Degenerative Joint Disease

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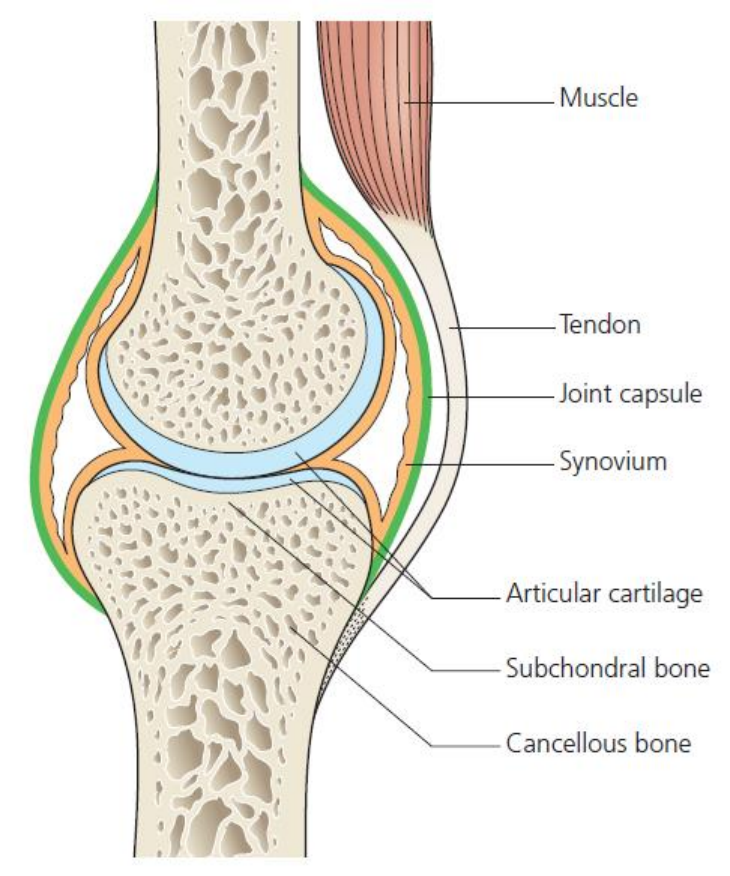
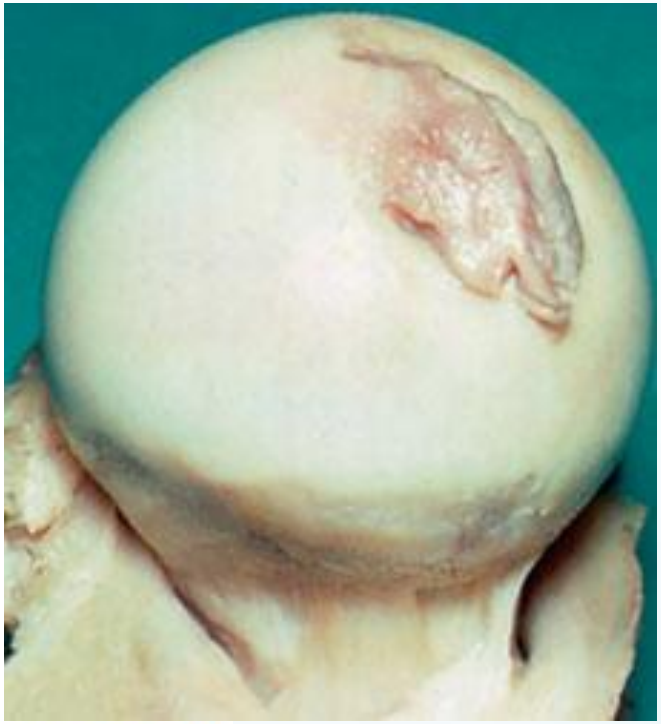
Articular Cartilage

- Hyaline cartilage
- Viscoelastic material with variable load-bearing properties
- Decreases joint friction
- Avascular and aneural



Cartilage Composition



1. Water (60% to 80% wet weight)
   - -Pumped in and out of cartilage depending on load
   - -Contributes to lubrication and nutrition.

