

# **OSTEOARTHRITIS AND ITS MODERN MANAGEMENT**

**- FOCUS ON THE LOWER LIMB**

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# ABOUT MYSELF

- I declare no conflict of interest in this presentation
- Mauritian born and educated up to A-level
- Undergraduate studies- University of Newcastle, UK
- Early Postgraduate education – North East & North West UK
- 2 years out of training – volunteering in Malawi
- Higher Postgraduate education North West UK (Mersey)
- FRCS (Tr & Orth) Nov 2016
- Due to complete training Aug 2018
- 1 year fellowship in foot and ankle surgery from Aug 2018 - Sheffield
- Plan to return to Mauritius afterwards



# ACKNOWLEDGEMENTS

- IBL
  - Thuldeo, Nadeem and Shivam
- Dr E Rajan
- Mrs A Hebe
- Mr M Doorgakant  
and the family





# OVERVIEW

- What osteoarthritis (OA) is
- Diagnosis
- General principles of management

- Focus:
  - OA hip
  - OA knee
  - OA ankle
- Summary

Introduce the orthopaedic taxonomy used in OA





# OSTEOARTHRITIS

- “wear and tear”
- “degenerative non-inflammatory condition of hyaline cartilage”
- “ageing of the joints”

In reality:

- OA is histologically different from ageing
- OA involves whole joint- cartilage, bone, synovium and capsule
- OA involves some inflammatory pathways



# DEFINITION OF OSTEOARTHRITIS

- Disorder of synovial joints that is characterised by
  - focal areas of damage to the articular cartilage
  - remodelling of underlying bone and the formation of osteophytes  
**and**
  - mild synovitis

*as defined by NICE*

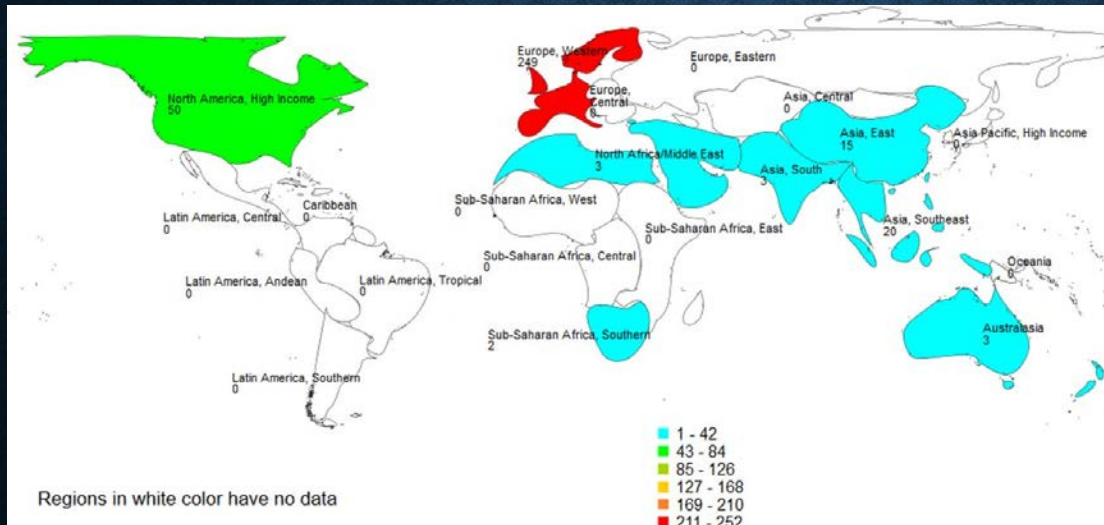


# EPIDEMIOLOGY

- Commonest chronic MSK condition

*“WHO 2010: among 289 diseases, OA now 11th cause of yrs lived with disability, up from 16th within only 10 years”*

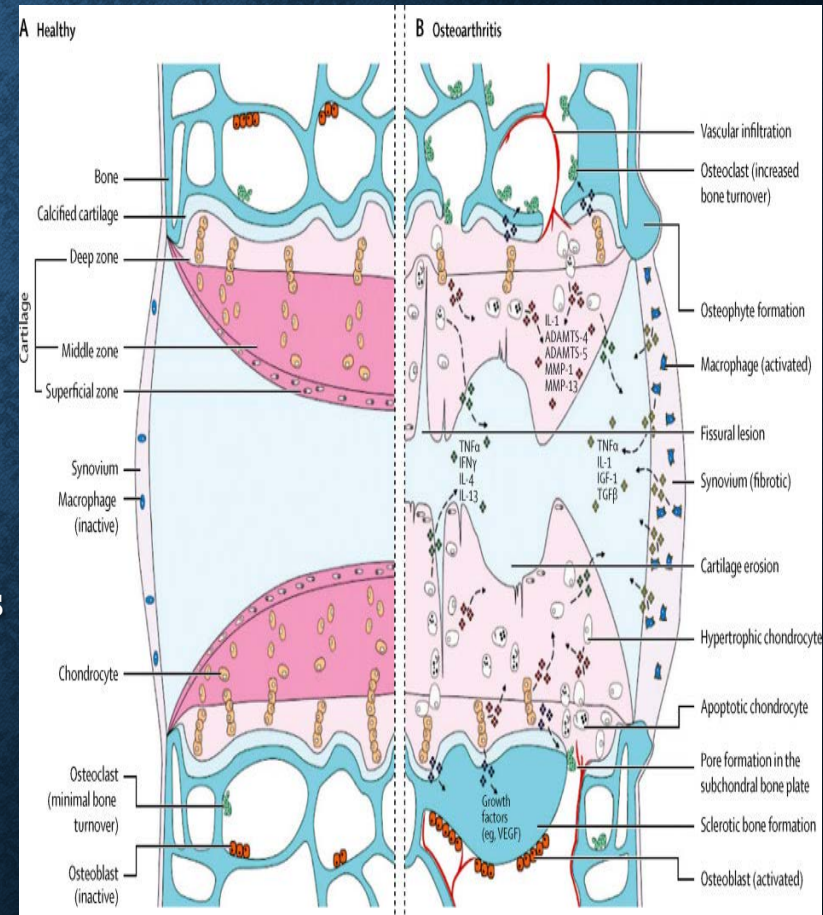
- Age (80-90% >65 have radiographic evidence OA)
- Gender (female > male over 55)
- Race & geography (unclear)





# PATHOPHYSIOLOGY

- Early:
  - Swelling of cartilage (hypertrophy)
  - Increased proteoglycan synthesis (repair response to cartilage damage)
- Late:
  - PG level drops
  - Softening oedematous cartilage
  - Reduced elasticity
  - Compromised joint surface integrity
  - Loss of joint space- worst in high load areas
  - Denuded bone becomes denser due to high stress
  - Cysts due to synovial intrusion through cracks or mini infarcts
  - Osteophyte formation





# AGEING v OA

	Aging	Osteoarthritis
Water Content	Decreased	Increased
Collagen	Same	Disorganized
Proteoglycan Content	Decreased	Decreased
Proteoglycan Synthesis	Same	Increased
Chondrocyte Size	Increased	Same
Chondrocyte Number	Decreased	Same
Modulus of Elasticity	Increased	Decreased

