



# Mechanical Low Back pain

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# Epidimeology

- Most common cause of disability under 45 years worldwide
- Major cause of OPD visits
- Significant socio-economic burden

# Definition of MLBPs

- Pain arising from spinal structures
- Activity related
- Improves with rest
- Non radicular
- No neurological deficit

**Mechanical** - 85-  
90%

**Neurological**

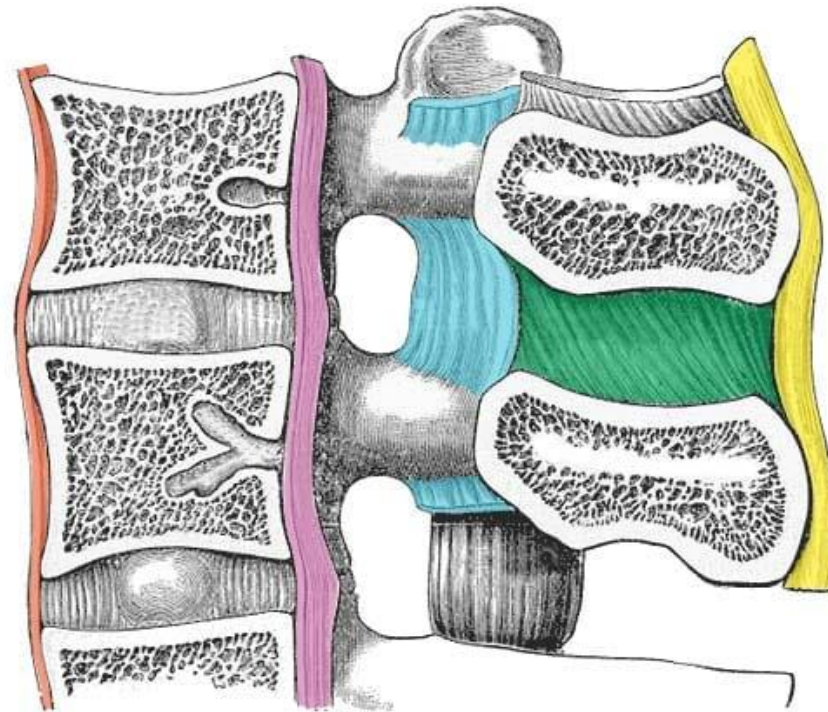
Radicular pain  
Neurogenic  
claudication  
Cauda equina  
syndrome

**Secondary causes**

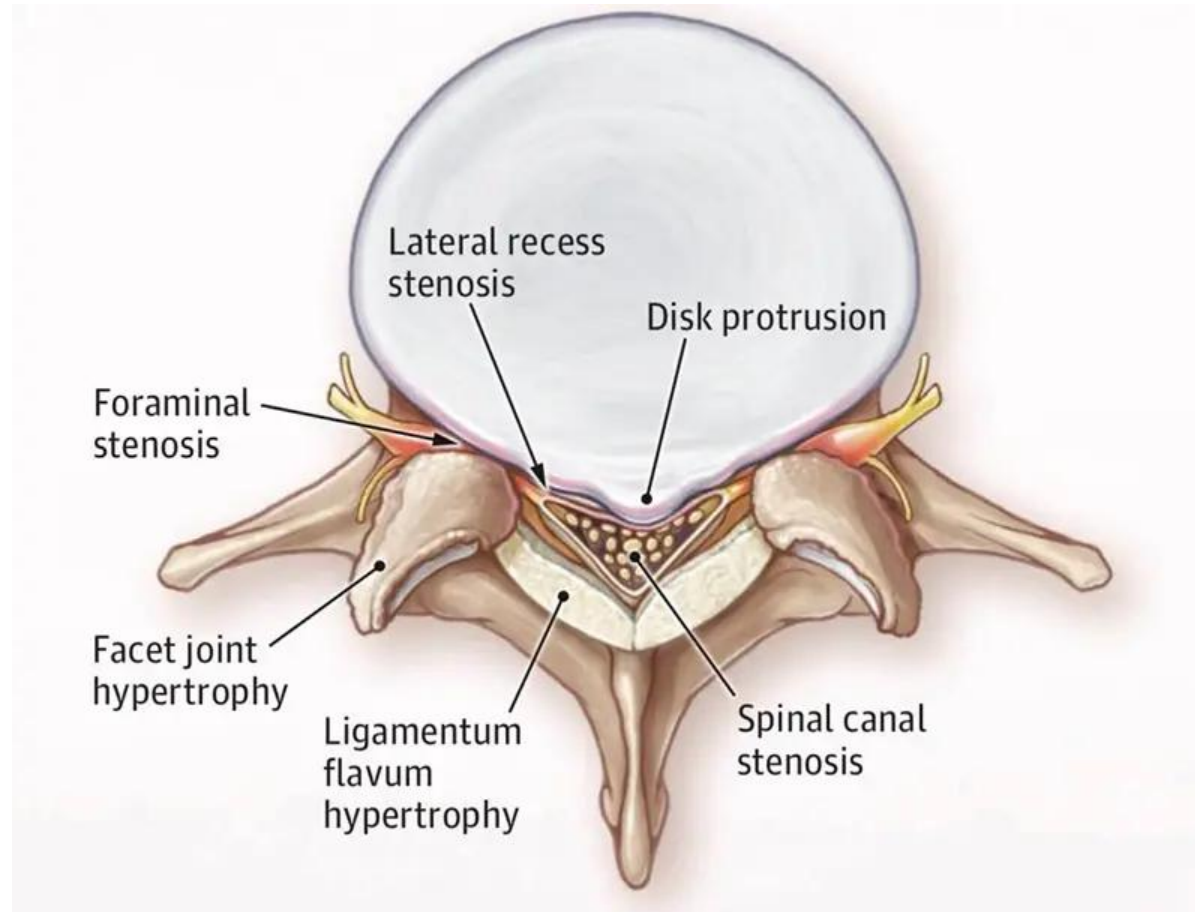
Infection ,  
tumour , fracture  
, inflammatory