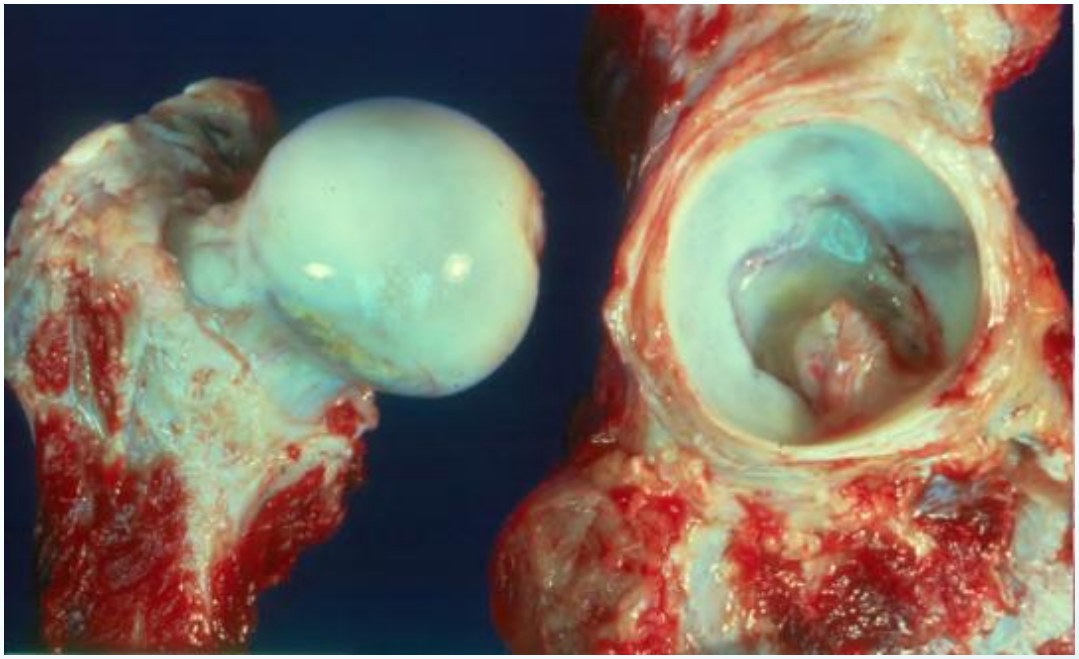
2. Collagen (10% to 20% wet weight)
   - -Secreted by chondrocytes
   - -Mostly type-II collagen (90%)
   - -Confers tensile strenght to cartilage

3. Proteoglycans (10% to 15% wet weight)
   - -Secreted by chondrocytes
   - -Composed of GAG (aggrecan, chondroitin and keratin sulfate)
   - -Negatively charged proteins hold water within the matrix
   - -Provides compressive strenght

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

Cartilage Composition

- Chondrocytes have little capacity for cell division in vivo
- Direct damage to the articular surface is poorly repaired, or repaired only with fibro-cartilage
- Fibro-cartilage has inferior biomechanical properties than hyaline cartilage



Cartilage Composition

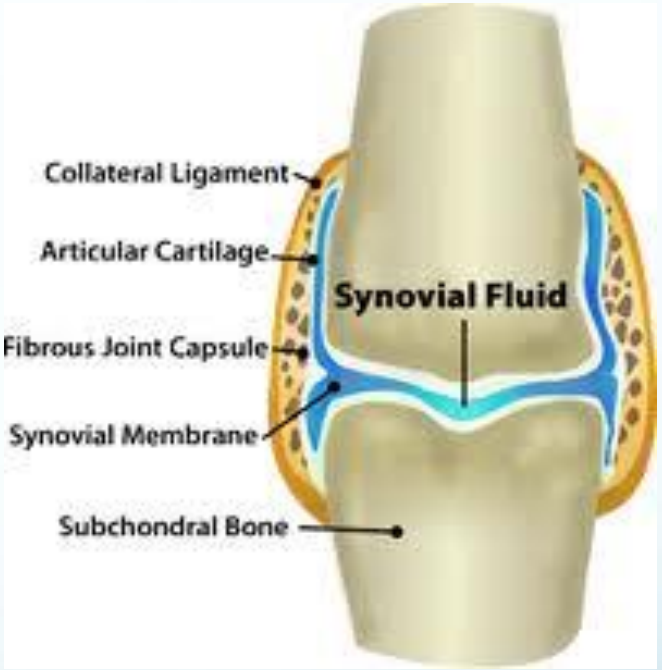
- If the collagen network is disrupted, the matrix becomes waterlogged and soft
- Followed by loss of proteoglycans, cellular damage and splitting (‘fibrillation’) of the articular cartilage.
- Damaged chondrocytes begin to release matrix-degrading enzymes

Capsule and Ligaments

- Capsule: fibrous structure with tough condensations on its surface (ligaments)
- Together with the overlying muscles, help to provide stability.

Synovium and synovial fluid

- Thin membrane; richly supplied with blood vessels, lymphatics 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



Synovial Fluid

- Nourishes the avascular articular cartilage
- Reduces friction during movement
- has slight adhesive properties which assist in maintaining joint stability.
- The volume remains fairly constant, regardless of movement.
- When a joint is injured fluid increases (joint effusion)

Degenerative Joint Disease

- Primary' ('idiopathic') osteoarthritis (OA)
- Chronic disorder
- **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.**

