

Complex Biological Knee Reconstruction:

Bipolar, Multifocal Lesions and Osteoarthritis



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18th International Sports Medicine
Fellow's Conference

SCORE

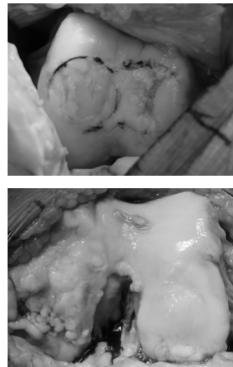
Ideal Candidate for Cartilage Restoration

- Age under 30
- Few previous surgeries
- Isolated femoral condyle lesion
 - Traumatic or OCD
- Sound mechanical environment (meniscus, ligament, alignment)
- Biologically "quiet" joint
- Prefers lower demand lifestyle
- No genetic risk factors
- Not that common!



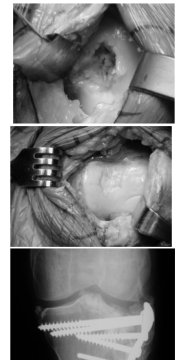
"Large" or "Complex" Lesions

- Greater than 4 centimeters
- Subchondral bone involvement
 - OCD, osteonecrosis
- Failed previous cartilage surgery
- Degenerative lesions
- Multifocal or bipolar lesions
- Meniscus or ligament deficiency
- Malalignment
- Patellofemoral, tibial lesions

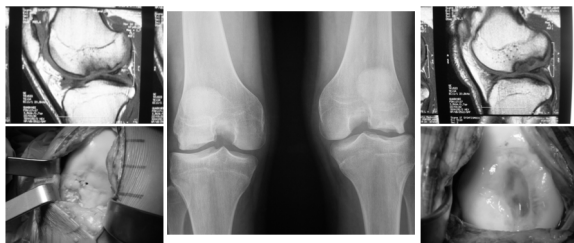


Joint Restoration: Diagnostic Categories

- Osteochondritis dissecans/OLT
- Traumatic chondral/osteochondral lesions
- Revision of previous cartilage surgery
- Osteonecrosis/ SONK
- Fracture malunion (tibial plateau)
- Focal degenerative chondral lesions
- Osteoarthritis



18 Year Old Bilateral Osteochondritis Dissecans



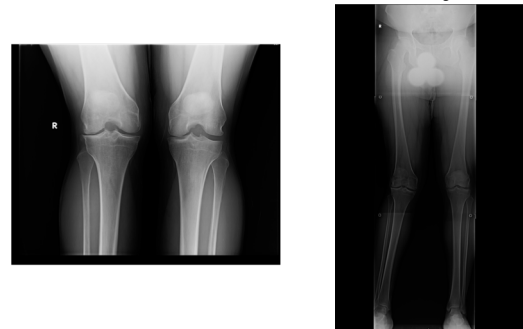
20 year old Woman Steroid Induced Osteonecrosis



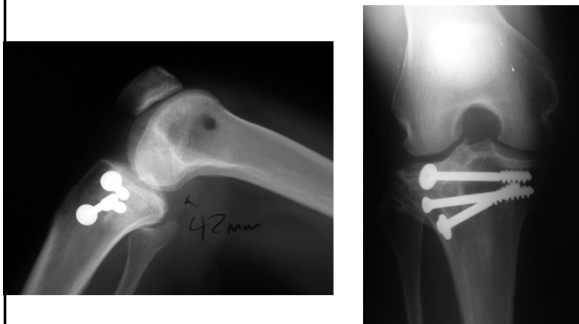
31 year old nurse
multiple operations



33 year old police officer
lateral meniscectomy



46 y.o. Woman
Lateral Tibial Plateau Fracture



51 year old man
left knee
medial meniscectomy



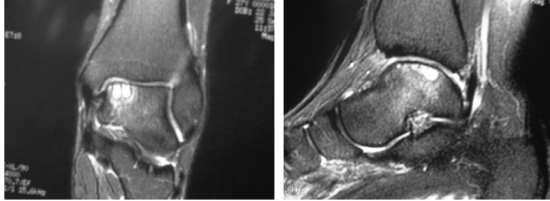
48 year old tennis pro
“lots of injuries, lots of operations”



