Hashemite University
H·U·M
Medical School Committee

Scientific Team
الفريق العلمي

PATHOLOGY

Lecture :

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JOINTS

تم اضافة بعض الصور والمعلومات المهم ولم يتم يحذف اي معلومة بالسلايدز فقط اعادة ترتيب المعلومات بشكل منظم اكثر

بسم الله الرحمن الرحيم

- سلايدات الدكتور باللون الاسود،

والشرح الخارجي باللون الاخضر.

JOINTS

#forms of arthritis, namely, degenerative joint disease (osteoarthritis, OA)

gout

infectious (Suppurative & Lyme arthritis)

(And reactive arthritis,RA)

& the 2 most common benign joint tumors (pigmented villonodular tenosynovitis & giant-cell tumor of tendon sheath).

1) Osteoarthritis (OA)

☼ OA, the most common joint disorder in the world.

● It is estimated that the economic toll of OA in the US is more than $33 billion annually

☼ Although the term implies an inflammatory disease, OA is primarily a degenerative (and not inflammatory)disorder.

لانه بكون عدد

WBCs فيه

قليل مقارنة مع

other types of arthritis

بصير عنا inflammation

بس مو هو السبب هو العرض

☼It is fundamentally degeneration of the articular cartilage (AC); any structural changes in the underlying bone are secondary.

OA is either Primary or Secondary :

(I) Primary OA is the most common type (95% of cases).

appears insidiously with age, without apparent initiating cause. The disease is usually oligoarticular (affecting few joints).

بكون idiopathic

(2) Secondary OA is much less common (5% of cases), when OA strikes in youth, in which there is typically some predisposing condition, such as previous developmental deformity, traumatic injury, or underlying systemic disease such as diabetes, hemochromatosis, or marked obesity.

بسبب او ممكن حتى يصير

medication

Secondary (يعني انه كان complication)

Secondary OA involves one or several predisposed joints.

Pathogenesis of OA

قبل ما نعرفه لازم نراجع ال

healthy joint شوي

bones هو عبارة عن ٢

فوق كل وحدة عنا

articular cartilages

عبارة عن

connective tissue

والمسؤول عن صناعة كل ما تحتاجه

Cartlge

chondrocyte هو

يلي بتصنع وبتكون برضه موجودة في

ECM:

collagen type 2 for structural supportive + protoglycans such as hyaluronic acid

ECM وظيفة هاي :

Give cartilge high elasticity + high tensile strength

chondrocyte بتفرز :

Anabolic enzymes + catabolic (degenerative) enzymes

balance بالوضع الطبيعي عنا

imbalance بينهم اي

disease رح يؤدي ل

#ولما نحكي عن هاد المرض احنا بنحكي بالتحديد عن

synovial joint

يلي عندهم بالاضافة للفوق :

Synovium= loose CT + BV + lymphatic vessels + type a cells (clear debris) + type b

cells (produce component of synovial fluid)

هاد الحكي للفهم عشان نقدر نفهم السلايدز

Normal articular cartilage (AC) performs two functions:

(1) along with the synovial fluid, AC provides virtually friction-free movement within the joint; &

(2) in weight-bearing joints, AC spreads the load across the joint surface in a manner that allows the underlying bones to absorb shock & weight, these functions require the AC to be: → Elastic, (to regain normal architecture after compression, provided by proteoglycans), & to have,

→ High tensile strength, provided by type II collagen,

#Both proteoglycans & type II collagen are produced by

chondrocytes.

#Normally, as with adult bone, AC constantly undergoes matrix degradation & replacement, & Chondrocyte function is critical to maintain cartilage synthesis & degradation; any imbalance can lead to OA.

اذن بهاد المرض شو بصير ؟

Abnormal function of chondrocyte >>>> breaking down cartilage

بتنجن ال chondrocyte

وبتطلع كتير cytokines and proteases

الامر الذي يؤدي ل inflammation

And inadequate repair >>>>> cartilage die (apoptosis) >>>> bone exposed>>> friction >>>> bone inflammation

بالاضافة انها بتصير

+

produce less proteoglycan + more collagen with abnormal mineralization

طبعا هاد الحكي بدو سنين مو بيوم وليلة

#Regardless of the inciting stimulus, early OA is marked by:

(1) Degenerating AC, containing more water & less proteoglycan,

(2) Diminished collagen network as a result of ↓ local synthesis & ↑ breakdown & ↑ chondrocyte apoptosis.

