

Spinal Disorders

◆ Degeneration:

- “deterioration of a tissue or an organ in which its function is diminished or its structure is impaired”

❖ Other terms:

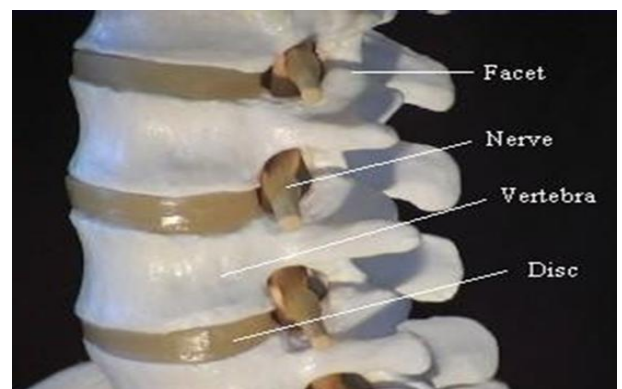
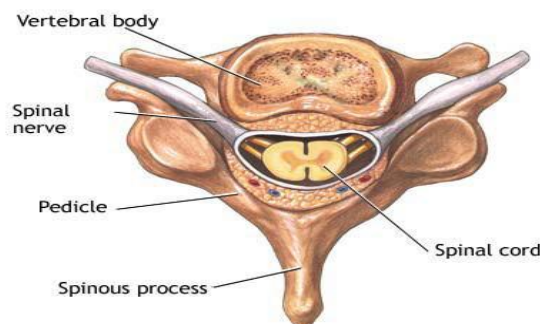
- “Spondylosis” → wide term of all degenerative disorders of the spine
- “Degenerative disc disease”
- “Facet osteoarthritis”

◆ Etiology

- Multi-factorial
 - Genetic predisposition
 - Age-related
 - Some environmental factors:
- **Environmental factors :**
- Smoking
- Obesity
- Previous injury, fracture or subluxation
- Deformity
- Operating heavy machinery, such as a tractor → any job cause repetitive vibration

◆ Anatomy

- **Anterior elements:**
 - Vertebral body
 - **Inter-vertebral disc** → it has no synovial fluid BUT it has Gelatinous material
- Degeneration occurs at the disc
- **Posterior elements**
 - Pedicles, laminae, spinous process, transverse process, **facet joints (which are synovial joints having synovial fluid)** (2 in each level)
- Osteoarthritis occurs at the facet joints
- **Neurologic elements:**
 - Spinal cord
 - Nerve roots
 - Cauda equina



NB : between the 2 pedicles the nerve root comes out

◆ **Pathology, inter-vertebral disc:** → **Affect young age**

- The first component of the **3 joint complex**
- It is primarily loaded in **FLEXION** مهم
- Composed of “annulus fibrosis” and “nucleus pulposus” → **No synovial fluid**
- Degeneration of the **nucleus** مهم causes loss of cellular material and loss of hydration
 - Movement is impaired-painful- and could become unstable
- Disc degeneration will also cause
 - Loss of disc height→
 - Abnormal loading of facet joints
 - Stenosis in the inter-vertebral foramen
 - Bulging of the disc into the spinal canal
 - Contributing to spinal stenosis
 - Herniation of the nucleus into spinal canal
 - Causing radiculopathy (e.g. sciatica in the lumbar spine) مهم

◆ **Pathology, facet joints:** → **affect old age (Osteoarthritis)**

- Scientific name: “zygapophysial joints”
 - Synovial joints
 - 2 in each segment
 - Together with the disc, form the **3 joint complex**
 - Are primarily loaded in **EXTENSION**
 - Pattern of degeneration similar to other synovial joints
 - *Loss of hyaline cartilage, formation of osteophytes, laxity in the joint capsule* الفقرات تتزلق على بعض
- Facet degeneration will cause:
 - Hypertrophy, osteophyte formation
 - Contributing to spinal stenosis or foraminal stenosis
 - Laxity / Leniency in the joint capsule
 - Leading to instability (degenerative spondylolisthesis) مهمة جدا