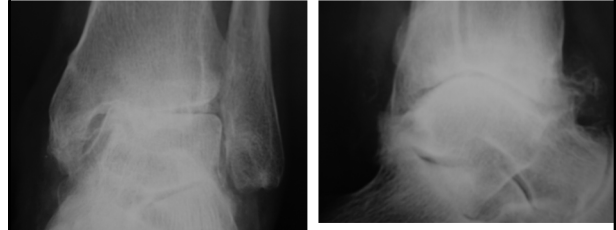
22 y.o with Chronic
Shoulder Dislocation



26 year old with large cystic OLT

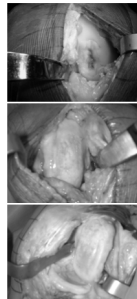


35 y.o. Post Traumatic Ankle OA

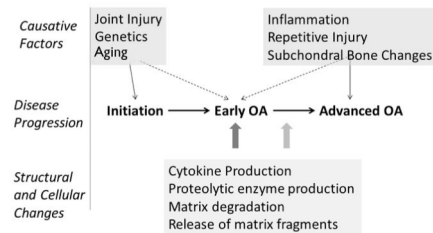


Cartilage disease is a continuum, encompassing a spectrum of pathologic states

- Focal (osteo)chondral defect in an otherwise healthy knee.
- Chondral lesion with degenerative changes.
- advanced osteoarthrosis



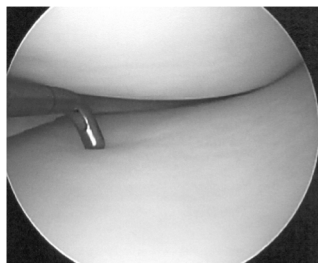
The Arthritis “Cascade”



Every cartilage patient you treat has some form of post traumatic osteoarthritis

Patient characteristics matter and in a specific order!

- Mind
- Limb
- Neuromuscular
- Joint
- Ligament
- Meniscus
- Lesion



Background Factors

- Acceptable or solvable
 - Physical therapy/ training
 - Osteotomy
 - Ligament reconstruction
 - Mensical restoration or transplantation
 - Disease modification?



Synthesizing the Clinical Information

- Complexity of clinical situation
 - Burden of disease
 - Simple, complex or salvage situations
- | | |
|---|--|
| <ul style="list-style-type: none"> □ SIMPLE: □ COMPLEX: □ SALVAGE: | <ul style="list-style-type: none"> - single unipolar grade III/IV lesion femur - tibial surface or patella no worse than grade II - no generalized chondromalacia - multifocal unipolar grade III/IV lesions, femur - unipolar lesion patella/tibia - OCD - concurrent correction of tibiofemoral/patellofemoral malalignment - bipolar focal chondral lesions - osteophytes or radiographic joint space narrowing present - generalized chondromalacia grade II or greater - osteonecrosis |
|---|--|

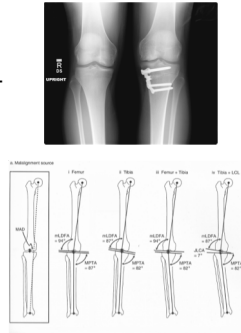
Malalignment is bad, especially when combined with other pathology

- Physiologic vs. pathologic alignment
 - Sharma, JAMA 2001
 - Cerejo, Arthritis Rheum 2002
 - Kaufman, JBJS 2008
- Compound pathologies
 - Axis deviation (static and dynamic)
 - Chondral lesion
 - Meniscal deficiency
 - Instability (ACL, MCL, PL)
- Missed malalignment is the most common error in patient evaluation



Osteotomies are good! HTO, DFO, TTO

- Little objective data
 - Small series, short term follow-up
 - RPT unlikely to be performed
 - Difficult to define contribution of osteotomy to outcome
 - “trust me on this”
- Experienced surgeons are utilizing osteotomy more frequently in cartilage restoration procedures