Both 1 & 2 compromise cartilage tensile strength & resilience.

▲ In response to these degenerative changes, chondrocytes in the deeper layers proliferate & attempt to "repair" the damage by synthesizing new collagen & proteoglycans. Although these reparative changes are initially able to keep pace,

matrix changes & chondrocyte loss eventually predominate.

Morphology of OA

●The earliest structural changes in OA include enlargement, proliferation, & disorganization of the chondrocytes in the superficial part of the AC. This process is accompanied by ↑ water content of the matrix with ↓ concentration of the proteoglycans (which conveys turgor & elasticity).

● Subsequently, vertical & horizontal fibrillation & cracking of the matrix occur as the superficial layers of the AC are degraded (F21-16A), with grossly soft granular AC cartilage surface.

Eventually, full-thickness portions of the AC are lost, & the subchondral bone plate is exposed.

ال subchondral bone

هي العظمة يلي تحت ال

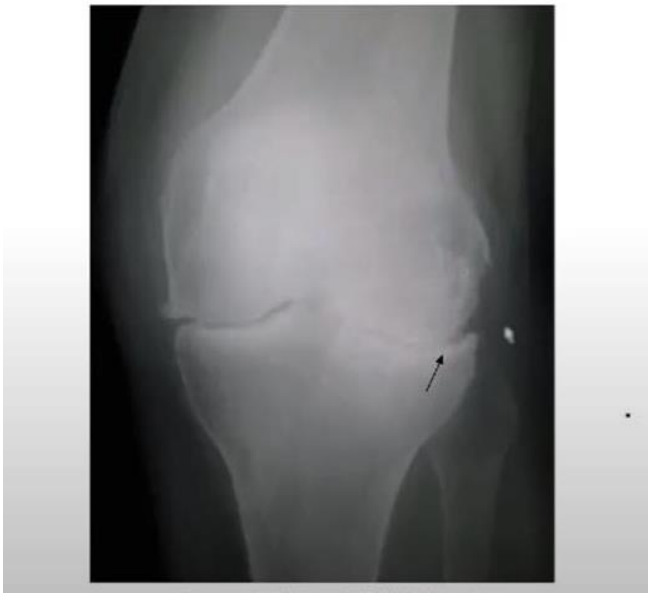
cartilge مباشرة

رح يصير عنا اشياء بتساعدنا بالتشخيص وبنشوفها ب

xray

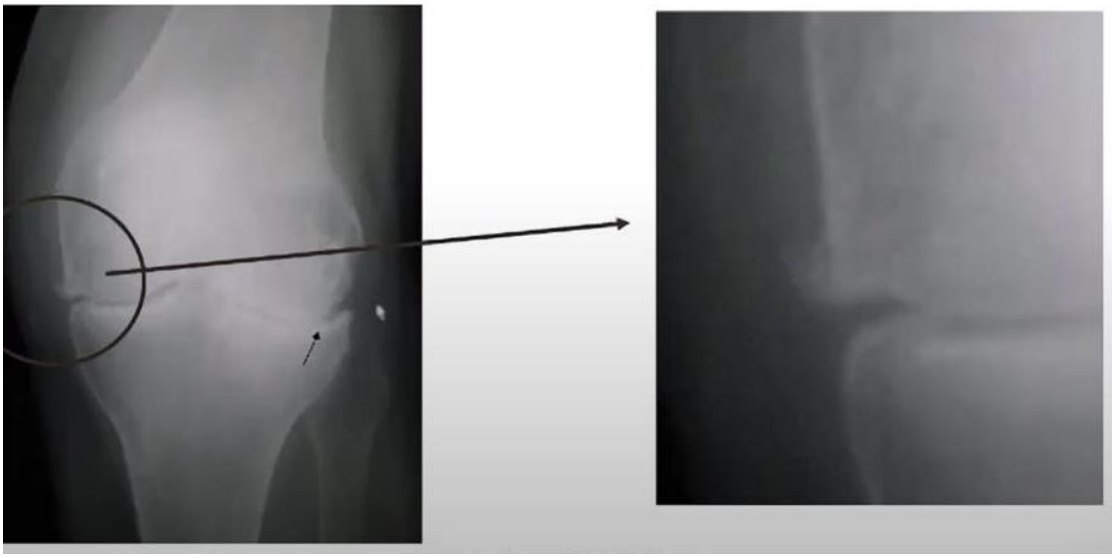
● Friction smooths the exposed bone, giving it the appearance of polished ivory **(bone eburnation)** (F21-16B).

