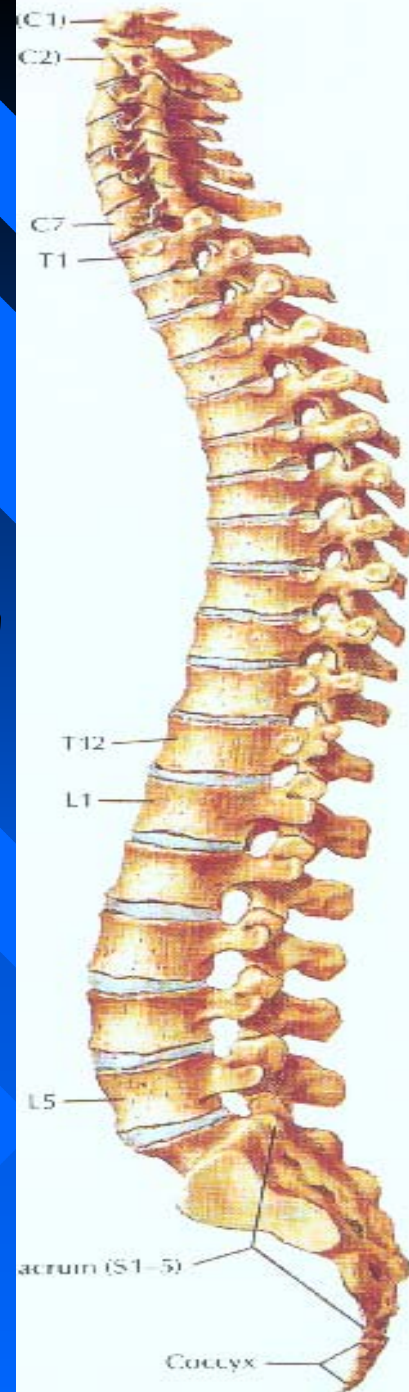
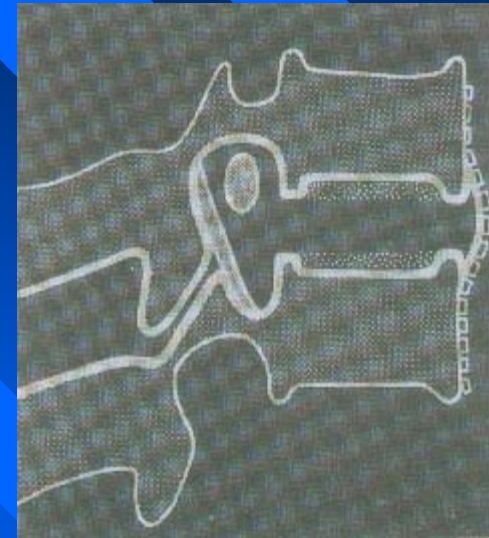


LUMBAR INSTABILITY



THE MOTION SEGMENT

- Motion is produced by structures holding vertebrae together
 - ❖ Intervertebral disc
 - ❖ Intervertebral foramen & facets
 - ❖ Interlaminar space
 - ❖ Ligamentum flavum
 - ❖ Inter and supra spinous ligaments



A change in the intervertebral disc produces change in the whole motion segment



SEGMENTAL INSTABILITY

- Increased motion in motion segment that deviates from physiological norm.
- Deviation from anatomical norm :- Involves structural loss such as defect in pars interarticularis.



SEGMENTAL INSTABILITY

❖ Dynamic Instability

- Contour misalignment
- Deg. Spondylolisthesis
- Retrolisthesis
- Excessive segmental lumbar lordosis



CAUSES OF INSTABILITY

- Congenital
- Acquired
- Traumatic
- Iatrogenic
- Infection
- Tumours, malignancy
- Systemic excessive lordosis from lax ligaments



CHRONIC LOW BACK PAIN

- Spondylolysis and Spondylolisthesis arise as a result of major structural changes in the lumbar spine.
- They are an important cause of chronic low back pain.



