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Degenerative Joint Disorders

Objectives:

★ not given

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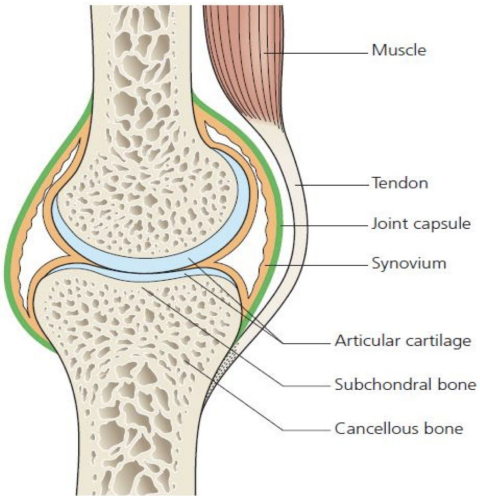
References: 435 Lectures And Notes /Apley / 433 Team

Background

Articular cartilage



- ★ It is avascular and aneural **hyaline cartilage**
- ★ Viscoelastic material with variable load - bearing properties
- ★ Decreases joint friction.

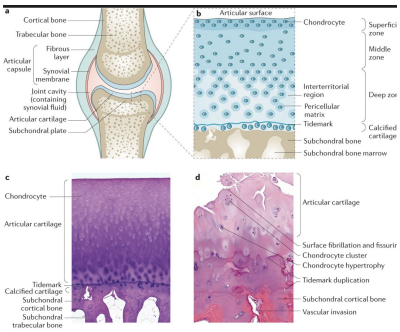
Cartilage composition:

1-Water (60% to 80% wet weight) most important part
- pumped in and out of cartilage **depending on load**
- contributes to lubrication and Nutrition

2-Collagen (10% to 20% wet weight)
- secreted by chondrocytes
- mostly type 2 collagen (90%)
- confers **tensile strength** to cartilage - قوة الشد

3-Proteoglycans (10% to 15% wet weight)
- secreted by chondrocytes
- composed of GAG[1] (aggrecan , chondroitin ,and keratin sulfate)
- negatively charged proteins holds water within matrix
- provides compressive strength

4-Chondrocytes (5% wet weight)
- only cell type in cartilage



- ★ **Chondrocytes** have little capacity for cell division in vivo and in vitro so when there is a direct damage to the articular surface, cartilage is poorly repaired, or repaired only with (poor cartilage) **fibrocartilage** which has inferior biomechanical properties than hyaline cartilage
- ★ If the collagen network is disrupted, initially the matrix becomes waterlogged and soft .later on it will be eroded, hard and underlying bone will be exposed
- ★ There will be loss of proteoglycans, cellular damage and splitting ('fibrillation' initially) of articular cartilage. then later on complete loss of articular cartilage, **In X ray** we see it as a reduction in joint space initially then there is no joint space and it's bone on bone
- ★ Damaged chondrocytes begin to release matrix-degrading enzymes inside the joint cause further damage.

Capsule and ligaments:

- ★ Fibrous structure with tough condensations on its surface which forms the ligaments.
- ★ Together with the overlying muscles, they help to provide stability. which is IMP

Synovium:

- ★ Thin membrane that is richly supplied with blood vessels, lymphatics and nerves.
- ★ It provides a non-adherent covering for the articular surface and **produces synovial fluid.**
- ★ **It is the target of autoimmune reactions in joint infections (septic arthritis) and autoimmune disorders such as rheumatoid arthritis and SLE.**

[1] glycosaminoglycan

Synovial fluid:

★ Have several functions: Nourishes the avascular articular cartilage, plays an important part in reducing friction during movement by type of fluid itself, it also has slight adhesive properties, which help in maintaining joint stability.

★ The volume remains fairly constant, regardless of movement. Unless the joint got injured or infected it increases resulting in joint effusion fluid accumulates and we feel it clinically as effusions

Degenerative bone disorder

when you get the words Osteoarthritis/arthritis/ osteoarthrosis → it meant to be degenerative type unless they specified (infective, inflammatory and so on)

1- Primary (idiopathic) osteoarthritis (OA)

★ **Chronic** disorder in which there is
- **Progressive softening and disintegration of articular cartilage**
- **New growth of cartilage and bone at the joint margins (osteophytes)**
- **Subchondral bone sclerosis and cyst formation**
- **Mild synovitis and capsular fibrosis.**

★ **Asymmetrically** distributed, often localized to only one part of a joint for example in the knee the medial part is affected usually.