Degenerative Joint Disease

- Asymmetrically distributed, often localized

to only one part of a joint

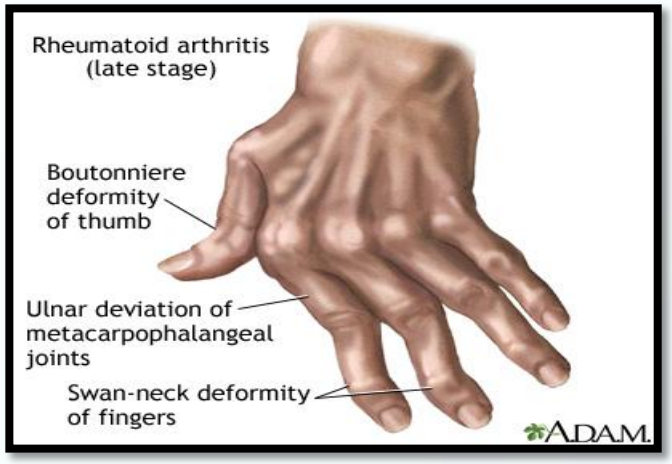
- Often associated with abnormal loading
- Unaccompanied by any systemic illness
- Not primarily an inflammatory disorder

although there are sometimes local signs of inflammation

- Not a purely degenerative; dynamic phenomenon; it shows features of both destruction and repair.

Inflammatory OA

- **RA**, SLE, Reiter's syndrome, Sjogren Syndrome, ankylosing spondylitis, behcet's syndrome.
- **Symmetric narrowing** of joint space
- Periarticular **soft tissue swelling**
- Periarticular **Osteopenia**
- **Juxta-articular bony erosions**



Secondary OA

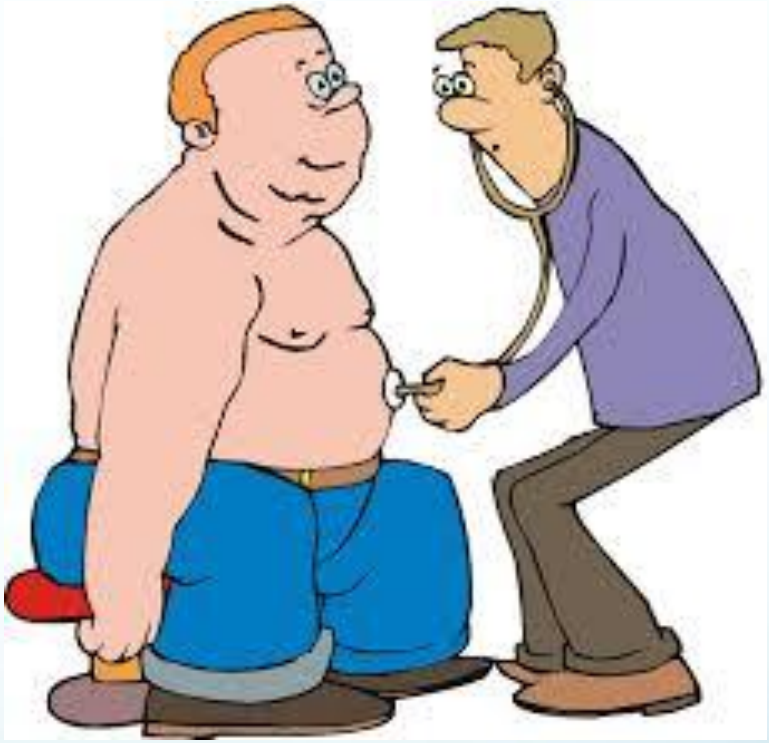
- Trauma: osteochondral, malunion, sport injury
- Infection
- Metabolic: crystaline deposition disease(gout, CPPD), Paget's disease.
- Congenital/developmental: hip dyplasia, multiple epiphyseal dysplasia, Perthe's disease.
- Osteonecrosis: idiopathic osteonecrosis, SCD,hemophelia, steroids

Etiology

- Increased mechanical stress in some part of the articular surface
- Disparity between the mechanical stress to which articular cartilage is exposed and the ability of the cartilage to withstand that stress.
- Varus deformity of the knee

Etiology

- More a process than a disease
- Increases in frequency with age.
- Obesity (hips and knees take 3-4 body weight with each step)
- Family history



Prevalence

- Degenerative OA is the commonest of all joint diseases.
- Much more common in some joints (knee, hip, spine and the fingers) than in others (the elbow, wrist and ankle).
- More joints are affected in women than in men.

Prevalence

- Knee OA is especially common in our community
- Much more common in females
- Presents earlier than in West
- About 90% of those over 40 have asymptomatic degeneration of weight-bearing joints
- Commonest joints are knee, hip, cervical and lumbosacral spine

