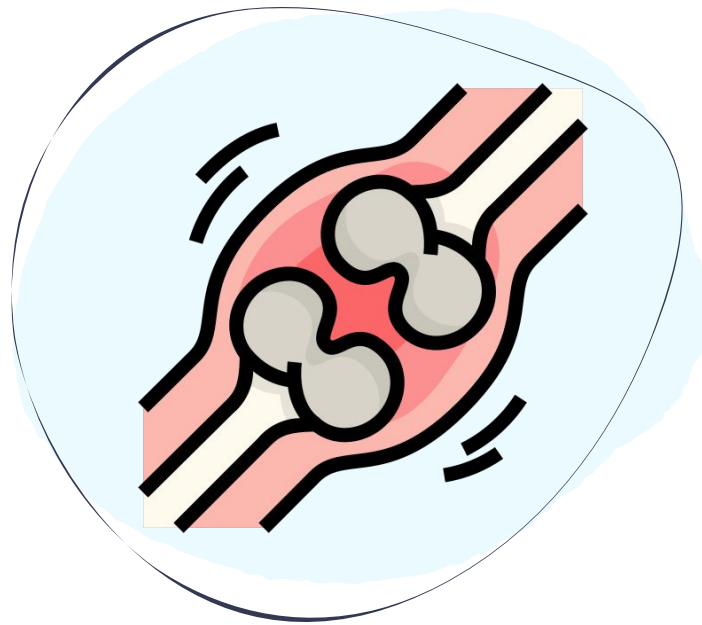






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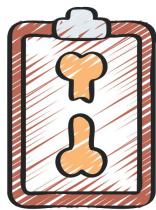


Inflammatory & Degenerative Joint Disorders

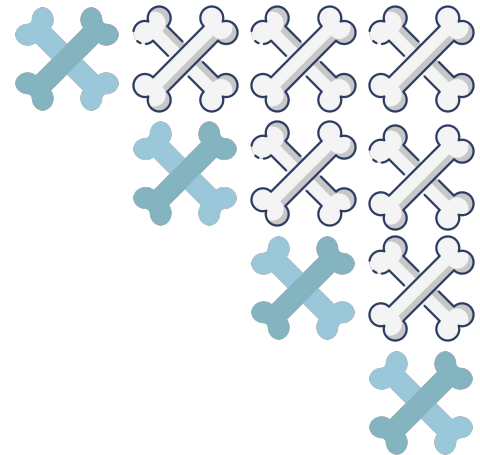
Dr. Ahmad Bin Nasser

Color Index:

-  Main Text
-  Important
-  441 Notes
-  Old Notes
-  Extra
-  



Objectives



No objectives were provided for this lecture.



Resources



Osteoarthritis
By Osmosis



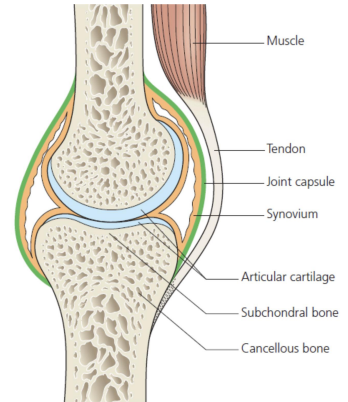
Osteoarthritis
By Orthobullets

Degenerative Joint Disease



Introduction

- Synovial joints are the most common type of joint in the body, these joints are termed diarthroses, meaning they are freely mobile.
- The joint is made up of different structures that act together to move, lubricate, nourish and stabilize the joint.