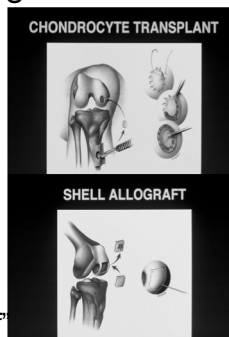


Surgical Skill Set for Large and Complex Lesions

- Autologous Chondrocyte Implantation
- Osteochondral Allograft Transplantation
- ACL (multi-ligament) reconstruction
- Meniscal Allografting
- Osteotomy (tibial and femoral)
- Patellofemoral joint re-alignment procedures

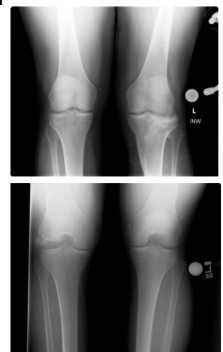
Clinically Relevant Surgical Techniques for Large Lesions

- Autologous Chondrocyte Implantation
- Osteochondral Allograft Transplantation
- Not a place for “new stuff”



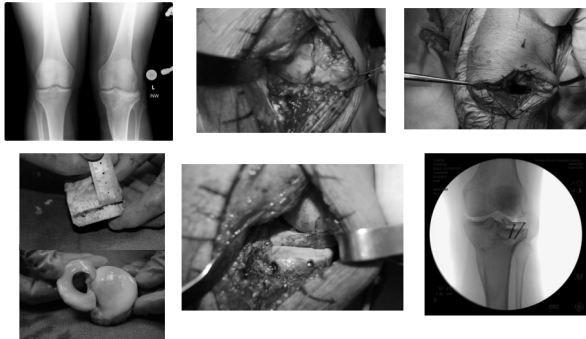
Osteochondral Fracture or Malunion

- 15-45 years old
- Tibial plateau fracture, patellar dislocation, periarticular trauma
- OCA best option: anatomic bone restoration
- ACI rarely indicated
- Realignment procedures common
- Outcome: good to excellent



Surgical Technique

Unipolar Tibia + Meniscus

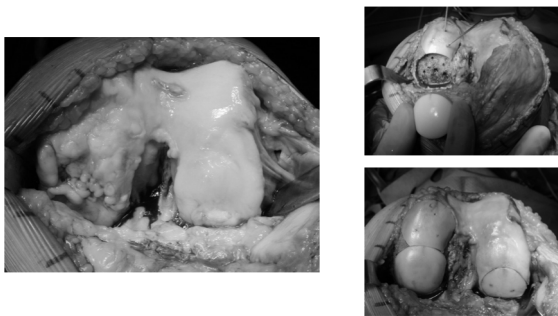


Osteonecrosis

- 15-55 years old
 - 2 variants
- SONK (OA prodrome, focal cyst, older age)
- True AVN (diffuse pattern of necrosis), risk factors
- SONK: bone graft only or graft +ACI or OCA
- AVN: allograft (shell) +/- bone graft
- Results: good

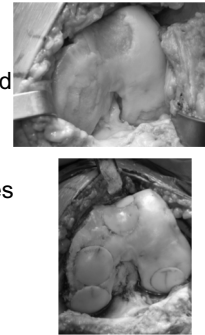


20 year old woman steroid induced osteonecrosis



Degenerative Chondral Lesions

- Age 35-55
- Chronic disease state
- Multifocal lesions, meniscus and ligament compromise
- ACI or OCA can be used
- Multiple grafts
- Staged/ combination procedures
- Results: fair to good
- Must accept arthroplasty as a salvage



Lateral Compartment Disease

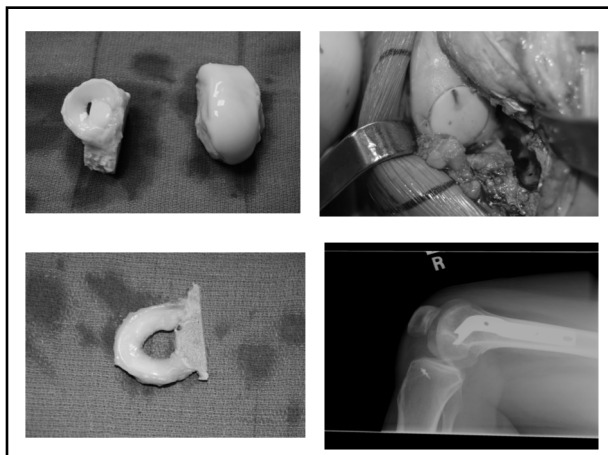
- The new "terrible triad"
 - Valgus
 - Meniscal deficiency
 - Chondral injury



