Managing Knee Arthritis in the Active Patient

Primary Care Conference
7/21-7/25/25
Kauai, HI

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Disclosures

None to report

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We all desire to live long but no one wants to get old

Staying Active is a Priority

- Exercise improves cardiovascular function, increases lean body mass, and decreases the risk of stroke, HTN, DM, osteoporosis, and cognitive decline
- In 2014 20.7% of adults met the CDC guidelines for activity compared to 14.5% in 1998

Goal

Achieve as normal knee function as possible with as little pain as possible for as long as possible

Osteoarthritis

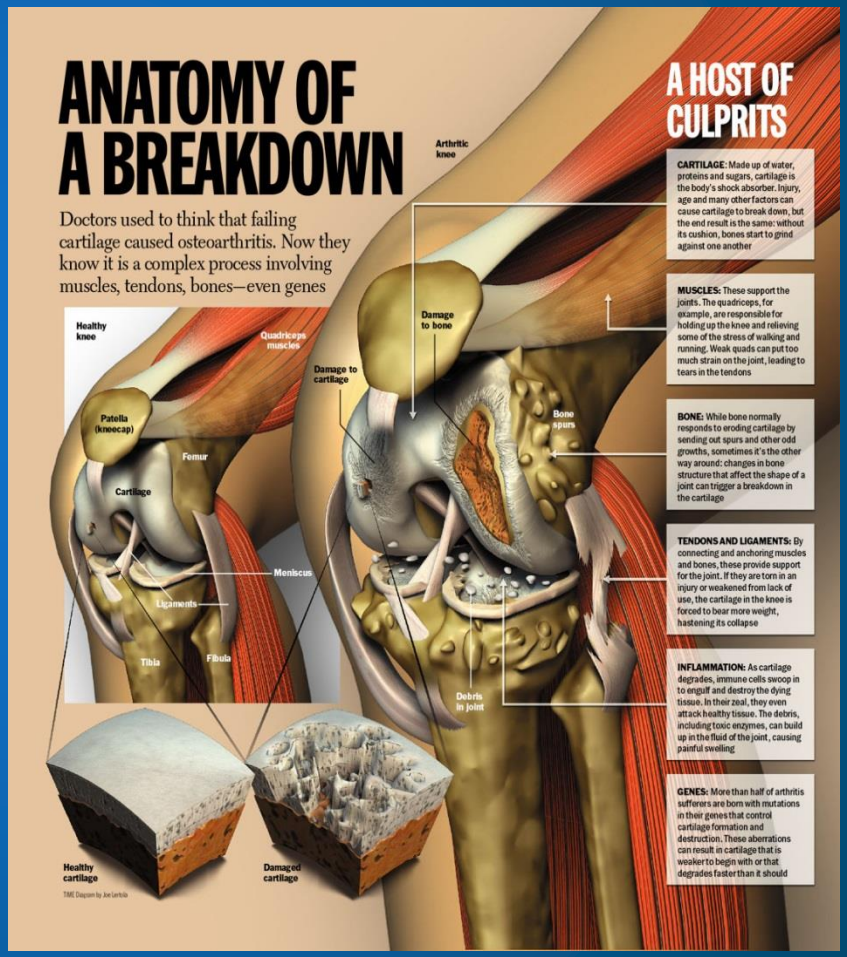
- Loss of cartilage associated with inflammation of the synovium, and subchondral bone remodeling