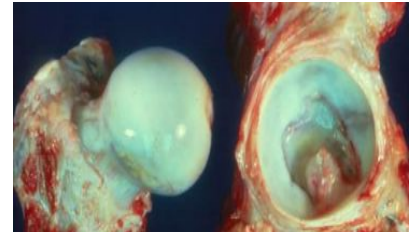


Components of Synovial Joints

1- Articular Cartilage

Cartilage is solid not liquid

- **Hyaline cartilage.** The hyaline cartilage is **not replaceable**, if damaged it's replaced by fibrocartilage.
- Viscoelastic material with variable load-bearing properties.
- **Decreases joint friction.**
- Avascular and aneural (**no nerve ending or vessels**).
- Chondrocytes have little capacity for cell division in vivo (**even stem cells**).
- Direct damage to the articular surface is poorly repaired, or repaired only with fibrocartilage.
- Fibrocartilage has inferior biomechanical properties than hyaline.
- If the collagen network is disrupted, the matrix becomes waterlogged and soft, followed by loss of proteoglycans, cellular damage and splitting ('fibrillation') of the articular cartilage, damaged chondrocytes begin to release matrix-degrading enzymes¹.



Cartilage Composition

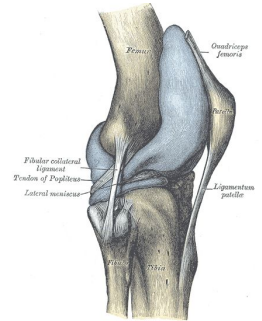
<p>Water (60-80% net weight)</p>	<ul style="list-style-type: none"> • Pumped in and out of cartilage depending on load. • Contributes to lubrication and nutrition.
<p>Collagen (10-20% net weight)</p>	<ul style="list-style-type: none"> • Secreted by chondrocytes. • Mostly type-II collagen (90%). • Confers tensile strength to cartilage.
<p>Proteoglycans (10-15% net weight)</p>	<ul style="list-style-type: none"> • Secreted by chondrocytes. • Composed of GAG (aggrecan, chondroitin and keratin sulfate). • Negatively charged proteins hold water within the matrix. • Provides compressive strength.
<p>Chondrocytes (5% net weight)</p>	<ul style="list-style-type: none"> • The only cell type in cartilage.

1- Mainly the loss of cartilage is progressive but sometimes the loss happens very quickly like in septic arthritis when the bacteria and the enzymes released by bacteria and phagocytosis cause direct damage to the joint.



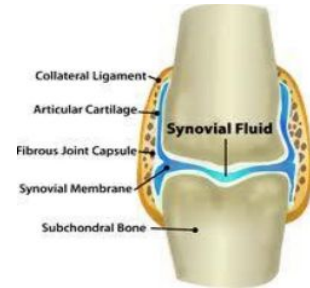
2- Capsule and Ligaments

- Fibrous structure with tough condensations on its surface (ligaments).
- Together with the overlying muscles, help to provide stability.
- Ligaments provide stability to the joint when it's torn we lose a major stabilizing factor.