Pathology

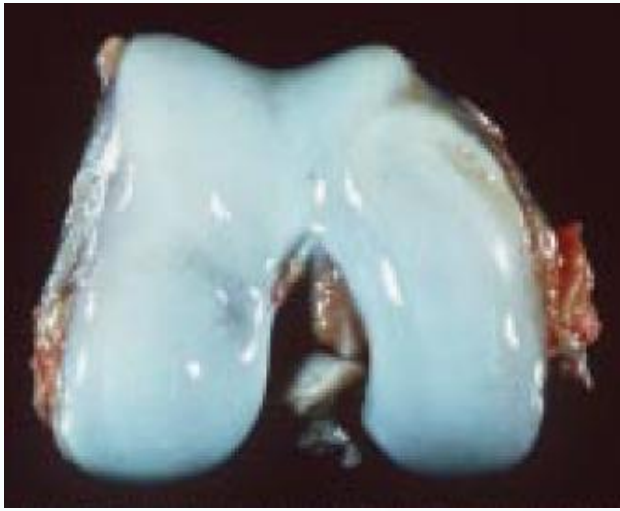
Cardinal features

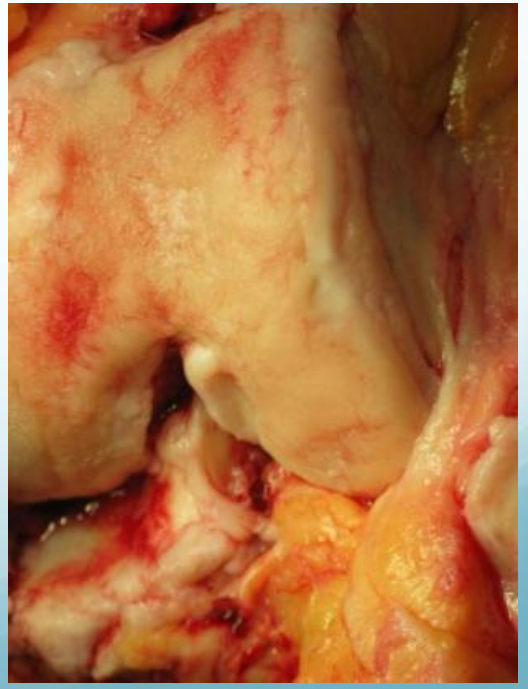
- Progressive cartilage destruction
- Subarticular cyst formation
- Sclerosis of the surrounding bone
- Osteophyte formation
- Capsular fibrosis.

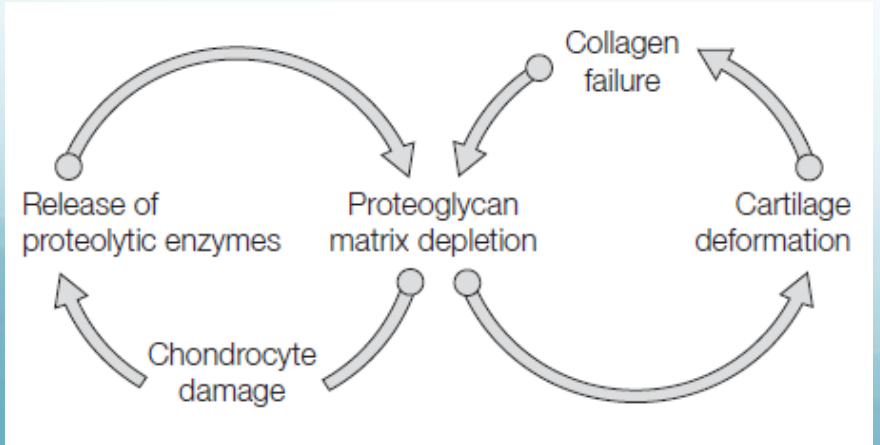
Pathology

Progressive cartilage destruction

- Increased water content: swelling and softening of cartilage
- Depletion of Proteoglycans
- Chondrocyte damage and synovitis › proteolytic enzymes› collagen disruption
- Fibrillation on weight bearing surfaces