# Pain generators in MLPs

- Vertebra (L 1-5)
- Intervertebral disc- disc degeneration
- Facet joint - arthropathy
- Ligaments- sprains
- Paraspinal muscles - sprains
- Sacroiliac joints - arthropathy

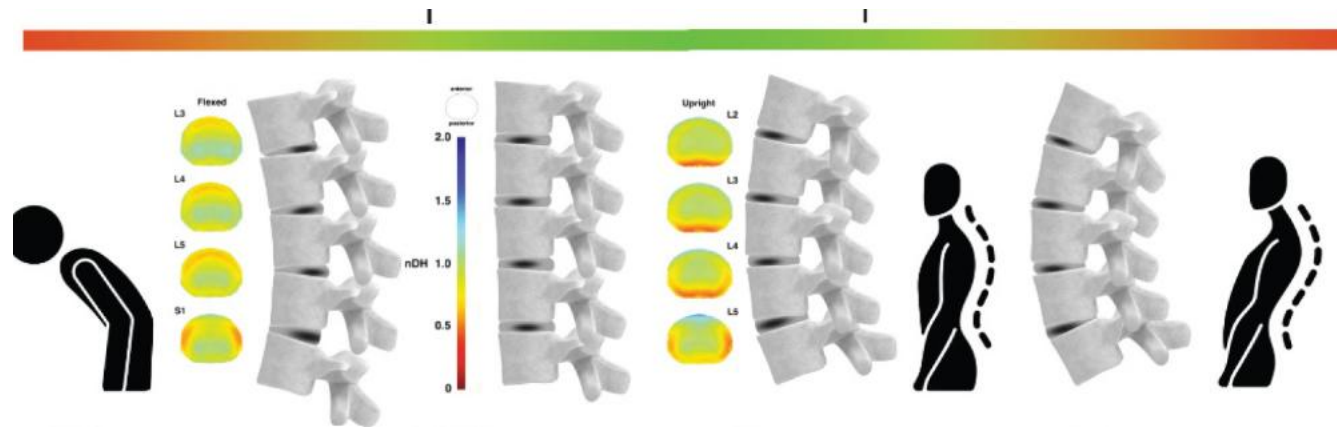


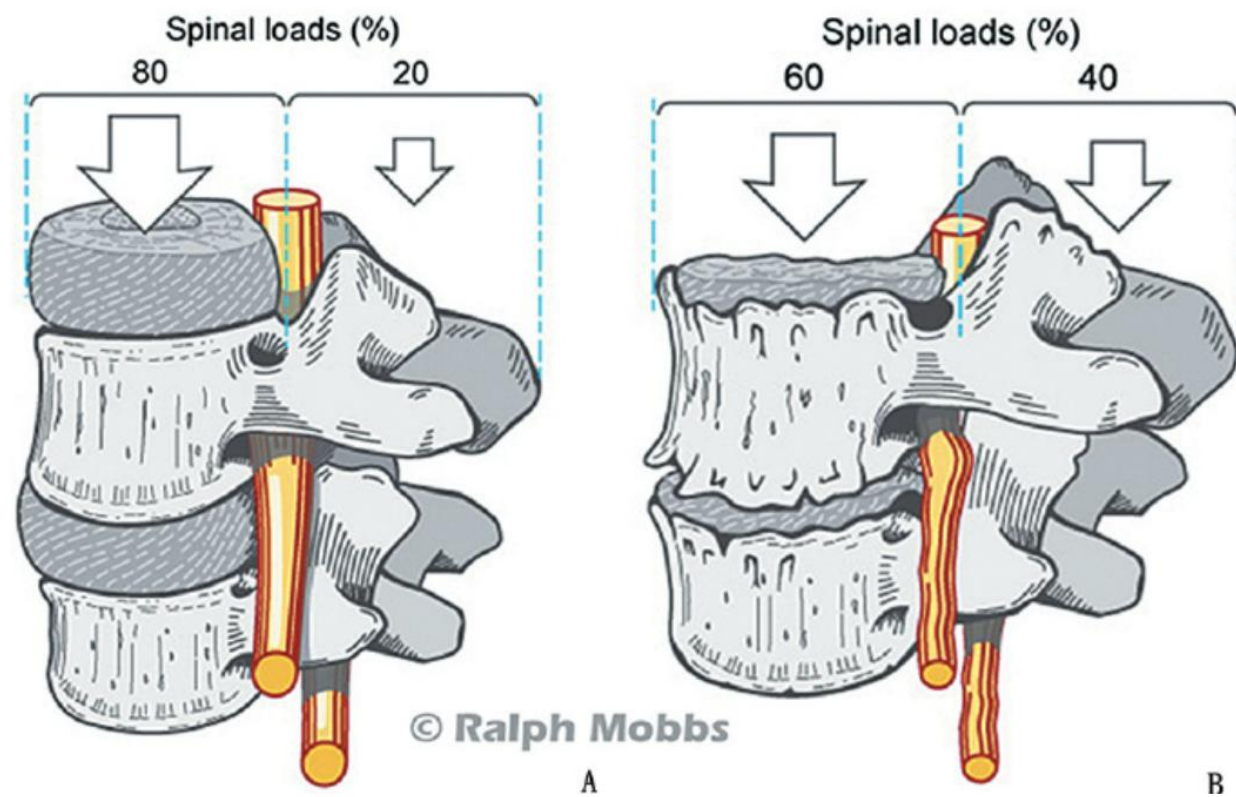
|                                                                                     |                            |
|-------------------------------------------------------------------------------------|----------------------------|
|  | Anterior longit. ligament  |
|  | Posterior longit. ligament |
|  | Ligamentum flavum          |
|  | Interspinous ligament      |
|  | Supraspinous ligament      |



# Load distribution in Lumbar spine

- Axial loading
- Flexion and extension forces
- Shear forces
- Intra-discal pressure variation





(A) Distribution of spinal loads on the anterior and posterior weight-bearing columns in a normal lumbar spine.  
(B) Shifting of spinal loads to the posterior column after degenerative pathology to the lumbar spine.



# Segmental Load distribution

- **Intervertebral Discs:** Act as the primary shock absorbers. Radial bulging of the annulus fibrosus helps distribute pressure.
- **Facet Joints:** Support a portion of the compressive load, particularly in extension, and protect against shear.
- **Muscles/Ligaments:** Passive structures (ligaments) and active muscle forces stabilize the spine and share loads from gravity and external weights.