*Ageing predisposes to OA but doesn't automatically result in OA*

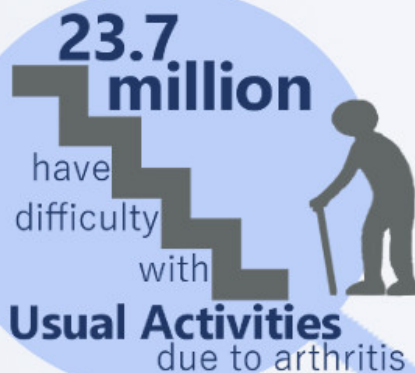


# IMPACT OF OA

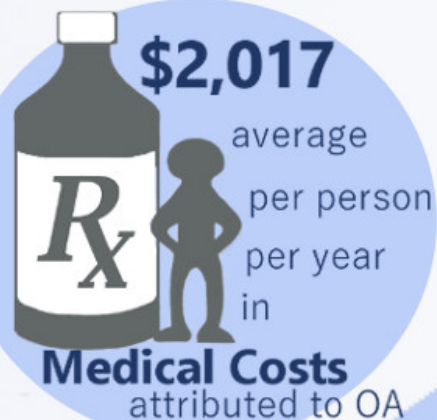
The public health impact of **Osteoarthritis**

**OA** OSTEOARTHRITIS  
ACTION ALLIANCE

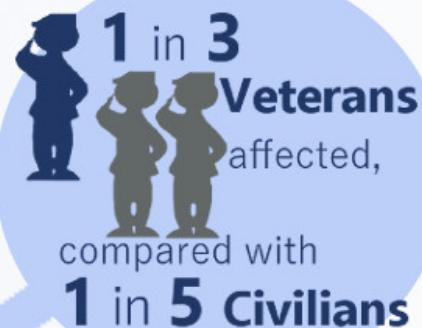
**23.7 million**  
have difficulty with  
**Usual Activities**  
due to arthritis



**\$2,017**  
average per person per year in  
**Medical Costs**  
attributed to OA



**1 in 3 Veterans** affected,  
compared with  
**1 in 5 Civilians**



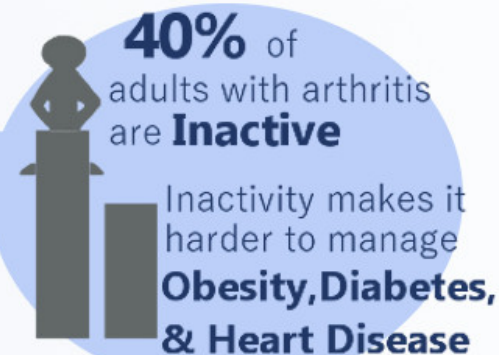
**\$80 billion**  
**Lost Work**  
Earnings/yr attributed to OA



OA affects  
**30+ Million**  
US Adults



**40%** of adults with arthritis are **Inactive**  
Inactivity makes it harder to manage  
**Obesity, Diabetes, & Heart Disease**

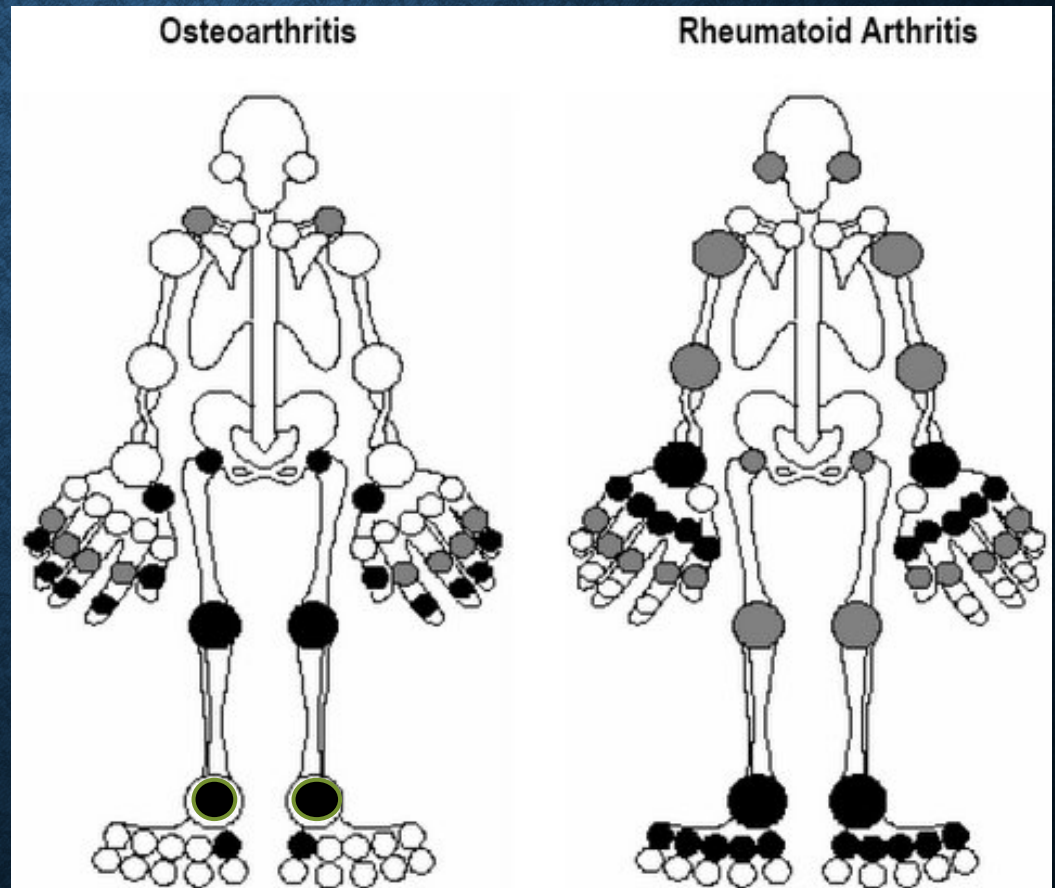


Life changing:  
Impaired social functioning/ Reduced autonomy/ Financial loss\*/ Depression  
Society wide consequences



# OA DISTRIBUTION

- Large weight-bearing jts
- Hands
- 1<sup>st</sup> MTPj/ CMCj
- Spine
- Different from inflammatory picture





# CAUSES OF OA

- **Primary – “idiopathic”**

V

- **Secondary**

*Both present in identical way*



# SECONDARY OA

## Physical

- Abnormal joint loading
- Deformity
- Post traumatic
- Joint instability  
*(cause AND effect of OA)*
- Previous surgery (meniscectomy)
- (Physical lifestyle)
- (Obesity)
- (Age)

## Medical

- Rheumatoid/ inflammatory arthritis
- Skeletal dysplasias
- Crystal arthropathies
- Metabolic
- Haemophilia, Sickle cell, Thalassaemia
- Neuropathic (Charcot)
- Post septic
- Avascular necrosis
- Paget's
- Acromegaly
- DDH/ SUFE/ Perthes



# OA DIAGNOSIS

- Clinical
- Radiological
  - X-ray
    - WEIGHT BEARING VIEWS
  - CT
  - MRI
  - Bone scan
  - USS ?
- Laboratory ?