●The underlying subarticular cancellous bone becomes **sclerotic** & thickened.



Notice the bright white colour which indicate bones

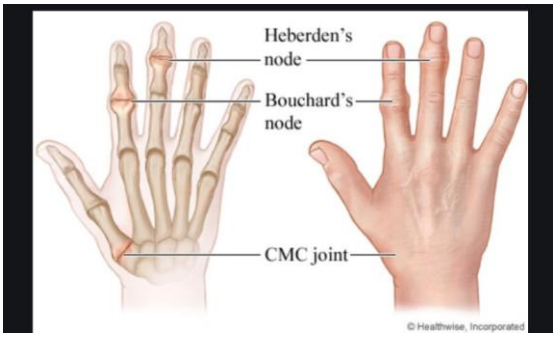
● Mushroom-shaped bony outgrowths **(marginal osteophytes)** develop at the margins of the articular surface



نفس يلي فوق بس عالطرف

Often happen on insertion point of tendon or muscle or ligament

● **Heberden nodes** in the fingers, are prominent osteophytes at the distal interphalangeal joints, are characteristic in women.

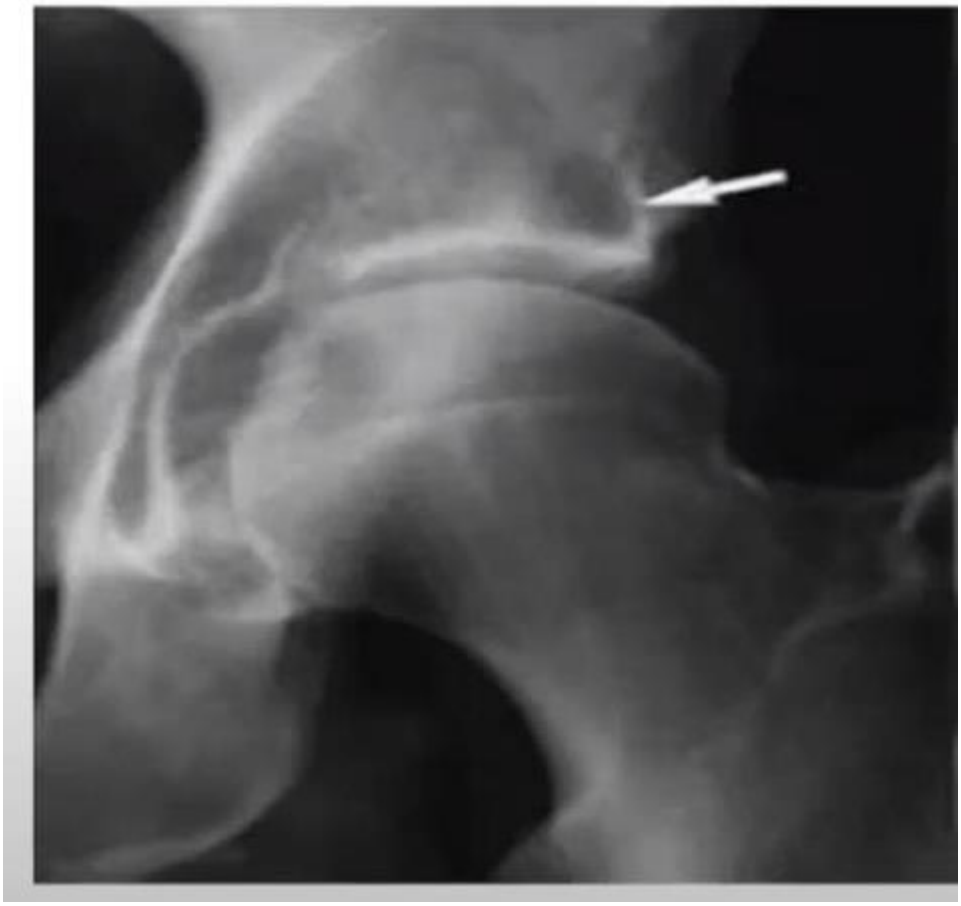


Bouchard nodes: in proximal interphalangeal joints

●Small fractures can dislodge pieces of cartilage & subchondral bone into the joint(synovial space) , forming loose bodies **(joint mice).**

●The fracture gaps allow synovial fluid to be forced into the subchondral regions to form fibrous **walled cysts**.