TYPES OF SPONDYLOLISTHESIS

- There are different types of spondylolisthesis.
- The basic lesion lies in the pars interarticularis which, when subjected to stress becomes increasingly stretched and eventually breaks.
- Spondylolysis is common in L4 and L5 being more common in L5.

It is said to occur in 2 to 10% of active and young individuals.



SPONDYLOLISTHESIS

- Once the pars interarticularis is stretched.
- The vertebral body starts slipping forwards.
- This is known as spondylolisthesis.



SPONDYLOLYSIS



SPONDYLOLISTHESIS



HISTORICAL MILESTONE

- ❖ The condition was first described by Herbineaux, a Belgian obstetrician, in 1782.
- ❖ He observed that occasionally a bony prominence in front of the sacrum constituted an obstruction to labour.



MEYERDING CLASSIFICATION

- Meyerding in 1932 described spondylolisthesis in four grades depending on the extent of forward slip of the vertebra.
- Grade – I 25%, Grade – II 50%, Grade – III 75% and Grade – IV more than 75%.
- Total forward slip of the vertebral body is known as spondyloptosis.



GRADES OF SPONDYLOLISTHESIS



GRADE IV SPONDYLOLISTHESIS



RESISTANCE TO LISTHESIS

Normally, the forward slip of the vertebra is resisted by following factors:

- Pair of facet joints
- Intact posterior neural arch
- Pedicle
- Normal bone resilience preventing stretch of the pedicle.
- Intervertebral disc binding the vertebral bodies



CLASSIFICATION

- Spondylolisthesis has been divided into six groups depending on their aetiology.



CONGENITAL

- **Congenital:** The forward slip of the vertebra is present at birth
- It is more of a clinical curiosity.
- Multiple congenital anomalies present.
- If the child survives, the defect in the spine produces scoliosis which then needs management.



ISTHMIC SPONDYLOLISTHESIS

- Important group in the whole classification
- It occurs in young people.
- As a result of the stress, the pars interarticularis gets pulled out.
- Finally, it breaks.
- The stress on the pars is laid right from the time the child starts standing and walking.
- Hamstring are not developed.
- Child starts standing or walking with hips flexed and exaggerated lordosis.



ISTHMIC SPONDYLOLISTHESIS

- Further slip requires stretching and elongation of pars.
- The degree of slip is quite marked because instead of disc degenerating the hyaline cartilage plate detaches from the bone.
- Compression of cauda equina is at times seen.



ISTHMIC SPONDYLOLISTHESIS

- If the defect is produced but the symptoms are not produced early, then the symptoms come on when these boys and girls are engaged in active strenuous sport.
- Usually after kicking a football, they get pain in the back.
- X-rays show the defect in the pars.



SPONDYLOLYTIC SPONDYLOLISTHESIS

- ❖ The most common group.
- ❖ The defect in pars interarticularis either unilateral or bilateral.
- ❖ The defect occurs between the ages of 5 and 7 years.
- ❖ After the age of 20 usually the forward slip does not increase.



THE PATHOGENESIS OF BACKACHE

- If the fibrous union firmly binds the two halves, then there is no pain.
- Union is loose, separation occurs during flexion of the spine, and a strain is applied to the fibrous band.
- Repetitive strains then give rise to arthritis and pain.
- Neurological deficit and root irritation is common in this group.