★ Often associated with abnormal loading

★ Unaccompanied by any systemic illness

★ **Not primarily an inflammatory disorder** (although there are sometimes local signs of inflammation)

★ **Not a purely degenerative**(dynamic phenomenon: it shows features of both destruction and repair). it is a misnomer because they have signs of degeneration and repair / signs of repair like osteophytes

2- Inflammatory OA be aware about it

such as (**RA** mainly, SLE, Reiter's syndrome[2], Sjogren Syndrome, ankylosing spondylitis, behcet's syndrome)

★ **Symmetric** narrowing of joint space it affects the whole joint that is why it's symmetrical

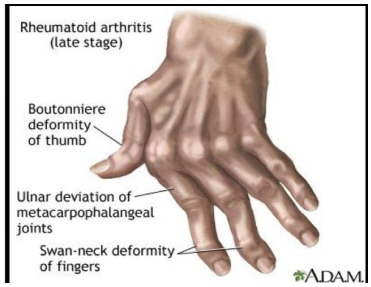
★ Periarticular soft tissue swelling because of the severe inflammation

★ Periarticular Osteopenia because of the severe fluid and inflammation, osteoporosis of the inflammatory disease

★ Juxta - articular bony erosions also because of the inflammation and osteoporosis

[2] an inflammatory syndrome (etiology unknown) predominantly in males; characterized by arthritis, conjunctivitis and urethritis





why they call it boutonniere deformity[3]?
it is PIP flexion ,DIP hyperextension.
with the extensor mechanism going volar, the joint with extensor mechanism becomes like button that is why they call it boutonniere

Secondary OA:

Trauma:	osteochondral , malunion , sport injury
Infection	Perthe's disease, osteonecrosis , steroids
Metabolic:	crystaline deposition disease (gout, CPPD[4]), Paget's disease.
Congenital/developmental:	Hip dysplasia , multiple epiphyseal dysplasia, Perthe's disease.
Osteonecrosis:	idiopathic osteonecrosis, SCD[5] ,hemophilia , steroids

Etiology OA has no single cause , rather, it is due to a variable combination of several risk factors

★ OA results from a disparity between the stress applied to articular cartilage and the ability of the cartilage to withstand that stress. This could be due to one or a combination of **two processes:**

- **Weakening of the articular cartilage** (due to a genetic defect or enzyme activities).
- **Increased mechanical stress** in some part of the articular surface. Which can be caused by overuse or joint instability.

★ The initial trigger for OA appears to be the damage to the cartilage collagen network and loss of proteoglycans from the matrix, giving rise to deformation and gradual structural disintegration.

★ **Varus deformity of the knee. Medial side is the most affected.** For example in the knee ,the normal knee is in valgus with the inflammation and degenerative OA it becomes varus

★ **Other causes (risk factors)**

- OA is more of a process than a disease
- Increases in frequency with age.
- Obesity (hips and knees take 3 - 4 times body weight with each step)
- **Family history** IMP factor

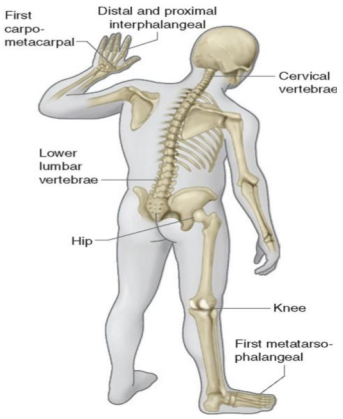
[3] The **deformity** garnished its **name** because the injury caused the proximal phalanx to protrude through like a **finger** through a buttonhole
Boutonniere deformity is a deformed position of the fingers or toes, in which the joint nearest the knuckle (the proximal interphalangeal joint, or PIP) is permanently bent toward the palm while the farthest joint (the distal interphalangeal joint, or DIP) is bent back away (PIP flexion with DIP hyperextension).

[4] Calcium pyrophosphate dihydrate crystal deposition disease (**CPPD**)

[5] Sickle cell disease

Prevalence

- ★ Degenerative osteoarthritis is the **commonest** of all joint diseases.
- ★ Osteoarthritis is much more common in some joints (knee, hip , spine and the fingers) than in others (the elbow, wrist and ankle).
- ★ Common in our community especially knees, hip, Cervical spine & Lumbosacral Spine
- ★ Much more in females and more joints are affected in women than in men.
- ★ Presents earlier than in West at about 40's.
- ★ About 90% of those over 40 have asymptomatic degeneration of weight bearing joints.