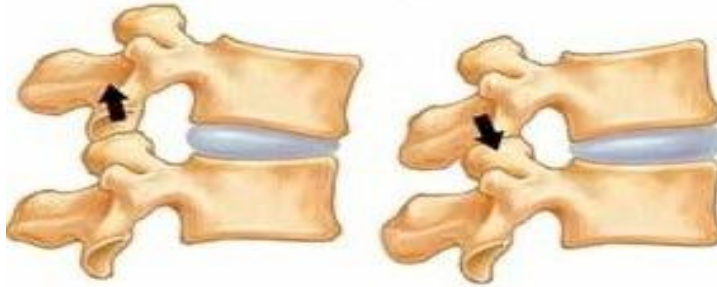
✓ **Notes :**

- Forminal : peripheral nerve
- Spinal: the whole spinal cord
- Spondylolisthesis: slipping of the vertebra on the one beneath it, either posteriorly or anteriorly.

◆ **Presentation**

- Falls into 2 categories:
 - Mechanical pain: due to joint degeneration or instability
 - “Axial pain” in the neck or back
 - Activity related-not present at rest
 - Neurologic symptoms: due to neurologic impingement
 - Spinal cord → **upper motor neuron**
 - Presents as **myelopathy** (means → , spinal cord injury)
 - Caudaequina& Nerve roots → **lower motor neuron**
 - Presents as **radiculopathy** (means → nerve root injury) (e.g. sciatica) or neurogenic claudication

- Mechanical pain
 - Associated with movement
 - Sitting, bending forward (*flexion*):
 - originating from the disc : “**discogenic pain**”
 - Standing, bending backward (*extension*) :
 - originating from the facet joints: “**Facet syndrome**”
 - NB : the Pic demonstrate the difference between (intervertebral joint) and (Facet joints) :



- Neurologic symptoms
 - Spinal cord
 - Myelopathy:
 - Loss of motor power and balance
 - Loss of dexterity
 - » Objects slipping from hands
 - UMN deficit (rigidity, hyper-reflexia, positive Babinski...)
 - Slowly progressive “step-wise” deterioration.
 - **Note:** Loss of motor → indication for surgery
 - Spinal cord injury
 - With Spinal stenosis, there is a higher risk of spinal cord injury
 - Complete or incomplete
 - Cauda equina & Nerve roots
 - Radiculopathy
 - LMN deficit
 - Commonest is sciatica, but cervical root impingement causes similar complaints in the upper limb
 - Neurogenic claudication
 - Pain in both legs caused by walking
 - Must be differentiated from vascular claudication
 - **Cause : spinal stenosis**
 - How to differentiate between the Vascular claudication (VC) and the Neurogenic claudication ?**
 - By / 1- Hx : in NC the pt prefer to be in flexed position to release the spinal stenosis (also the pt may mention that walking in the Supermarket with the shopping cart relieve his symptoms)**
 - While in VC flexion makes no difference**
 - 2- Ex : Absent of Pulse occur only in VC Also stress test are not tolerable in pt, with VC**

Vascular vs. Neurogenic claudication**Table – Differentiating neurogenic and vascular claudication**

Factors	Neurogenic	Vascular
Evaluation after walking	Increased weakness	Unchanged
Palliative factors	Bending over, sitting	Stopping
Provocative factors	Walking downhill Increased lordosis	Walking uphill Increased metabolic demand
Pulses	Present	Absent
"Shopping cart" sign	Present	Absent
van Gelderen bicycle test	No leg pain	Leg pain

Bending over, sitting: widens the spinal canal

Shopping cart sign: bending on the cart while pushing it.