## Typical XRAY findings

- Loss of joint space
- Subchondral sclerosis
- Osteophytes
- Subchondral cysts

*Symptom severity  $\neq$  radiological severity*



**Endogenous predisposition to OA**

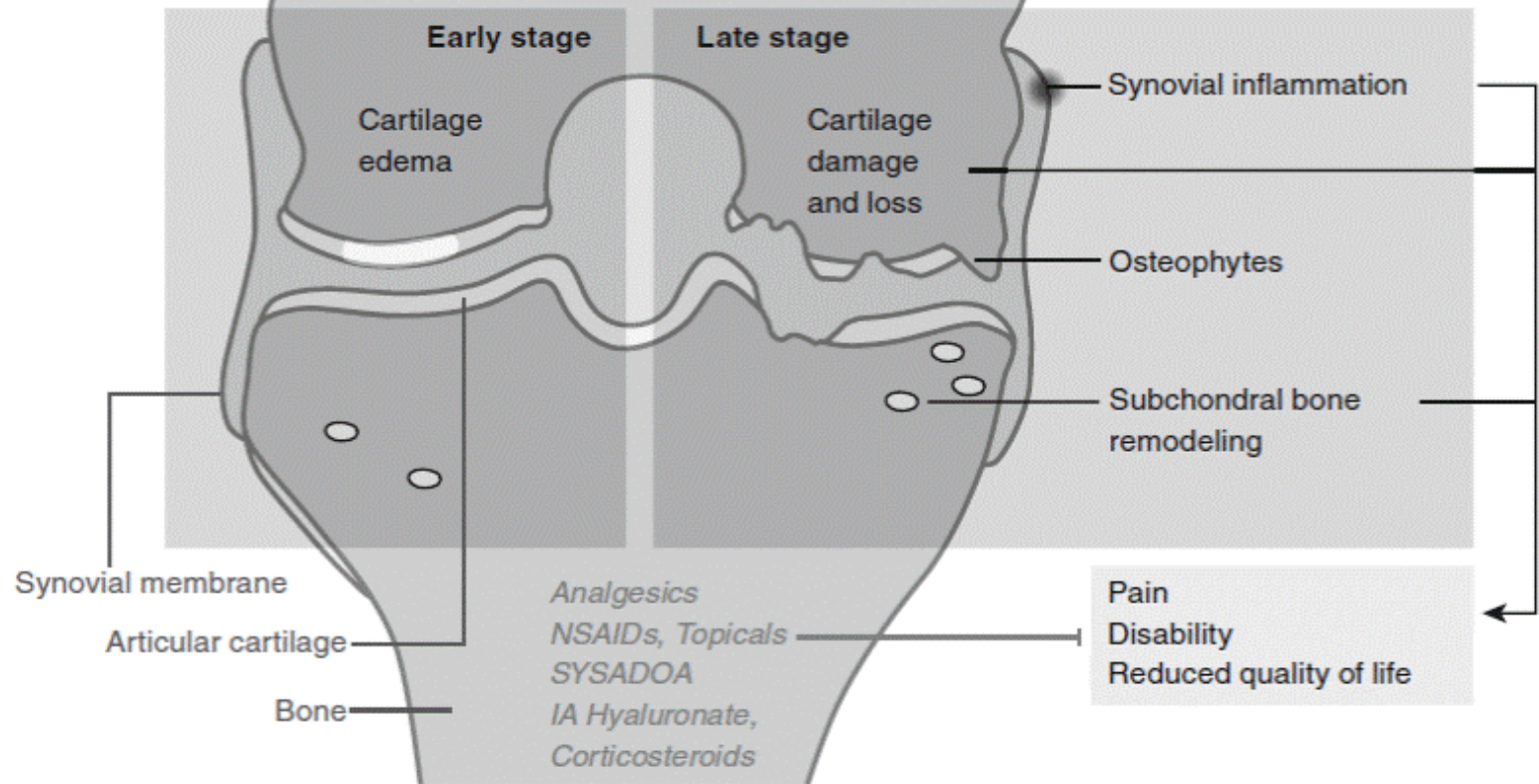
Age  
Gender  
Genetics  
High BMI

Education  
Weight loss

**External risk factors**

Trauma  
Overload

Prevention  
Exercise





# CLINICAL FEATURES OA

## History

- Pain (typically activity related)
- Stiffness (morning)
- Swelling
- Neurology (spine OA)
- LOSS OF FUNCTION

## Examination

Look – Feel – Move

- Deformity/ swelling
- Joint line tenderness
- Crepitus
- Reduced ROM
- Instability
- Abnormal gait
- Neurovascular impairment
- Reduced Function



# GENERAL PRINCIPLES OF OA MANAGEMENT

## Non-surgical v Surgical

- Non-surgical:
  - Lifestyle modification
  - Pharmacological
  - Injections
  - Physio/Occupation therapy
  - Braces/ orthotics
  - Alternative therapy
- Surgical:
  - Joint preserving
  - Joint sacrificing





# LIFESTYLE MODIFICATION

- Stop doing what hurts!
- Patient education
- Weight loss
- Exercise
- ?Application of heat and cold



# PHARMACOLOGICAL

## WHO Analgesic Ladder: adults



Step up if pain persists or increases



Step up if pain persists or increases



Consider prophylactic laxatives to avoid constipation

<i>Non-opioids</i>	ibuprofen or other NSAID, paracetamol (acetaminophen), or aspirin
<i>Weak opioids</i>	codeine, tramadol, or low-dose morphine
<i>Strong opioids</i>	morphine, fentanyl, oxycodone, hydromorphone, buprenorphine
<i>Adjuvants</i>	antidepressant, anticonvulsant, antispasmodic, muscle relaxant, bisphosphonate, or corticosteroid

Combining an opioid and non-opioid is effective, but do not combine drugs of the same class.

Time doses based on drug half-life ("dose by the clock"); do not wait for pain to recur

Adapted by Treat the Pain from World Health Organization <http://www.who.int/cancer/palliative/painladder/en/> (accessed 7 November 2013)

4

- Topical NSAIDS
- Others: Chondroitin sulfate, glucosamine, cod liver oil, vit D
- Injections





# INJECTIONS

- Less effective as disease progresses

E.g.

- Steroids + LA
  - Depomedrone, Triamcinolone
- Viscosupplementation
  - Hyaluronic analogues
- Plasma-Rich-Protein



# THERAPY

## Physio

- Some effectiveness

Different modes

- Strength/ resistance training
- Agility training
- General exercise
- Hydrotherapy

## OT

- Aids
- Adaptations to help cope

Patient education

Can help delay surgery



# BRACES / ORTHOTICS

E.g.

- Walking aids
- Insoles/ shoe modifications
- Corrective appliances

Work by:

- Reducing unwanted (painful) movements
- Assisting in correction of flexible deformities

May slow progression of OA





# ALTERNATIVE THERAPIES

- TENS/ Neuromuscular electric stimulation
- Pulse electromagnetic field therapy
- Therapeutic ultrasound
- Manual therapy
- Whole body vibration
- Heat/ infrared therapy
- Yoga
- Taichi
- Acupuncture



# JOINT PRESERVING SURGERY

- Debridement
- Cartilage regeneration
- ?? Arthroscopic washout
- Re-alignment osteotomies
  
- *Arthrodiastasis*



# JOINT SACRIFICING

- Fusion
- Arthroplasty
- Excision arthroplasty



# HIP OSTEOARTHRITIS





# AETIOLOGY / DIFFERENTIALS

- Idiopathic v previous predisposing diagnoses:
  - DDH, Perthes, SUFE, AVN, Trauma, Septic arthritis
- Differentials:
  - Femoral acetabular impingement syndromes
  - Labral tears
  - Back / Knee OA
  - Inflammatory/ crystal arthropathy
  - Transient osteoporosis



# DIAGNOSIS

## Hx

- Pain
  - Sometimes referred to knee
  - Can be referred from back
  - Night pain →?surgery
- Stiffness
- Limp
- Reduced function
  - Unable to reach foot
  - Sexual dysfunction

