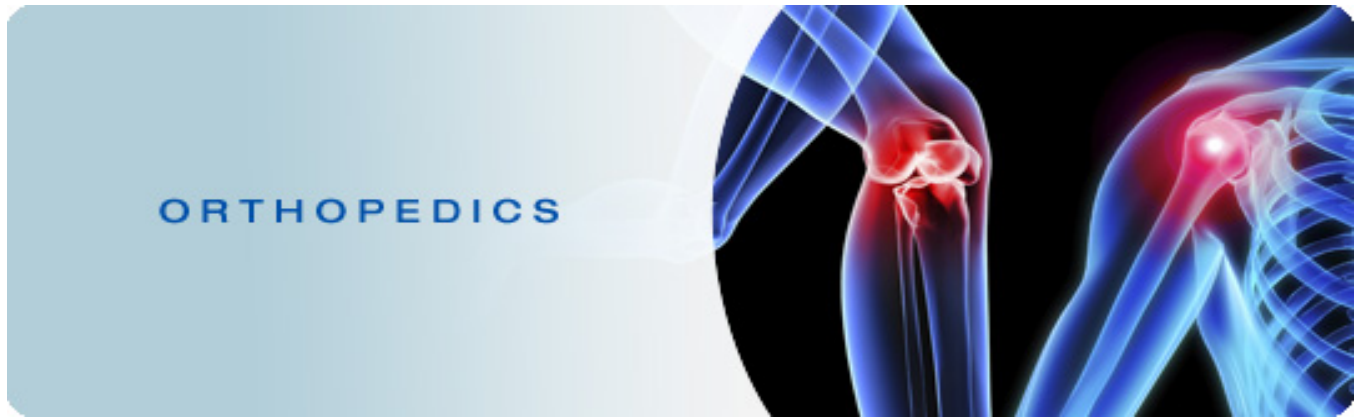


Isn't it funny how someone can say, "I believe in Allah " but still follow the Satan who by the way also, " believes " in Allah...

430 ORTHOPEDICS TEAM



Lecture: Common spinal disorders.

Team Members:

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Team Leader:

Ayedah Al-Ruhaimi.

- The slides were provided by the doctor.
- Important notes in **Red**
- Copied slides in **Black**.
- Doctor's notes in **green**.

Degenerative Spinal Disorders

1. Degeneration:

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

2. Other terms:

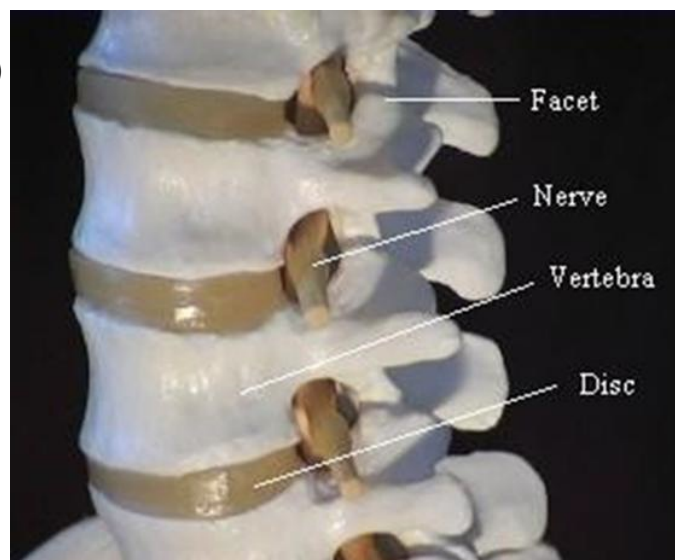
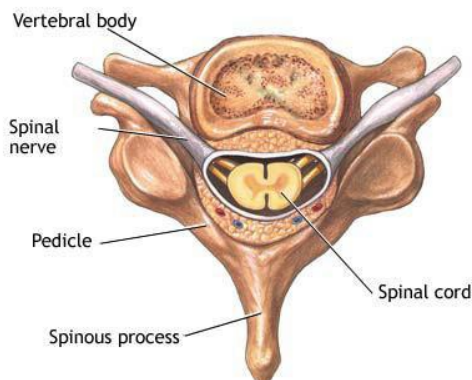
- “Spondylosis”
- “Degenerative disc disease”
- “Facet osteoarthritis” → arthritis