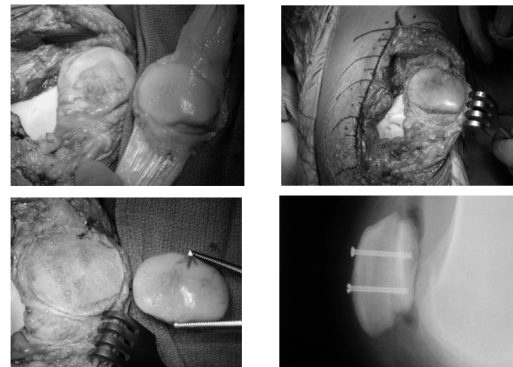
2 Stage Operation

- 1: Distal femoral osteotomy
- 2: Lateral mensical allograft and femoral condyle OCA or ACI





Whole Patellar Allograft

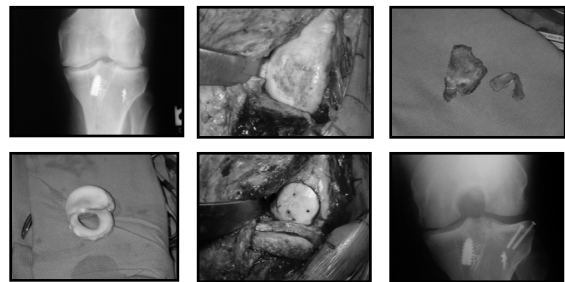


Advanced Osteoarthritis

- 30-60 years old
- The “unsolved problem”: too young for arthroplasty
- Osteotomy alone as first line treatment
- Careful use of cartilage restoration (ACI, OCA)



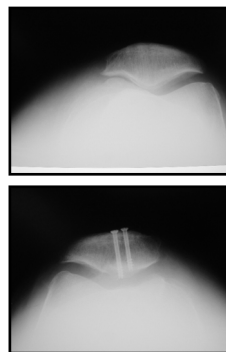
Surgical Technique: Tibio-femoral Lesions



Allograft Study Group

- 54 knees in 52 patients (11% of allograft pts)
- 28 females, 24 males
- Mean age 39 years (range, 15–66)
- All had prior surgeries (mean 3.4; range, 1–8)
- 39 tibio-femoral, 15 patello-femoral allografts
- Mean allograft area 18 cm² (range, 4–41)
- 19 meniscal allografts and 2 osteotomies

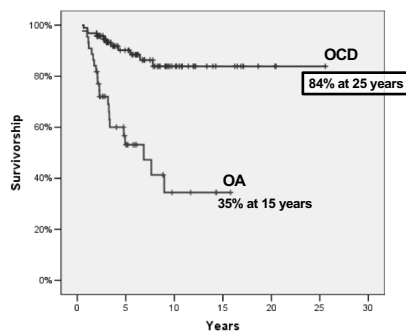
Bipolar Lesions



- 70% of patients avoided arthroplasty at mean follow-up of 6.5 years
- Successful cases had a significant objective improvement and excellent patient satisfaction
- High reoperation rate (30-50%)

- 69 patients, mean age 39 (18-57)
- Resurfaced area = 11.66 cm. (4-31)
- Defects per knee: 2.2 (1-4)
- Mean 42 month f/u
- 42/69 osteotomy

- Treatment of large and complex cartilage lesion requires a broader and more thoughtful approach
- Diagnostic categories more useful than lesion size (better predictor of outcome)
- Evaluation should include a comprehensive biomechanical assessment
- Technically challenging
- “Underpromise and overdeliver”



“Youth would be an ideal state
if it came much later in life”

Herbert Henry Asquith



Thank You