Bicycle: Bending the back

Specific areas :

"TheCervical spine"

- Degenerative changes typically occur in C3-C7
- Presents with axial pain (mainly the neck), myelopathy, radiculopathy
- Physical examination:
 - Stiffness (loss of ROM)
 - Neurologic exam
 - Weakness
 - Loss of sensation
 - Hyper-reflexia, hypertonia
 - Special tests: Spurling's sign



Rotation + bending to the back →
+ve if the whole symptoms
appear

◆ **Management**

- Conservative treatment
 - **First line** of treatment for axial neck pain and mild neurologic symptoms (e.g. mild radiculopathy without any motor deficit)
 - Physiotherapy:
 - Focus on ROM and muscle strengthening
 - Non-steroidal anti-inflammatory medications (NSAID)
 - E.g. Diclofenac, ibuprofen, naproxen
 - Neuropathic medication: for radiculopathy pain
 - E.g. Gabapentin or pregabalin
 - Indicated for:
 - Spinal stenosis causing myelopathy
 - Disc herniation causing severe radiculopathy and weakness
 - Failure of conservative treatment of axial neck pain or mild radiculopathy
 - Procedures:
 - Anterior discectomy and fusion of bone
 - Posterior laminectomy → decompress the spine

Anterior Discectomy and fusion:

The two vertebrae are removed after removing the intervening disc. This procedure will affect the full range of motion; however it will slightly affect the functional range of motion. (10 % loss of ROM)

**"The Lumbar spine"****MOST COMMON AFFECTED PART**

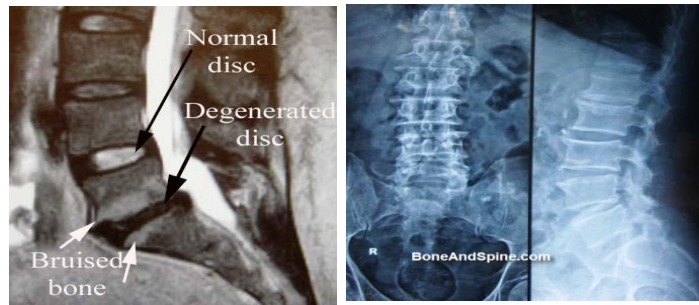
- Degenerative changes typically occur in L3-S1
- Presents with axial pain, Sciatica, neurogenic claudication → No myelopathy because it is in the level below the Spinal Cord
- Physical examination:
 - Stiffness (loss of ROM)
 - Neurologic exam
 - Weakness
 - Loss of sensation
 - Hypo-reflexia, hypo-tonia
 - Special tests: SLRT

✓ **Notes:**

- No myelopathy because the spinal cord ends at L2
- Sciatica is simply radiculopathy of the sciatic nerve
- *Straight Leg Raising Test* (SLRT)

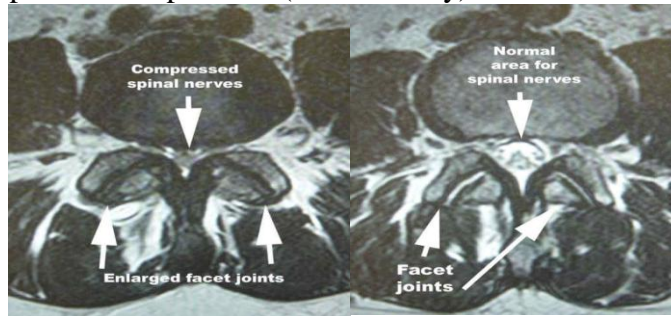
◆ **Management**

- Axial low back pain
 - Conservative treatment if first-line and mainstay of treatment
 - Physiotherapy: core muscle strengthening, posture training
 - NSAID
 - Surgical treatment indicated for:
 - Instability (ex. *Laxity of the joints*) or deformity (scoliosis or kyphosis)
- E.g. high-grade spondylolisthesis
- Failure of conservative treatment

Group A1

Lumbar spondylosis, Low intensity of the degenerated disc on the MRI (the dick will be smaller and black)

- Spinal stenosis → affect both legs
 - Conservative treatment is first line of treatment
 - Activity modification, analgesics, epidural cortico-steroid injections
 - Surgical treatment
 - Indicated for
 - Motor weakness e.g. drop foot
 - failure of –minimum- 6 months of conservative treatment
 - Spinal decompression (laminectomy) is the commonest procedure