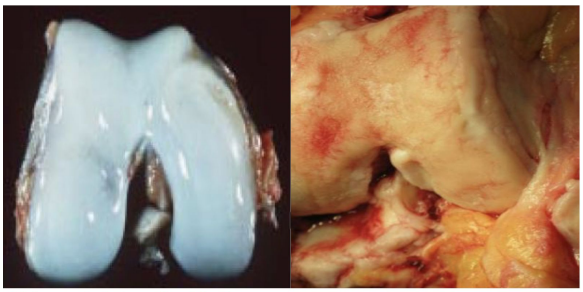


Pathology

The 5 cardinal (major) features are:

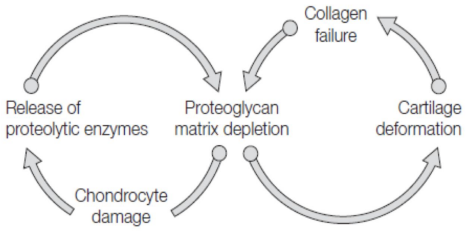
1- Progressive cartilage destruction seen in all X rays

- Increase in water content : swelling and softening of the cartilage in the initial stages cartilage is (swollen, waterlogged with softening)
- then later on there will be
  - depletion of proteoglycans
  - chondrocyte s damage and synovitis → proteolytic enzymes → collagen disruption
  - splitting of articular cartilage fibrillation on weight bearing surfaces and then complete destruction



This is normal articular cartilage it is shiny hyaline structure)

Cracks in articular cartilage



2-Subarticular cyst formation cyst doesn't usually appear in x rays of knees but in hips it is common to see it

There are 2 theories behind cyst formation

- Subarticular cyst could arise from local areas of osteonecrosis the bone get necrosed and die
- from the forceful pumping of synovial fluid through cracks in the subchondral bone plate.from the fibrillation (crack خطوط in the cartilage) → with pressure there will be pumping of fluid which will accumulate under the sub articular cartilage to form the cyst

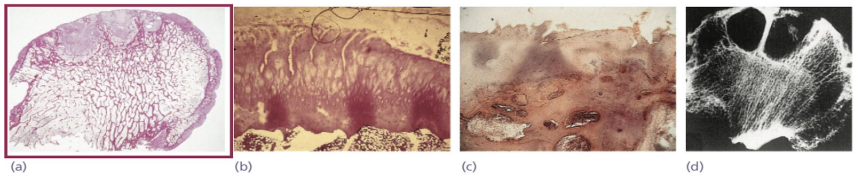
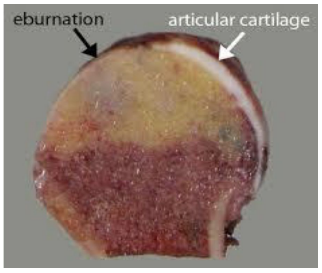
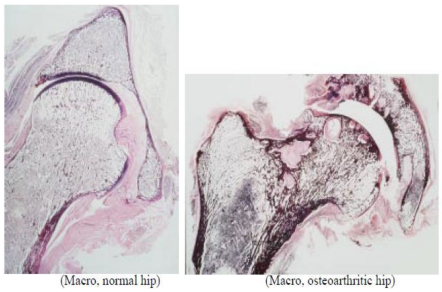


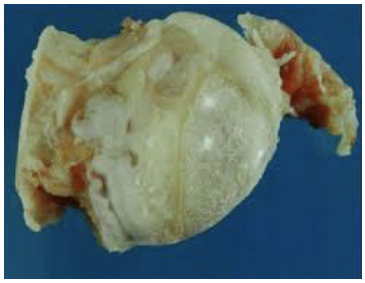
Figure 5.5 Osteoarthritis – histology (a) Destructive changes (loss of articular cartilage and cyst formation) are most marked where stress is greatest; reparative changes are represented by sclerosis around the cysts and new bone formation (osteophytes) in less stressed areas. (b) In this high-power view, the articular cartilage shows loss of metachromasia and deep clefts in the surface (fibrillation). Attempts at repair results in (c) subarticular sclerosis and buds of fibrocartilage mushrooming where the articular surface is destroyed (d).

