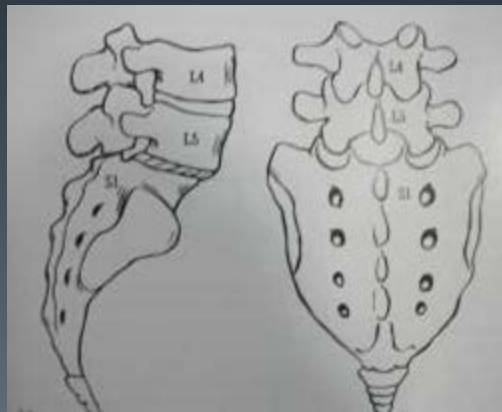
- Varied clinical presentation

Classification

- Wiltse , Newman , MacNab
- Modified by Wiltse & Rothman
- Type 1&2 – Anatomic characteristics of the neural arch
- Type 3 to 6 - Acquired pathological conditions

Type-1-Congenital or Dysplastic Spondylolisthesis

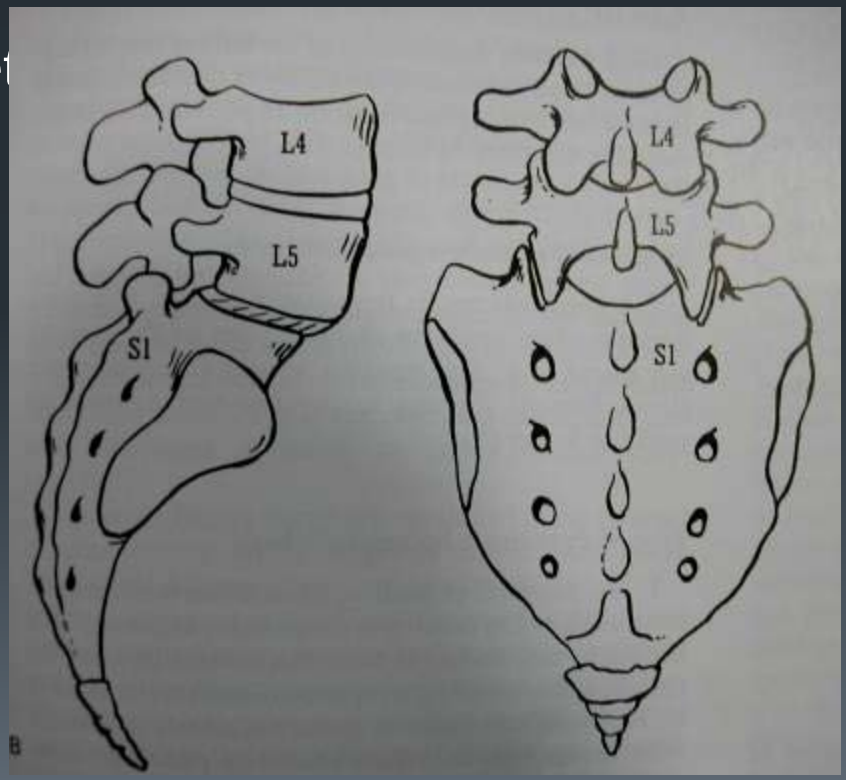
- Subtype 1A,
- Horizontal facet joints
- Spina bifida of L5-S1
- Pars intact - Critical narrowing of spinal canal
- Pars hypoplastic, elongated or broken - No critical narrowing



Bone School @ Bangalore

Type-1-Congenital or Dysplastic Spondylolisthesis

- Subtype 1B
- Sagittal malorientaion of the facet
- Intact neural arch



Bone School @ Bangalore

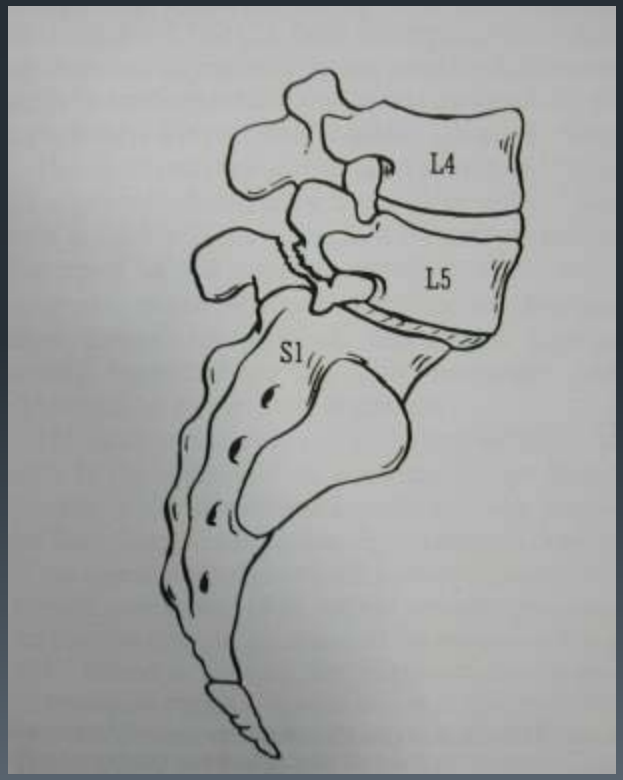
Type-1-Congenital or Dysplastic Spondylolisthesis

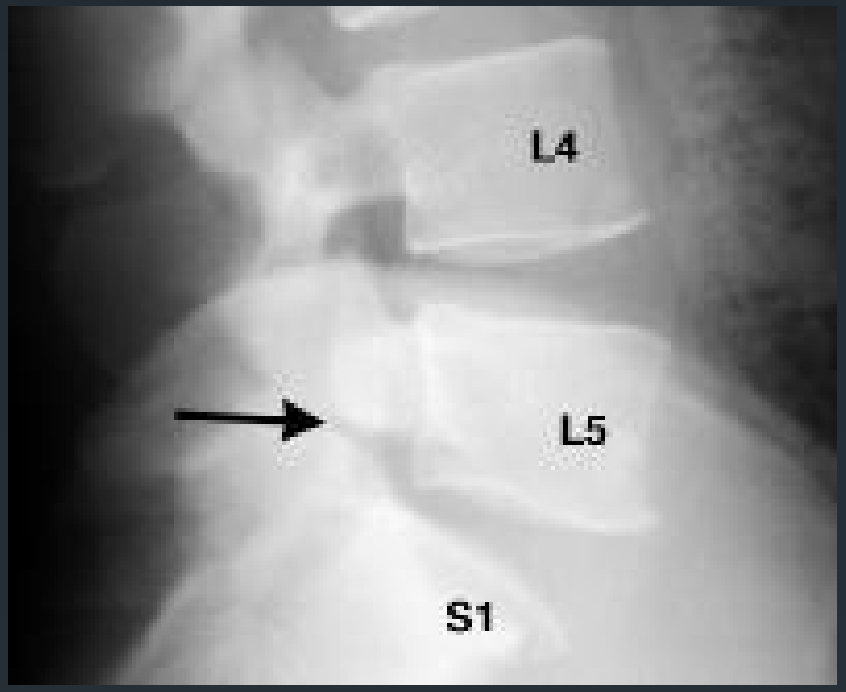
- Subtype 1C
- All other congenital malformation of the lumbosacral junction, including congenital kyphosis