- Affects 32.5 million Americans

Kurtz COOR 2009, JBJS 2007

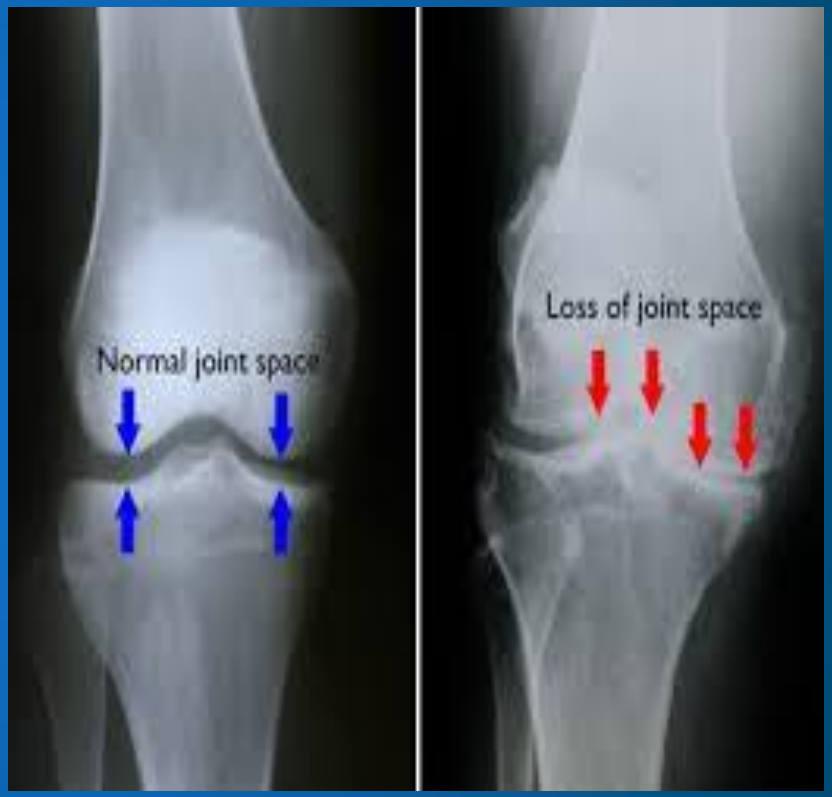
Outline

- Risk Factors
- Non Surgical Treatment
  - Weight loss
  - Exercise
  - Bracing
  - Medications
  - Injections
- Surgical treatment
  - Arthroscopy
  - Osteotomy
  - Biologic replacement
  - Arthroplasty



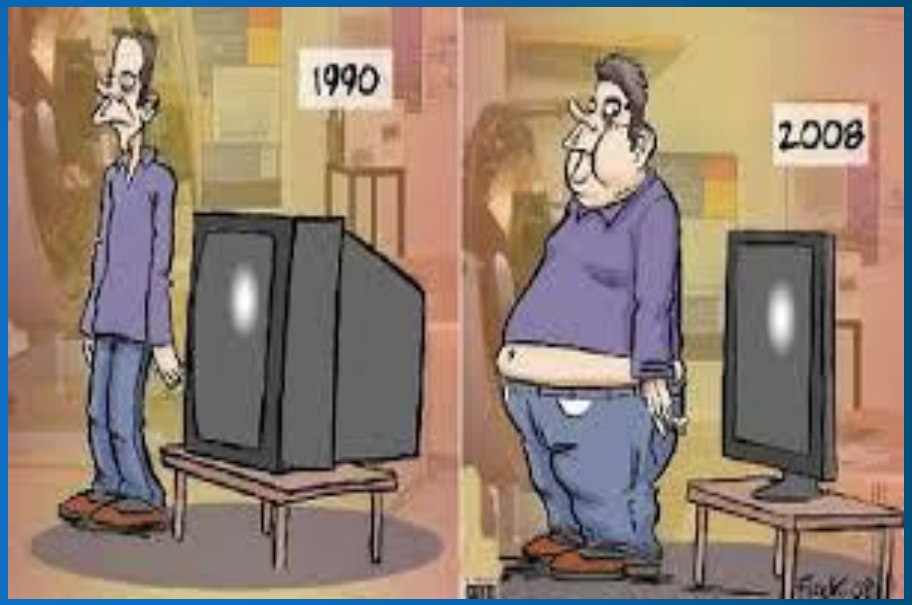
Risk factors for OA

- Increasing age
  - 70% by age 70
  - 5-10% men and 5% women have symptomatic OA by age 50
- Mechanical factors
  - Increased BMI
  - Malalignment
  - Joint injury
- Gender (females)
- Biochemical environment
  - IL*B*, IL-6, IL-8, TnF
- Genetics



Obesity

- 4-10 fold higher risk of developing OA if obese
- Modifiable risk factor
- Decreasing BMI by 2 points decreased the risk of OA by 50% in overweight women
- Every 1 kg reduction in body weight, peak knee load was reduced by 2.2kg
- Wt loss of 10% improved function by 28%



Felson Ann Rhem Dis 1996 Ann Int Med 1992
Aaboe Osteoarthitis and Cartilage 2011

Exercise

- Cyclic loading stimulates cartilage synthesis and remodeling
- AGS reports that pain and morbidity are decreased with increased physical activity
- Running has not been shown to increase the risk of OA progression
- Exercise programs as effective as NSAIDS for pain relief