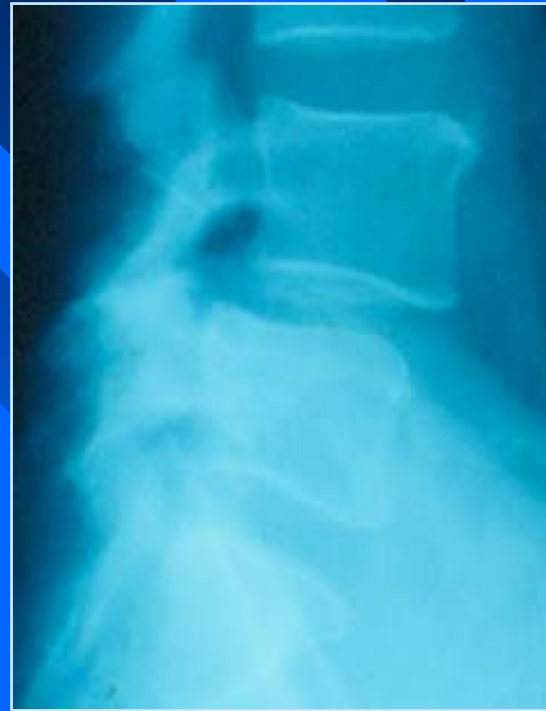


DEGENERATIVE SPONDYLOLISTHESIS

- ◆ There is no defect in the pars.
- ◆ The posterior arch is intact.
- ◆ The slip is never great.
- ◆ Excessive mobility in lumbar motion segment (usually L4/5) following degenerative changes.
- ◆ More common in females at the age of 50.
- ◆ Root entrapment and sciatica are common.



DEGENERATIVE SPONDYLOLISTHESIS



TRAUMATIC SPONDYLOLISTHESIS

- Dislocation of the posterior joints, fracture of spinous process extending into the lamina at the pars.
- Clearly defined edges are both suggestive of trauma.
- Acute traumatic slip can also be quickly reduced and maintained in reduced position.



PATHOLOGICAL SPONDYLOLISTHESIS

- ▶ Primary or secondary malignancy of the spine.
- ▶ Diseases of bones like osteogenesis imperfecta, achondroplasia, osteomalacia may allow attenuation of the pedicle.
- ▶ Resultant forward slip of the vertebral body.



INVESTIGATIONS

- In most of the cases of spondylolisthesis the defect in the pars can be demonstrated by taking oblique views of the spine demonstrating the pars and its defect very clearly.
- Lateral X- rays of the spine helps to establish the diagnosis and degree of spondylolisthesis.
- A CT scan of the lumbar spine has less clinical value in this disorder.
- MRI is a very useful investigation in spondylolisthesis.
- Discography help in diagnosing degeneration in the disc one above the listhesis.
- Discography at the same level has no clinical significance.



MANAGEMENT

- Not all cases of spondylolysis need surgical intervention.
- Many cases can be treated conservatively with rest, analgesics and with the use of braces.
- When pain becomes intractable in the back or patient shows evidence of root compression surgery is indicated and there is no justification for conservative treatment.
- Not all cases of spondylolisthesis eventually come for surgery and their long term follow up does not justify withholding surgery on those with definite indications.

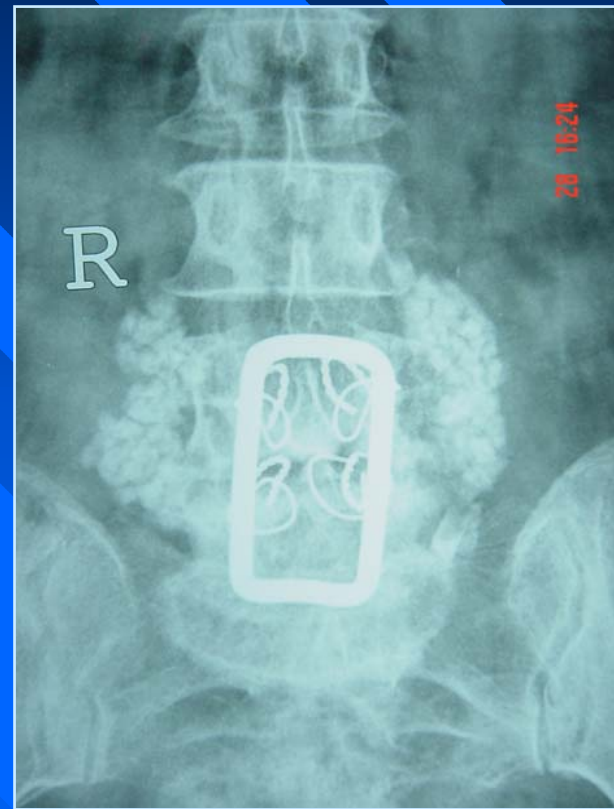


POSTERO-LATERAL FUSION

- Spondylolisthesis managed by postero-lateral fusion with or without decompression of the roots.
- Very satisfactory particularly in adolescent patients.
- It is easy to perform.
- Bedrest for 10 to 12 weeks and then brace for few months till satisfactory fusion is achieved.
- Bilaterally from L4 to S1 levels. The rate of recurrence of backache is high.
- Progressive slippage and pseudoarthrosis has been reported in up to 25% of the cases.