TABLE 2

Differential Diagnosis of Mechanical Low Back Pain

Diagnosis (percent-  
age of patients with  
low back pain)

Key characteristics and clinical clues

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lumbosacral muscle strains/sprains (70%) | Often following isolated traumatic incidents or repetitive over-use; pain worse with movement, relieved by rest; examination may reveal restricted range of motion, muscle tenderness, or trigger points                                                                                                                                                                                                                                                                             |
| Lumbar spondylosis (10%)                 | More common in persons older than 40 years; pain may be present in or radiate from the hips; pain is worse with activity; pain may worsen with lumbar spine extension or rotation; neurologic examination is usually normal                                                                                                                                                                                                                                                          |
| Disk herniation (5% to 10%)              | Most often involves the L5 or S1 nerve root, at L4-L5 or L5-S1 in 90% to 95% of cases; symptoms may include pain, paresthesia, sensory change, loss of strength or reflexes depending on affected nerve root                                                                                                                                                                                                                                                                         |
| Spondylolysis (less than 5%*)            | Common in young athletes; symptoms often develop insidiously; pain with activities involving lumbar extension; imaging is diagnostic, but early imaging in the absence of red flags is typically not necessary; usually occurs in a lower lumbar vertebra, most often L5                                                                                                                                                                                                             |
| Vertebral compression fracture (4%)      | Fracture may occur slowly over time or acutely with mild trauma; acute episodes usually resolve in four to six weeks, but abnormal healing or additional fractures may result in chronic pain and functional impairment; presents as localized back pain that is worse with flexion and often point tenderness on palpation; risk factors include increased age, history of trauma, chronic steroid use, and osteoporosis; plain radiography should be obtained to confirm diagnosis |

|                              |                                                                                                                                                                                                                                  |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spondylolisthesis (3% to 4%) | Pain often radiates into the buttocks or posterior thigh; leg pain may be worse than back pain; often presents as paresthesias, numbness, or weakness; occurs at L5 in 90% of cases                                              |
| Spinal stenosis (3%)         | Presents as back pain, sometimes with sensory loss or weakness in the legs; calf pain with ambulation that is relieved with rest/sitting (pseudoclaudication); neurologic examination findings are normal; imaging is diagnostic |

# Muscle sprains

- Most common cause of MLBs
- Acute pain after lifting /twisting
- Localised tenderness

# Ligament sprains

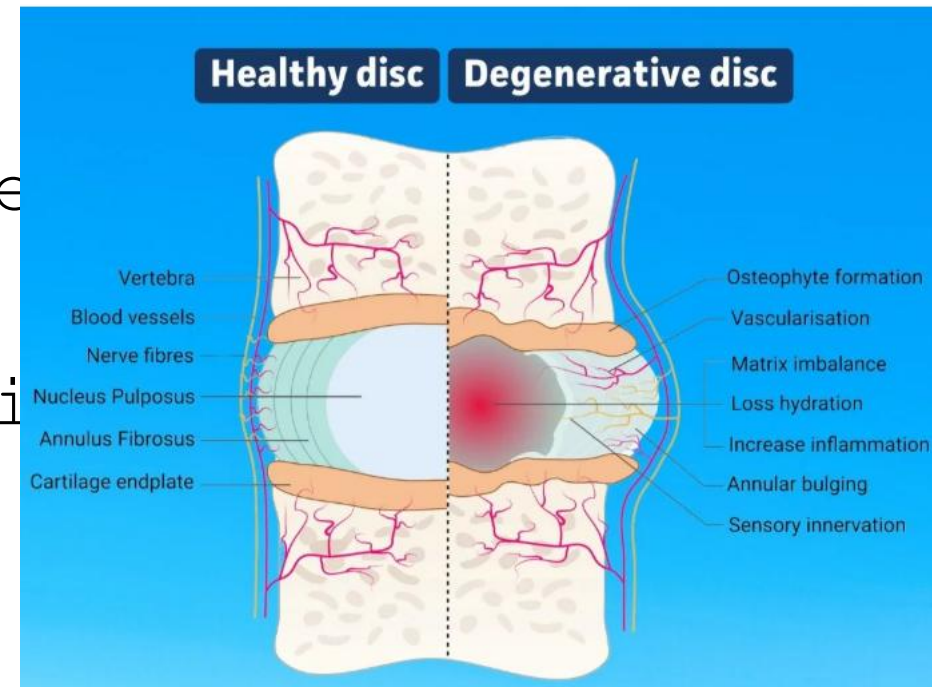
- Overstretching injury
- Classic – “thunderbolt strike”
- Localised pain and aggravated by movements