Fransen Cochrane Database 2008
Chakravarty Am J Prev Med 2008
Roddy Rheum 2005

Oral Medications

- Acetaminophen/NSAIDS
  - Cochrane Review 2006
  - Acetaminophen was superior to placebo in 5/7 trials
  - 5% improvement in pain
  - Equal to NSAIDS for mild OA pain but NSAIDS superior for moderate to severe pain.
- Glucosamine and Chondroitin sulfate
  - GAIT Study Not statistically better than placebo
  - Cochrane Review 2005 Decreased pain by 22%, improved function by 11%
  - LEGS study No difference in pain relief compared to placebo, but less joint space narrowing

Towheed Cochrane Database 2005,2006
Fransen Ann Rheum Dis 2015

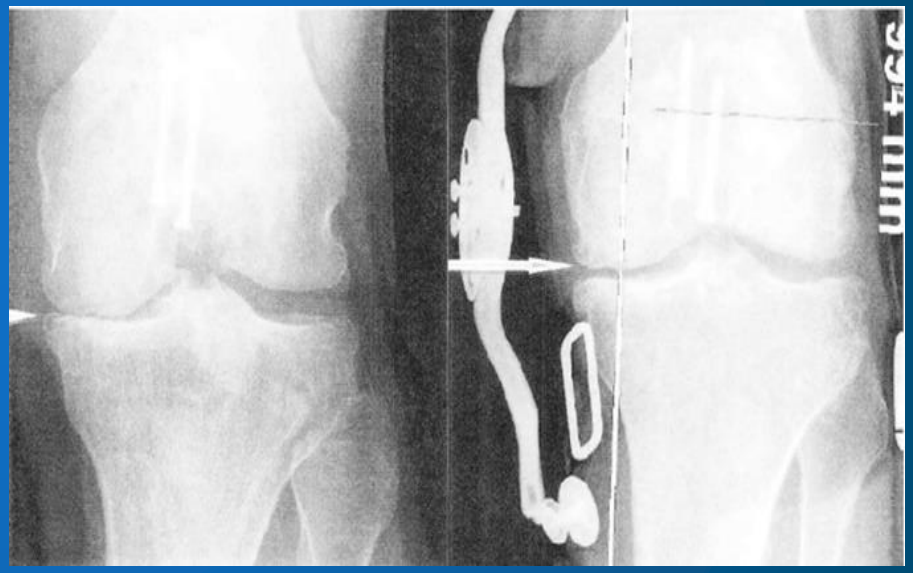
Unloader Knee Brace

- A 4^0-6^0 increase in varus alignment will increase medial compartment loading by 70%-90% during single leg stance

Kirkley JBJS 1999

Unloader Brace

- Unloader brace may decrease the ground reaction forces in the affected compartment
  - Braces have been shown to reduce pain by 48% and increase function by 69%
  - May not be tolerated long term. 41% still using brace at 2.7 years



Lindenfeld CORR 1997
Ramsey Sports Health 2009
Wilson Orthopedics 2011

Injections

- Corticosteroids
  - Cochrane review significant short term pain relief (4 weeks)
  - No radiographic changes noted with repeated injections 3 months apart but cartilage loss noted on MRI
  - Triamcinalone appears to be more efficacious than Betamethasone or Methylprednisalone

McAlindon JAMA 2017
Raynauld Arthritis Rhem 2003

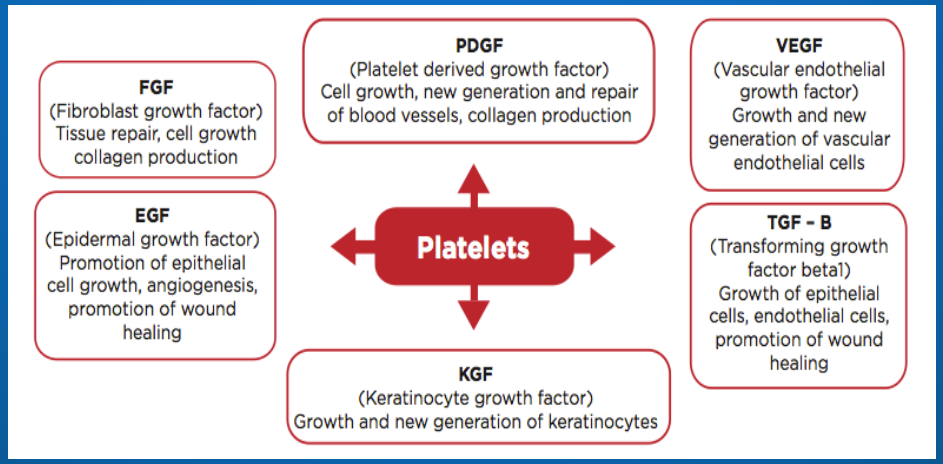
Hyaluronic Acid (Viscosupplementation)