3-Sclerosis of the surrounding bone seen in all X rays

bone becomes **exposed** → may be **polished or burnished** to ivory-like smoothness (eburnation) ivory عاج صلب جدا/ in x ray we see it like whitening of the bone

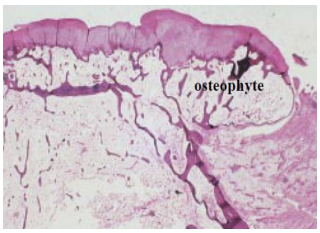


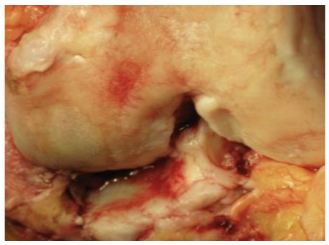

(Macro, normal hip) (Macro, osteoarthritic hip)



4-Osteophyte formation seen in all X rays

Osteophytes arise from proliferation and remodeling of the adjacent cartilage at the edges followed by endochondral ossification of that cartilage. the joint try to increase the surface area to distribute the stress so it forms a cartilage at the periphery of the joint and this cartilage underwent endochondral ossification and becomes a bone , in x-ray we see it as osteophyte





5-Capsular fibrosis

- ★ Marked vascularity and venous congestion of the subchondral bone this is the cause of pain(in medial side) ,we also should consider it in the management plan
- ★ The capsule and synovium are often thickened but cellular activity is slight
- ★ Progressive bone erosion› BONE COLLAPSE
- ★ Fragmented osteophyte › LOOSE BODIES
- ★ Loss of height and ligamentous laxity› MALALIGNMENT or subluxation
- ★ MALALIGNMENT/ subluxation, LOOSE BODIES, BONE COLLAPSE are signs of severe or recurrent OA. if patient presents with night pain or pain at rest it means end stage disease

Key pathological features of OA (EXTRA FYI from apley)

Pathology	Radiographic correlates
Focal areas of loss of articular cartilage	Joint space narrowing (if loss is extensive)
Bone growth at the joint margins	Osteophytes
sclerosis of underlying bone	sclerosis of subchondral bone
cyst formation in underlying bone	bone cyst
Loss of bone	Bone attrition
varying degree of synovial inflammation	Effusions may be apparent
Fibrosis and thickening of the joint capsule	not visible on radiograph

Clinical features It has an **intermittent** course , with period of remission sometimes lasting for months, affecting one or two of the weight bearing joints (hip and knee) in our community every patient having degenerative knee will have degenerative lumbosacral and cervical spine , usually when we do the surgery for knees we ask the surgeon to check spine and vice versa

Symptoms:

This is particularly common in the **early morning** after first awakening. The cause is not known. Less well-appreciated symptoms of OA include fatigue, sleep disturbance caused by pain and anxiety/depression.

★ **Pain**

- Localized to affected part of joint or rarely referred to distant site (for example: pain in the knee from osteoarthritis)
  any patient with knee pain almost every year we see 1 or 2 patients, who had all the investigation to the knee (CT ,X-rays, MRI) which all appear to be normal but the hip was not examined **,so always examine hip in knee pain** because about 20 % of hip pain refers to the knee, it is a common scenario in private hospital

- insidious in onset/ aggravated by exertion and relieved by rest/ in advance stage there will be night pain or pain at rest

- causes of the pain :

- bone pressure due to vascular congestion and intraosseous hypertension (most important) osteotomy done in young patient is based on this theory in order to relieve the vascular congestion and intraosseous hypertension
- mild synovial inflammation
- capsular fibrosis with pain on stretching the shrunken tissue
- muscular fatigue

★ **Stiffness** it's initially after periods of inactivity,but later on it will be constant and progressive

★ **Loss of function**

BOTH knees are affected by varus , but right knee is severely affected and left is moderately affected. normal valgus of knees (5-7 degree), 7 in female bc they have hip and ligament laxity

Signs:

★ **Swelling:** intermittent (bc of effusions) continuous (large osteophytes)
★ **deformity** severe
★ **tenderness**
★ **limited** range of **movement**
★ **crepitus** rubbing of bone against bone, you can both hear and feel
★ **instability** because of Loss of cartilage and bone, asymmetrical capsular contracture and/or muscle weakness and imbalance between flexor and extensor mechanism

Heberden's nodes

EXTRA :SYMPTOMS AND SIGNS AT DIFFERENT JOINT SITES

HIP

- ★ Pain is usually felt in the groin, laterally over the hip and radiates down the anterolateral aspect of the thigh to the knee. Occasionally the pain can radiate beyond the knee. Referred pain felt only in the knee is not uncommon, and clinicians should always consider hip OA as a cause of isolated knee pain
- ★ Pain is worse on exercise and walking distance is reduced. Pain at rest and night pain can be particularly troublesome.
- ★ Stiffness is usually experienced first thing in the morning and after having sat still for a while, but it quickly resolves on movement to be replaced by pain. Complex movements, such as getting in and out of a motorcar or putting on socks, which involve deep flexion combined with rotation, are often difficult or impossible to perform. Patients struggle with stairs and in the absence of a banister may only manage stairs on all fours.