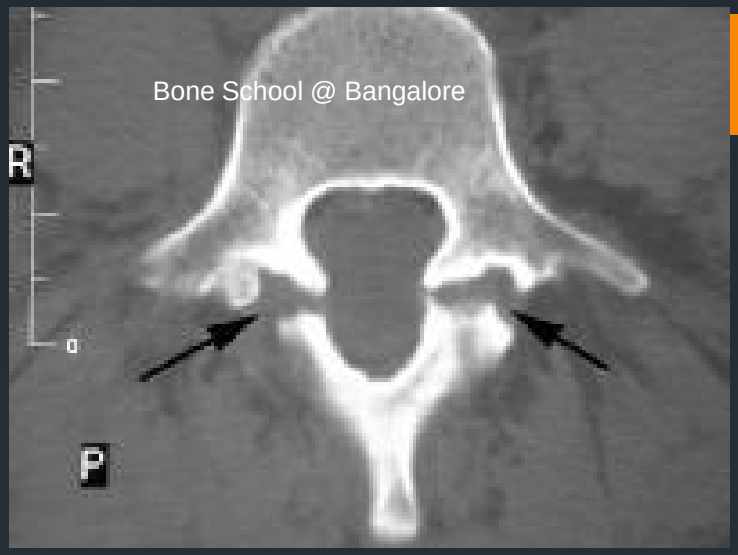
Bone School @ Bangalore

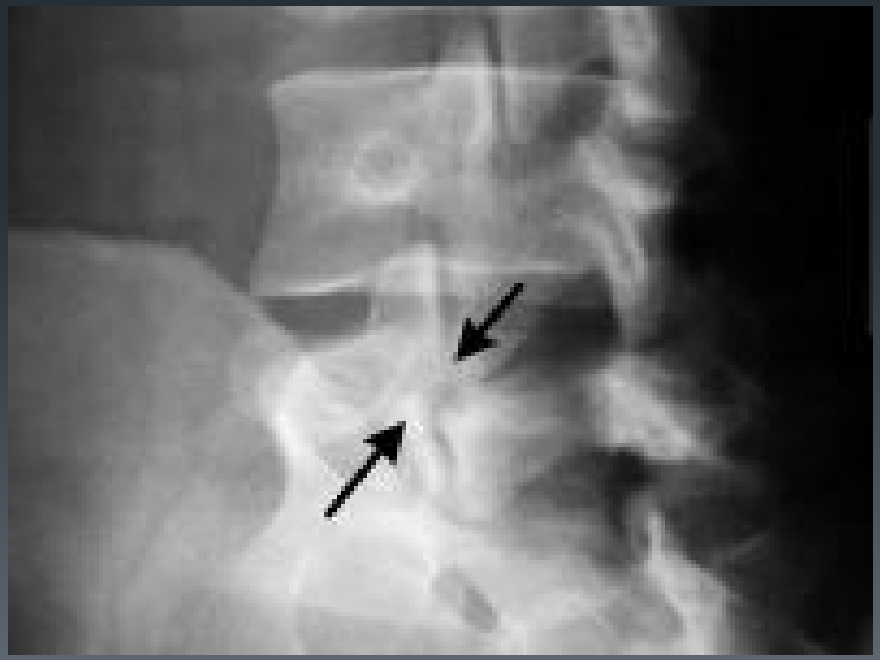
Type-2: Isthmic Spondylolisthesis

- Subtype 2A
- Uni or bilateral spondylolysis



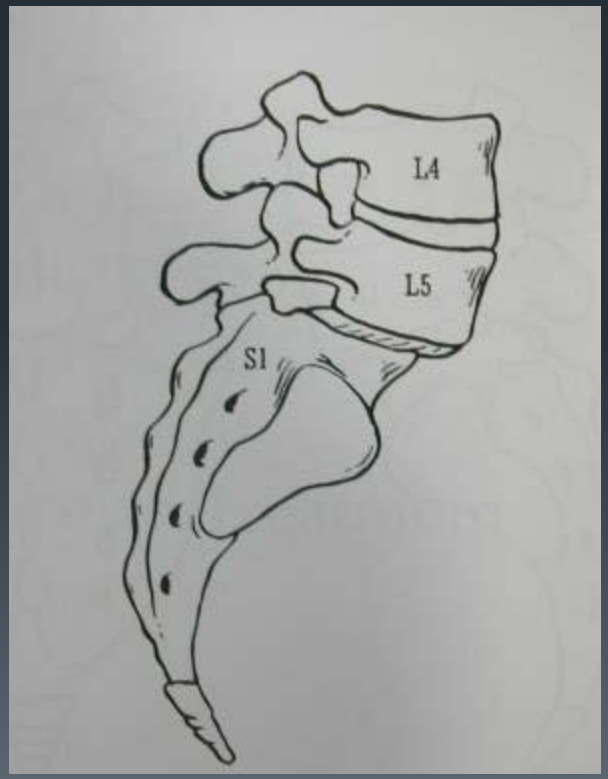

L4
L5
S1


Bone School @ Bangalore
R
P



Type-2: Isthmic Spondylolisthesis

- Subtype 2B
- Elongation of pars



Type 3: Degenerative Spondylolisthesis

Type 4: Traumatic Spondylolisthesis

Type 5: Pathologic Spondylolisthesis

Polymyositis and Osteomalacia

Type 6: Post Surgical Spondylolisthesis

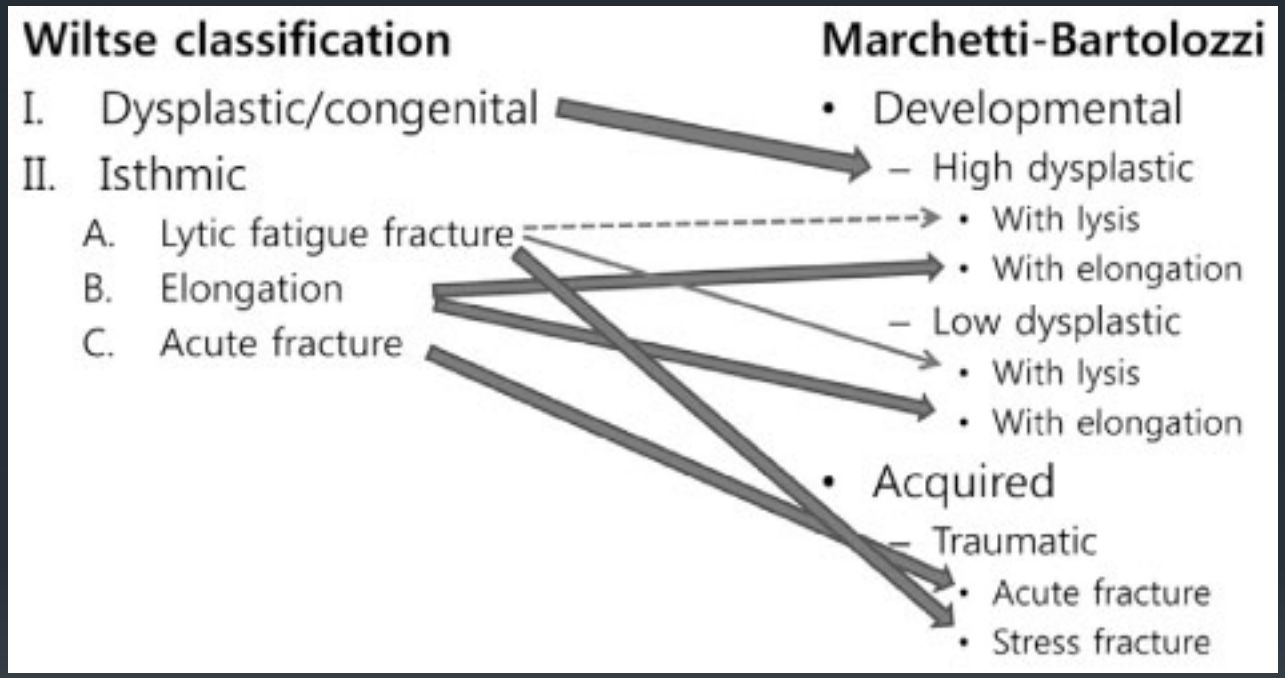
- Following extensive facet joint removal
- Stress fracture of weakened inferior articular process

Marchetti & Bartolozzi

- Developmental
- Low Dysplastic
- **High Dysplastic**
- Lysis or Elongation

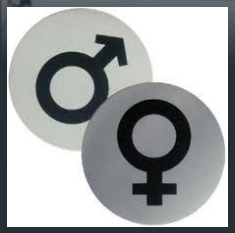
Acquired

Exotic


Wiltse classification
I. Dysplastic/congenital
II. Isthmic
A. Lytic fatigue fracture
B. Elongation
C. Acute fracture
Marchetti-Bartolozzi
• Developmental
– High dysplastic
• With lysis
• With elongation
– Low dysplastic
• With lysis
• With elongation
• Acquired
– Traumatic
• Acute fracture
• Stress fracture