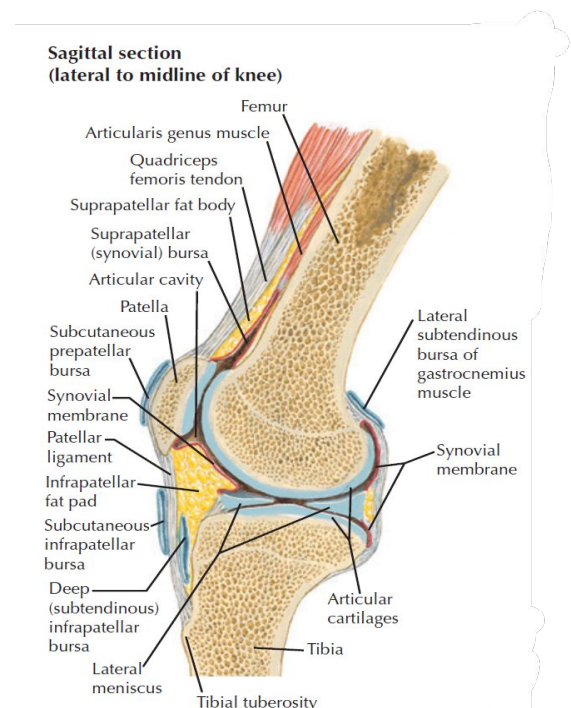
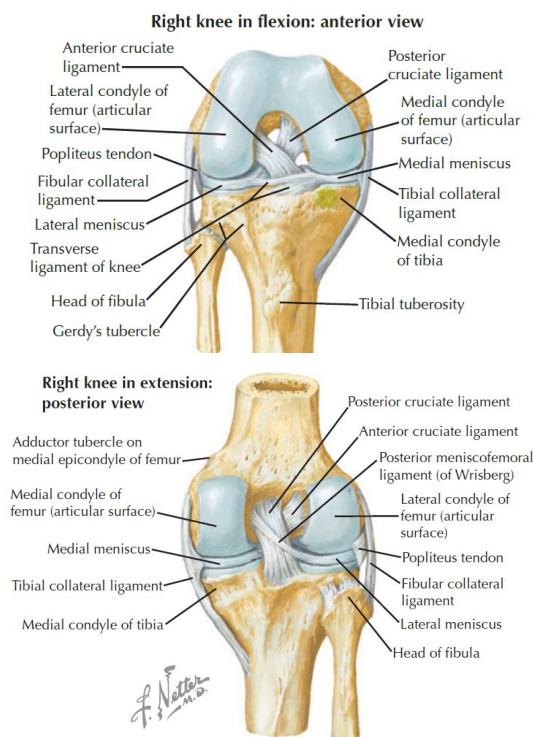
3- Synovium

- Thin membrane.
- Richly supplied with blood vessels, lymphatic and nerves.
- Target tissue in joint infections and autoimmune disorders such as rheumatoid arthritis.
- Provides a nonadherent covering for the articular surfaces.
- Produces synovial fluid.



4- Synovial Fluid

- Synovial fluid nourishes the avascular articular cartilage.
- Plays an important role in reducing friction during movement.
- Has slight adhesive properties which assist in maintaining joint stability.
- Synovial fluid functions: Reduce friction, supply nutrition and lubrication.
- The volume remains fairly constant, regardless of movement.
- When a joint is injured fluid increases (joint effusion).
- Increases in case of inflammation (OA), lymphatic obstruction.
- It NEVER decreases.
- Effusion: Increase fluid inside the capsule (Joint effusion).
- Swelling: Increase fluid in tissues outside of the joint.



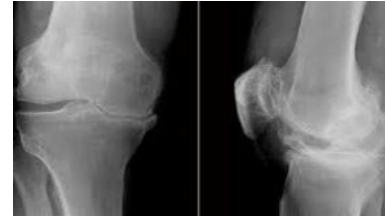
Osteoarthritis



Primary Idiopathic Osteoarthritis

Chronic disorder, characterized by:

- Progressive softening and disintegration of articular cartilage.
- New growth of cartilage and bone at the joint margins (osteophytes¹).
→ Which leads to the loss of the congruency of the articular surface.
- Subchondral bone sclerosis and cyst formation.
- Mild synovitis and capsular fibrosis.
→ Synovium becomes inflamed and produces more fluid as a protective mechanism.
- **Asymmetrically distributed**, often localized to only one part of a joint.
→ The place where the highest pressure is located at, on the hip it will affect the top part more, if it's fully damaged search for another reason.
- Often associated with **abnormal loading**.
→ Usually causes of OA is more mechanical (weight and loading), whatever part is loaded more will have early osteoarthritis like, in obese patients patello-femoral part will be affected.
- **Unaccompanied by systemic illness**.
- **Not primarily an inflammatory disorder** although there are sometimes local signs of inflammation.
- Not purely degenerative, it's a dynamic phenomenon, it shows features of both destruction and repair.
- Osteoarthritis patients have these 5: 1- Cardiac diseases, 2- DM2 & obesity, 3- Depression, 4- Muscle weakness, 5- Peptic ulcer & Kidney diseases "with treatment".