Etiology:

- **Multi-factorial**
 - a. Genetic predisposition (**non-modifiable**)
 - b. Age-related (**non-modifiable**)
 - c. Some environmental factors: (**modifiable**) → you can't reverse or stop the disease, you can only lessen its progression.
 - Smoking
 - Obesity
 - Previous injury, fracture or subluxation
 - Deformity
 - Operating heavy machinery, such as a tractor

Anatomy:

- **Anterior elements:**
 - a. Vertebral body
 - b. **Inter-vertebral disc**
 - Degeneration occurs at the disc
- **Posterior elements:**
 - a. Pedicles, laminae, spinous process, transverse process, **facet joints** (2 in each level)
 - Osteoarthritis occurs at the facet joints
- **Neurologic elements:**
 - a. Spinal cord
 - b. Nerve roots (**peripheral nerves**)
 - c. Caudaequina



Pathology: The inter-vertebral disc:

- The first component of the 3 joint complex (**disc anteriorly, canal centrally and 2 facet joints posteriorly**)
- It is primarily loaded in **FLEXION**

- Composed of “annulus fibrosus” and “nucleus pulposus”
- Degeneration of the nucleus causes loss of cellular material and loss of hydration
 - **Movement is impaired-painful- and could become unstable**
- Disc degeneration will also cause:
 - As you 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)

Pathology: The facet joints:

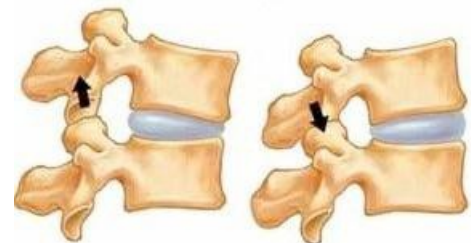
- Scientific name: “zygapophysial joints”
 - Similar to any synovial joint, **unlike the disc (fibrous)**
 - 2 in each segment
 - Together with the disc, form the 3 joint complex
 - Are primarily loaded in **EXTENSION**
 - Pattern of degeneration similar to other synovial joints
 - *Loss of hyaline cartilage,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

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
 - Presents as myelopathy, spinal cord injury
 - Caudaequina& Nerve roots
 - Presents as **radiculopathy** (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”



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.
- **Spinal cord injury**
 - With Spinal stenosis, there is a higher risk of spinal cord injury
 - Complete or incomplete
- **Cauda equina & Nerve roots**
 - Radiculopathy → **unilateral arm or leg pain**
 - LMN deficit
 - Commonest is sciatica, but cervical root impingement causes similar complaints in the upper limb (**impingement causes pain along the dermatomes**)
 - Neurogenic claudication → **bilateral leg pain, postural**
 - Pain in both legs caused by walking
 - Must be differentiated from vascular claudication

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

The Cervical spine:

Introduction:

- Degenerative changes typically occur in **C3-C7**
- Presents with axial pain, myelopathy, radiculopathy
- Physical examination:
 - Stiffness (loss of ROM)
 - Neurologic exam:
 - Weakness
 - Loss of sensation
 - Hyper-reflexia, hypertonia
 - Special tests: **Spurling’s sign** → axial pressure + rotation + bending (**it’s meant to provoke radiculopathy, similar to the straight leg raising test in the leg**)



Management:

a. **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): for joint (axial) pain**
 - E.g. Diclofenac, ibuprofen, naproxen
 - **Neuropathic medication: for radiculopathy pain**
 - E.g. Gabapentin or pregabalin

b. **Surgical management** (motor weakness is an indication for surgery!)