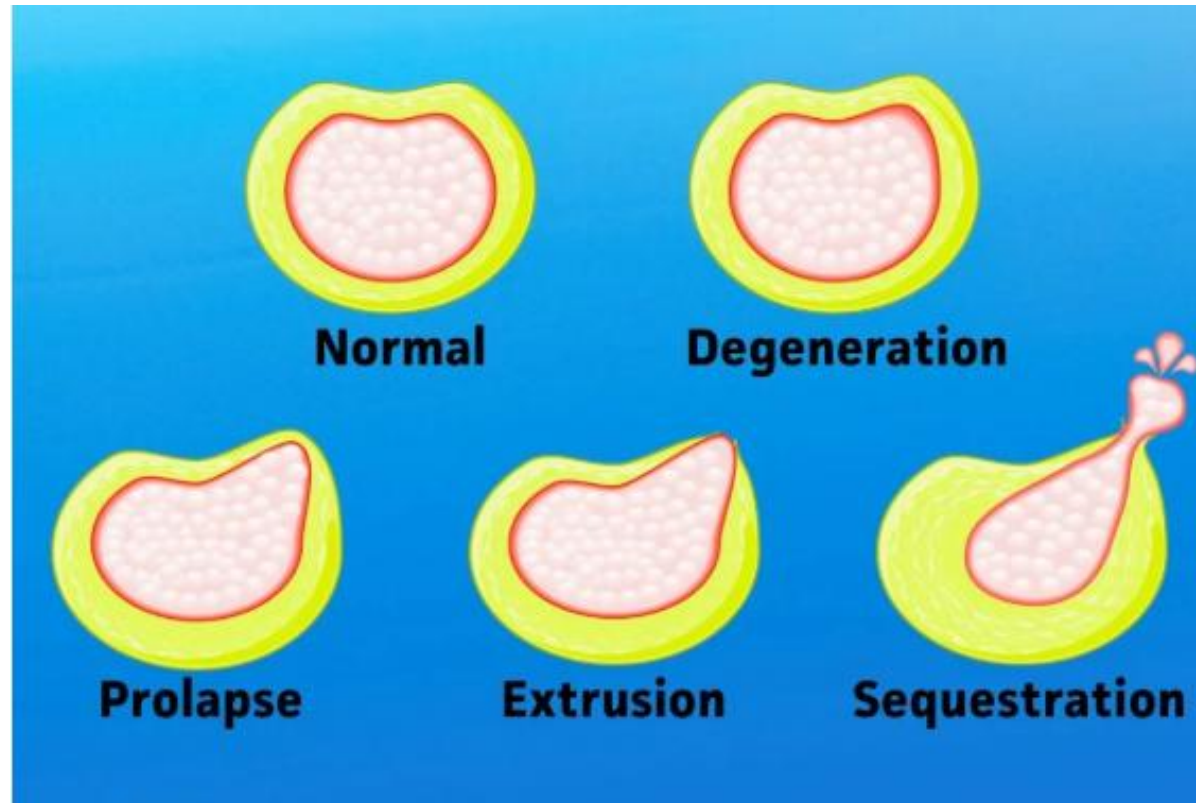
# Disc pathology ( 10%)