بصير عنا شقوق وكسولر بالعظمة بدخل فيها سائل



Black center indicate fluid

● In severe disease, a fibrous synovial **pannus** covers the peripheral portions of the articular surface

Risk factors :

#Chondrocyte function can be affected by a variety of influences

*mechanical stresses

*aging are the most important

It is a frequent, if not inevitable, part of aging & is an important cause of disability in individuals over 65 years.

► Clinically, OA is an insidious disease, predominantly affecting patients beginning in their 50s & 60s.

*Genetic factors also seem to contribute to OA susceptibility, particularly in the hands & hips, but the responsible genes are not known.

*The Risk of OA is ↑ with ↑ bone density, & sustained high estrogen levels.

(Female gender)

In addition obesity

كيف رح اشخص المرض ؟؟

xR اول شي بيجي بشكي المريض من ؟ شو الاشياء يلي رح نشوفها ب

● Characteristic symptoms include

*deep aching pain exacerbated by use

وبالتالي اكيد رح يكون الالم اشد اشي بليل لانه طول النهار بكون بتحرك وبستخدمهم وهاي يلي بكون قمة الالم اول ما يصحى من النوم بسبب انه نشاط RA مهمة لتميز بينه وبين inflammatory cells بزيد بليل

بكون عنا pain without swelling بس ب RA بكون عنا swelling

*morning stiffness less than hour ,

But in RA more than hour

*crepitus (grating or popping sensation in the joint),

*limited range of movement.

● Osteophyte impingement on spinal foramina can cause nerve root compression with radicular pain, muscle spasms, muscle atrophy, & neurologic deficits.

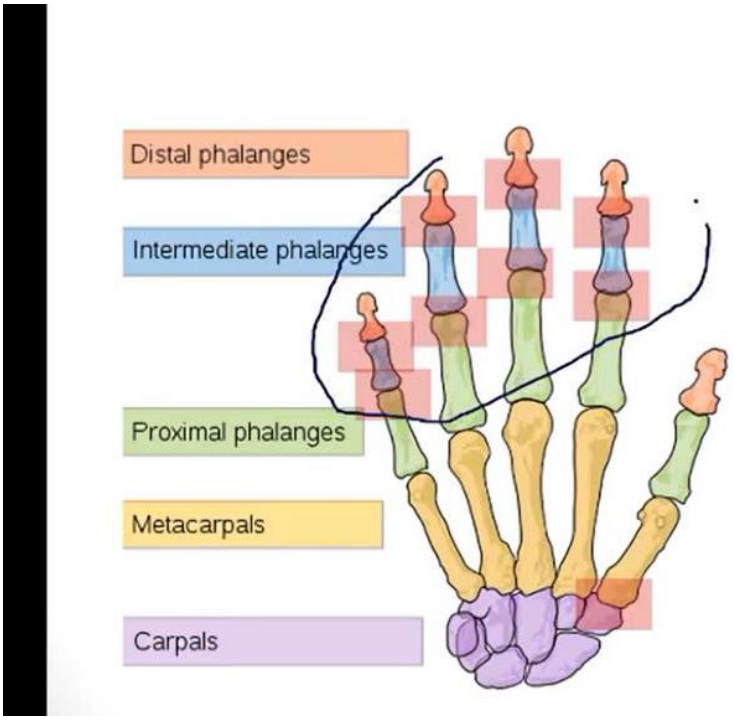
● Commonly involved joints are the hips, knees, lower lumbar & cervical vertebrae, proximal & distal interphalangeal joints of the fingers, first carpometacarpal joints, & first tarsometatarsal joints of the feet.