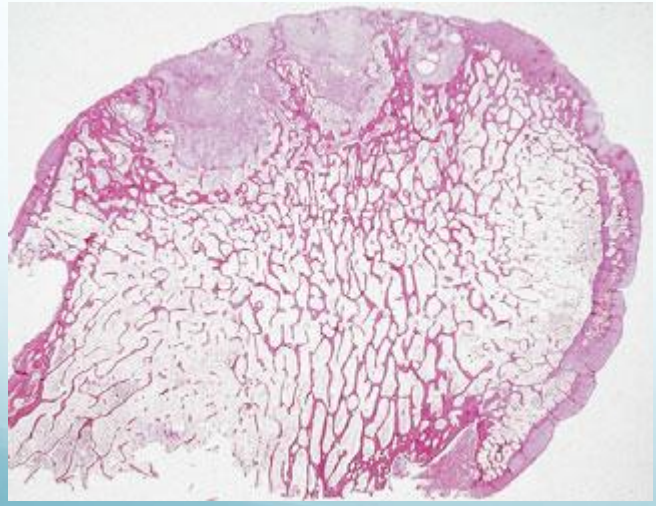




Pathology

Subarticular cyst formation

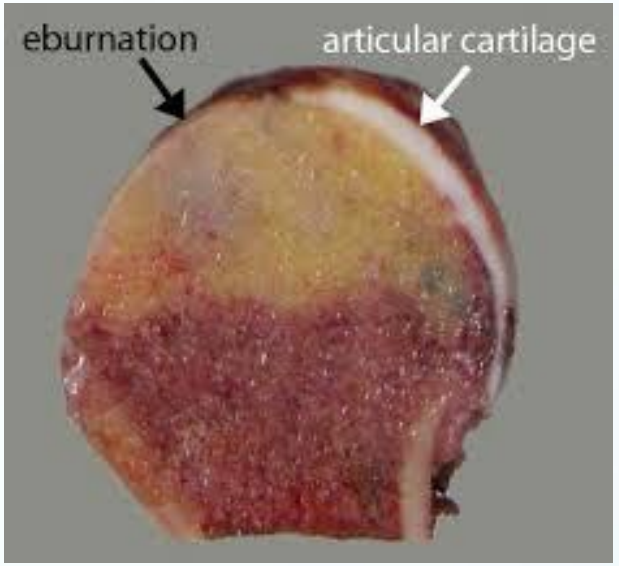
- it could arise from local areas of osteonecrosis
- Or from the forceful pumping of synovial fluid through cracks in the subchondral bone plate

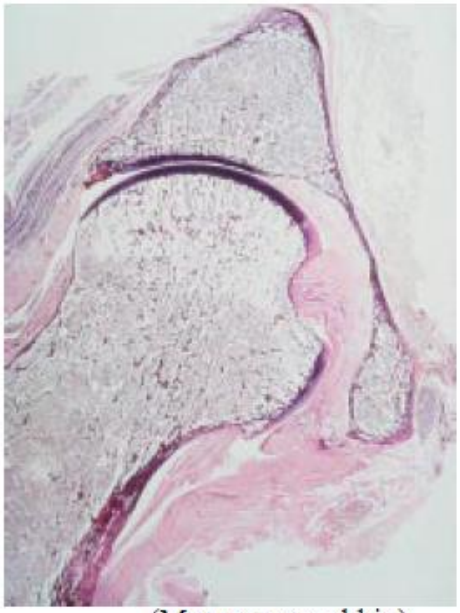


Pathology

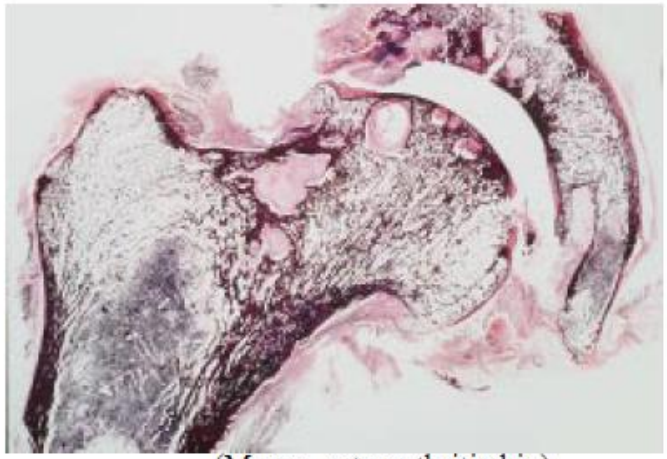
Sclerosis of the surrounding bone

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

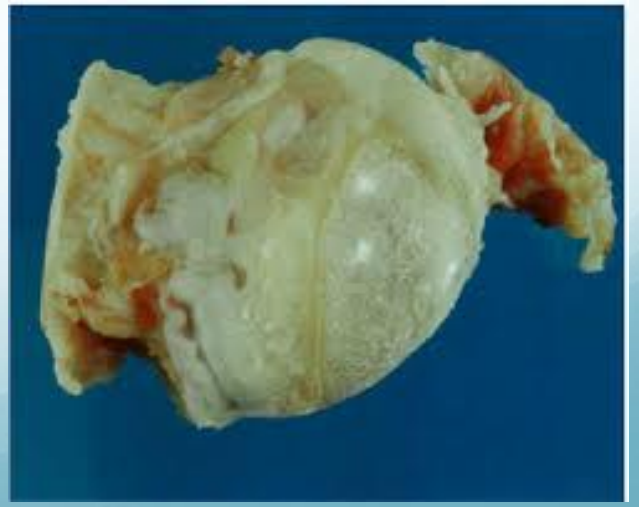




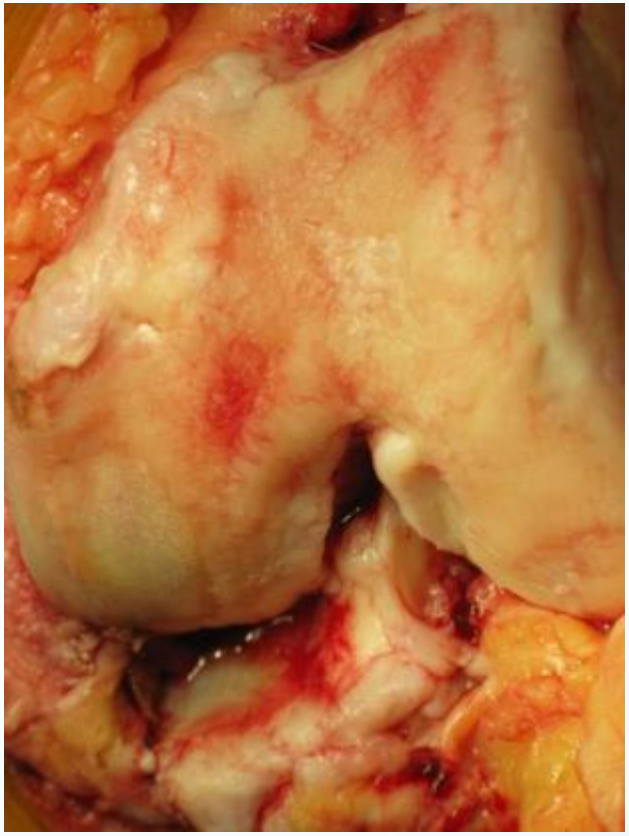
(Macro, normal hip)