## O/E

- Scars
- Deformity from previous  $\Delta$
- Scoliosis
- Limited tenderness
- Leg length discrepancy?
- Reduced ROM
  - Pain in groin
- Antalgic gait
- Trendelenburg gait

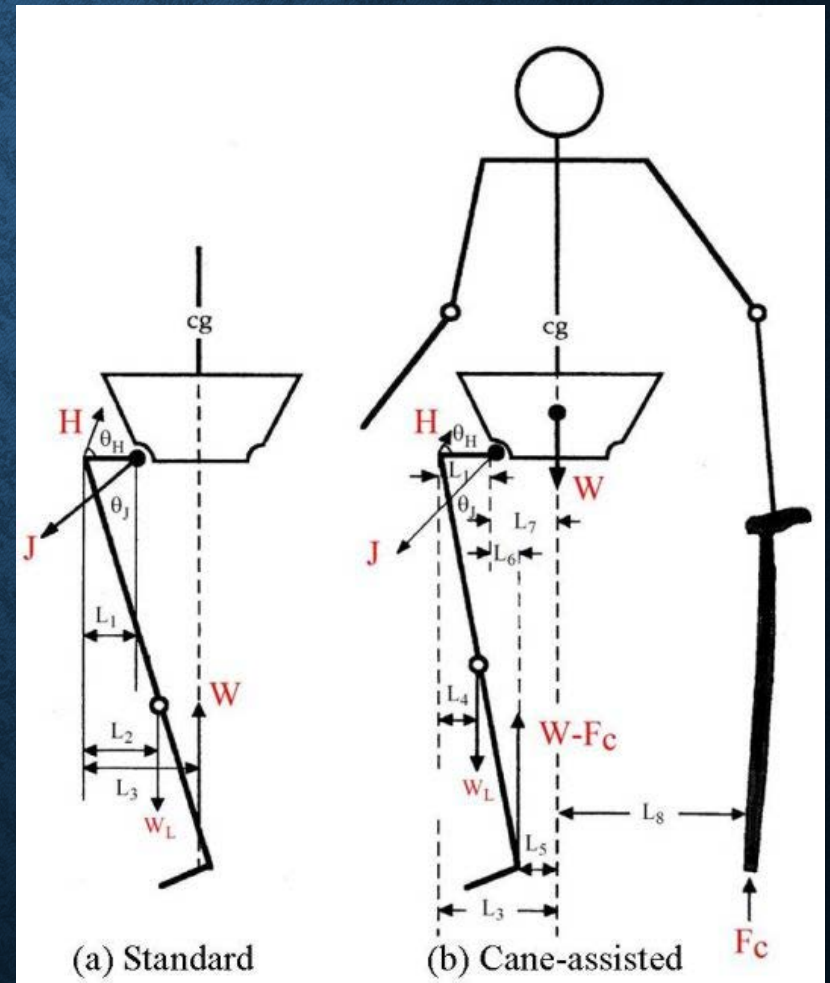
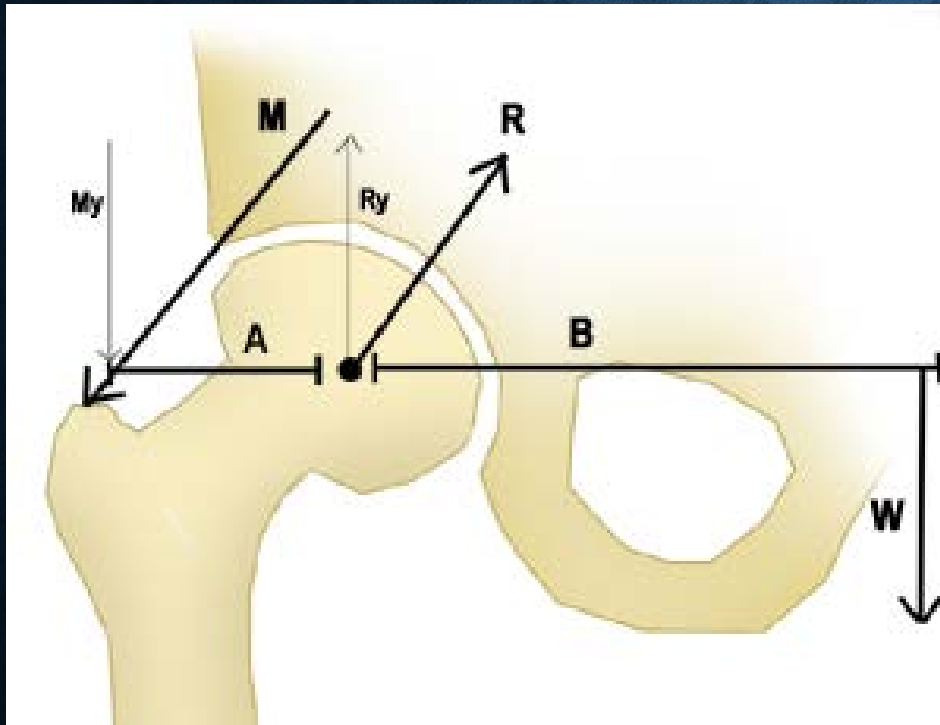


# NON SURGICAL TREATMENT

- Analgesia
- Lifestyle changes- weight loss
- Injection
  - Diagnostic e.g. for troch burs
  - Therapeutic into joint
    - Steroid + LA
    - X-ray guided with contrast
- PT/ OT
- Walking aids
  - 1 stick in opposite hand
  - Carry (light) shopping in same hand
- Zimmer frame
- Scooter



# FREE BODY DIAGRAM





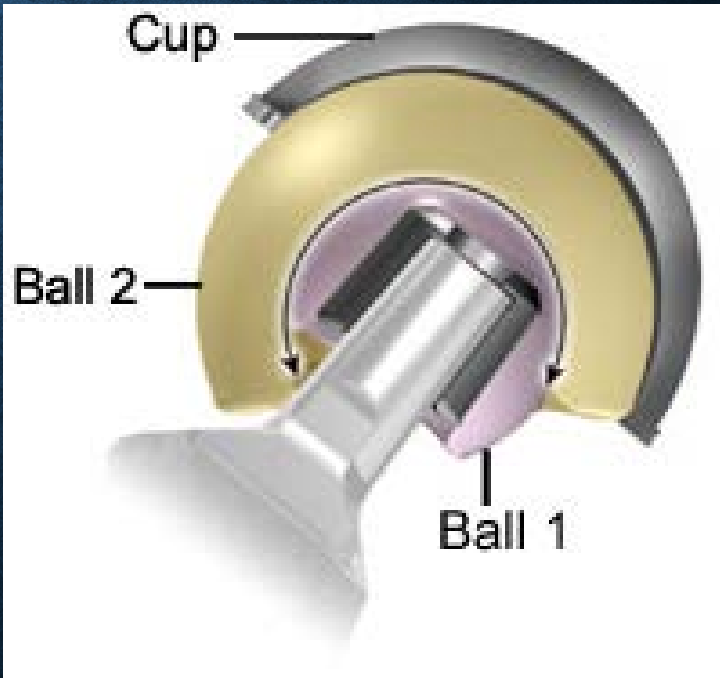
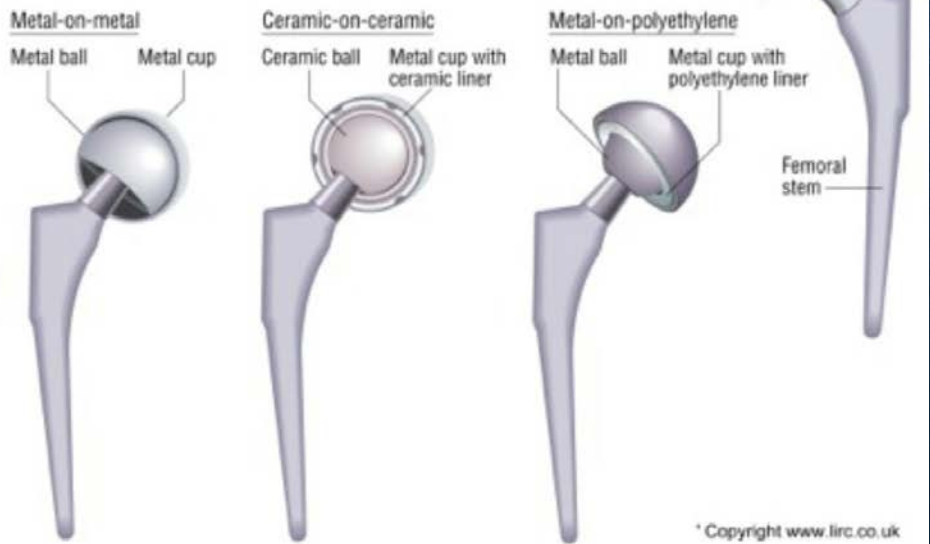
# SURGERY