20% -FDR

2:1 F to M



Never seen

Very high incidence

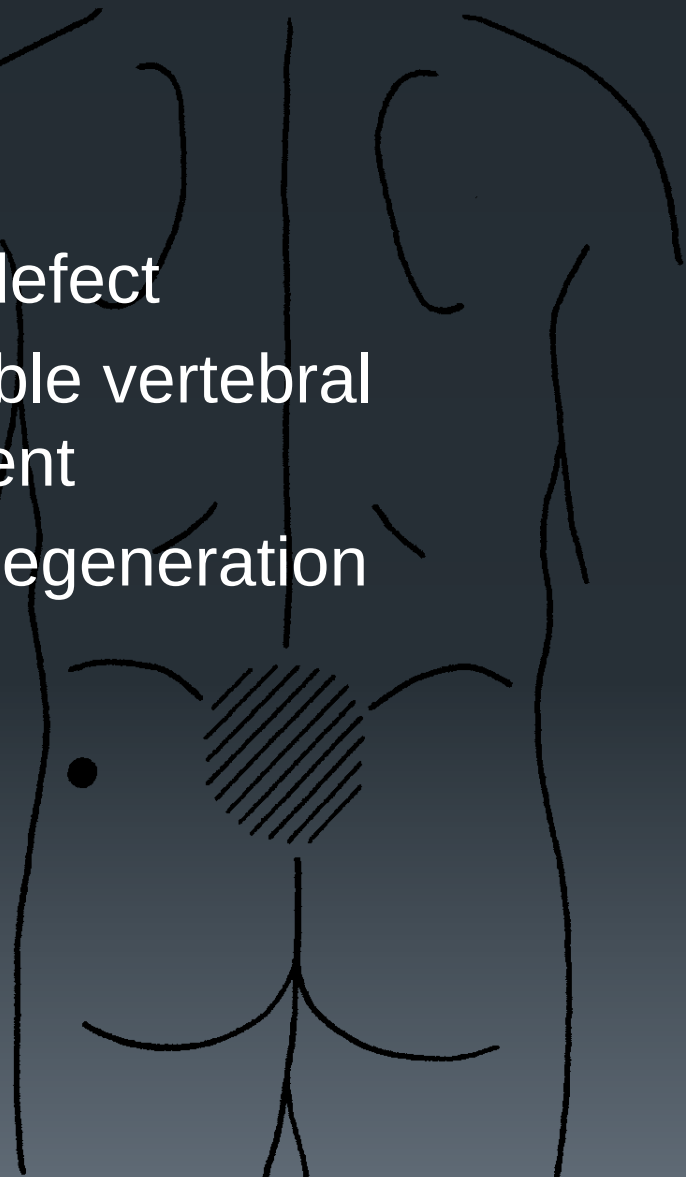
Bone School @ Bangalore

- Gymnastics,
- Throwing sports,
- Football,
- Wrestling,
- Dance,
- Swimming breast and butterfly strokes

Presentation – Lysis & Low Grade Listhesis

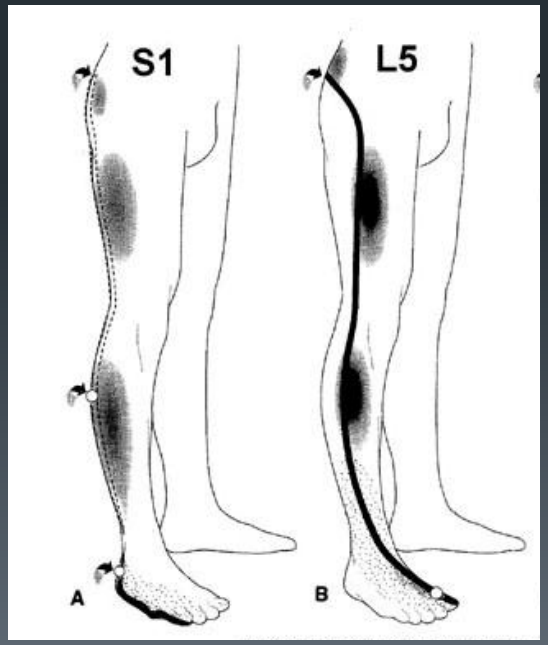
- Back pain – common
- Dull
- Back
- Buttock
- Posterior thigh
- Greater trochanter

- Pars defect
- Unstable vertebral segment
- Disc degeneration



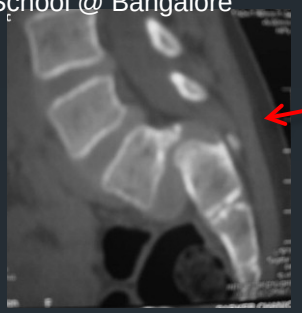
- Radicular lower extremity pain
- Little or no back pain

- L5 or S1 root
- Paresthesia weakness(Isthmic)



Physical Signs

- Back tenderness – not specific
- Step sign – only in grade 3 or greater
- Painful limitation of extension
- Restricted SLR
- Neurological deficits

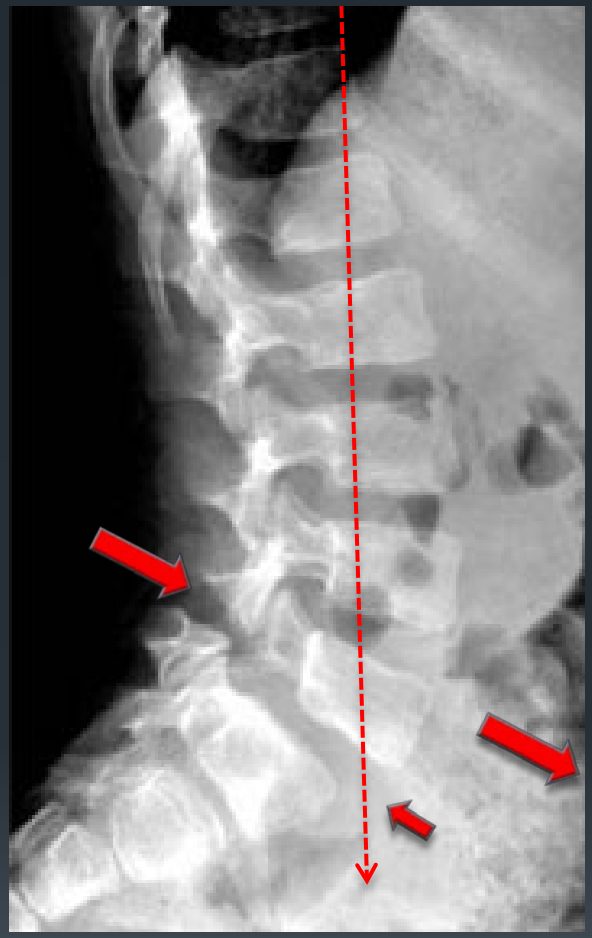


Female

Skeletal immaturity

High grade slip

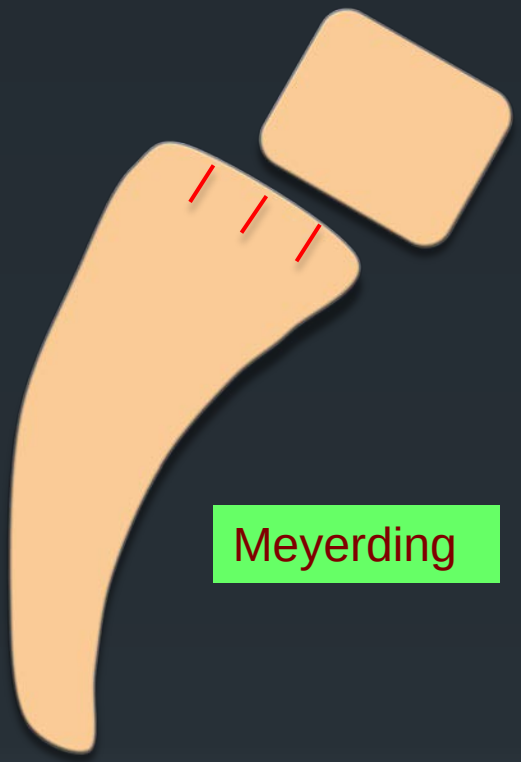
Lumbo sacral kyphosis



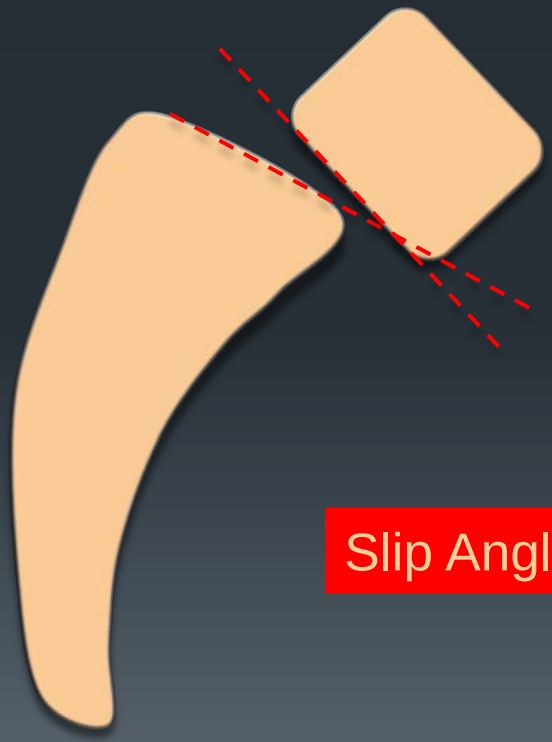
Disc degeneration

Associated Conditions

- Spina bifida occulta
  - 20-70% - Isthmic
  - 40% - Dysplastic
- Reactive sclerosis/fracture of contralateral pedicle
- Scoliosis
  - 5-7% of all patients
  - Long C shaped
  - Reflex spasm
  - Rarely structural – asymmetric slippage at LS junction, apex
- Abnormal disc on MRI



