LUMBAR DISC PROLAPSE

RAKESH MIRYALA
Distribution of load in the inter-vertebral disc.

(A) In the normal, healthy disc, the nucleus distributes the load equally throughout the annulus.

(B) As the disc undergoes degeneration, the nucleus loses some of its cushioning ability and transmits the load unequally to the annulus.

(C) In the severely degenerated disc, the nucleus has lost all of its ability to cushion the load, which can lead to disc herniation.
Disc Biomechanics

• Stresses
  – Annulus Fibrosus
    • highest tensile stresses
  – Nucleus Pulposus
    • highest compressive stress
  – Intra-discal pressure is position dependent
    • pressure is lowest when lying supine
    • pressure is intermediate when standing
    • pressure is highest when sitting and flexed forward with weights in the hands
    • when carrying weight, the closer the object is to the body the lower the pressure

• Stability
  – following subtotal discectomy, extension is most stable loading mode
Etiology of Intervertebral disc degeneration

• Repetitive mechanical activities
• Living a sedentary lifestyle
• Traumatic injury to lumbar discs
• Obesity – overloading the motion segment.
• Poor posture
• Tobacco abuse
• Mutation
Causes and Risks Factors

Specific causes

- **Inflammatory.** Rheumatoid arthritis, ankylosing spondylitis, and reactive arthritis.
- **Mechanical.** Osteoarthritis, facet joint pain, lumbar spondylosis, spondylolisthesis, radiculopathy, kyphosis, scoliosis, herniated disc, sciatic, degenerative disc or joint disease and fracture.
- **Metabolic.** Osteoporosis, Paget’s disease and osteomalacia.
- **Others.** Tumors and infections.

Non-Specific causes

- Poor posture when sitting and standing, lifting ergonomics and unknown causes.

(Concannon, & Bridgen, 2011).
PROLAPSED INTERVERTEBRAL DISC

- **Etiology**
  - Mostly seen in lumbar region followed by cervical region.
  - Affects young adults 30-40 years who still have relatively maintained disc height.
  - Male:female ratio 3:1
  - 95% involves L4-5 and L5-S1 (most common)
  - Herniates through the postero-lateral corner of annulus fibrosus (thin region)
  - Most common causes:
    - Sudden violent trauma (sports injuries)
    - Less severe trauma in degenerated annulus (lifting, bending, coughing, sneezing etc)
Clinical features: History

- History of episode of trauma
- Radicular pain (buttock and thigh pain, extending below the knee following the distribution of the involved nerve roots)
- aggravated by flexion, sitting, straining, sneezing, cough
- decreased by rest, especially in the semi-Fowler position
- Other symptoms:
  - Weakness Corresponding to level of neurological involvement
  - Paraesthesia in dermatomal distribution
  - Cauda equina

- Natural course of symptomatic PIVD is slow resolution of symptoms over 6-8 weeks period in 80% of cases
Cauda Equina syndrome

- Emergency
  - Aggressive evaluation and management
  - Large central herniation
- Most consistent symptoms
  - Saddle anesthesia
  - Bilateral ankle areflexia
  - Bladder symptoms
- Other symptoms-
  - Numbness and weakness in both legs,
  - Rectal pain,
  - Numbness in the perineum,
  - Bowel disturbances
Clinical Features- Signs

• **Antalgic gait**
  – Affected hip more extended and knee more flexed than normal side

• **Trendelenberg gait (L5 nerve root)**

• **List**
  – abrupt planar shift
  – Axillary disc – same side
  – Shoulder disc - opposite side

• **Thigh and calf muscle wasting**

• **Loss of lumbar lordosis**

• **Paraspinal spasm- central furrow sign**
Provocative tests

- **Straight Leg Raise**
  - a tension sign for L5 and S1 nerve root
  - technique
    - can be done sitting or supine
    - reproduces pain and paresthesia in leg at 30-70 degrees hip flexion
  - sensitivity/specificity
    - most important and predictive physical finding for identifying who is a good candidate for surgery

- **Contralateral SLR**
  - crossed straight leg raise is less sensitive but more specific

- **Lesegue sign**
  - SLR aggravated by forced ankle dorsiflexion

- **Bowstring sign**
  - SLR aggravated by compression on popliteal fossa
Figure 9-25. Straight-leg raising test.

Figure 9-26. Lasegue's test.

Figure 9-27. A and B, Bowstring sign.
Red Flag Signs

- Extremes of age (<15yr, >55yr)
- Neurological deficits
- Fever
- Unexplained weight loss (10lb in 6months)
- Malaise
- Rest pain/night pain
- Significant trauma
- Drug and alcohol abuse
# Common causes of low back pain

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MANAGEMENT

• NON OPERATIVE MANAGEMENT
  – 90% respond to conservative management
  – Rest in semi-fowler position, ice packs, analgesics, muscle relaxants, oral steroids, physical therapy and exercises
  – Selective nerve root blocks: transforaminal SNRB with local anesthetic agent and long acting corticosteroid combination
  – Lumbar epidural steroid injection
Bed Rest

• No data to suggest that bed rest alters the natural history of lumbar disc herniation or improves outcomes.