- Annular tears
- Dehydration
- Loss of disc height
- Degenerative disc disease

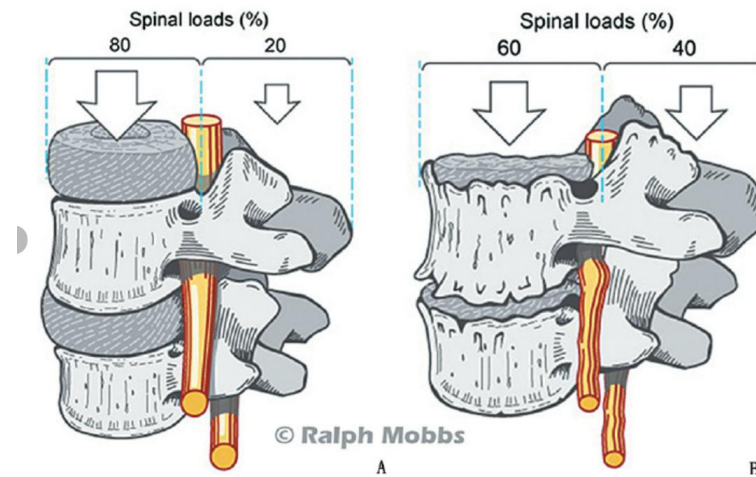
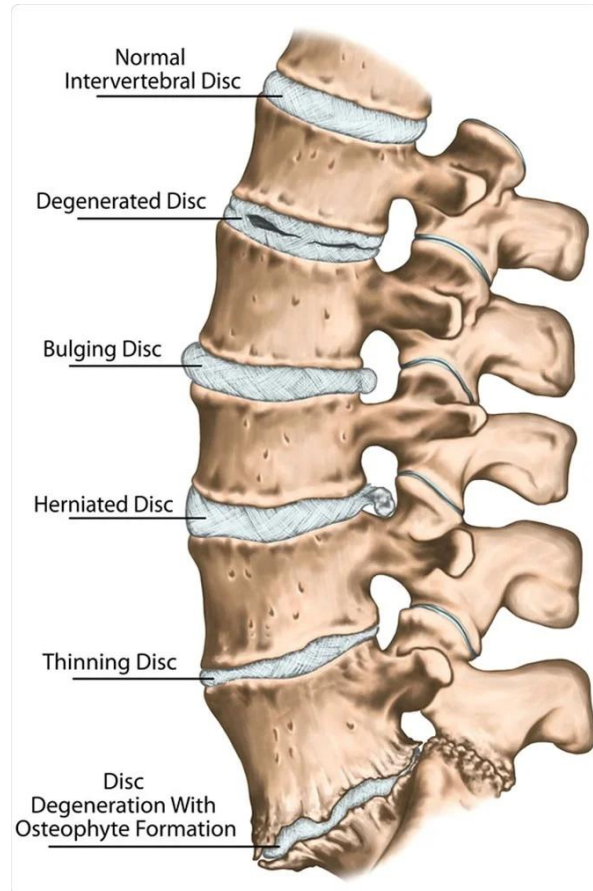
# Degenerative disc disease

- Age related disc disease
- Reduces disc height
- Mechanical pain on loading

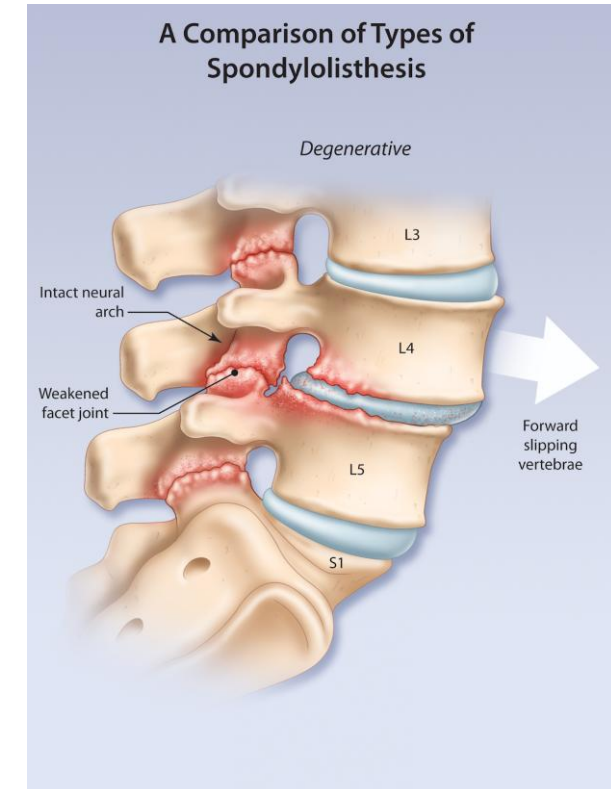




# Pathoanatomy of disc disease



(A) Distribution of spinal loads on the anterior and posterior weight-bearing columns in a normal lumbar spine.  
(B) Shifting of spinal loads to the posterior column after degenerative pathology to the lumbar spine.