- Mainstay is hip arthroplasty
- Cemented v uncemented
- Resurfacing v THR
- Different bearing materials
  - Metal on poly
  - Ceramic on poly
  - ~~Metal on metal~~
  - Ceramic on ceramic
  - Dual mobility
- Different approaches
  - Posterior
  - Lateral
  - Anterolateral
- *Hip arthroscopy for alternate diagnoses*
- *Core decompression/ grafting for early AVN*
- *Girdlestone as salvage option*





**Types of replacement hip joints**





**Cemented**

Taper-slip (Force-closed)  
Example: Exeter

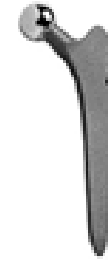


Composite Beam (Shape-closed)  
Example: LubinusSP2

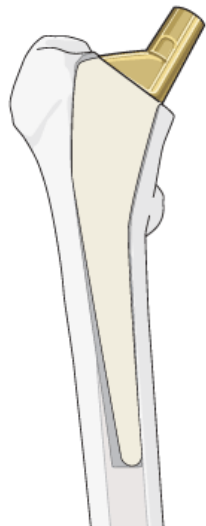


**Uncemented**

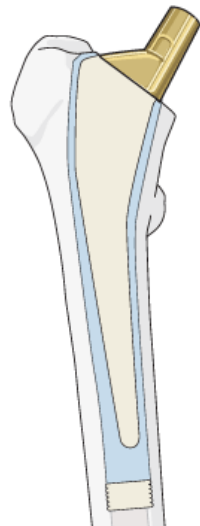
Fully coated  
Example: Zweimuller



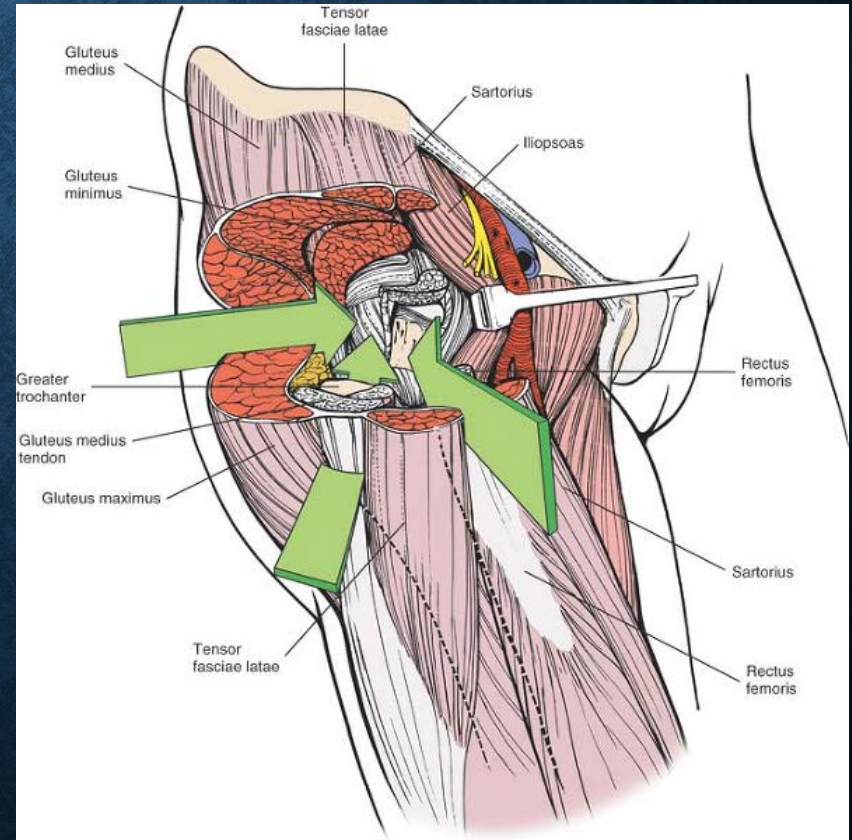
Proximally coated  
Example: Accolade



Uncemented



Cemented





# KNEE OSTEOARTHRITIS





# AETIOLOGY / DIFFERENTIALS

- Idiopathic v previous predisposing diagnoses:
  - Trauma- Meniscal injury/ meniscectomy, Ligament injury, OCD,
  - Infection- Septic arthritis; Malalignment- post-traumatic, Blount's
- Differentials:
  - Meniscal injury
  - Tendinopathies
  - Back/ Hip OA
  - Inflammatory/ crystal arthropathy
  - SONK



# DIAGNOSIS

## Hx

- Pain
  - Sometimes referred to hip/leg
  - Can be referred from back/hip
  - Night pain → surgery
- Stiffness
- Limp
- Reduced function
  - Unable to kneel (pray?)
  - Stairs

## O/E

- Scars
- Deformity
  - Varus/ Valgus
  - Fixed flexion deformity
  - Tibial/ femoral mal-alignment
- Quadriceps wasting
- Tenderness
  - Define compartment
- Crepitus
- Reduced ROM
- Instability
- Antalgic gait
- Valgus/ Varus thrust
- Neurovascular (CPN - *valgus knee*)