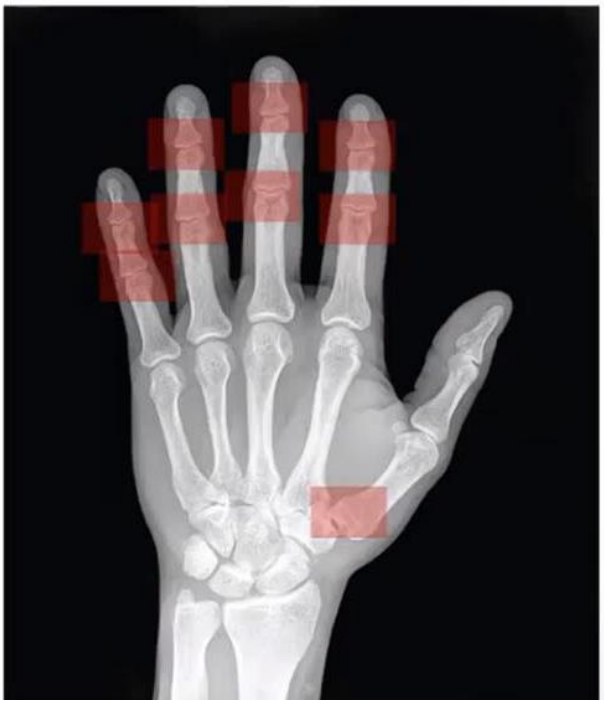
Not metacarpal

عكسRA

lower lumbar vertebrae >>>> lower back pain

cervical vertebrae >>> neck pain





● Knees & hands are more commonly affected in women, whereas hips are more commonly affected in men

طب لي هدول بالتحديد لانهم ؟؟؟

WEIGHT BEARING BONES

Aside from complete inactivity, there is no predicted way to prevent ► or halt the progression of primary OA; it can stabilize for years but is generally slowly progressive.

With time, significant joint deformity can occur, but unlike rheumatoid arthritis (RA), fusion does not take place.

A comparison of the important morphologic features of these 2 disorders

CLINICALLY **لي لازم نميز بين RA لانه هدول المرضين كتير بشبهوا بعض**

رابط اسموسز :
https://drive.google.com/file/d/1vYQI9frVHFl4EwMW_CTE-Xpx5nP7EHfK/view?usp=sharin

نوتات باثوما :

18.3 Joint

DJD	RA	Spondyloarthropathy
	+ve Rheumatic factor	Negative rheumatic factor
Affects both DIP and PIP (heubordin-bouchard nodes)	Affects mainly PIP symmetrically	Affects mainly DIP (sausage fingers)- for psoriatic only
Pain worsens during day	Pain gets better during day	
	Associated with HLA-DR4	Associated with HLA-B27

Degenerative joint disease

Defn	- progressive degeneration of articular cartilage - aka non-inflammatory arthritis (no redness or swelling in joints). Synovial fluid accumulates but lymphocyte infiltrate are not seen. **Lymphocyte infiltrate are hallmark in inflammatory arthritis - gout and RA.**
Risk factors	- Obesity - Age - Trauma
Clinical features	○ Commonly affects hip, lower lumbar, DIP and PIP joints ○ Symptoms worsen during day (HY)
Pathologic features	○ Eburnation (bone rub) of subchondral bone ○ Pieces of bone might fall off in joint space (aka joint mice) ○ Enlarged DIP and PIP joints (heubordin-bouchard nodes) due to osteophyte formation (bone spurs) (HY)

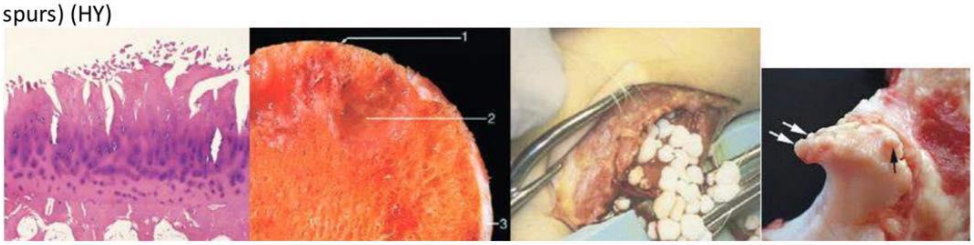


Fig: from left to right - characterstic fibrillation of articular cartilage; 1=bone eburnation, 2 =subchondral cyst, 3 = normal articular cartilate; joint mice; osteophytes