Etiology

1. **Increased mechanical stress** in some part of the articular surface (abnormal loading).
2. **Disparity between the mechanical stress** to which the articular cartilage is exposed and the ability of the cartilage to withstand that stress.
3. **Varus deformity of the knee** (that's why the medial side is usually only affected).
4. More of a process than a disease.
5. Increase in frequency with age.
6. **Obesity** (hips and knees take 3-4x body weight with each step).
7. Family history.



Secondary Osteoarthritis

- **Main difference is total symmetric joint involvement** (not only medial), universal cartilage loss not due to mechanical stress.

Etiology

1. Metabolic: Crystalline deposition disease (gout², CPPD³), Paget's disease.
2. **Inflammatory: Rheumatoid arthritis**, SLE, Reiter's syndrome.
3. Neuropathic: DM, tabes dorsalis.
4. Hematologic: Sickle cell disease, hemophilia.
5. Endocrine: DM, acromegaly.
6. Trauma: **Malunion**, osteochondral, sport injury, dislocation, **Meniscal tear** (Post meniscectomy → OA).
7. Congenital/developmental: Hip dysplasia "DDH", multiple epiphyseal dysplasia.
8. Infection: (Septic arthritis).
9. Necrosis: **Perthe's disease**, osteonecrosis, steroids.



1- To distribute the pressure.

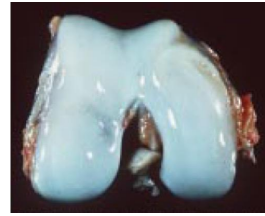
2- Monosodium crystals with translucent aspiration.

3- Mostly.



Prevalence

- Osteoarthritis is the commonest of all joint diseases (it's a disease of the cartilage not the synovial fluid).
- Osteoarthritis is much more common in some joints (hip, knee, spine and the fingers) than in others (the elbow, wrist and ankle).
- Much more in **females**, also more joints are affected in **women** than in men.
- Common in our community especially knees (presents earlier than in West).
- About 90% of those over 40 have asymptomatic degeneration of weight bearing joints.
- Commonest joints are knee, hip, cervical spine & lumbar spine, 1st Carpometacarpal, 1st Metatarsophalangeal and Interphalangeal joints.



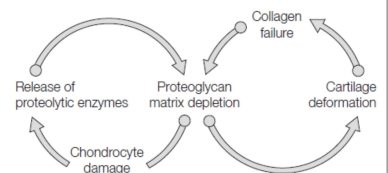
Normal knee cartilage

Pathology

Cardinal Features

1- Progressive Cartilage Destruction (poor cartilage regeneration)

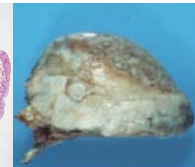
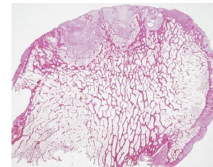
- **Increased** water content which leads to swelling and softening of the cartilage.
- This will lead later on to the **depletion/loss** of proteoglycans.
- Chondrocytes will be damaged and cause synovitis → Release of proteolytic enzymes → Collagen disruption.
- Fibrillation on weight bearing surfaces.
- Destruction of the cartilage → **secondary** inflammation and formation of osteophytes.



2- Subarticular Cyst Formation (doesn't appear in X-rays except in the hip)

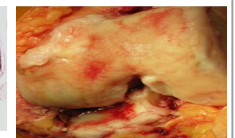
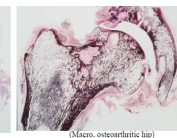
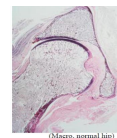
Arises from:

- Local areas of osteonecrosis.
- Forceful pumping of synovial fluid through subchondral bone plate **cracks**.