Meyerding



Slip Angle

Management

- Spondylolysis
- Low grade listhesis
- High grade listhesis
- Degenerative listhesis

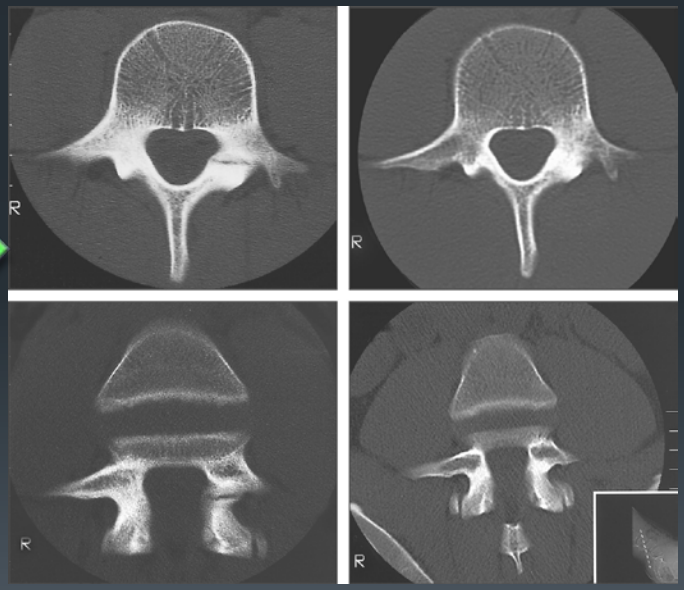
Bone School @ Bangalore

Spondylolysis

Acute Pars Fracture

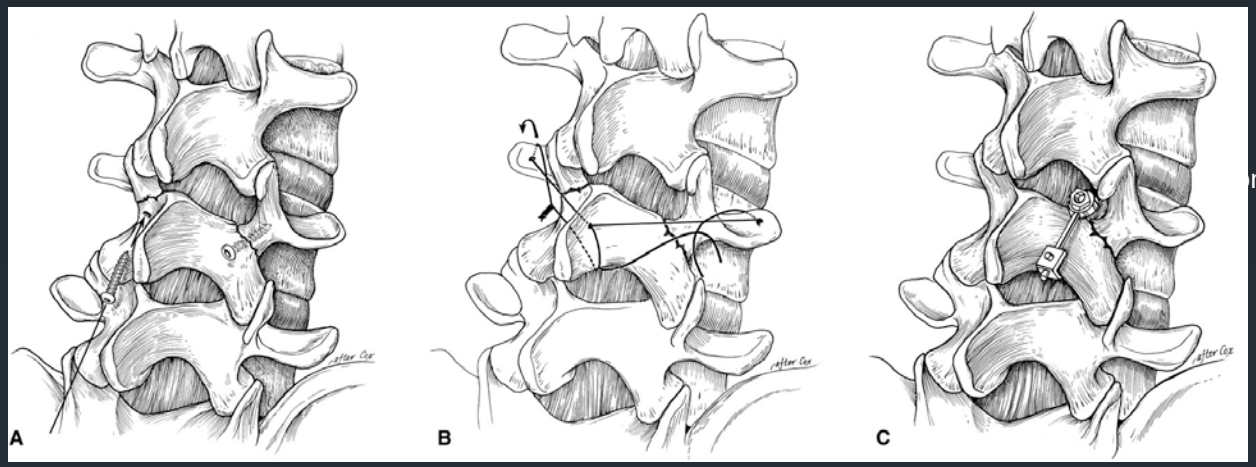
Rest

Bracing



Surgical Treatment

- Young individuals (16-30)
- No evidence of DDD
- Low back pain only
- Lesion at L4 or above
- Direct pars repair


A
B
C

Conservative treatment in Young Patients for LGSL

- 25 % slip – asymptomatic
- Radiographic evaluation
- Activity modification

Surgical indication in young patients

- Failure of conservative treatment – 1yr
- Tight hamstring with abnormal gait
- Sciatic scoliosis
- Progressive neurologic deficit
- Progressive slipping beyond 25-50% even when asymptomatic

Conservative treatment - adults

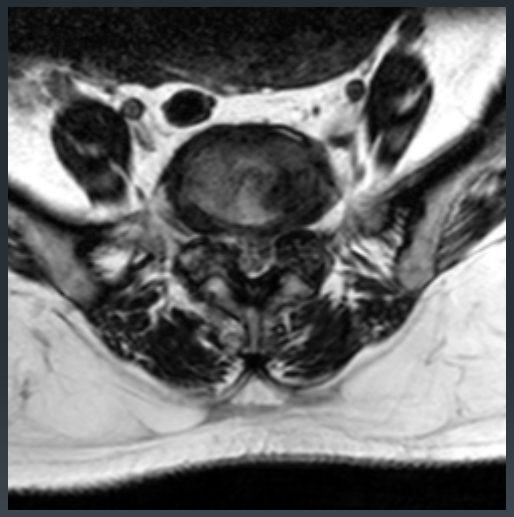
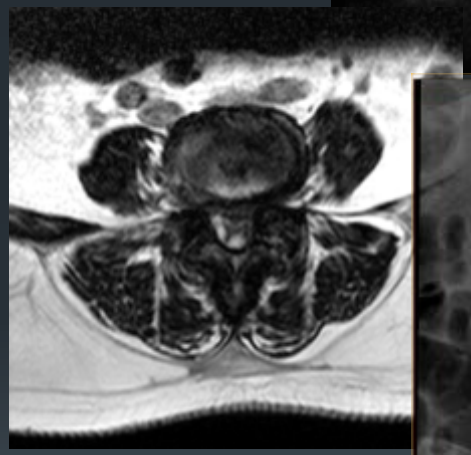
- **Do not automatically assume that the patients symptoms are due to the spondylo listhesis look for other causes**
- **Short period of rest with rapid return to activities**
- **Pain medications**
- **No scientific evidence for bracing**
- **Exercise – Flexion,Stabilization,Stretching**