Pic : show spinal stenosis

- Disc herniation → affect one leg only → it usually occur to young pt, as acute presentation
 - Conservative treatment is first line of treatment for mild sciatica without motor deficit
 - Short (2-3 day) period of rest, NSAID, physiotherapy, epidural cortico-steroid injection
 - 95% of sciatica resolves within the first 3 months without surgery
 - Surgical treatment:
 - Indicated for cauda-equina syndrome, motor deficit, failure of 3 months of conservative treatment – weakness مهمه
 - Procedure: Discectomy (only the herniated part)



The Pic show Hernia in one site only
فرقها عن
Spinal stenosis



◆ Osteoporotic Vertebral Fractures

- Pathologic fractures
- Anterior column (\pm middle column) only compromised (Wedge/Burst Fracture)
- Often missed
- Repetitive fractures result in kyphotic deformity (hunchback) مهمه
- Treatment of underlying cause!! مهمه

◆ Spinal Deformities

- Scoliosis
 - deformity of the spine in the Coronal plane
- Kyphosis:
 - deformity of the spine in the Sagittal plane
- Spondylolisthesis
 - Translation(slippage)of one vertebra over another → occur mainly in sagittal plane BUT could occur in Coronal plane

❖ Types of scoliosis

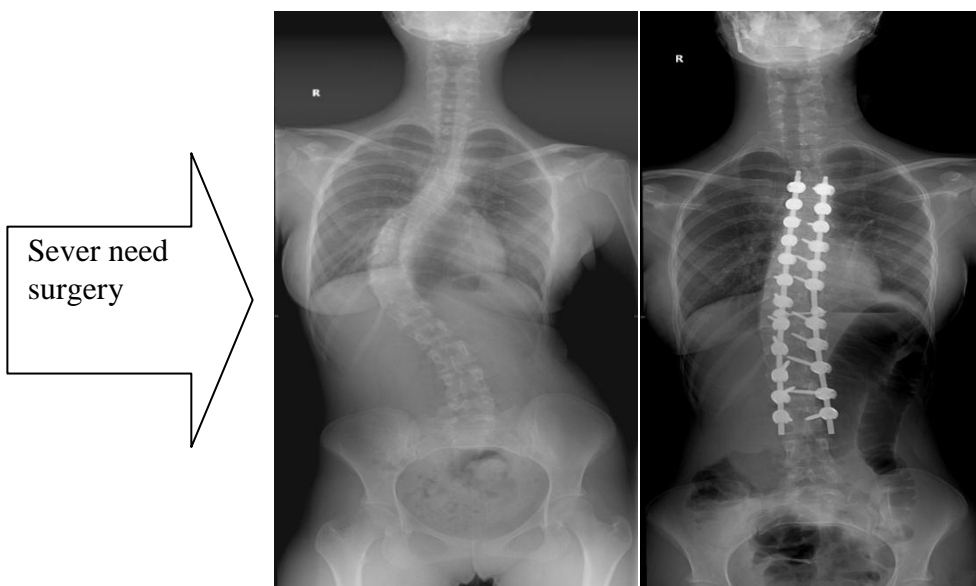
- Congenital
 - Associated with anomalies of the bony vertebral column, e.g. hemivertebra
- Acquired (=secondary) → Ex pt with short limb present as scoliosis Or Pt with tumor or infection
 - Secondary to other pathology, e.g. tumor , infection, spinal cord anomalies, degeneration
- Idiopathic
 - Most common is adolescent type

❖ Adolescent idiopathic scoliosis → affect Females mainly

- Three dimensional deformity of the spine
- Vertebral Rotation is the hallmark
- Presents with deformity with little or no pain (No neurological symptoms) مهمه
- Usually noticed by parents/others, not the patient herself/himself
- Examination: neurologically normal, positive Adams test (look for Rip hump)
- Management depends on degree of deformity → if sever it requires surgery