# Facet joint syndrome

- Pain worse on extension
- Localised paraspinal tenderness

# History taking

- Onset
- Occupational history
- Trauma
- Aggreavating /relieving factors
- Red flags

# Risk factors

- Obesity
- Sedentary lifestyle
- Poor ergonomics
- Heavy lifting
- smoking
- Weak core muscles

# Red flags

Investigate urgently

| Table 1 – Clues in the history that raise a “red flag” in the evaluation of low back pain |                                                                                    |
|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Red flags                                                                                 | Possible cause                                                                     |
| Duration > 6 wk                                                                           | Tumor, infection, rheumatologic disorder                                           |
| Age < 18 y                                                                                | Congenital defect, tumor, infection, spondylolysis, spondylolisthesis              |
| Age > 50 y                                                                                | Tumor, intra-abdominal processes (such as an abdominal aortic aneurysm), infection |
| Major trauma, or minor trauma in elderly                                                  | Fracture                                                                           |
| Cancer                                                                                    | Tumor                                                                              |
| Fever, chills, night sweats                                                               | Tumor, infection                                                                   |
| Weight loss                                                                               | Tumor, infection                                                                   |
| Injection drug use                                                                        | Infection                                                                          |
| Immunocompromised status                                                                  | Infection                                                                          |
| Recent genitourinary or gastrointestinal procedure                                        | Infection                                                                          |
| Night pain                                                                                | Tumor, infection                                                                   |
| Unremitting pain, even when supine                                                        | Tumor, infection, abdominal aortic aneurysm, nephrolithiasis                       |
| Pain worsened by coughing, sitting, or Valsalva maneuver                                  | Herniated disc                                                                     |
| Pain radiating below knee                                                                 | Herniated disc or nerve root compression below the L3 nerve root                   |
| Incontinence                                                                              | Cauda equina syndrome, spinal cord compression                                     |
| Saddle anesthesia                                                                         | Cauda equina syndrome, spinal cord compression                                     |
| Severe or rapidly progressive neurologic deficit                                          | Cauda equina syndrome, spinal cord compression                                     |

# Physical examination

- Gait analysis
- Look for localized swelling / p
- Loss of lordosis
- Feel for muscle spasm
- Localised tenderness
- Flex and extend the spine
- Neurological examination including a DRE /  
perineal sensation