# NON SURGICAL TREATMENT

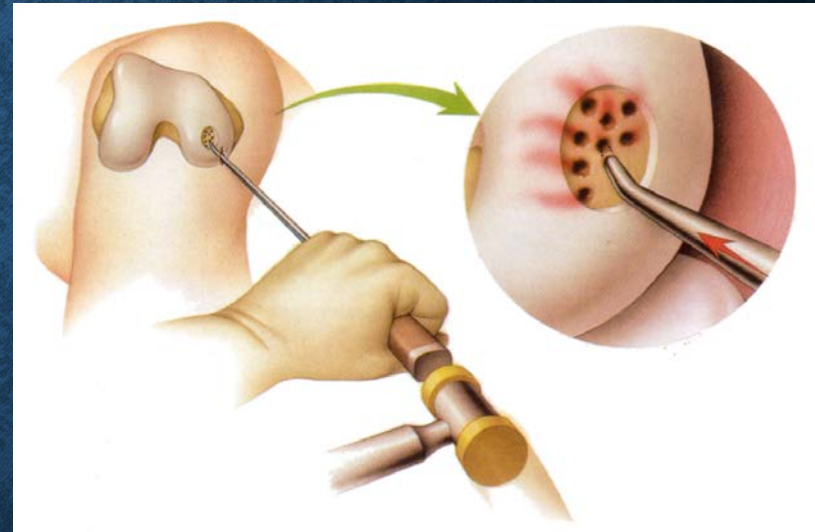
- Analgesia
- Lifestyle changes- weight loss
- Injection
  - Diagnostic
  - Therapeutic into joint
    - Steroid + LA
    - Viscosupplements
    - Can be done in clinic
- PT/ OT
- Walking aids
  - Stick, crutches, Zimmer
- Off-loader brace
  - Corrects valgus / varus





# SURGERY- EARLY OA

- Cartilage surgery
  - Washout
  - Chondroplasty, micro-fracture
  - OATS, osteochondral allograft
  - ACI, MACI
- Re-alignment osteotomies
  - High tibial osteotomy
  - Distal femoral corticotomy



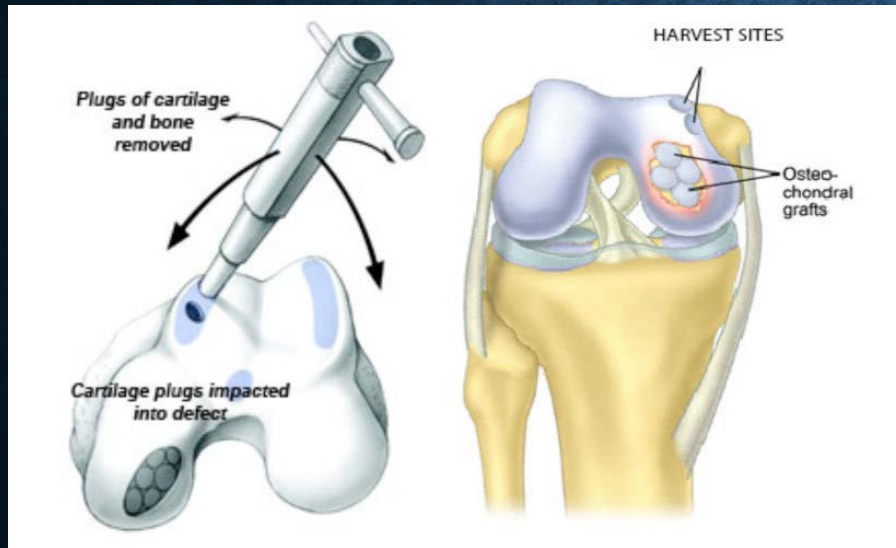
*Medial or lateral; opening wedge or closing wedge*

*Medial opening wedge HTO commonest*



# OATS

Mosaicplasty



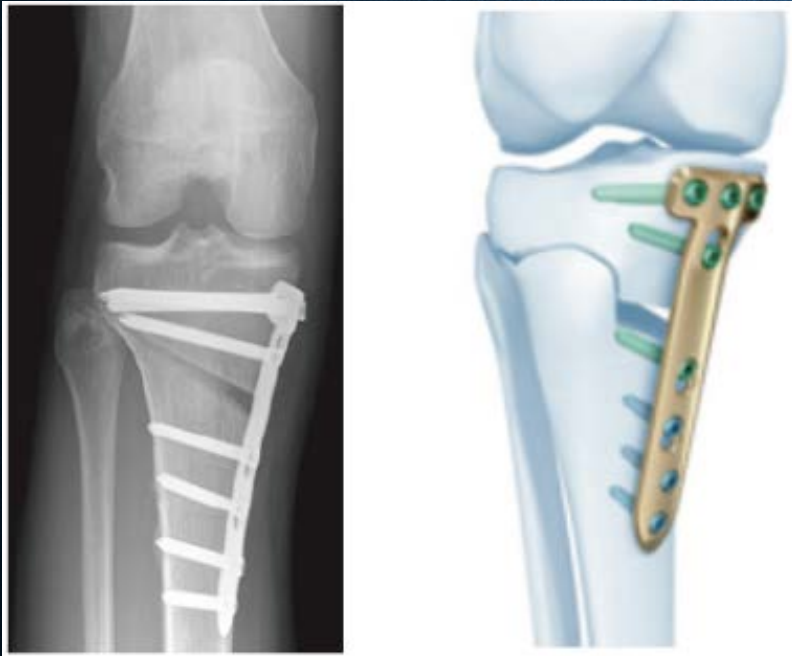
# MACI





# HTO

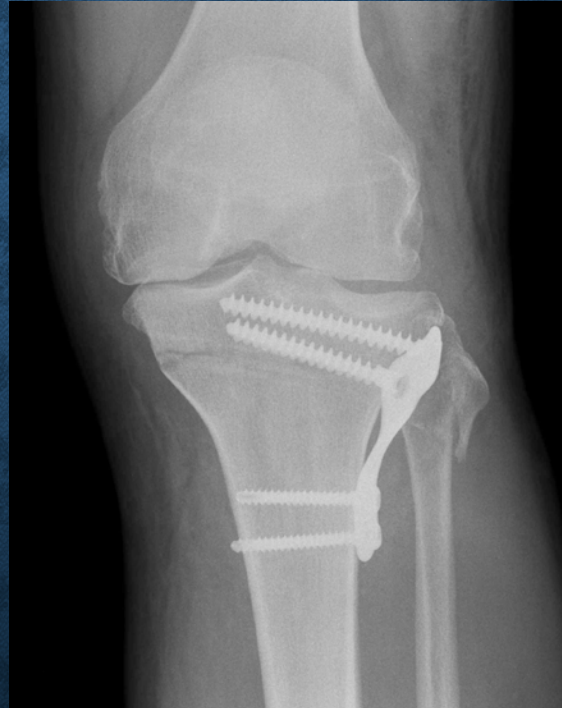
Medial opening wedge  
high tibial osteotomy