- Inflammatory cytokines, proteolytic enzymes, and free radicals of the osteoarthritic joint may impair HA function
- Cochrane review 2006 effect for up to 6 months comparable to NSAIDS
- Large meta-analysis suggested that overall benefit was clinically irrelevant and adverse events were not negligible
- Recent systematic review suggests improvement in pain and knee function for up to 26 weeks

Bellamy Cochrane Database 2006
Campbell Arthroscopy 2015
Ruties Ann Int Med 2012

Biologic Injections

- PRP
  - Platelet granules contain multiple growth factors that may affect cartilage
  - FDA only allows minimal manipulation



PRP

- Few large studies
  - Multiple preparations
    - Concentration of platelets
    - Leukocyte rich or poor
- 2 yr f/u in 90 patients showed a benefit with a mean duration of 9 months.
  - May work best < 50 and mild OA

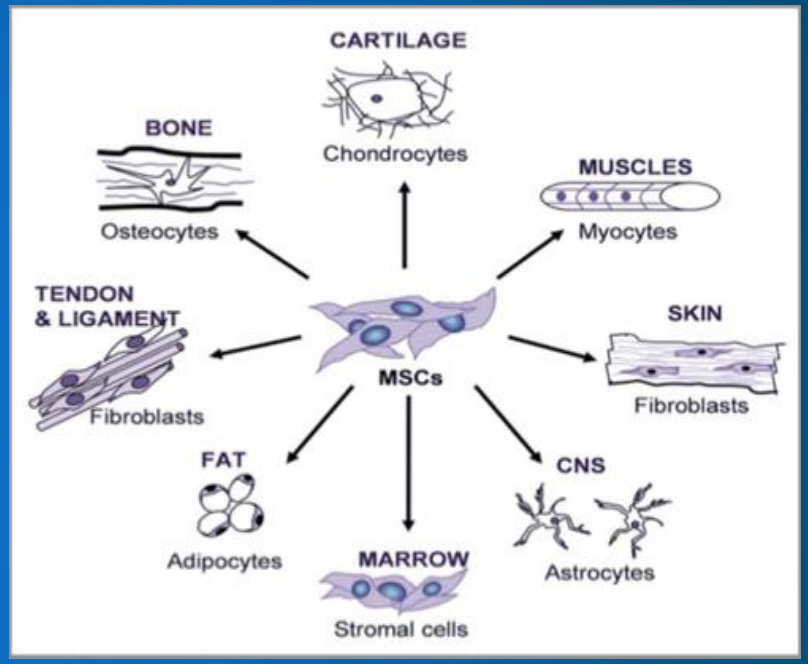
Campbell Arthroscopy 2015
Filardo KSSTA 2015

- Systematic Review 8/15 BJSM
  - PRP less pain than placebo and HA at 6 mos
  - Improved function compared to controls at 6 mos.
  - Significant bias with the studies included
- Promising but evidence still inconclusive

Laudy B J Sports Med 2015

Biologic Injections

- Stem Cells (bone marrow, fat)
  - Mesenchymal stem cells are capable of differentiation into chondrocytes
- Little research to date
- Post meniscectomy double blind study with high dose vs low dose MSC vs control
  - 18% of low dose patients had 15% regrowth of meniscal tissue
  - Improvement in pain in all groups