(Macro, osteoarthritic hip)



Pathology



Osteophyte formation

- Proliferation and remodelling of the adjacent cartilage at the edges
- Enchondral ossification

Pathology

- Marked vascularity and venous congestion of the subchondral bone
- 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)

Symptoms

- Pain
- Stiffness
- Loss of function

Symptoms

Pain

- Localized or rarely referred to a distant site; e.g. pain in the knee from hip osteoarthritis.
- Insidious
- aggravated by exertion and relieved by rest
- Advanced stage, night pain or at rest

Symptoms

Possible 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

Symptoms

- Stiffness

Initially after periods of inactivity

Later, constant and progressive

- Loss of function

Signs

- Swelling

Intermittent (effusion)

continuous (large osteophytes)

- Deformity; mal-alignment
- Tenderness

Signs

- Limited movement
- Crepitus
- Instability

Loss of cartilage and bone, asymmetrical capsular contracture and/or muscle weakness

Imaging

- Asymmetrical loss of cartilage (narrowing of the ‘joint space’)
- Subchondral bone sclerosis
- Cysts close to the articular surface

Imaging

- Osteophytes at the margins of the joint

Late features

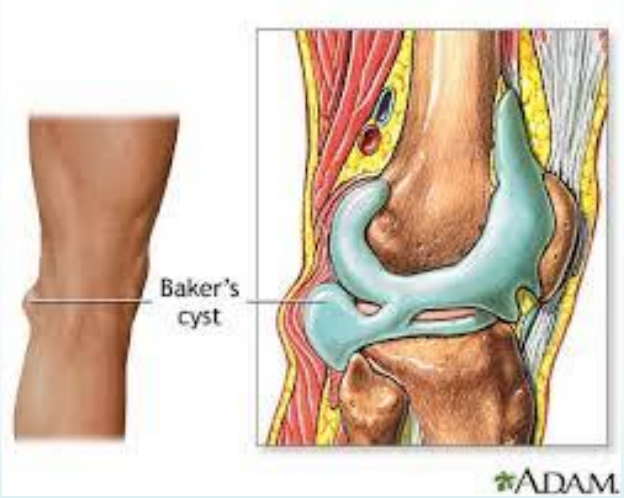
- Malalignment
- joint subluxation
- bone loss
- Loose bodies

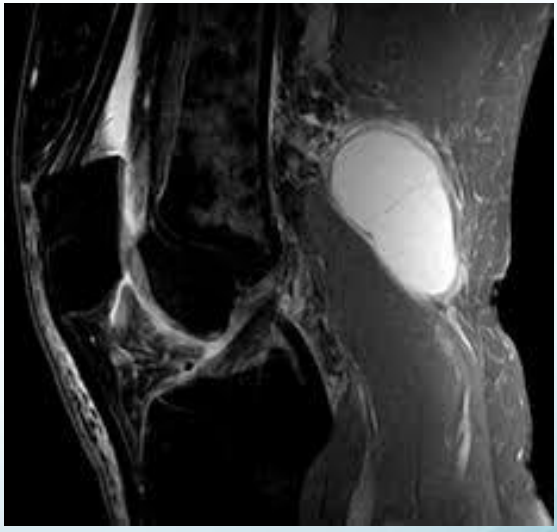
Imaging

- Signs of other disorders
- Symmetric narrowing in inflammatory OA e.g. RA

Complications

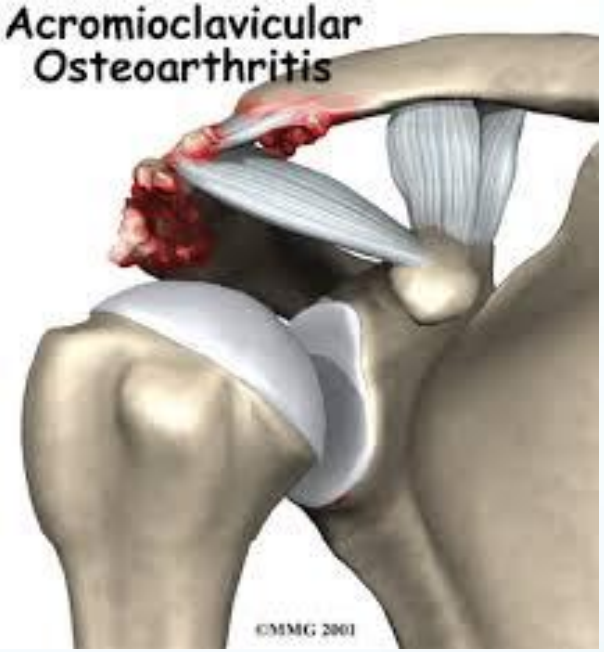
- Capsular herniation: Knee OA; marked effusion and herniation of the posterior capsule (Baker's cyst).