EXAMINATION :

- ★ **antalgic gait,** characterized by an uneven cadence, in which less time is spent in the stance phase of the painful limb.
- ★ There is a **globally reduced range of movement** with internal rotation often restricted early in the disease progression
- ★ Joint movement is **limited by pain** at the extremes of movement.

KNEE

- ★ knee osteoarthritis occurs most commonly in the **medial tibiofemoral joint** but can occur in all three compartments and is often tricompartmental. Isolated patellofemoral OA is probably due to altered biomechanics of the extensor mechanism.
- ★ Pain is felt globally over the knee and the proximal tibia. In isolated patellofemoral OA the pain is felt anteriorly over the knee and is often worst when ascending or descending stairs as the patella is compressed against the femur.
- ★ As in the hip, the pain is a deep-seated aching sensation related to exercise. Rest pain and night pain develop in the later stages
- ★ Patients sometimes report **audible crepitus** (crackling or grating sounds) coming from the knee as well as s**ymptoms of instability** (a feeling that the knee is going to give way).
- ★ They may notice gradual deformity of the knee, in **particular varus deformity (s**ee Figure 5.10), but less commonly valgus deformity. **Fixed flexion deformity** means that the knees cannot lock in full extension and thus patients cannot stand comfortably for prolonged periods due to muscle fatigue. Loss of flexion beyond 90 degrees makes stand- ing from a sitting position difficult as patients cannot move their centre of gravity anterior to their mid-coronal plane. Swelling and stiffness are common features.

EXAMINATION :

- ★ **antalgic gait,**
- ★ **wasting of quadriceps muscles,**
- ★ **joint effusion**
- ★ **joint deformity** The joint deformity may be passively correctable. Deformity is towards the compartment most severely affected, usually varus deformity with predominantly medial compartment OA.
- ★ **crepitus palpable and sometimes audible on movement.**
- ★ **Tenderness along the joint line and palpable osteophytes that can be tender.**

HAND

- ★ most commonly affecting **DIPs and the thumb base** (both the radiocarpal and scaphotrapeziod joints), less commonly, PIPs joints and metacarpophalangeal joints .
- ★ OA of the hand is strongly associated with OA at other joint sites, especially the knee, and with genetic predisposition . It is far more common in **women** starts relatively abruptly around the time of the **menopause** (sometimes called 'menopausal OA') with painful inflammation in DIPs joints over time(years) the inflammation settles and the joint is left with the typical pathological features of OA.
- ★ **Erosions** can occur ('erosive OA'), and cysts containing hyaluronan that protrude at the margins of the joints are not uncommon.
- ★ Distal interphalangeal joint OA is not generally a major problem in terms of function, but thumb base OA can be, as it leads to instability and difficulty with pinch grip.

Other joints

Almost any joint can be affected by OA, particularly if it is damaged by severe trauma.

However, there are peculiarities to the phenotype of the condition at different sites. For example, elbow OA is almost always asymptomatic (just causing loss of full extension of the elbow), while shoulder OA is more likely to result in severe bone destruction (a condition sometimes called 'Milwaukee shoulder') than is OA at other joint sites.

Imaging

- ★ **Asymmetrical** loss of cartilage (narrowing of the 'joint space') magic word is asymmetrical
- ★ **Subchondral bone sclerosis**
- ★ **Cysts close to the surface** in knee most likely in the medial side, in hip it's seen in the dome (superior-lateral)
- ★ **osteophytes at the margins of the joint**

Late features: **Malalignment, Joint subluxation, Bone loss, Loose bodies.**

Subchondral bone sclerosis	Subchondral cyst	osteophyte formation	Bone loss
 white sclerotic lesion in the medial side of knee	 cysts at the dome of acetabulum (superolateral part)		

- ★ look for signs of other disorder
- ★ symmetric narrowing in **inflammatory OA** (such as RA)

EXTRA	
Osteoarthritis x-ray finding Mnemonic : LOSS	Rheumatoid arthritis x-ray finding Mnemonic : LESS
L : Loss of joint space (**asymmetric**)	L : loss of joint space (symmetric)
O: osteophytes formation	E: erosion of joint
S : subchondral sclerosis	S : synovial thickening
S : subchondral cysts	S : subluxation and joint deformities

The radiograph is a blunt instrument for revealing these pathological changes, but it is the only routinely available tool to detect them, and as long as the changes in the joint are severe enough, they result in characteristic joint space narrowing, osteophyte formation and subchondral bone sclerosis, which are pathognomonic of OA As with the pathological changes, there are a number of different scoring