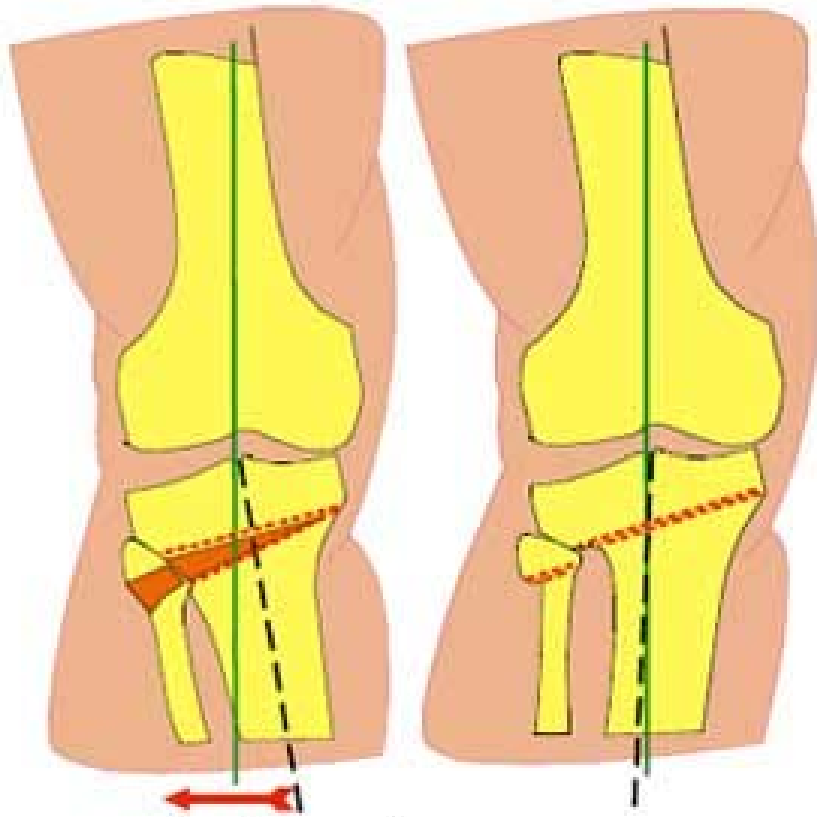
# DCO

Lateral opening  
wedge distal cortical  
(femoral) osteotomy

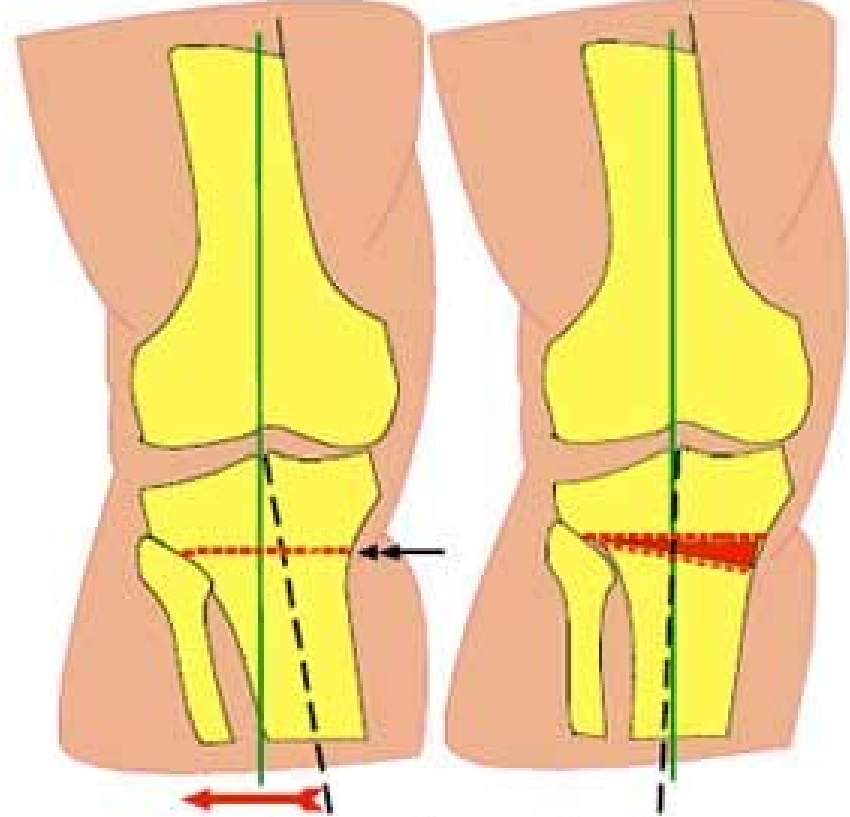
Lateral closing wedge  
high tibial osteotomy







**closing wedge osteotomy**



**opening wedge osteotomy**



# SURGERY- ADVANCED OA

- Partial knee replacement
  - Lateral, medial, PF, Deuce
- Total knee replacement
  - Different interfaces
    - Cemented v uncemented
  - Fixed b mobile bearing
  - Different constraints
    - Cruciate retaining
    - Cruciate sacrificing (PS)
    - Semi-constrained (high post)
    - Fully constrained (hinged)
  - Patella resurfacing or not







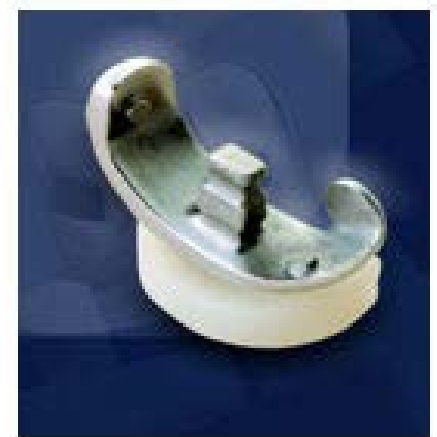
Cruciate retaining modular



All Poly + patella button



Mobile bearing



Unicompart mental



Mobile Bearing



Posterior Stabilized



Cruciate Retaining



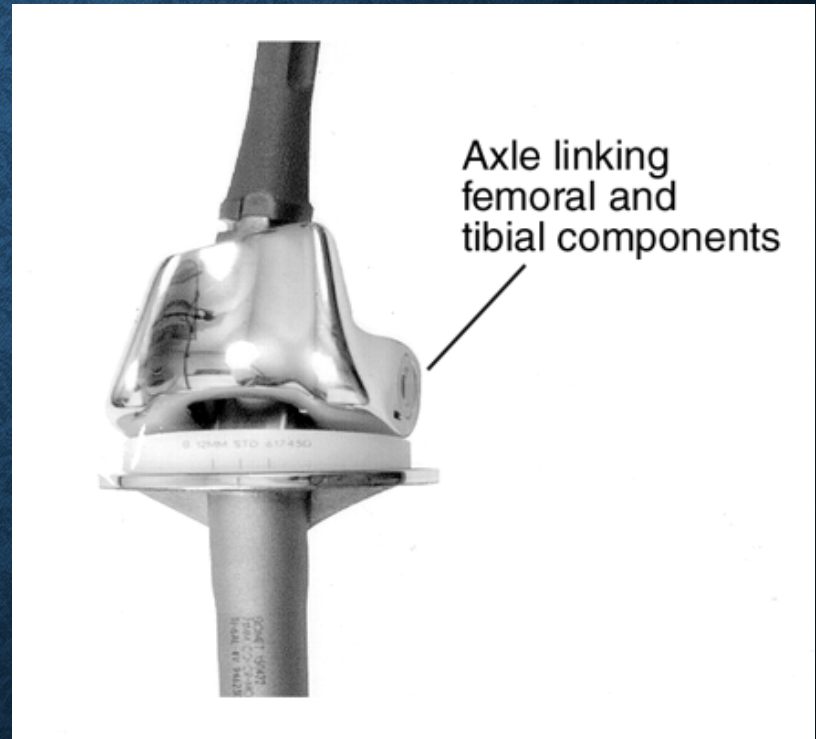
Cruciate Sacrificing (deep-dish)