- 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
 - Posterior laminectomy



Anterior Discectomy + fusion

The Lumbar spine:

Introduction:

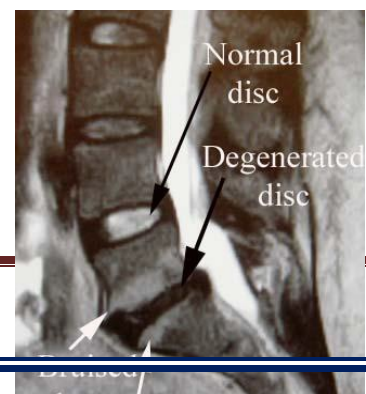
- Degenerative changes typically occur in **L3-S1**
- Presents with axial pain, Sciatica (**radiculopathy**), neurogenic claudication
- Physical examination:
 - Stiffness (loss of ROM)
 - Neurologic exam:
 - Weakness
 - Loss of sensation
 - Hypo-reflexia, hypo-tonia
 - Special tests: SLRT (**straight leg raising test**)

Management:

• **Axial low back pain:**

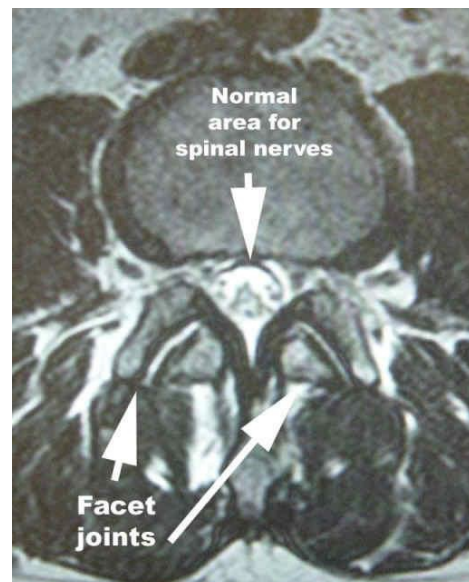
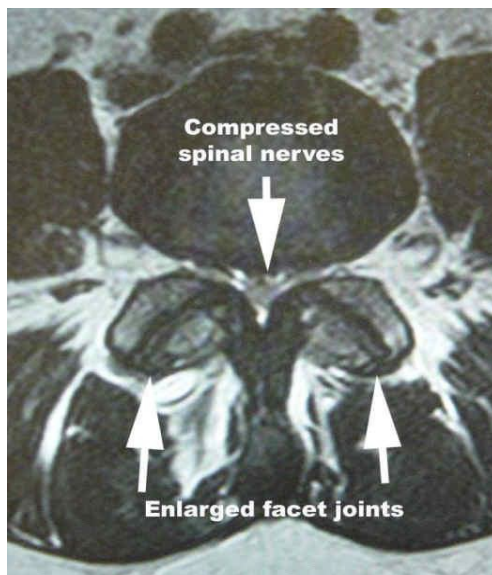
- Conservative treatment if first-line and mainstay of treatment
 - Physiotherapy: core muscle strengthening, posture training
 - NSAID
- Surgical treatment indicated for:
 - **Instability** or **deformity** (e.g. high-grade spondylolisthesis)
 - Failure of conservative treatment

E.g. Lumbar Spondylosis:



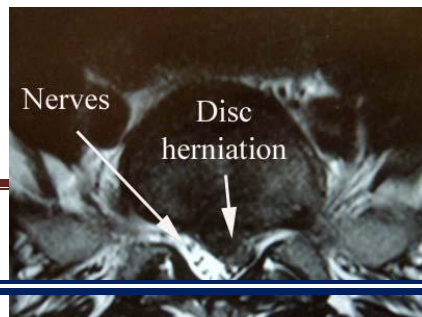
- **Spinal stenosis:**(in the cervical spine it cause myelopathy)
 - Conservative treatment is first line of treatment
 - Activity modification, analgesics, epidural cortico-steroid injections
 - Surgical treatment
 - Indicated for:
 - **Motor weakness**e.g. drop foot
 - failure of –minimum- 6 months of conservative treatment
 - Spinal posterior decompression (laminectomy) is the commonest procedure

E.g. Spinal Stenosis:



- **Disc herniation:**
 - 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
 - Procedure: Discectomy (only the herniated part)+ spinal fusion

E.g. Disc Herniation:



Spinal Fusion



Osteoporotic Vertebral Fractures:

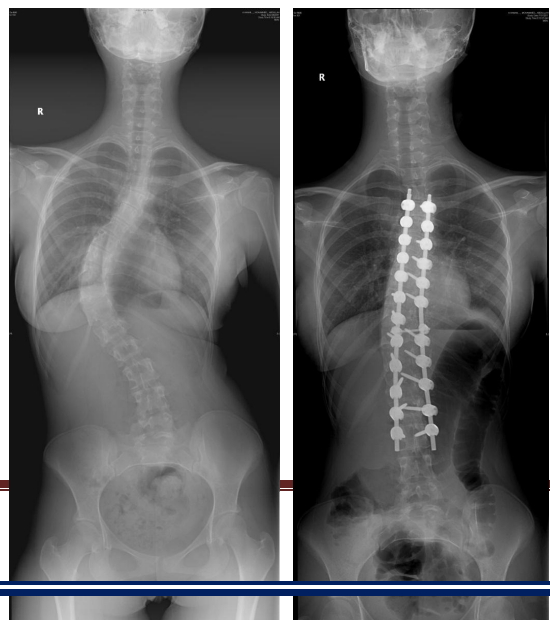
- Pathologic fractures
- Anterior column (\pm middle column) only compromised (Wedge/Burst Fracture)
- Often missed
- Repetitive fractures result in **kyphotic** deformity (hunchback)
- Treatment of underlying cause!!

Spinal Deformities:

- **Scoliosis**
 - deformity of the spine in the **Coronal plane**
- **Kyphosis**
 - deformity of the spine in the **Sagittal plane**
- **Spondylolisthesis**
 - **Translation** of one vertebra over another

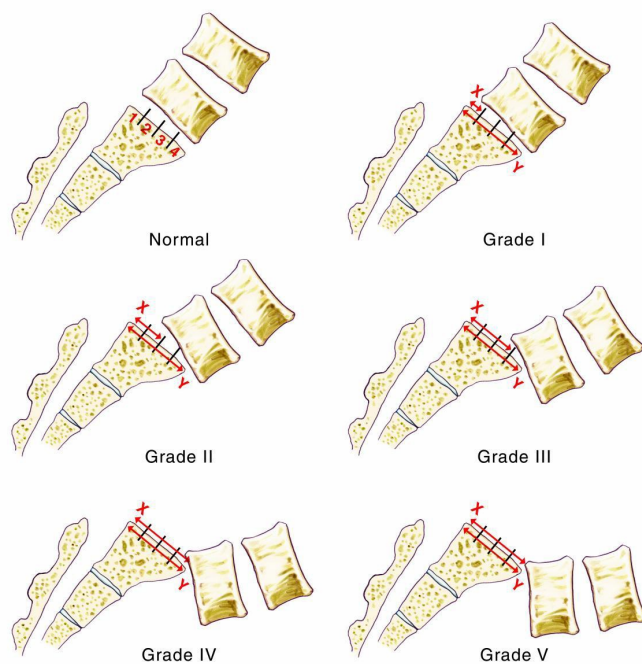
Types of scoliosis:

- **Congenital**
 - Associated with anomalies of the bony vertebral column, e.g. hemivertebra
- **Acquired** (=secondary)
 - Secondary to other pathology, e.g. tumor, infection, spinal cord anomalies, degeneration
- **Idiopathic**
 - Most common is adolescent type
- **Adolescent idiopathic scoliosis:**
 - Three dimensional deformity of the spine
 - Vertebral **Rotation** is the hallmark
 - Presents with deformity *with little or no pain*
 - Usually noticed by parents/others, not the patient herself/himself
 - Examination: neurologically normal, positive **Adams** test
 - Management depends on degree of deformity
- **Imaging shows truncal shift**



Spondylolisthesis: (slippage of one vertebra over the other)

- 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)



Destructive Spinal Lesions:

- Present with pain at rest or at night (the pain is biological in origin, NOT mechanical)
- 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! The reason is that the venous supply of the spine is valveless(micrometastasis)
 - Biopsy required if primary unknown (can be done safely through CT guidance)

Spinal infections:

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

Spinal Tuberculosis (with psoas abscess)