Vangsness JBJS 2014

Arthroscopy

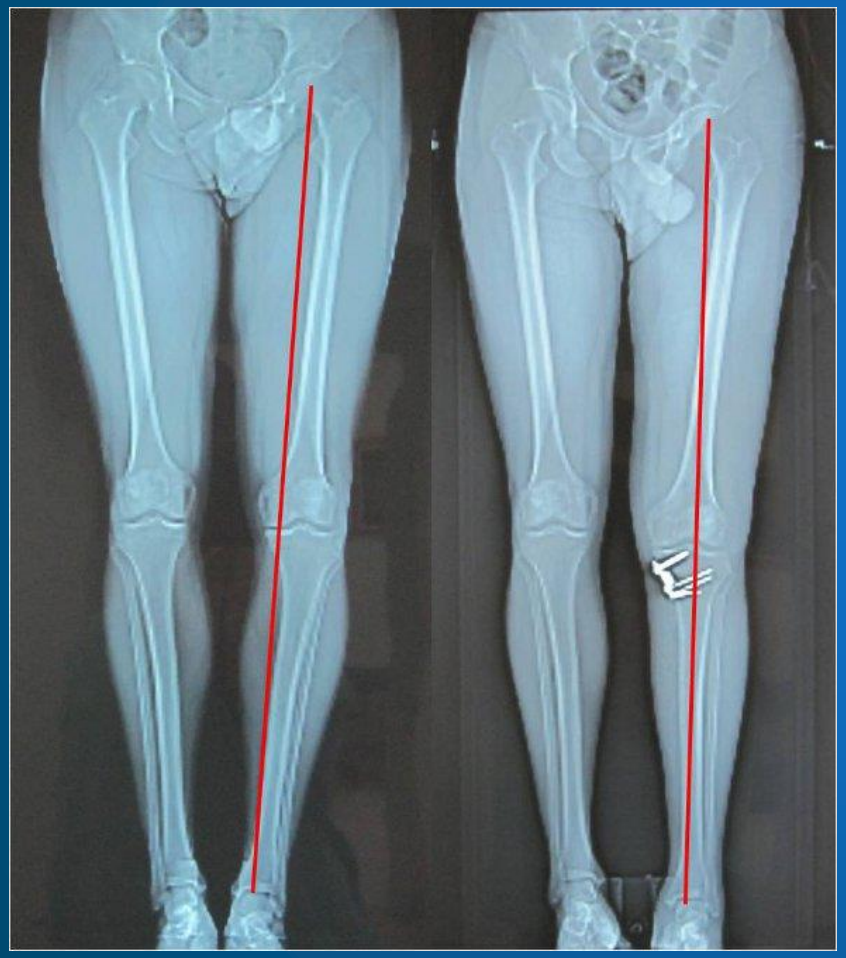
- Mosley NEJM
  - Lavage, debridement, placebo
  - No difference at 2 years (all improved)
- Kirkley
  - Arthroscopy +PT + medical RX
  - PT + Medical RX
  - Arthroscopy better at 3 months but no difference at 2 years
- MeTeOR
  - 350 randomized to arthroscopy vs PT
  - No difference at 6 months
  - 30% of PT patients had surgery
- Escape Study
  - PT not inferior to Arthroscopy

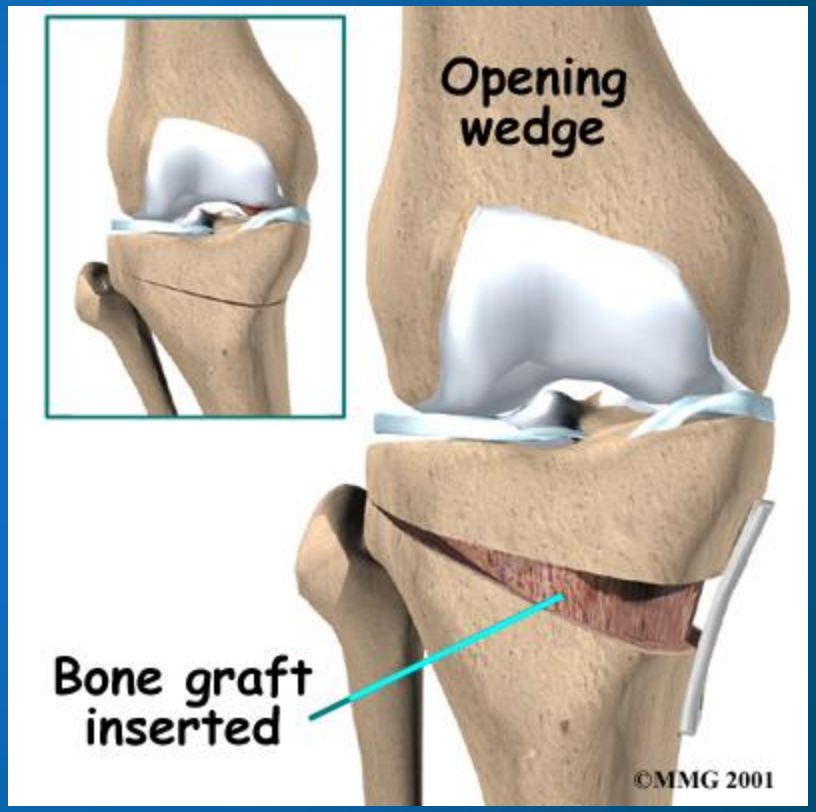
Katz N Eng J Med 2013
Kirkley N Eng J Med 2008
Mosley N Eng J Med 2002
Van de Graf JAMMA 2018