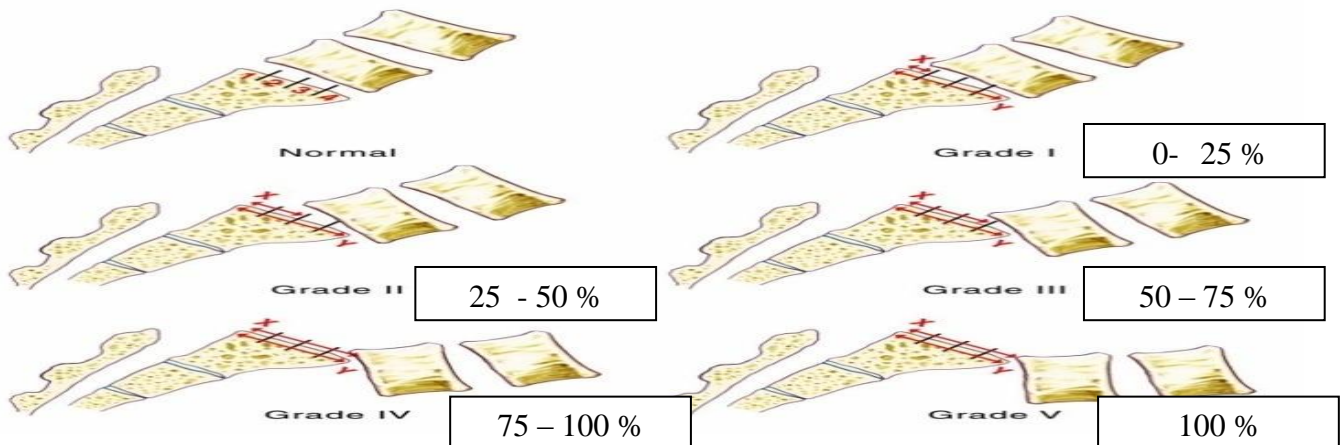
✓ Notes: Adams test

- The patient bends forward dangling the arms, with the feet together and knees straight. The curve of structural scoliosis is more apparent when bending over. In a patient with scoliosis, the examiner may observe an imbalanced rib cage, with one side being higher than the other, or other deformities.



Group A1❖ **Spondylolisthesis (slide of one vertebra on the other)**

- Degeneration of the articulating part of a vertebra
- Conservative treatment first
- Surgery if Grade 3 or more or failed conservative management.
- Types:
 - Degenerative Spondylolisthesis
 - Causes spinal stenosis
 - Isthmic spondylolisthesis:
 - Caused by inter-articularis defect (spondylolysis)



Grades are determined by the degree of translocation over the vertebra below, which is assigned by numbers (as shown left in the picture)

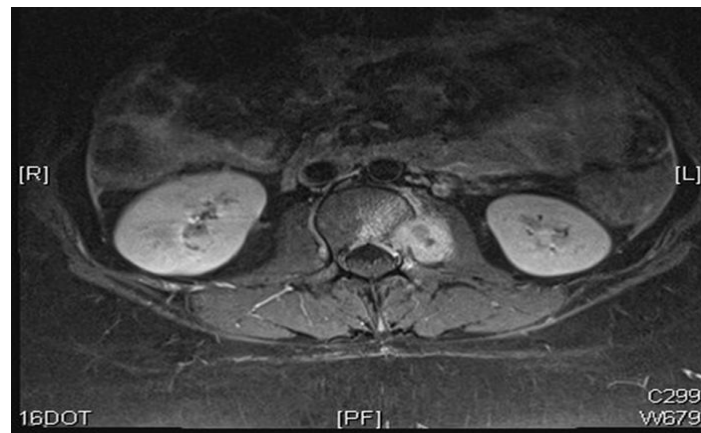
❖ **Destructive Spinal Lesions → 1st look for the red Flags**

- Present with pain at rest or at night
- Associated with constitutional symptoms
- Most common causes
 - Infection
 - Tumors
- Vertebral body and pedicle are the commonest sites of pathology

❖ **Spinal Tumors**

- Primary Spinal tumors:
 - Rare
 - Benign (e.g. osteoid osteoma) or malignant (e.g. chordoma)
 - Management depends on pathology
 - Spinal metastasis
 - Very common
 - Biopsy required if primary unknown
- Steps of management : 1- investigate the primary 2- get Biopsy

- Most common is TB and Brucellosis مهمه
- History of contact with TB patient, raw milk ingestion , مهمه
- Potentially treatable diseases once diagnosis is established and antimicrobials administered



Spinal Tuberculosis (with psoas abscess)