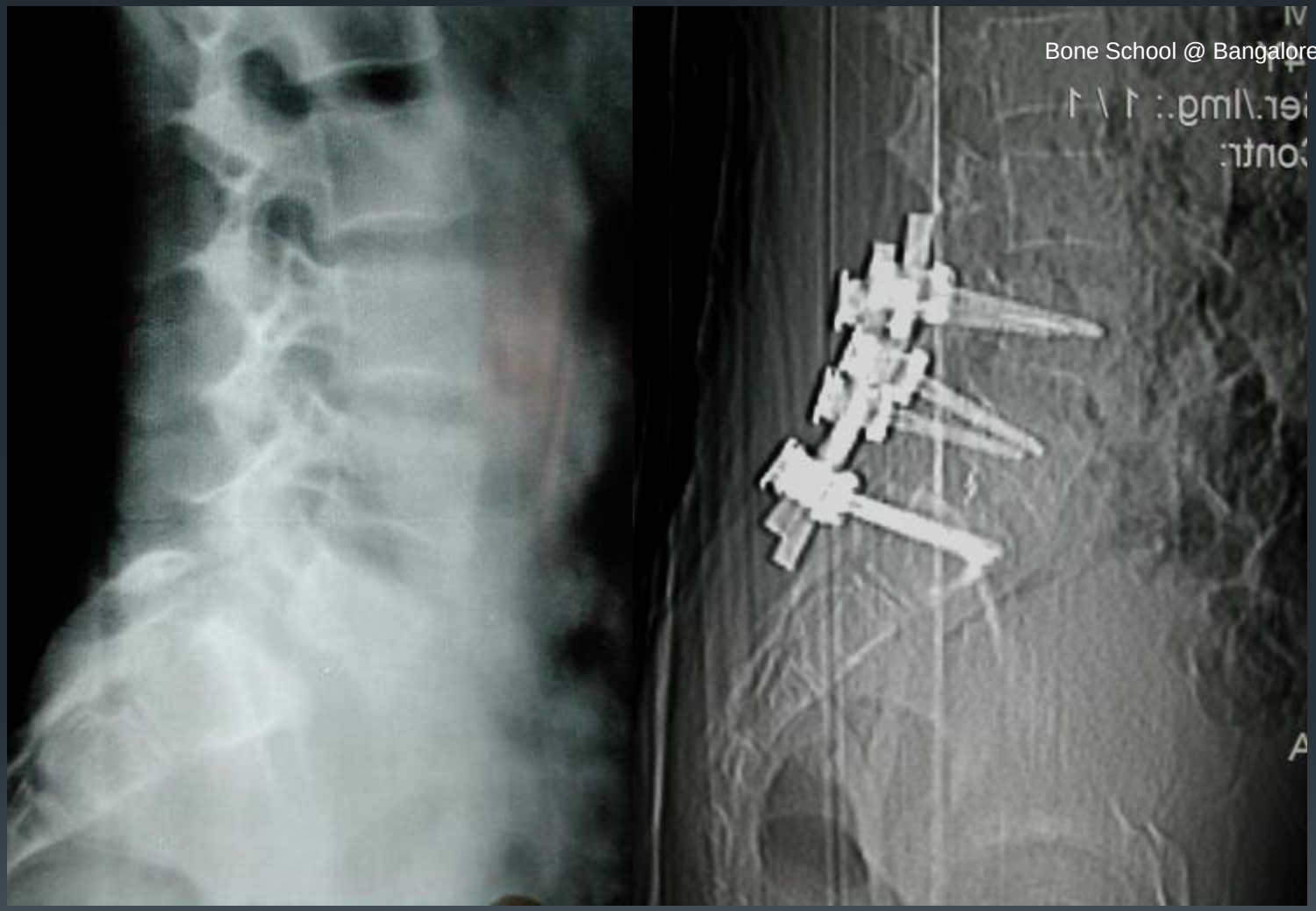
Surgical Treatment

- Six months of conservative treatment fails to improve symptoms
- MRI
- Dynamic LS spine films
- Discography
- Selective nerve root block
- Facet/Pars block


10cm



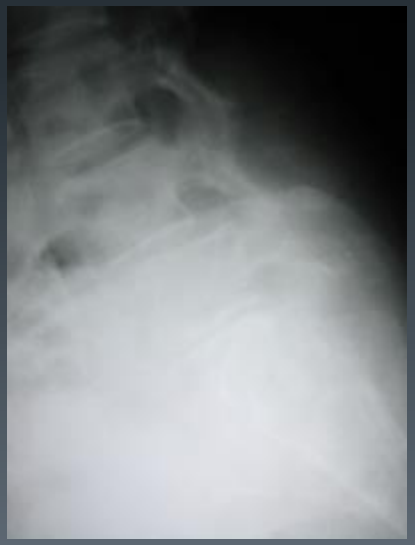

Bone School @ Bangalore



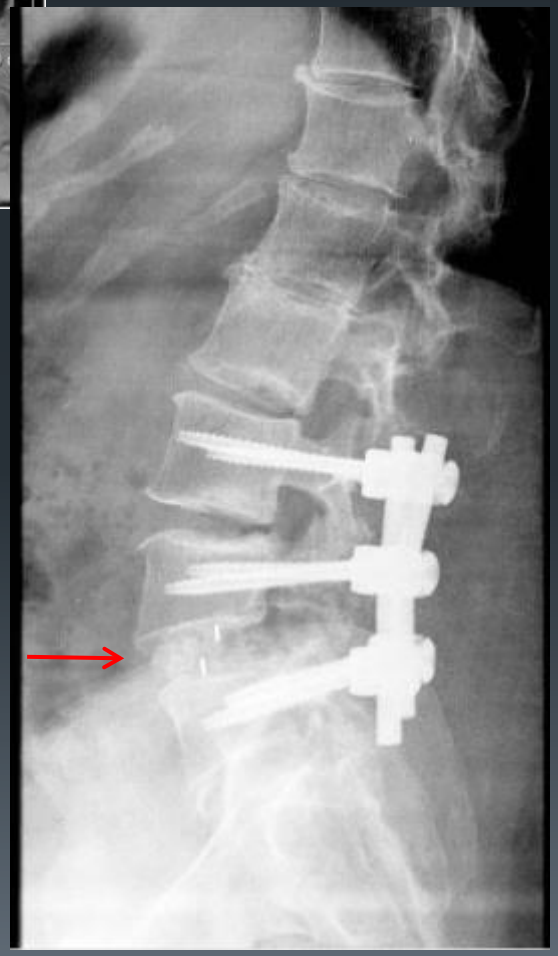



Bone School @ Bangalore

Degenerative SL

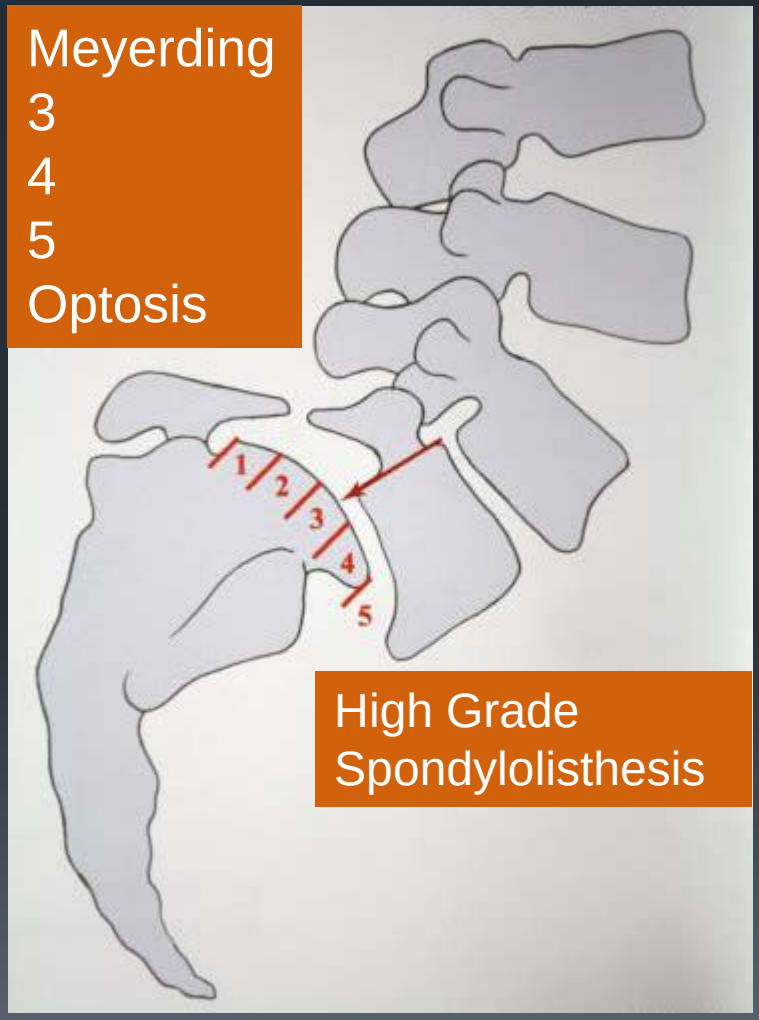
- Neurogenic claudication
- Canal stenosis
- Back pain
- Decompression
- IT or IB fusion