Is There any Value in Arthroscopic Debridement?

- Yes
  - Younger patient with minimal arthritis and a meniscal tear
  - Arthritic patient with sudden onset of mechanical symptoms (locking from meniscal fragment or loose body)

High Tibial Osteotomy (HTO)





HTO

- Cochrane Review 2014
  - Less pain and improved function though literature does not allow for definitive recommendations
- Young to Middle-aged patients
  - (Mean age 40) 3.6 yr f/u, 94% survivability
- Elite Athletes
  - At least 2 played in NFL and one in NHL

Brouwer Cochrane Database 2014
LaPrade Arthroscopy 2012

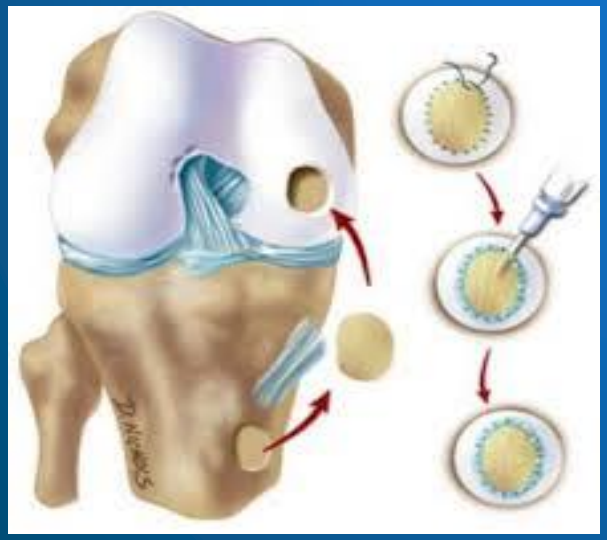
Articular Cartilage Restoration

- Reparative
  - (Marrow Stimulation or Microfracture)
  - Deliver pluripotent marrow cells to articular cartilage defect
  - Best for small lesions (<2 cm^2)
  - Steadman: 75-80% of patients had improvement

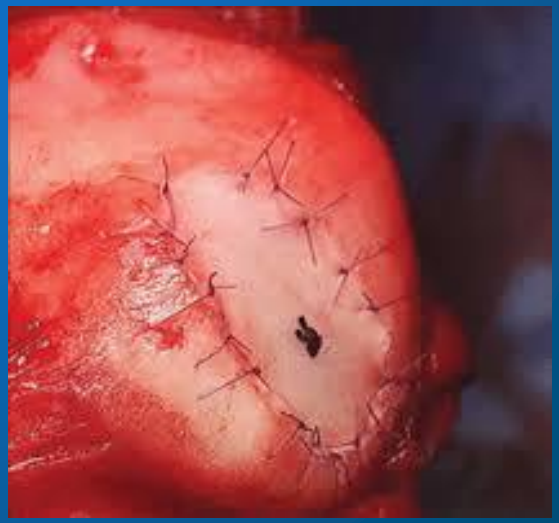
Steadman Arthroscopy 2003

Autologous Chondrocyte Implantation (ACI)

- Two-staged procedure
  - Cartilage cells harvested and replicated in the lab
  - Re-implanted under a patch