POSTERO LATERAL FUSION AND HARTSHILL RING



SURGICAL CORRECTION OF SPONDYLOLISTHESIS

- ❖ Surgical reduction was first advocated in 1932, but was performed in 1936.
- ❖ The advantages of doing so are as follows:
 1. Normalisation of biomechanical function at the lumbosacral junction.
 2. Once reduced and held in reduced position the stabilization process becomes more simpler.
 3. Elimination or reduction of neurological complications.
 4. Better mobility of spine.
 5. Improvement in the appearance of back.
 6. Better quality of relief from pain.
- ❖ Surgical reduction can be performed by means of an anterior approach or posterior approach, or a combination of both.

Posterior approach is generally preferred.

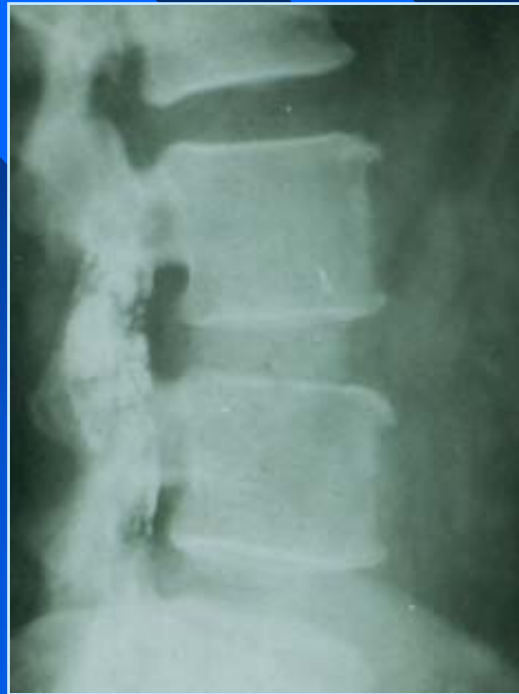


PLIF (POSTERIOR LUMBAR INTERBODY FUSION)

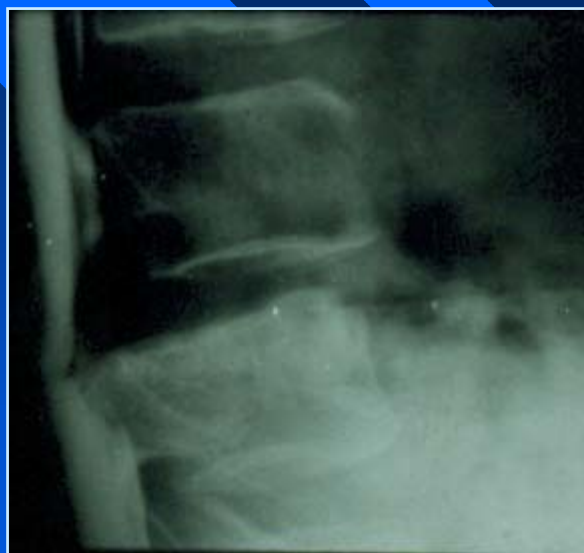
- The Cloward, has been doing it since 1943.
- The operation is technically demanding.
- PLIF is a superior operation in the treatment of instability created by spondylolisthesis.
- It dynamically decompresses the neural structures by holding the vertebrae apart.
- It can be repeated at more than one level.



PLIF



INSTABILITY CORRECTED BY PLIF



CIRCUMFERENTIAL OR GLOBAL FUSION

- Used in Grade III and Grade IV spondylolisthesis as it is very unstable.
 1. Posterior lumbar interbody fusion.
 2. Pedicle screws and plates.
 3. Postero-lateral fusion



CIRCUMFERENTIAL FUSION



THANK YOU