Bone School @ Bangalore

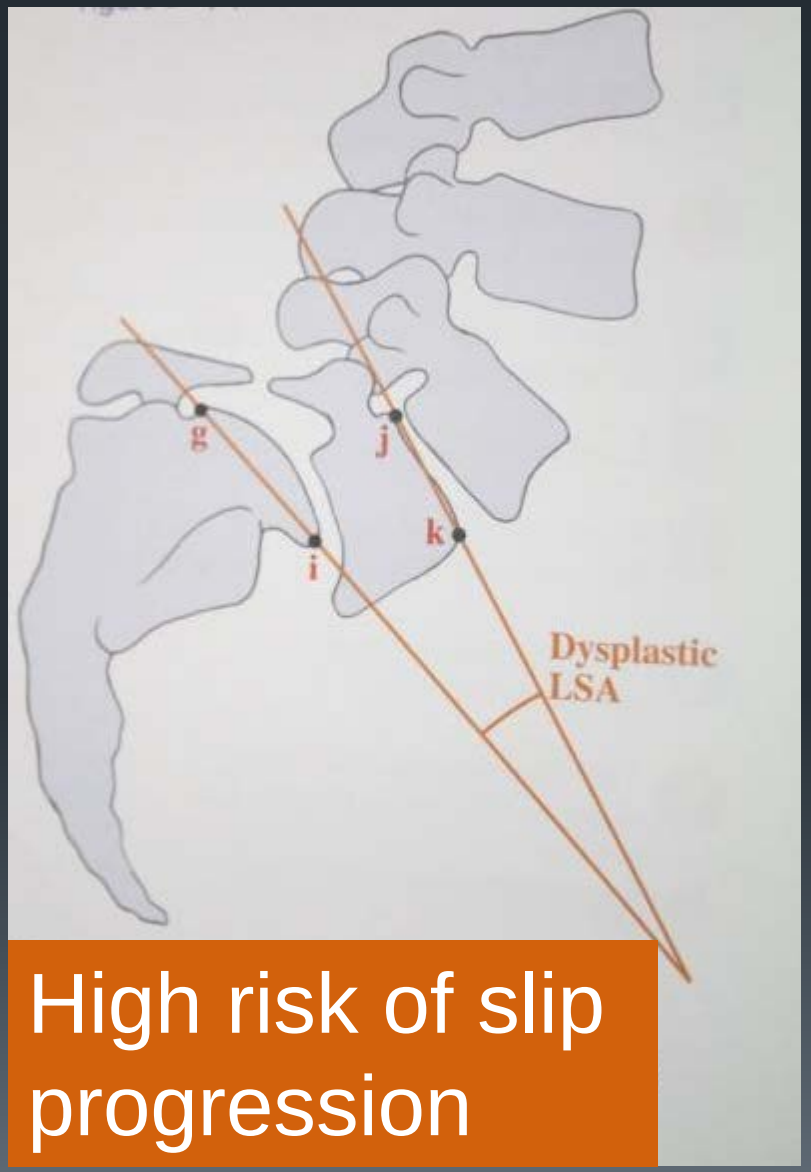
Meyerding
3
4
5
Optosis



High Grade Spondylolisthesis

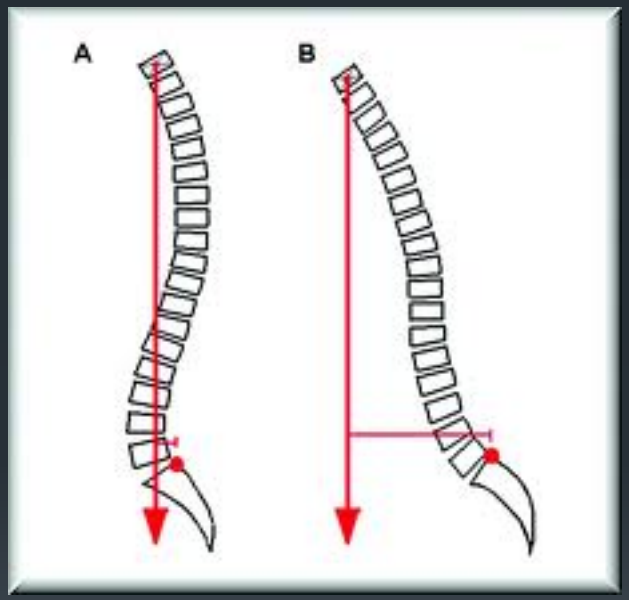
High Dysplastic

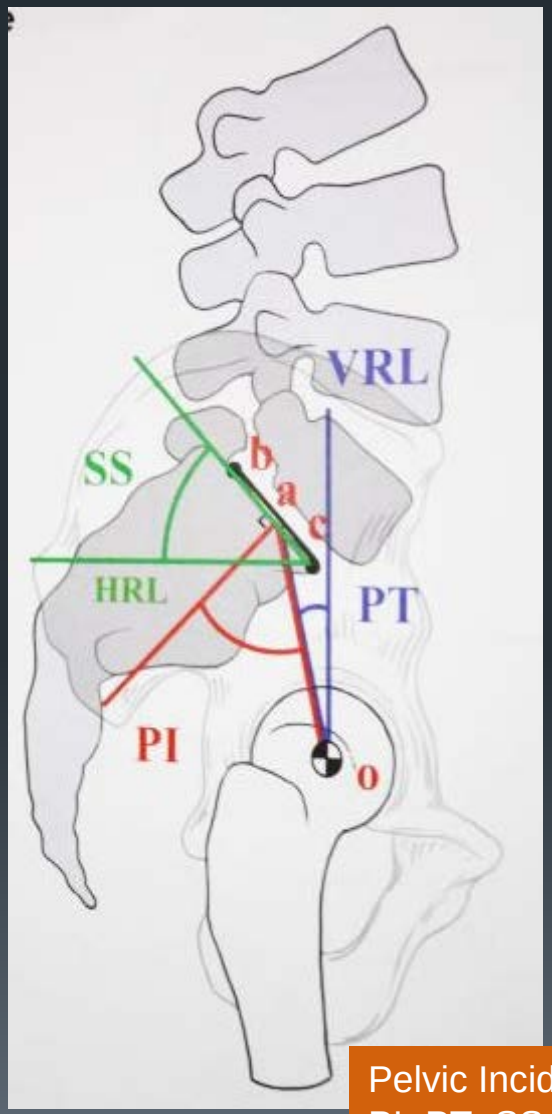
- Lumbo Sacral Kyphosis
- Trapezoidal L5
- Dome shaped S1 UEP
- Pelvic retroversion
- Hyper lordosis
- Dysplastic posterior elements