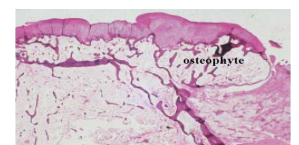
3- Sclerosis of The Surrounding Bone (seen in all X-rays)

- Bone becomes exposed, may be polished or burnished to ivory-like smoothness (eburnation).



4- Osteophyte Formation (seen in all X-rays)

- Proliferation and remodeling of the adjacent cartilage at the edges.
- This will be followed by endochondral ossification.
- The joint try to increase the surface area to distribute the stress so it forms a cartilage at the periphery of the joint which underwent ossification and became a bone.



5- Capsular Fibrosis

- Marked vascularity and venous congestion of the subchondral bone (causes pain).
- 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**





Clinical Features

- Intermittent course, with periods of remission, sometimes lasting for months.
- One or two of the weight-bearing joints (hip or knee) **might be affected**.
- In our community patients having **degenerative knee will have degenerative lumbosacral & cervical spine**. So, in a knee surgery check spine and vice versa.
- Pain of OA starts in one of two ways, either suddenly after an event (I did something I'm not used to e.g. Marathon) or progressively (day after day).
- **Localized progressive** pain during or after exertion (e.g. Prolonged walking, at the end of the day) **that is relieved with rest**.

Symptoms The most common problem is pain and swelling

1- Pain

- **Localized** or rarely referred to a distant site (e.g Pain in the knee from hip osteoarthritis).
- Insidious **in onset**.
- Aggravated by exertion and relieved by rest, **so the patient will stop any activities or painful movements to avoid pain** → Muscle wasting and stiffness (further worsening).
- In advanced stages **there will be** night pain or pain at rest.
- The pain is **fluctuating (never constant)** and **not continuous** especially during the extremities of motion.



Causes of Pain:

- Bone pressure due to vascular congestion and intraosseous hypertension **"most important"**.
- Mild synovial inflammation.
- Capsular fibrosis with pain on stretching the shrunken tissue.
- **Muscular fatigue**¹.
- Friction.

2- Stiffness

- **Initially after periods of inactivity, but later on it will be constant and progressive**.
- **The worst advice you give the patient is to tell him/her not to use the affected joint, as a result the patient will develop stiffness, weight gain, muscle loss and the symptoms will be worse!**

3- Loss of Function

Signs

- Swelling: Intermittent = **Effusions**, Continuous = Large osteophytes.
- Deformity → Mal-alignment (**Primary OA = Varus** "genu varus" or "bow legs").
- Tenderness.
- Limited **range of movement**.
- Crepitus
 - **Joint crepitation is not an indication of OA unless it is accompanied by pain or swelling, or limited ROM.**
- **Instability**
 - **Due to loss of cartilage and bone, asymmetrical capsular contracture and/or muscle weakness.**



¹- Might be muscle pain, the joint is weak so the muscles contract for a long time, causing pain and fatigue. So the patient avoids fully flexing and extending, at the end they will give up and don't try to move, that's why **physiotherapy** and **exercise** is important, it also increases the capacity of the muscle and strengthens it to support the joint, so more movement before feeling pain. Muscle relaxation by massage will relieve the pain temporarily but won't treat the primary cause.



Imaging¹

- Used to confirm the diagnosis and rule out other causes (NOT to treat).
- Used to support/confirm the clinical diagnosis (DOES NOT GUIDE MANAGEMENT PLAN).
- Two perpendicular views (AP & lateral), and the other limb to compare.