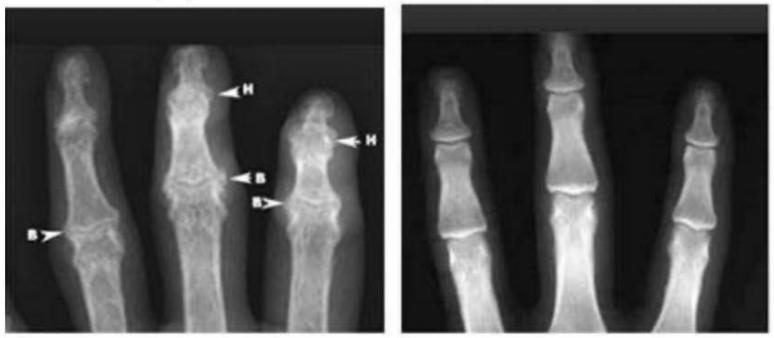


Fig - osteophytes leading to heubordin-bouchard notes on the left x-ray. Right is normal hand x-ray

Rheumatoid arthritis

Rheumatoid arthritis

Defn	- chronic systemic autoimmune joint disease that causes symmetrical polyarthritis and mainly affects PIP and MCP joints - Classically seen in middle age woman
Genetics	- Associated with HLA-DR4
Pathogenesis	○ Synovitis leading to formation of pannus (granulation tissue) ▪ Contraction of pannus by myofibroblast can lead to • ankylosis, • joint distortion, • damage of cartilage, • osteopenia (wearing away of bone due to inflammatory processes)
Presentation	- morning stiffness that improves with day - Symmetric PIP involvement - DIP spared (HY) - both DIP and PIP involved in DJD. - Fever, malaise, myalgia, wt loss (systemic autoimmune signs) - Others: - Rheumatoid nodules - Vasculitis - Baker cyst (swollen bursa behind knee) - Pleural effusion, LAD, interstitial lung disease
Labs (HY)	- Positive rheumatoid factor (IgM against Fc of IgG) - Presence of neutrophils and protein in synovial fluid.
Complicaions	- Anaemia - ○ chronic inflammatory state produces hepsydin (acute phase protein). Hepsydin blocks ability to use iron that's stored in macrophage. Results in anemia - Secondary amyloidosis (liver makes acute phase protein SAA that gets converted to AA amyloid deposition)

Seronegative Spondyloarthropathy

A 67-year-old woman presents to your clinic complaining of stiffness and pain in both of her knees. Upon further questioning, she tells you that the pain becomes worse later in the day after she has been walking around. Physical examination reveals bilateral, swollen knees with mild joint effusion and crepitus with flexion. You also notice bony nodules on her DIP and PIP joints. You suspect that her condition is caused by the wear and tear of everyday life.

Osteoarthritis

Etiology and Epidemiology	Destruction of articular cartilage resulting from mechanical trauma to the joints that accumulates over time (**wear-and-tear arthritis**) Affects **women** more often than men; **age of onset is usually > 50;** associated with obesity
Pathology	*Joint:* **Joint cartilage flakes off** and is eroded, exposing underlying bone; **eburnation of bone** (polishing of bone due to rubbing of bone with bone); **cystic degeneration** beneath eburnated bone (subchondral cysts); **osteophyte formation** (growth of new bone at articular edges); **joint mice** (fractured osteophytes floating in synovial fluid)
Clinical Manifestations	**Joint pain** and stiffness that **worsens with use** most commonly occurring in the hip joint, knee joint, lumbosacral spine, MTP joint of the toe, and **DIP and PIP joints of the fingers;** may see **Heberden nodes** and **Bouchard nodes** (osteophytes at the DIP and PIP joints, respectively)
Treatment	NSAIDs; surgical replacement of joint
Notes	Osteoarthritis can be distinguished from rheumatoid arthritis on the basis of location of joint involvement, laboratory tests (normal in osteoarthritis), and description of joint pain (effect of movement on pain).