High risk of slip progression

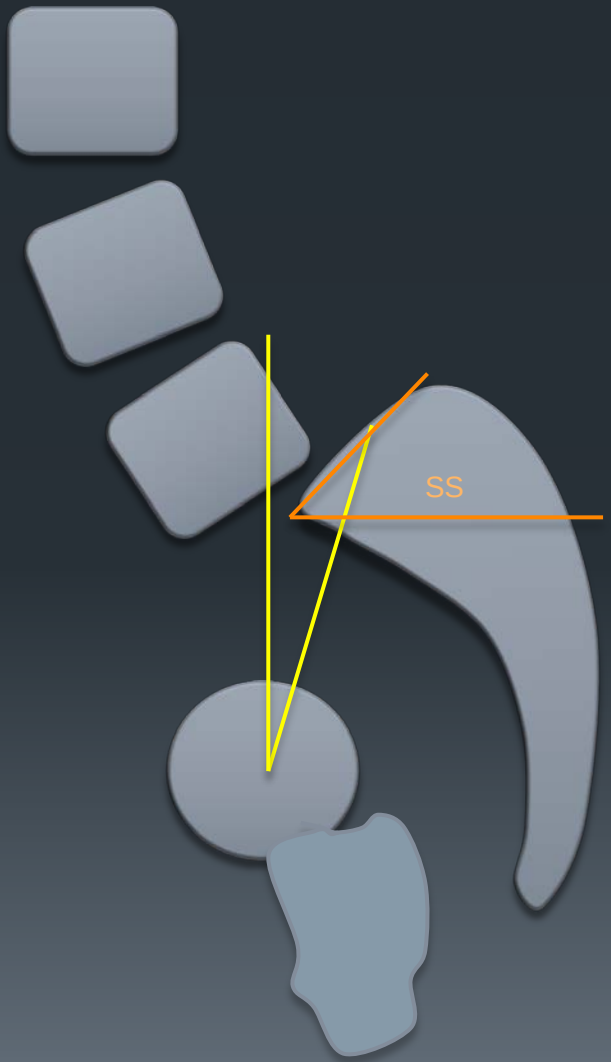
Lumbo Pelvic Parameters



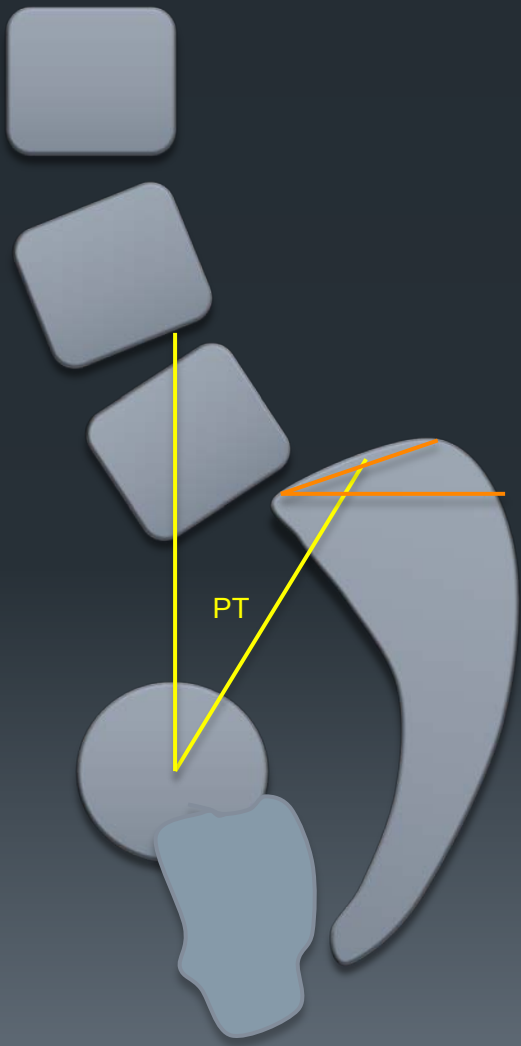


Pelvic Incidence
PI=PT+SS

High SS/Low PT
Balanced Pelvis



Low SS/High PT
Retroverted Pelvis



Hresko, Labelle,
Rousoully - 2005

Symptomatic HGS

Bone School @ Bangalore

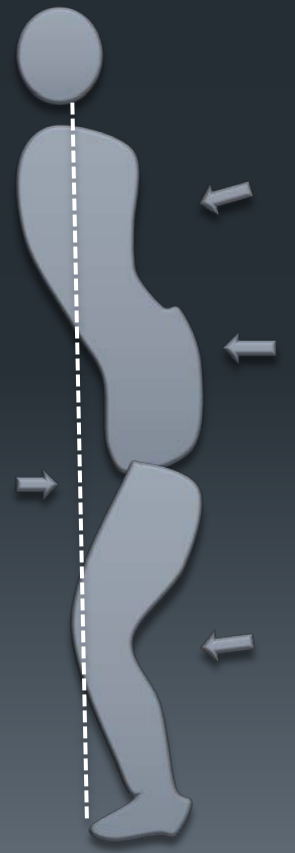
Pediatric – Growing Years

Adult

Symptomatic HGS – Growing Years

- Back pain
- Sagittal plane imbalance
- Phalen dixon sign
- Radicular pain
- Cauda equina

Surgical Intervention



High Dysplastic HGS – Growing Years

- 50% or greater slip
- Dysplastic features
- Lumbo sacral kyphosis
- With minimal or no symptoms

- Still an indication for fusion

High Grade Spondylo listhesis

- No one right way of management

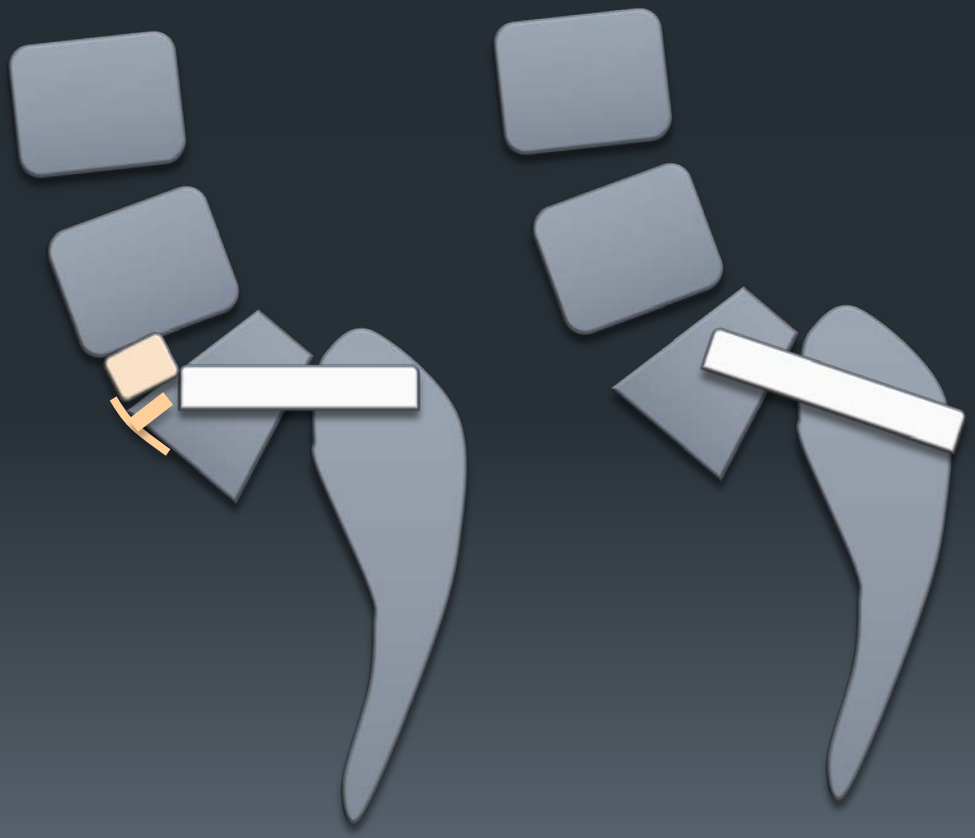
Surgical Management

- In situ fusion
  - 360^{o}
- Reduction and fusion
  - Posterior approach
  - Combined
- Resection
  - Complete
  - Partial

In Situ Fusion

- Un instrumented
- Instrumented
- Postero lateral
- 360 ^{o}
- Trans vertebral

In Situ – Trans Vertebral - Bohlman



Auto ,Allo – Fibula
Hollow Modular Screw Cage

+

Pedicle screw instrumentation

24/25 extremely satisfied patients in SRS questionnaire, Rick. C.Sasso 2007

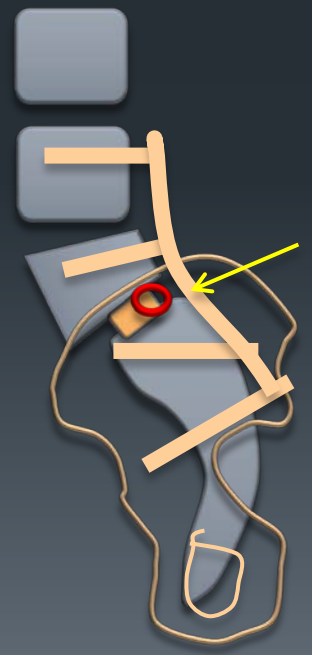
Reduction

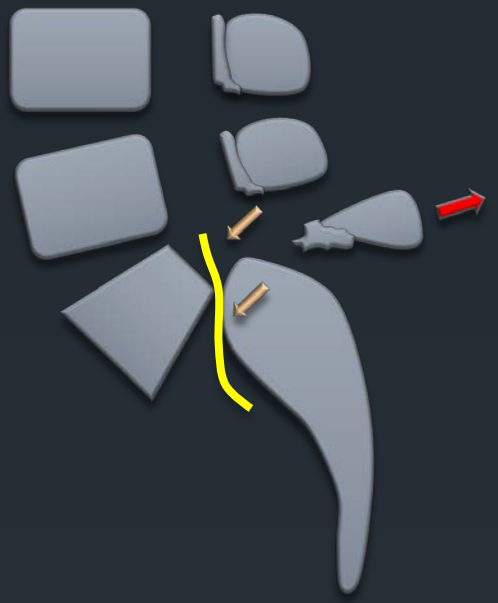
- Correction of
  - Pelvic retroversion
  - Lumbosacral kyphosis (slip angle)
- Partial reduction
- Complete correction of translation not required

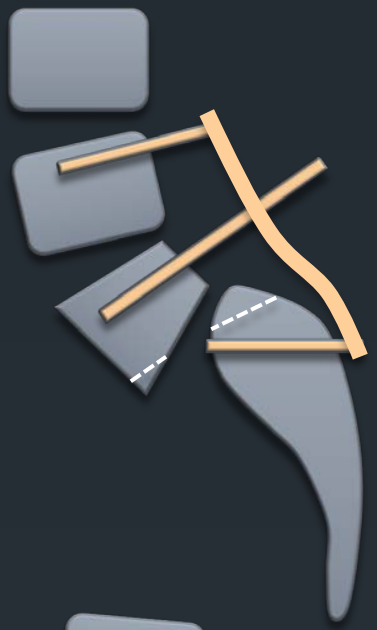
Improving the biomechanical milieu for fusion