Early

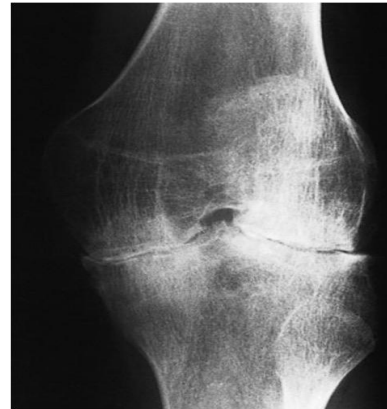
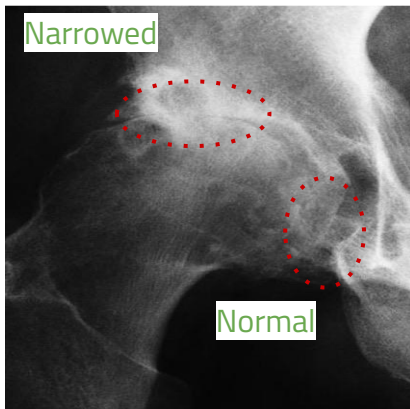
- **Asymmetrical** loss of cartilage (narrowing of the 'joint space').
- Subchondral bone sclerosis.
- Cysts close to the articular surface.
- **Osteophytes** at the margin of the joint.



WEIGHT BEARING X RAY

Late

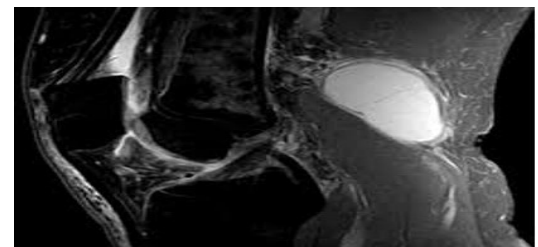
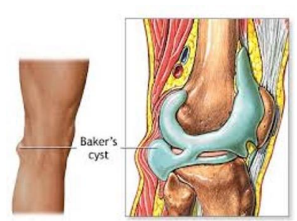
- Malalignment.
- Joint subluxation.
- Bone loss.
- Loose bodies.
- Signs of other disorders.
- **Symmetric** narrowing in inflammatory OA e.g. Rheumatoid arthritis.



Grade 4 is bone on bone, while grade 1 is only seen on a MRI, X-Ray is normal

Complications

- Capsular herniation: Knee OA; marked effusion and herniation of the posterior capsule (Baker's cyst).
 - Very common, synovial fluid finds a weak area and goes there.
- Loose bodies
 - Arthroscopy is done if there are mechanical symptoms (Loose bodies).
 - Can't move because pebble like structures are preventing it from moving.
- Rotator cuff dysfunction in acromioclavicular joint OA.
- Spinal stenosis.
- **Spondylolisthesis**.
 - Severe segmental disability; at L4/L5



1- Imaging is X-Ray and weight bearing (standing) X-Ray. Standing X-ray is always better, if you are searching for thinning of cartilage, do weight bearing X-ray to indirectly see the cartilage (you will see the space occupied by the cartilage). MRI is indicated if X-ray is normal.



Management

Depends on: 1- Joint (or joints) involved, 2- Stage of the disorder, 3- Severity of the symptoms, 4- Age of the patient, 5- Functional needs.

2 Factors that you can control (confirmed by literatures): 1- Weight reduction, 2- Muscle strengthening.

Early Treatment

- Maintain movement and muscle strength.
- Protect the joint from 'overload'.
- Relieve pain: Analgesics (1- Ice packs, 2- Paracetamol, 3- NSAIDs).
- Modify daily activities (If obese lose weight, avoid carrying heavy weight, strengthen muscles).

Conservative Management

1- Maintain Movement and Muscle Strength by Physiotherapy

This will help in:

- Pain relief through massage or application of warmth.
- Prevent contractures.
- Muscle strengthening.
- Range of motion.
- It's recommended to do low weight bearing exercises, e.g. Swimming.



2- Load Reduction: Never advise the patient to stop moving or to be immobile

- Weight reduction (if the patient is obese).
- Shock-absorbing shoes.
- Walking stick (carry the stick using the hand on the unaffected side).
- Unloading brace (if the knee is in varus, it pushes knee to valgus).
→ Failed to show any benefits.
- Not bearing heavy objects.