- Examine for sacroiliac joint pathology

# Investigations – not required in acute setting

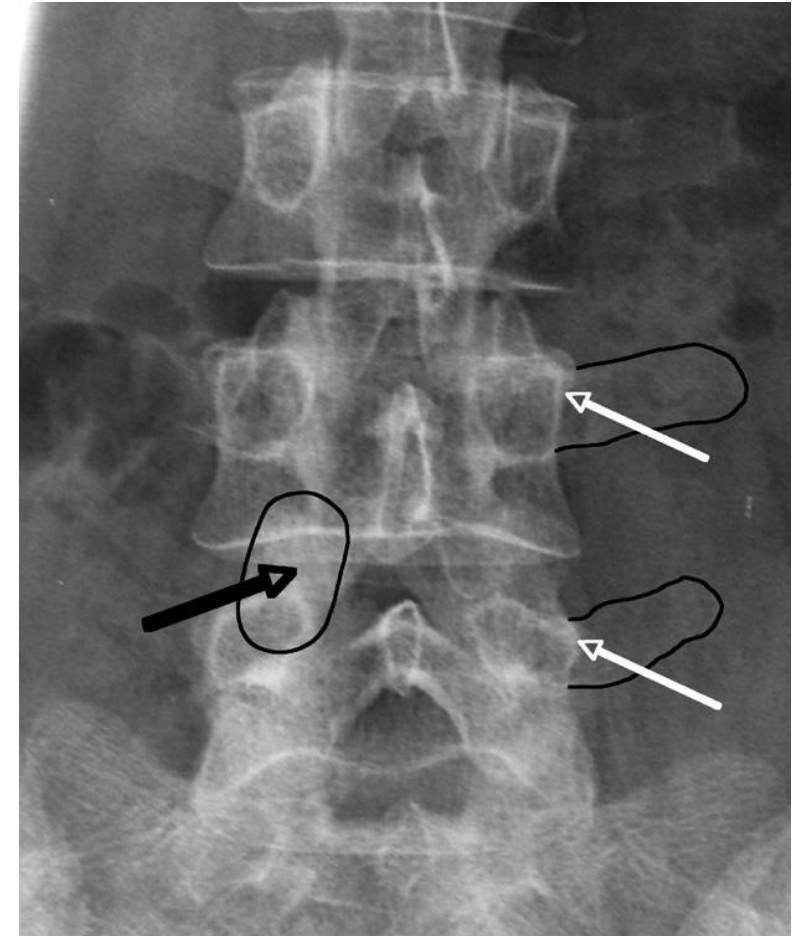
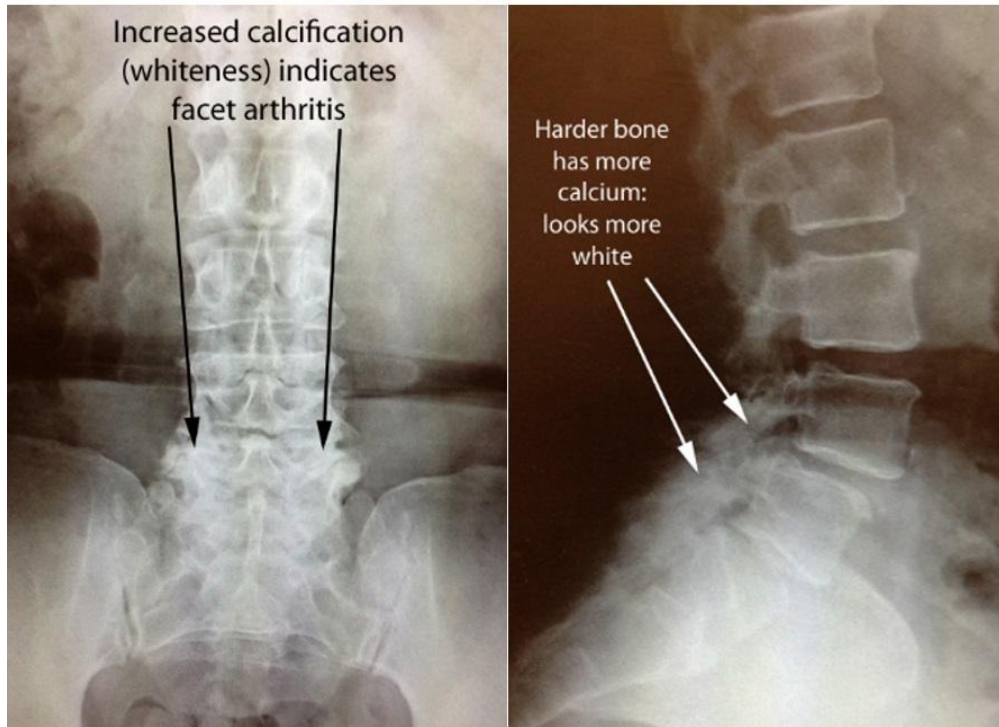
- Only do if there are red flags
- Persisting more than 6 weeks



# Imaging

- Xrays – looking for Lordosis , disc degenerations / facet arthropathy

Facet arthritis (more calcified, looks cloudy, more white)



# MRI

- Red flags
- Persistent symptoms despite adequate physical therapy

# Management overview

- Patient education
  - Pharmacological therapy
  - Physical therapy
  - Lifestyle modifications
  - Surgical
- 
- There are multiple treatment modalities for mechanical low back pain, but strong evidence of benefit is often lacking

# Pharmacological management

- NSAIDs
- Short term muscle relaxants

# Non pharmacological therapies

- Avoid prolonged bed rest
- Early mobilization
- Hot /cold therapies
- Lumbar supports

# Minimally invasive Thearpies

- Facet joint steroids – USS guided /CT guided

# Ergonomic advice

- Proper sitting posture
- Lumbar support chair
- Correct lifting techniques

# Prevention of relapse

- Weight reduction
- Core strengthening
- Workplace ergonomics



# Evidence for management in acute setting

## **No evidence**

- Paracetamol
- NSAIDs in the setting of radicular symptoms
- Gabapentin
- Oral steroids
- Topical anaesthetics

## **Little evidence**

- Opioids in short term- risk of abuse and misuse
- Steroid injections to facet joints , epidural space

## **Moderate /strong evidence**

- Patient education - very strong evidence
- Physical therapy- McKenzie method , Yoga
- Muscle relaxants

# Key take home messages

- 85–90% of LBP is mechanical
- Clinical diagnosis in most cases
- Imaging not routinely required
- Early mobilization is the key
- Watch for red flags