0	*Normal*	No features of OA
1	*Doubtful*	Minimal osteophyte, doubtful significance
2	*Minor*	Definite osteophyte, no loss of joint space
3	*Moderate*	Some diminution of joint space
4	*Severe*	Advanced joint space loss and sclerosis of bone

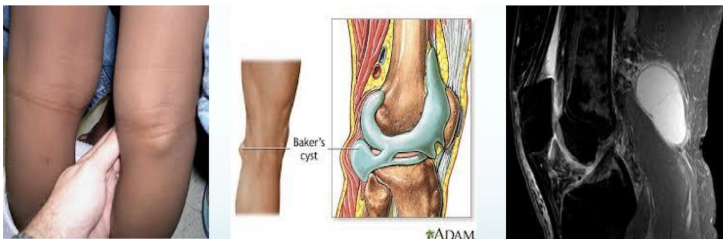
Complication:

Complications

★ **1- Capsular herniation** : Knee OA; marked effusion and herniation of the posterior capsule (Baker's cyst).

there is pressure inside the joint and severe effusion >hiatus at the back site of the knee on the posterolateral part >fluid get go through the hiatus and accumulates under the skin

In private hospitals they tend to perform multiple baker's cyst aspiration which is wrong because it tends to come back again so just treat underlying cause (OA)



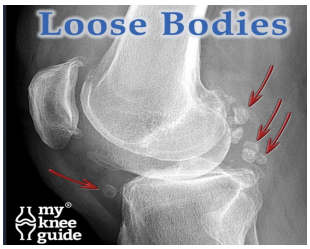
★ **2- Rotator cuff dysfunction:** acromioclavicular (AC) joint OA

- Because of severe OA at AC joint the osteophytes that will happen will compress the joint and overlying rotator cuff causing impingement of rotator cuff and tendonitis and later on tear

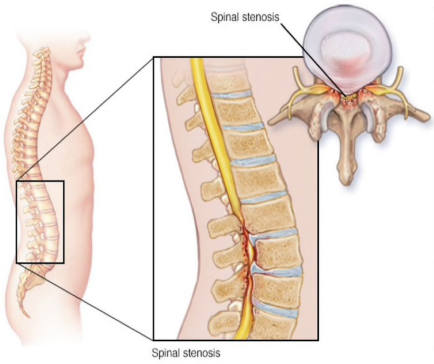
-what are the rotator cuff muscles ?
supraspinatus, subscapularis, teres minor and infraspinatus

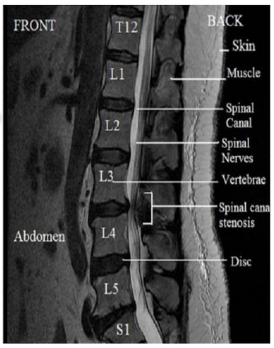
★ **3- Loose bodies**

especially in the knee, can cause pain , flicking
if large we can go with scope and remove it

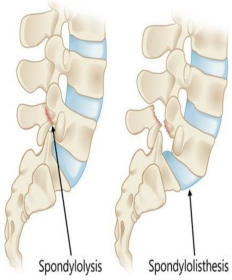


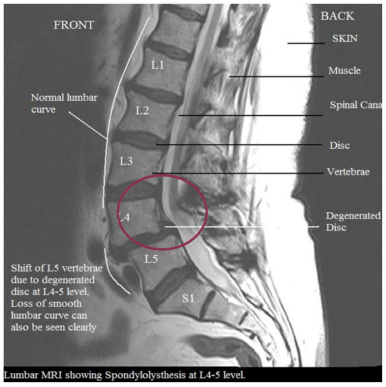
★ **4- Spinal stenosis** very dangerous





★ **5- Degenerative Spondylolisthesis : severe segmental instability at L4/ L5 movements between vertebrae at the end there is pressure on the spinal cord nerve roots**





Management : Depends on several factors :

- ★ Joint (or joints) involved
- ★ Stage of the disorder
- ★ Severity of the symptoms
- ★ Age of the patient
- ★ Functional needs

Early stage of the disease(conservative): we apply the following principles:

★ **Maintain movement and muscle strength (increasing joint mobility)**: by **physiotherapy** which will help in:
1- pain relief (either by massage or application of warmth) or by other different types of physiotherapy
2- Prevents contractures
3-Muscle strengthening
4-Enhancing the range of motion Physical therapy is one of the important modalities in the initial management in all patient
- partial for young active patients with mild OA , like the knee joint