3- Modify Activities and Sitting Habits

- Modify activities and avoid others (pray using a chair for example).
- Change sitting habits (AVOID sitting on the floor 'تربيعه' for example, and prolonged sitting in one position, and sitting in extremes of motion).

4- Medications: Pain relief only as needed

- **Oral:** Paracetamol, NSAIDs (e.g. Ibuprofen), muscle relaxants, narcotics, supplements and herbs.
→ Supplements has no effect on the disease (placebo effect).
- **Injections:** (Local) **not** recommended in general.
 - 1- Steroids: It is used for patients who can't use NSAIDs either for kidney disease or peptic ulcer.
 - 2- Hyaluronic acid injection (oil injection/filler): The goal is to relief pain, it might be an option for patients with early disease or those who can't take medications (not effective).
 - 3- Plasma: Take blood from patient and separate plasma, limited effect on pain relief (not effective).
 - 4- Stem cells: No proof of effectiveness.



"Remember injection is not a part of standard treatment of OA"



- If conservative treatment fails and the patient is in pain, we can proceed to surgical management or if the pain started affecting patients quality of life.
- We shouldn't proceed to surgical management based on radiological features alone even if there's severe OA features, the only exception to this is if there's extensive bone resorption along with severe malalignment.

Surgical Management

1- Joint Debridement (Arthroscopy): Honeymoon surgery

DON'T DO IT, only limited cases, not common procedure, done under GA, done commonly in private hospital, not indicated and will not correct the disease, used only if there is indication for it (blocking or latching of the joint).

- Removal of loose bodies.
- Removal of meniscal or labral tears.
- For mechanical symptoms.
- Prior to corrective osteotomy to check for areas of osteoarthritis, if generalized we don't proceed.

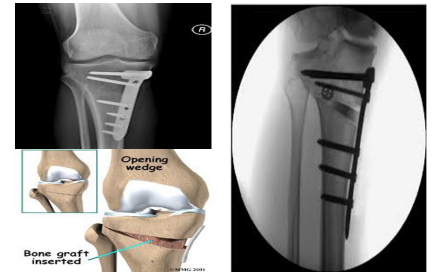


2- Corrective Osteotomy

- Realign axis and distribute weight.
- We offload the arthritic part, and we load the uninjured part.
- Knee and hip are the common sites.
- Candidate: Young, active, mild OA "for early stages".

Minor role in pain relief:

- Vascular decompression of the subchondral bone.
- Redistribution of loading forces towards less damaged parts of the joint.



3- Arthrodesis

- Transfer from painful stiff into painless stiff joint (leads to loss of motion).
- Small joints: Hand (wrist joint), foot and spine (1st CMC).



4- Joint Replacement (Arthroplasty): GOLD STANDARD

- Nowadays the procedure of choice for advanced OA.
- (indicated if the patient's quality of life didn't improve with the non-surgical options)

Total joint replacement:

- Knee, hip, shoulder, ankle and elbow.
- Candidate: Painful, deformed stiff joint, old patient.

Partial joint replacement:

- Knee.
- Candidate: Same as for osteotomy (Young, active, mild OA).

Excision arthroplasty:

- Resection arthroplasty.
- Thumb, acromioclavicular joint, hip.





441 Doctor Notes

Osteoarthritis one of the most common topics about musculoskeletal disorders.

IMPORTANT It is degeneration of what?? Of the **articular (hyaline) cartilage**, not bone, not fluid.

One of the most common misunderstandings and complete opposite advices that given to the patient is to avoid walking or remain sedentary!!

Degeneration of cartilage is a progressive disease, once it starts we cannot stop it and we cannot reverse it.

IMPORTANT So, the goal of treatment in osteoarthritis is:

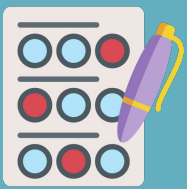
- 1- Delay the progression of the disease.
- 2- **Symptoms management rather than stopping the disease.**
- 3- Enhance the quality of life.