Ball-In-Socket



# Fully constrained knee





# Partial Knee Replacements

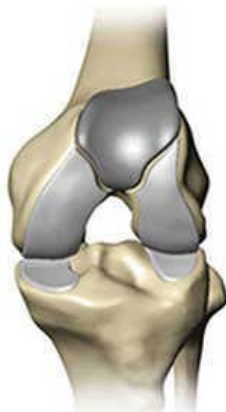
**Bicompartmental**



**Medial (inside)**



**Patellofemoral (top)**

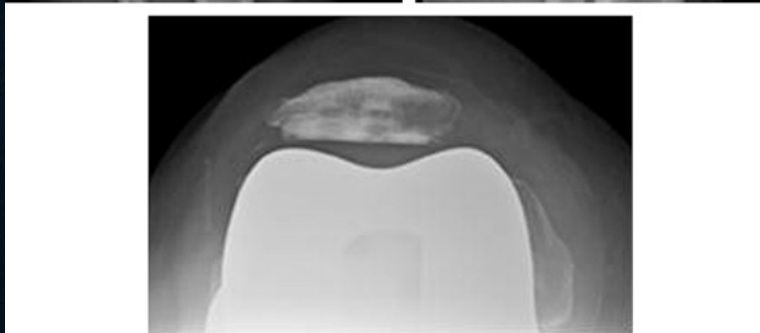


**Lateral (outside)**





# With or without patella resurfacing





# ANKLE OSTEOARTHRITIS





# AETIOLOGY / DIFFERENTIALS

- Rarely idiopathic
- Previous predisposing diagnoses:
  - Trauma- fracture, ligament injury, OCD; AVN; Tibialis posterior dysfunction; Congenital- CTEV, CVT; Infection- septic arthritis; Malalignment- post-traumatic
- Differentials:

OCD, tarsal tunnel syndrome, Tendinopathies; inflammatory/  
crystal arthropathy



# DIAGNOSIS

## Hx

- Pain
  - Worse on flat or uneven surfaces?
- Stiffness
- Limp
- Reduced function
  - Unable to walk
- Diabetes?

*Key is to recognise where the arthritis is:*

*Ankle +/- subtalar +/- midtarsal jts*

*CT may be required*

## O/E

- Scars
- Deformity
  - Hindfoot malalignment
  - Deformity higher up
- Muscle wasting
- Crepitus
- Tenderness
- Reduced ROM
- Instability
- Gait
  - Antalgic
  - Externally rotated leg gait inb pure ankle OA
- Neurovascular assessment

} Ankle, subtalar, midtarsal jts



# NON SURGICAL TREATMENT

- Analgesia
- Lifestyle changes- weight loss
- Injection
  - Diagnostic
  - Therapeutic into joint
    - Steroid + LA
    - Xray guided without contrast
    - ? PRP
- PT/ OT
- Orthotics
  - Insoles
  - Custom shoes
- Walking aids
- Scooter



# SURGERY

## Part joint involved

- Cheilectomy
  - Open v arthro
- Cartilage regeneration (arthroscopic)
  - Debridement
  - ? Microfracture
  - OATS
  - ACI/ MACI

## Whole joint involved

### Fusion v Replacement

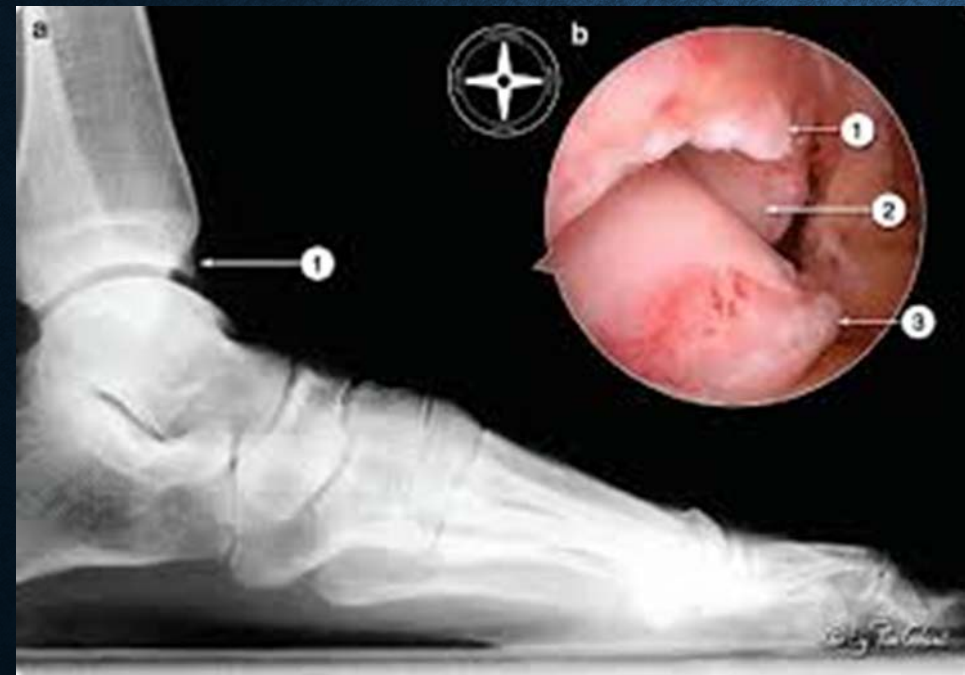
- Fusion → High Demand pt
  - Ankle v TTC v Pantalar
  - Open v arthroscopic
    - Antr v lateral
  - Screws v plate v nail (TTC)
  - Cross screws v parallel
- Replacement → Low Demand pt
  - Modern 3 component uncemented

*Realignment osteotomy?*

*Arthrodiastasis?*



# Ankle arthroscopy





# Ankle OA with and without subtalar involvement





Arthrodesis

v

Arthroplasty





# FUSION

Ankle

v

TTC

v

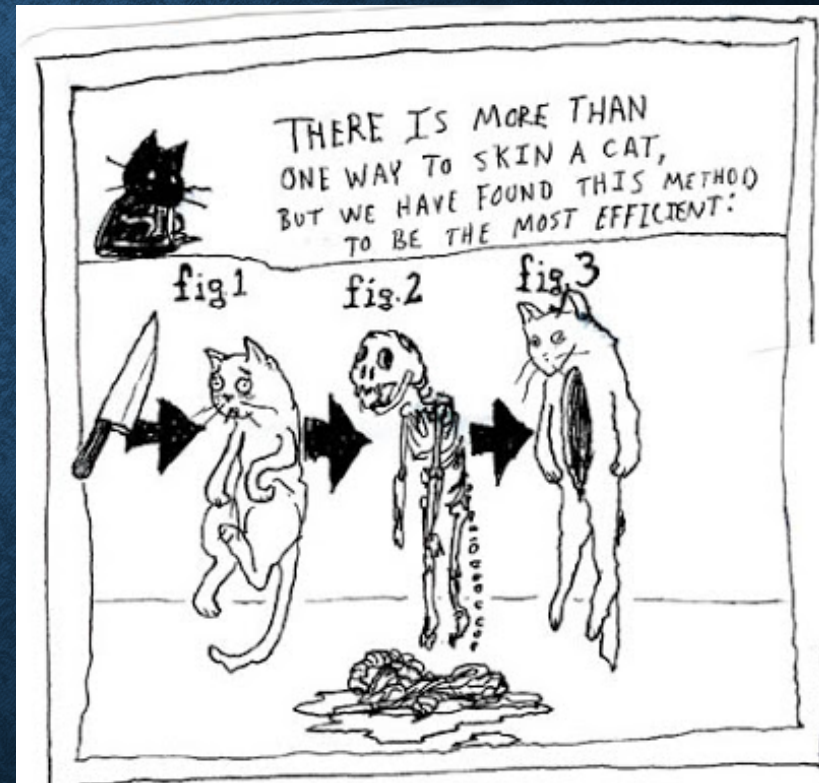
Pantalar





# SUMMARY

- Osteoarthritis is common
- It's a major health burden
- It affects WB joints commonly
- Taxonomy
- There's no one-size-fits-all approach
- Each joint is unique
- Each patient is unique
- Each treatment should also be unique!





# QUESTIONS?





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