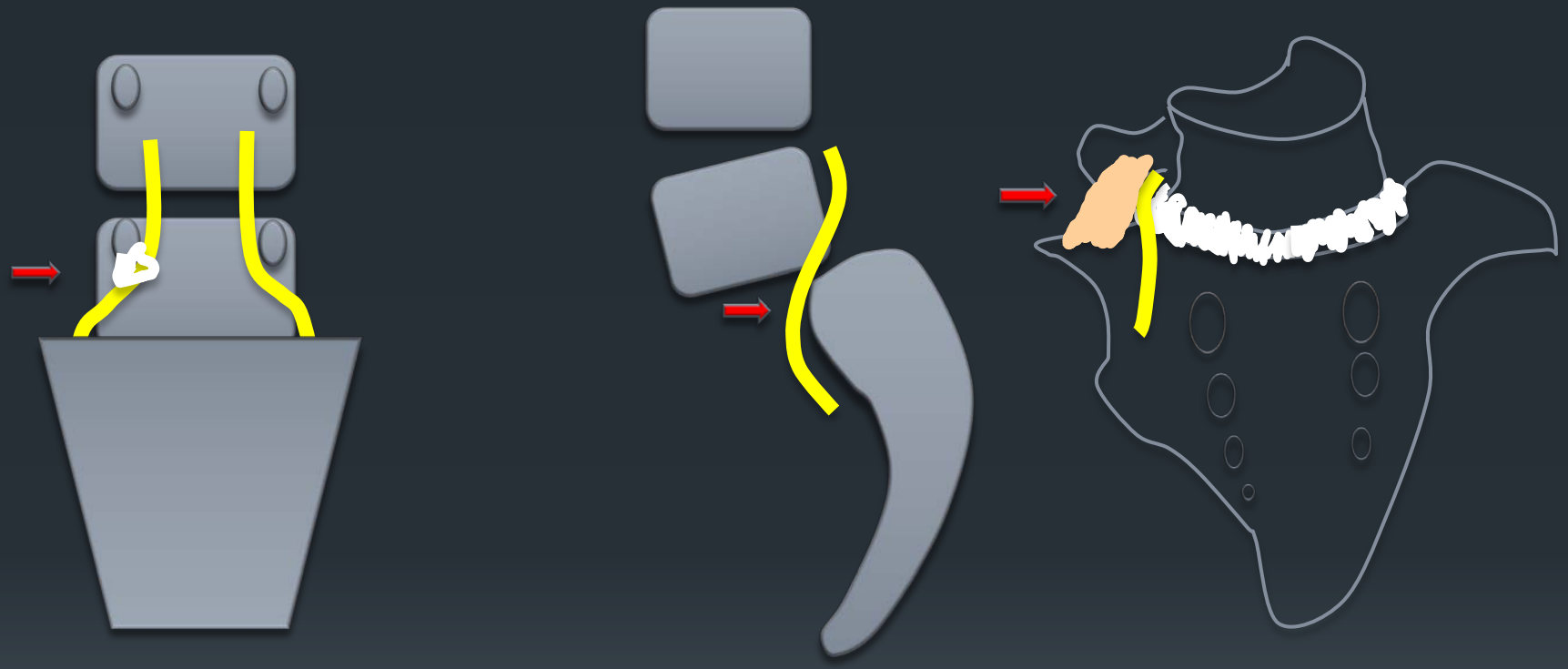
Reduction

- Inter body & Postero lateral fusion
- Anterior column support – Cage
- Pedicle screw instrumentation
- Extension to L4
- Extension to S2
- Iliac screws









L 5 Root

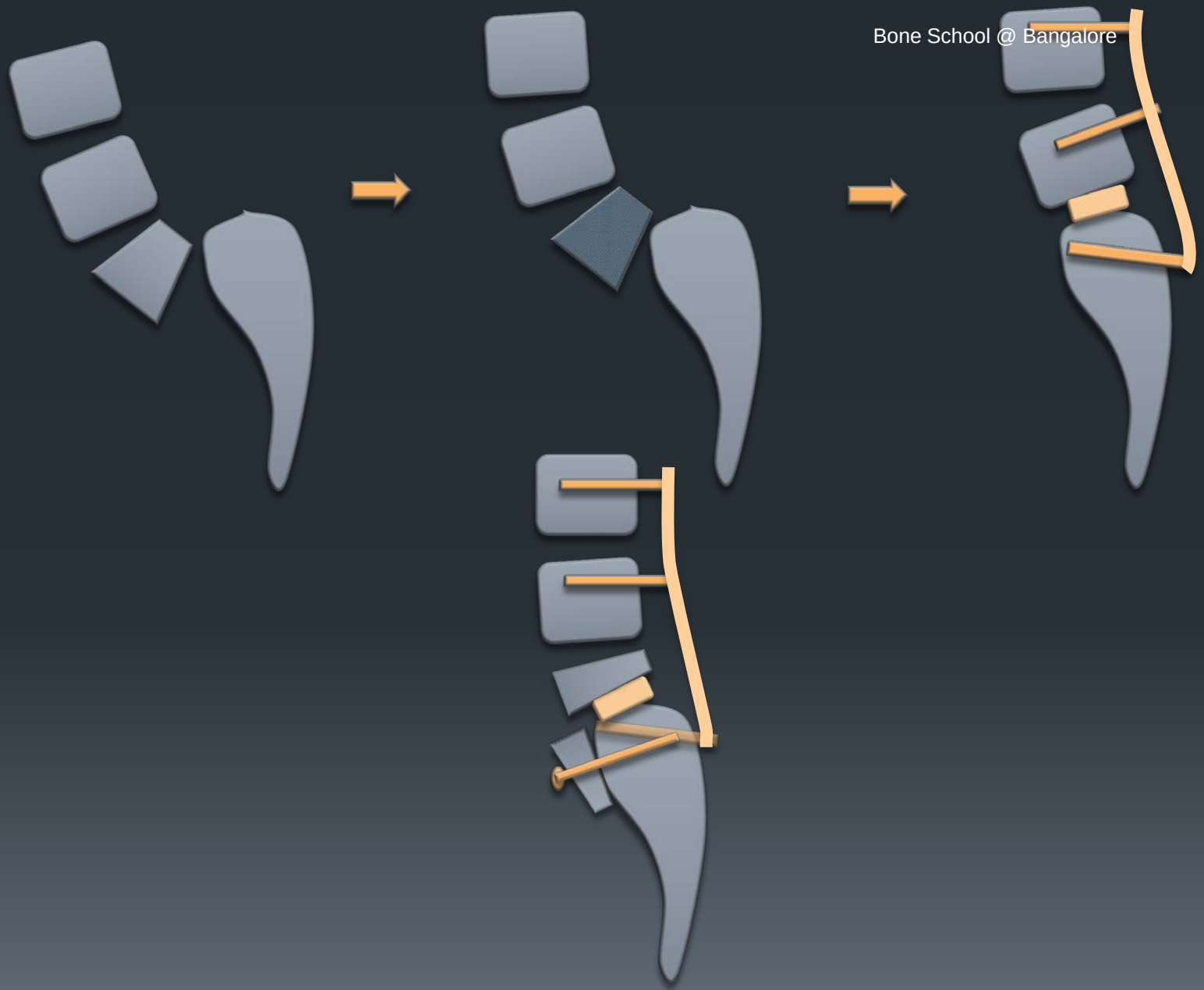
Successful Outcome

- Solid Fusion

L5 Vertebrectomy Gaines & Nichols

- Spondyloptosis
- With severe symptomatic sagittal imbalance

- Spinal shortening surgery



Asymptomatic HGS In Adults

- Good sagittal balance
- Distorted posture
- Bony stabilization – spontaneous fusion
- Back pain or radicular pain – Proximal lumbar pathology

Symptomatic HGS in Adults

- Acceptable sagittal balance with 3,4, 5
- Sagittal imbalance symptomatic
- Spondyloptosis

- In situ instrumented fusion – PL + Gill laminectomy
- Partial reduction and instrumented fusion – 360o, Gill + Sacral dome resection
- Bohlman transvertebral fusion, sacral dome resection + Gill & instrumentation

Do not be obsessed with radiological correction

Good decompression & Solid fusion

Summary - LGS

- Low dysplastic features
- Back pain , radicular pain
- Conservative or surgical
- In situ fusion , Reduction with Instrumented –IT or IB

Stenotic symptoms in DSL
Decompression and fusion

Summary - HGS

- High dysplastic features
- Symptomatic in growing years – risk of progression
- Need surgical intervention
- Reduction and inter body fusion with instrumentation
- Correction of lumbosacral kyphosis & pelvic retroversion
- L5 root injury
- Full reduction of anterior slip not required
- In situ trans vertebral fusion
- Gaines procedure
- In adults cause of pain may be elsewhere