What advice would you give a patient recently diagnosed with osteoarthritis to slow down the progression of disease and improve his symptoms?

- 1- Maintain movement.
- 2- Muscle strengthening.
- 3- lose weight.

Physical inactivity complications:

- 1- Muscle weakness
- 2- Obesity
- 3- Cardiovascular diseases
- 4- Diabetes
- 5- Depression



Quiz

Q1: Which of the following non-operative treatments for osteoarthritis has the best evidence to support its use?

A

Combination of supervised and home exercise programs

B

Hyaluronic acid injections

C

Paracetamol

D

Lateral heel wedge

Q2: According to the latest recommendations made for the treatment of osteoarthritis (OA) of the knee, which of the following nonoperative treatment modalities has the weakest supporting evidence for the treatment for knee osteoarthritis?

A

Weight loss

B

Activity modification

C

Intra-articular corticosteroids injection

D

Intra-articular hyaluronic acid injection

Q3: A 61-year-old man with progressive left hip pain comes to the physician for a follow-up examination. One year ago, he was diagnosed with osteoarthritis of the left hip. Since then, he has had an 8-kg (18-lb) weight loss after changing to a vegetarian diet, regular swimming, and physical therapy. The pain worsens when he climbs stairs, which makes it increasingly difficult for him to reach his apartment located on the second floor. Over the last few weeks, he gradually increased the frequency of diclofenac intake but says that even a daily intake does not provide complete pain relief. He asks if there is a treatment that will lead to a long-term improvement of his symptoms. He has no history of major medical illness. His only other medication is pantoprazole. He does not smoke or drink alcohol. He is 179 cm (5 ft 10 in) tall and weighs 80 kg (176 lb); BMI is 25 kg/m². Physical examination of the left hip shows crepitus, a limited internal rotation, and pain with full flexion and extension. An X-ray of the left hip shows joint space narrowing, osteophytes, and subchondral sclerosis and cysts. Which of the following is the most appropriate next step in management?

A

Refer for arthroscopic hip debridement

B

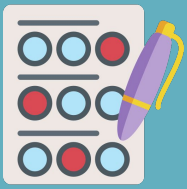
Perform intra-articular glucocorticoid injections

C

Prescribe walking aids

D

Refer for total hip arthroplasty



Quiz

SAQs

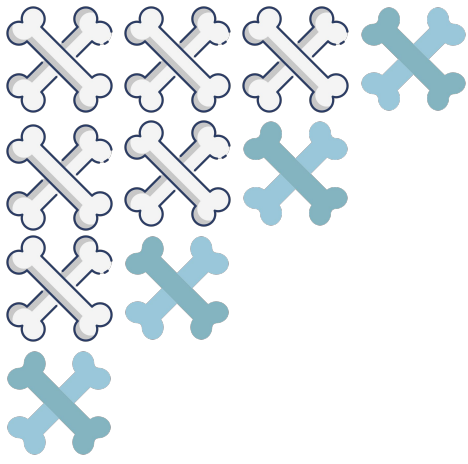
441:

There was a SAQs but the doctor didn't give it to us due to lack of time.

439:

Case...

1. What advice would you give a patient recently diagnosed with osteoarthritis to slow down the progression of disease and improve his symptoms?
- Maintain movement and muscle strength, lose weight.
2. Please describe the role of radiological investigations in the diagnosis and management of degenerative joint diseases, and mention any relevant technical aspects when requesting these investigations.
- Imaging is used for confirmation, not for diagnosis. We can use it to differentiate between primary and secondary osteoarthritis. Request images on weight-bearing.



Team Leader

Abdulrahman Alroqi

Done by

Sultan Ahmed

Organized by

Abdulrahman Alroqi

وَفَقَّكُمْ اللَّهُ



This work was originally done by team 438 & 439

