Patellofemoral Arthroplasty
Results: Review of Literature

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Disclosure

- Designer (Royalty income) - ***DePuy A Johnson & Johnson Company***
- Consultant on Knee Products for ***Smith & Nephew Orthopaedics***
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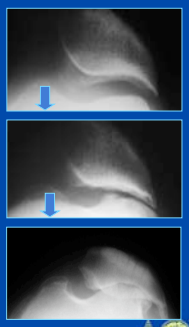
Knees likely to develop isolated PFA

- Chronic low grade patellar subluxation / dysplasia
- The multiply operated patellofemoral joint
- Old patellar fracture
- Patella Infera



Knees that develop PFA

- Most have abnormalities involving patellar tracking
- Therefore:
  - Prosthetic design, instrumentation, and soft tissue techniques must address patellar mal-tracking

Patellofemoral Arthritis

Surgical Treatment Options

1. Arthroscopic debridement
2. Unloading / realignment
3. Cartilage grafting
4. Patellectomy
5. PFA
6. TKR

Patellofemoral Arthritis

Weaknesses of Other Treatment Options

- **Arthroscopy**
  - Poor intrinsic healing properties of articular cartilage
- **Unloading procedures**
  - Unpredictable results
- **Patellectomy**
  - Residual quad weakness
- **TKA**
  - 7%-19% Residual anterior knee pain

Results of TKA for Patellofemoral Arthritis

- 30 TKAs for PF Arthritis
- Mean age: 73 yrs (59-88)
- Follow-up: 81 months
- Results: 28 excellent, 1 good, 1 poor
- No revisions

Mont: JBJS 2002

Implant Selection Design Considerations

Selecting an Implant for PFA

- Several different types of implants
  - Different trochlear designs
  - Different patellar designs

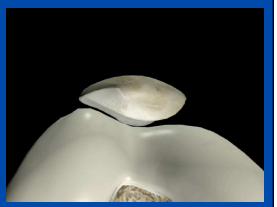
Patellar Component Designs

Dome | Bi-concave | Tri-concave

- Contact stresses
- Stability
- Transition zone issues

Anatomy of the Patellofemoral Joint

- Only joint in the animal kingdom in which articular surfaces overlap
- 7 articulating facets on the patella
- Contact area moves proximal on the patella as the knee flexes



- After 90 degrees flexion lateral facet articulates with the lateral femoral condyle & the odd facet articulates with the medial femoral condyle

Patellar Tracking

- Patella is pulled laterally in terminal extension
- The patella moves medially in early flexion
- The trochlear groove deviates laterally going distally
- The patella engages the condyles in deep flexion

Surgical Technique

- Externally rotate trochlear component to epicondylar axis
- Maximize coverage of the trochlea
- Flush or slightly recess the trochlear component
- Check patellar tracking

Unicompartmental Arthroplasty for PFA

Surgery

- Minimally invasive approach difficult
- Lateral release often needed
- Mark patella & quad tendons to help align patella vertically
- Alignment of both components is essential

New Instrumentation

Intramedullary guide

Recessed trochlear groove

Patellofemoral Arthroplasty

Best Results

- Accurate prosthesis placement with balanced soft tissues
- Implant that engages the prosthesis in the trochlear groove
- Implant that is broader and longer proximally

Implant Design Iterations

1st Generation - Lubinus

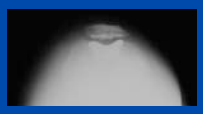
Short proximal profile

Narrow implant

Results

- 76 Lubinus PFA
- Follow-up: 7.5 yrs
- 55% unsatisfactory results
- 32% mal-tracking
- 28% revised

Tauro: JBJS-B, 2001



Implant Design Iterations

1st Generation - LCS

Short proximal profile

Narrow implant

Clinical Results

- 66 UKAs: Autocentric implant
- Avg. age: 57 yrs
- Follow-up: 16.2 yrs (12-20)
- Survivorship: 58%
- Revisions: 14 Tibiofemoral Arthritis
- 11 loosenings: some cementless

Argenson: CORR, 2005

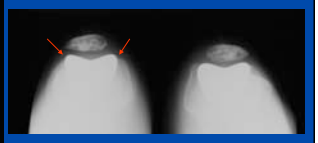
Results

- 56 Richards PFA
- Mean age: 50 years
- Mean follow-up: 17 years
- 86% good/excellent results
- 12 knees converted for progressive osteoarthritis

Kooijman: JBJS-B, 2003

Implant Design Iterations

2nd Generation - Avon



Results

- 124 Avon PFA
- Follow-up: 2-5 Years
- Progression of disease: 14 knees (12%)

Ackroyd: CORR, 2005

Avon Patellofemoral Arthroplasty

- 109 consecutive patellofemoral arthroplasties
- Minimum follow-up: 5 years
- Survival rate: 95.8%
- Radiological progression of arthritis:28%

Ackroyd C: JBJS-B, 2007

Results

- 30 consecutive Lubinus (1st generation) UKA versus 25 consecutive Avon (2nd generation) UKAs
- Lubinus: 17% patellar subluxation, catching, and pain versus 4% for Avon
- Implant differences:
  - Sagittal radius and proximal length, breadth, and constraint

Conclusions from Outcome Studies

- Development of tricompartmental arthritis is the most common mode of failure
- Implant design does make a difference
  - Mal-tracking, catching, and patellofemoral pain have largely been eliminated by improvements in implants and instrumentation

Patellofemoral Arthroplasty

Limitations

- Contraindicated for substantial patellofemoral mal-alignment:
  - Residual instability may result in early implant failure
- Avoid elderly patients with any evidence of tibiofemoral cartilage loss:
  - Progressive tri-compartmental arthritis is the most common mode of failure.

Patellofemoral Arthroplasty

Current Considerations

- Newer implant designs have reduced the problems with mal-tracking, catching, and pain
- Improved instrumentation should improve the accuracy of component placement

Summary

- PF Arthroplasty is:
  - *Optimal* for younger patients with PF arthritis and no considerable mal-tracking
  - *Reasonable* for patients with successful realignment procedures
  - *Attractive* for elderly patients without evidence of tibiofemoral chondrosis

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Thank You

Future Considerations

- Bi-compartmental arthroplasty
  - 72 PFAs: 36 with UKAs
  - Follow-up: 2-12 yrs
  - 85% good/excellent results

Cartier: J Arth, 1990

Unicompartmental Arthroplasty for PFA

Indications

1. Disabling pain due *solely* to PF joint arthritis
   - Pain that interferes with ADL
   - Tibiofemoral joint normal on WB x-rays
2. Other options have failed or are contraindicated
3. For "high demand" patients

Unicompartmental Arthroplasty for PFA

Contraindications

1. Psychogenic pain
2. Regional Pain Syndrome - RSD
3. Infection
4. Rheumatoid arthritis - inflammatory
5. Patella Infera

Patellofemoral Arthroplasty

Radiographic Evaluation

Patellofemoral Arthroplasty

Patient Selection

- Isolated patellofemoral arthrosis
- Younger patients that have failed conservative measures
- Discomfort with prolonged sitting, stair or hill ambulation, and squatting

Patellofemoral Arthroplasty

Patient Selection

- Exclude patients with considerable patellar mal-tracking or malalignment
- What about elderly patients?
  - Historically have done well with TKA

Patellofemoral Arthroplasty

Clinical Evaluation

- Pain on patellar inhibition test
- Patellofemoral bon-on-bone crepitus with resisted knee extension
- Retropatellar pain with squatting