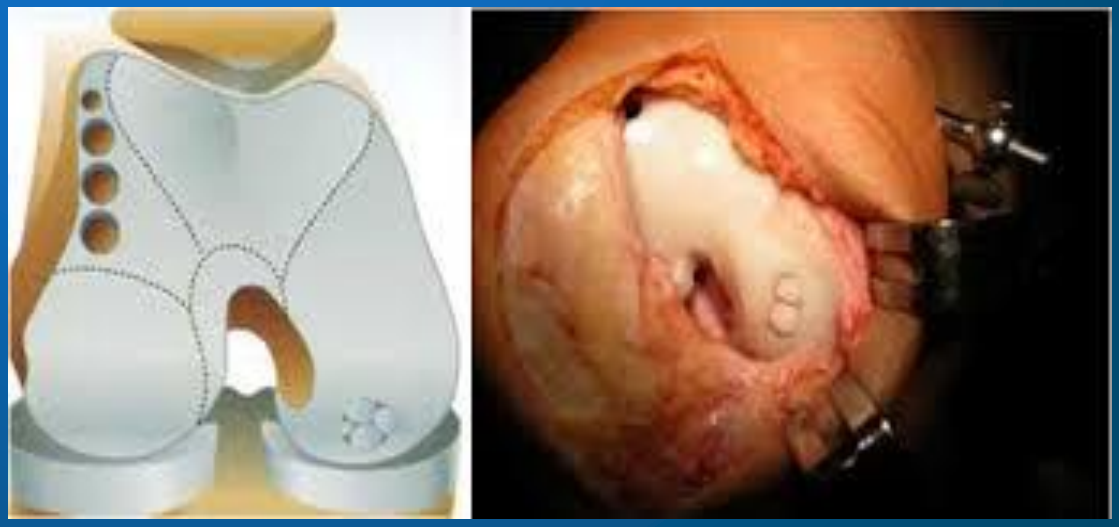
- 85-90% good and excellent results reported at > 5 yrs
- Best results are with femoral condyle lesions



Peterson AJSM 2002

Autograft Osteoarticular Transplant OATs

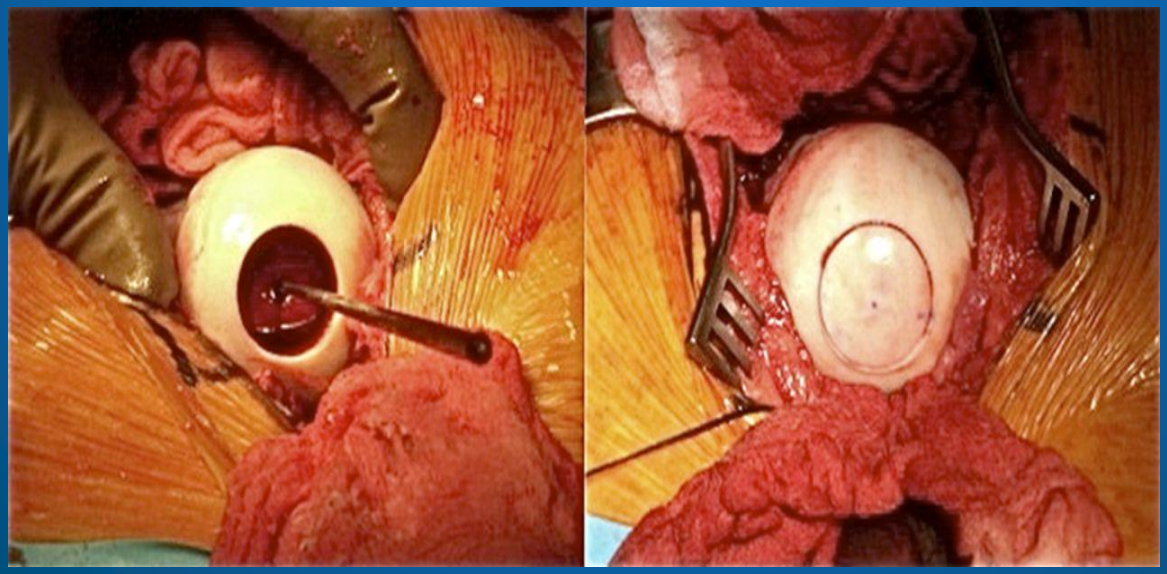
- Replacement with bone and cartilage plugs from another part of the knee
- Robbing Peter to pay Paul
- 80-90% good and excellent results