★ **Protect the joint from overload (load reduction)** : by using a (walking stick, unloading brace, wearing Shock- absorbing shoes, avoiding prolonged stressful activity and by weight reduction (if the pt. is obese)
The unloading brace is very bulky and not suitable for our community because the legs in our patient is champagne like,while it is widely used in the west it helps to push the knee into valgus so relieves stress on medial side

Walking stick

Shock absorbing shoes

Unloading brace

★ **Relieve pain**

- **<u>Using medication</u>** which could be <u>systemic</u> or <u>local</u>
  - systemic such as : paracetamol, NSAIDs (selective COX-2 inhibitors like Celebrex (celecoxib) and Mobic (meloxicam) and is the main mode of treatment)

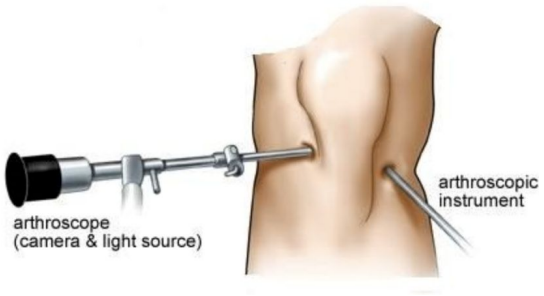
  -local (injection) is not recommended in general
  -All types of injections are not proven to be beneficial except for corticosteroid injection which can give only 1 month relief of pain and if we decide to do joint replacement or any procedure we should wait for 6 months at least +it carries a high risk of infection if surgery is done within 6 months period of steroid injection
  -Intra-articular HYALURONIC ACID ,mast cell ,stem cell (nothing can reproduce the cartilage after it is damaged) injections are not proved and will not be proved in doctor opinion

- **<u>Modify daily activities and rest period</u>**: avoiding activities like climbing stairs, squatting and praying on the floor pray on chair instead, application of warmth, massage.

Intermediate stage of the disease (surgical):

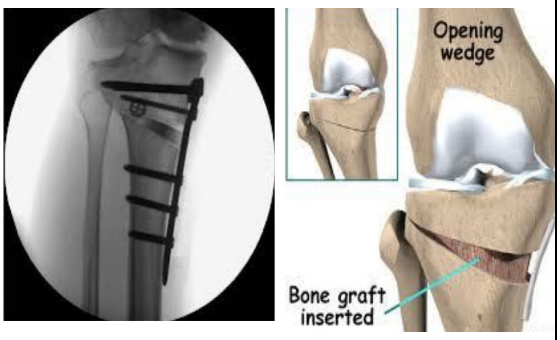
★ **Joint Debridement (Arthroscopy)** تنظيف الركبة
which is the removal of (interfering osteophytes/ meniscal tear in knees or labral tears in shoulder &/ loose bodies)

not common procedure, done under GA, done commonly in private hospital, not indicated and will not correct the disease, use only if there is indication for its use



★ **Corrective osteotomy**
- It will realign axis and redistributes weight has a role in <u>pain relief by</u> (1- vascular decompression of the subchondral bone 2- Redistribution of loading forces toward less damaged parts of the joint)
- <u>Usual candidates are</u>
  1. **young** less than 50, after 50 is better to do total knee replacement
  2. **active** patients
  3. **mild OA** still there is normal cartilage you want to preserve

★ the picture shows corrected varus , where they cut the bone to correct provided that we still have cartilage if no cartilage what is the point



LATE stage of the disease(surgical):

★ **Arthrodesis (Fusion of the two ends of the bones)**
- Transfer from painful stiff into painless stiff joint
- Small joints; hand, foot and spine where we cannot replace

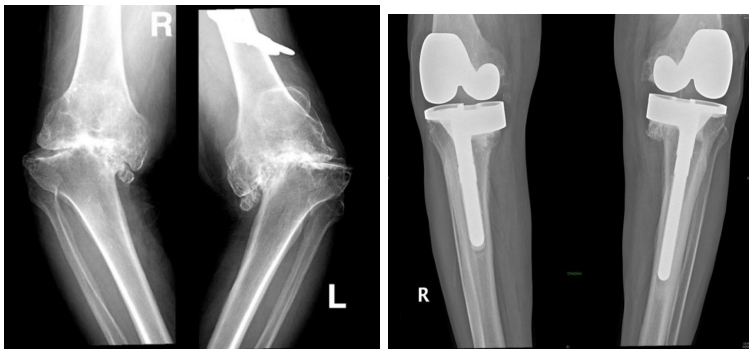
we go ahead and remove the cartilage and put نلغي المفصل تمام (bone and make it stiff (no joint anymore
remove cartilage and apply bone graft then it will heal >stiff
(غالبا اللي عندهم ديجنرتيف اوستيوارثارايتس يكون عندهم بينفل ستيفنس فإحنا نحوله من بينفل ستيفنس إلى نن بينفل ستيفنس)