• Consensus of 2 days (if used)
Physical Therapy

• IFT, SWD, TENS, Traction, Iontophoresis,
• Ultrasound therapy

• Exercises
PHYSICAL THERAPY

INTERFERENTIAL THERAPY

• BLOCKS PAIN SIGNALS AT SPINAL CORD LEVEL AND PROMOTE INCREASED BLOOD CIRCULATION.
• MORE DEEPER PENETRATION OF HEAT

TRANSCUTANEOUS ELECTRIC NERVE STIMULATION

• BLOCKS PAIN SIGNALS AND STIMULATE ENDORPHIN RELEASE
Physical therapy

Intermittent Pelvic Traction

– Goal- distract the lumbar vertebrae.
– enlargement of the inter-vertebral foramen,
– creation of a vacuum to reduce herniated discs,
– placement of the PLL under tension to aid in reduction of herniated discs,
– relaxation of muscle spasm,
– freeing of adherent nerve roots
– *Does not alter natural history of disease*
Exercises

• Better than medical care alone

• Begin when acute pain diminishes
Exercises

GENERAL RULES FOR EXERCISE

• Do each exercise slowly. Hold the exercise position for a slow count of five.
• Start with five repetitions and work up to ten. Relax completely between each repetition.
• Do the exercises for 10 minutes twice a day.
• Care should be taken when doing exercises that are painful. A little pain when exercising is not necessarily bad. If pain is more or referred to the legs the patient may have overdone it.
• Do the exercises every day without fail.
FOR ACUTE STAGE

BRIDGING EXERCISE

KNEE HUGS

Pelvic tilt
FOR RECOVERY OR SUBACUTE STAGE

EXTENSION CONTROL

HAMSTRING STRETCH

KNEE ROLLS
Lifestyle Modifications

• Avoidance of
  – Repetitive bending /twisting/ lifting
  – Contact sports
  – Heavy weights
  – 2wheelers, Auto rickshaws
  – Soft mattress( Spring, foam)

• Posture training

• Back support while sitting

• Firm mattress (rubberised foam, coir)
Other Non surgical therapeutic measures

- Chiropractice
- Complementary and alternate medicine (acupressure and massages)
- Back School Training
- Phootherapy (injection of irritant solutions into paraspinal muscles)
- Thermal Annuloplasty
Epidural and Intradiscal Steroid injection

**Contraindications**
- infection at the injection site
- systemic infection
- bleeding diathesis
- uncontrolled diabetes mellitus
- congestive heart failure.

**Complications**

**Minor**
- Non-positional headaches
- facial flushing insomnia
- low-grade fever,
- transient increased back or lower extremity pain

**Major**
- vasovagal reaction
- Dural puncture
- Positional headache
- epidural abscess,
- epidural hematoma,
- Dura-cutaneous fistula,
- Cushing syndrome
Epidural Steroid injection Techniques

- Interlaminar Approach
- Transforaminal Approach
- Caudal Approach
SURGICAL MANAGEMENT

• Absolute Indications
  – progressive and significant weakness
  – Cauda-equina syndrome

Relative indications

• Progressive and significant weakness
• Cauda-equina syndrome
  – persistent disabling pain lasting more than 6 weeks that have failed non-operative options (and epidural injections)

• Rehabilitation
  – patients may return to medium to high-intensity activity at 4 to 6 weeks

• Outcomes: improvement in pain and function greater with surgery
Operative management

- Standard discectomy
- Minimally invasive lumbar discectomy
- Microscopic Lumbar discectomy
- Endoscopic discectomy
- Chemo-nucleolysis
- Arthrodesis
- Disc replacement
Total Laminectomy
Hemilaminectomy
Minimally Invasive Lumbar Discectomy

- Fenestration of lamina
- Part of ligamentum flavum is excised
Micro Discectomy

- Requirements
  - operating microscope with a 400-mm lens,
  - small-angled Kerrison rongeurs of appropriate length,
  - microinstruments,
  - combination suction–nerve root retractor
Percutaneous endoscopic Discectomy

- Mechanically decompress a herniated lumbar disc via a posterolateral cannula
- Reduced morbidity
- Reduced hospital stay

Contraindications
- Presence of sequestered fragments
- Lumbar canal stenosis
- Lumbosacral discs
COMPLICATIONS

• Infection – Superficial wound infection, Deep disc space infection
• Thrombophlebitis/ Deep vein thrombosis
• Pulmonary embolism
• Dural tears may result in Pseudomeningocele, CSF leak, Meningitis
• Postoperative cauda equina syndrome
• Neurological damage or nerve root injury
• Urinary retention and urinary tract infection
Post op management

• Immediate post op
  – Monitor neurology
  – Turn in bed, semi fowler position
  – Walk with assistance to toilet
  – Oral analgesics and muscle relaxants for pain
  – Pt is mobilized on the next day
Chemo Nucleolysis

• Injecting chymopapain preparation into disc space

• Complications
  – Neurological
    • cerebral hemorrhage,
    • paraplegia,
    • paresis, quadriplegia,
    • Guillain-Barre syndrome,
    • seizure disorder.
  – Anaphylaxis

• Procedure is not in favour now
Disc Excision & Arthrodesis

• Indicated for
  – Marked segmental instability
  – Multilevel disc disease
  – Done when facets are destabilized bilaterally to prevent iatrogenic Spondylolisthesis

• Disadvantages of fusion:
  – Alters the biomechanics of spine
  – Loss of motion and overall shift in the sagittal alignment
  – Causes degenerative changes in the adjacent spinal motion segments
Total Disc Replacement

- Good bone quality (non osteoporotic)
- No spondylolisthesis or spinal deformity
- No infection
- Normal facet joints
ADVANTAGES OF DISC REPLACEMENT

• Removes the disc/presumed main source of pain
• Restore disc height----relieves load across the facet joints----improves the pattern of load bearing between vertebrae.
• Segmental stability, preservation and improvement of segmental motion
• Maintain lordosis curve
• Limit disability and early return to work
Keel Fixation

The endplates have a patented central keel and small spikes for initial fixation to the vertebrae.

A plasma sprayed titanium coating on all bone-contacting surfaces to promote bony on growth.
THANK YOU