Bartha J Orthop Sports Phys Ther 2006

Osteochondral Allograft

- Better option for larger lesions
- Graft survival 90% at 5 years, 75% at 10 years

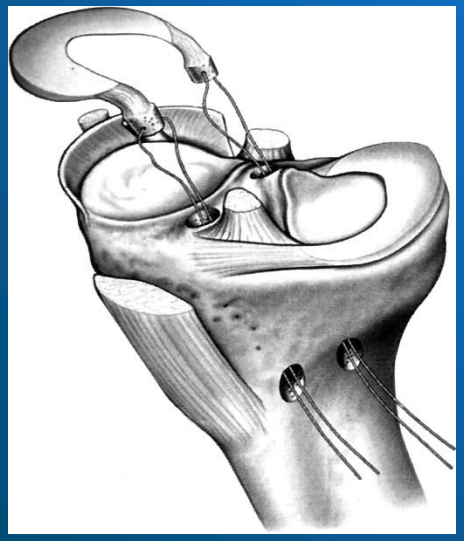


Which is Best?

- All with similar results
- Many studies performed by developer of the technique
- Each may have a role depending on the size and location of the lesion
- Systematic review 2016:
  - Insufficient evidence to determine if ACI was better than either Autograft OATs or Microfracture

Meniscus Transplantation

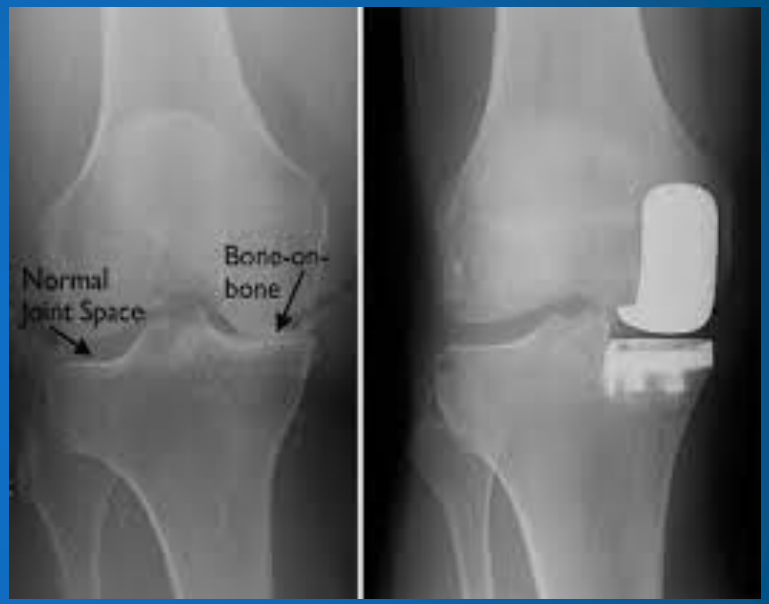
- Indications are pain, swelling, and meniscal deficiency with only Minimal cartilage degeneration



- Many will re-tear over time
- No evidence that meniscal transplantation will prevent arthritis
- No artificial meniscus alternative at this time

Unicompartmental Joint Replacement

- Partial replacement
  - Unicompartmental cartilage loss
  - Less bone removal than total replacement
  - More normal knee function
- UK experience
  - 95% survival at 13 years
  - These results not easily replicated
  - Complications increase with low volume surgeons



Berger JBJS 2005

HTO vs Partial Knee Replacement

- Meta-analysis 2011
  - 9-12 year follow-up
- Survivorship
  - HTO 84.4%
  - UKA 86.9%
  - Similar clinical outcomes and complication rates

- HTO better if returning to high impact sports

Spahn KSSTA 2011

Total Knee Replacement

- Indications:
  - Pain and functional limitation in “older” patient
  - Bi or Tri-compartmental disease

- Swedish Registry 10 yr revision risk
  - < 55 years 9%
  - ≥ 55 years 4%
- Systematic Review 13 studies 671 patients <55 yrs of age
  - 1st decade survival 90%-99%
  - 2nd decade survival 85%-96%

Healy JBJS 2008
Keeney CORR 2011

Goal
Stay as fit as possible for as long as possible

Crosstraining

- When the knee will no longer tolerate impact loading sports
  - Biking
  - Swimming
  - Walking
  - Elliptical
  - H20 aerobics

We don’t stop playing because we get old, we get old because we stop playing

Thank You

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