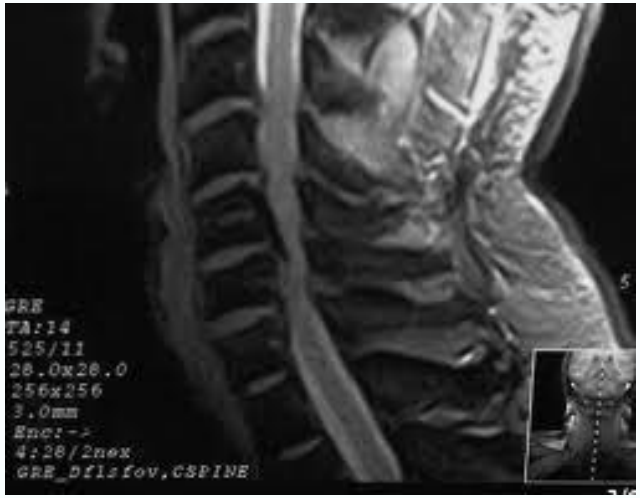
Complications

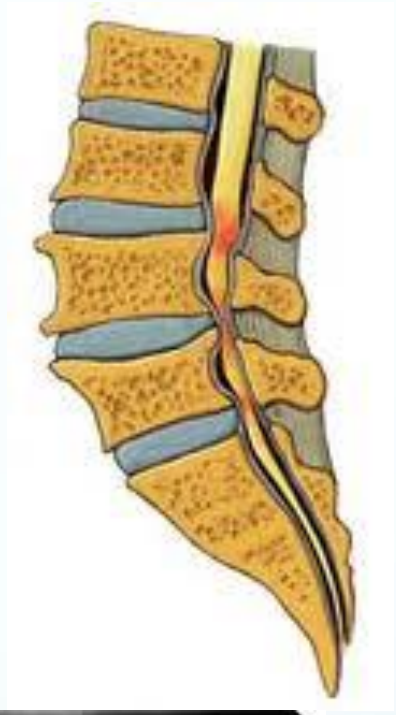
- Rotator cuff dysfunction: acromioclavicular (AC) joint OA
- Loose bodies



Complications

- Spinal stenosis





- Spondylolisthesis: severe segmental instability; at L4/5

Management

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

Management

EARLY TREATMENT

- Maintain movement and muscle strength
- Protect the joint from ‘overload
- Relieve pain
- Modify daily activities

Conservative Treatment

Maintain movement and muscle strength

Physiotherapy (Physical therapy)

- Pain relief: massage; application of warmth
- Prevent contractures
- Muscle strengthening
- Range of motion

Conservative Treatment

Load reduction

- Weight-reduction
- Shock-absorbing shoes
- Walking stick
- Unloading brace

Conservative Treatment

Modify activity

- avoiding activities like climbing stairs

Medications

- Systemic: paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs)
- Local: not recommended

Surgical Treatment

- Joint Debridement (Arthroscopy)
- Corrective Osteotomy
- Arthroplasty (Joint Replacement)
- Arthrodesis (Fusion)

Surgical Treatment

Joint Debridement (Arthroscopy)

- Removal of loose bodies
- Removal of meniscal or labral tears

Surgical Treatment

Corrective Osteotomy

- Realign axis and redistribute weight
- Knee
- Young, active, mild OA

Surgical Treatment

Corrective Osteotomy

Pain relief by:

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

Surgical Treatment

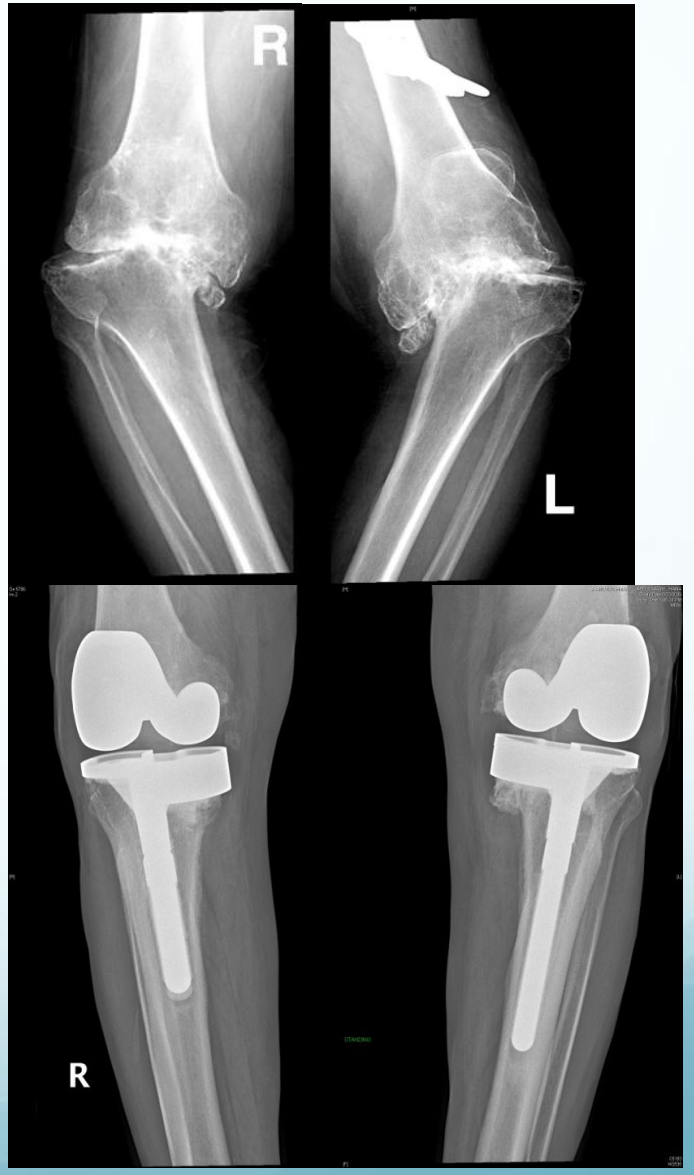
Arthrodesis

- Transfer painful stiff into painless stiff joint
- Small joints; hand, foot and spine

Surgical Treatment

Arthroplasty (Joint Replacement)

- Nowadays the procedure of choice for advanced OA
- Total Joint Replacement
- Knee, hip, shoulder, ankle and elbow
- Painful, deformed stiff joint, old patient

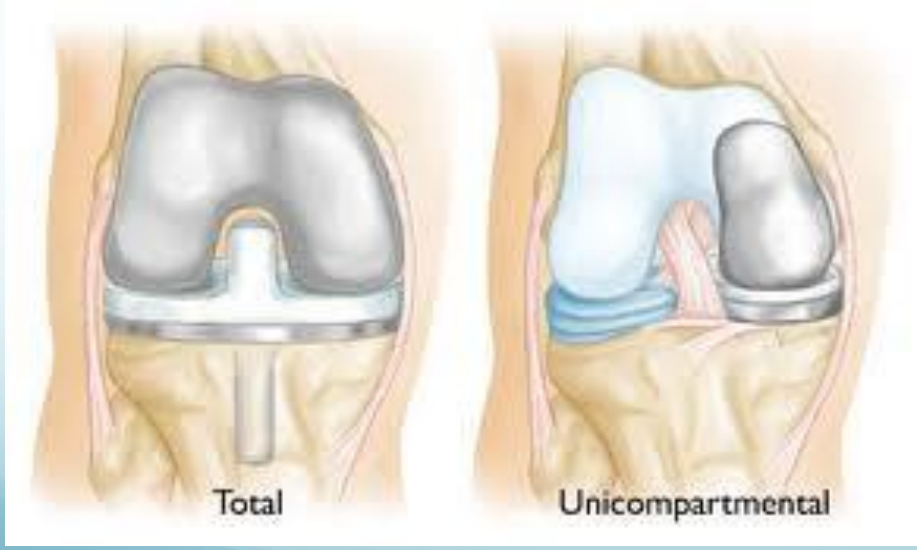


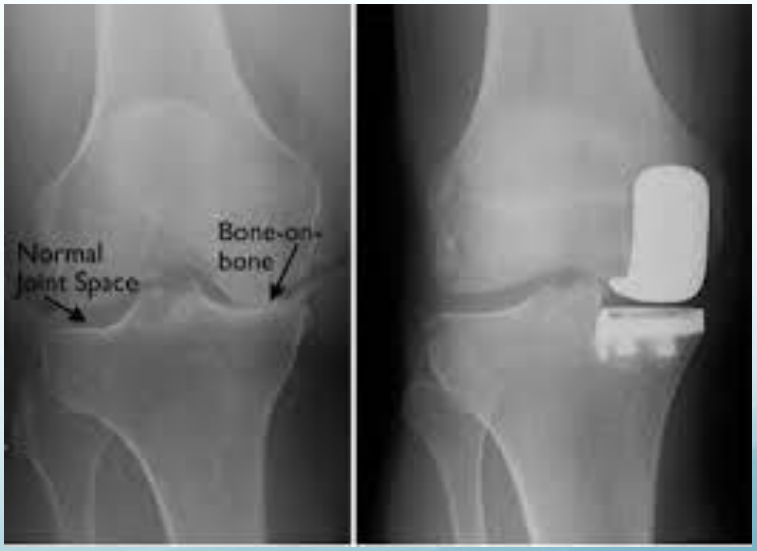
Surgical Treatment

Arthroplasty (Joint Replacement)

Partial Joint Replacement

- Same patient as for osteotomy
- Knee





Thank you