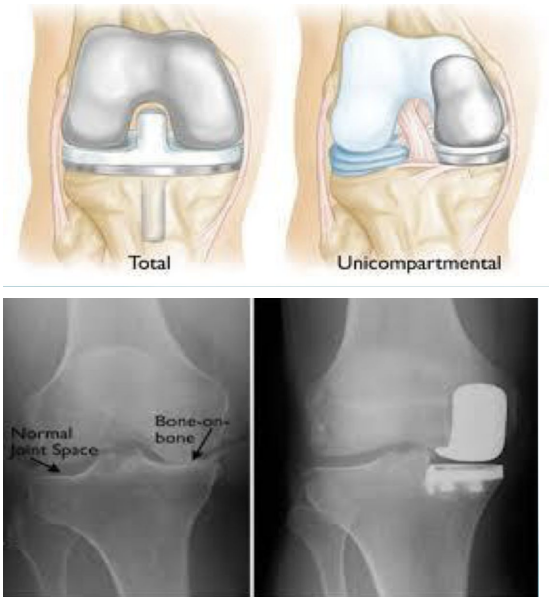
★ **Joint replacement (Arthroplasty)**
is the procedure of choice for OA in patients with severe and advanced symptoms and can be <u>Total</u> or <u>partial</u>

TOTAL for <u>old</u> نلغي المفصل patients with painful deformed stiff joint (no cartilage), usually done in (LARGE JOINT :knee , hip , shoulder , ankle and elbow) and the patient is more than 50 or 45

almost all large joints can be replaced but the most successful are the hip and knees

PARTIAL for <u>young</u> active patients with mild OA, like the(knee joint)
we replace one part of joint which is affected
INDICATIONS :you should have normal articular cartilage of other part of the joint if you want to replace medial, lateral or patellar يعني إذا بصلح أحدهم الباقين يكونون طبيعيين
and you can replace each part separately





There are a lot visit to clinics (20-30 years ladies complaining of knee sound)

-not every knee sound is OA (clicking sound) >there is a normal sound in the knee (we have 3 bones tibia , fibula, femur / 3 joints medial and lateral tibiofemoral patellofemoral joints)

- also it could be from knee ligaments

SAQs :

X ray pic of an osteoarthritis, mention 4 signs:
Mnemonic LOSS

Loss of the joint space.
osteophyte formation.
subchondral sclerosis.
subchondral cysts.

year old female patient presented to the Ortho clinic with knee pain that increase on movement and relieved by rest. Knee X-ray was done and shown below. Mention 4 signs of advanced course of the disease based on the x-ray.

Late features: Malalignment, Joint subluxation, Bone loss, Loose bodies.

MCQs

Young patient came to your clinic complaining of chronic knee pain. Whats the initial management:
Ans:oral NSAIDS

A 64 year old C/O right side groin pain radiating to inner right thigh (pic of right hip osteoarthritis) ... I don't remember the rest. Q/what is the cause of the pain :
Ans:Interosseous congestion/hypertension

Don't remember the case but the old patient with chronic osteoarthritis(case suggesting severe OA) what is the treatment of choice?
A-conservative
B-Corrective osteotomy
C-Increase joint mobility
D-Arthroplasty
Ans:D

Recurrence of Baker's cyst should make the surgeon suspect:
a. Neoplastic change.
b. **Undiagnosed pathology within knee.**
c. Incomplete removal of the cyst.
d. The communication to the joint is persisting.

localized bone sclerosis may be due to:
a. Syphilis
b. Sclerosing osteoperiostitis
c. Osteoarthritis
d. Bone tumors
e**. All of the above**

rheumatoid arthritis primarily involves the:
a. Articular cartilage
b. Subchondral bone
c. Synovial membrane
d. Capsule
e. Ligaments

Complications of rheumatoid arthritis in the hands include:
a. Tenosynovitis
b. Rupture of extensor tendons
c. Carpal tunnel syndrome
d**. Ulnar deviation at the metacarpophalangeal joints**
e. Bony ankylosis of affected joints

A 57 year old lady with osteoarthritis in both knees. They plan to do total knee replacement surgery What are the imaging findings?

- **A. Osteophytes**
- B. periarticular erosions
- C. Varus deformity

Case of osteoarthritis booked for knee replacement
which one of the following clinical manifestations represents advanced disease?

- **A. Rest pain**
- B. Stiffness
- C. Effusion
- D. Tenderness