HemiCAP Resurfacing of the Patello-Femoral Joint

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Isolated Patello-Femoral Arthrosis

• Surgical Management remains controversial
  ▪ Osteotomy – for lateral, distal disease
  ▪ Biological resurfacing (younger patients)
  ▪ Patellectomy
  ▪ Isolated patellar resurfacing
  ▪ TKA
  ▪ PFA
Biological resurfacing

- 17 y.o female
ACI: Trochlea

- 33 year old male
- Tennis player
- Arthroscopy revealed a superior trochlear defect (3.5 cm by 1.5 cm)
- Patella was normal
- Tibiofemoral joint was normal
- Arthroscopy, mfs unsuccessful
- Symptomatic with ADL
ACI: Trochlea
PATELLO-FEMORAL ARTHRITIS

INCIDENCE:

8% - 10% “ARTHritic KNEE POPULATION”

10-20% OF PAINFUL KNEES OVER AGE 55
HISTORY

• McKeever  50’s (hemi)

• Bechtol    70’s to present

• Various European Designs, Link, etc.

• Recent Production Designs

• Custom Devices-USA
PFA Designs Currently Most Popular in USA

- Stryker Avon
- DePuy LCS Mobile bearing
- Biomet Vanguard
- New custom Kinamed prosthesis
Patello-Femoral Arthroplasty
Designed as part of
Total Knee System

Trochlear Geometry
Has Instrumentation
Standard Avon PFA
Kinamed Custom Prosthesis
PROSTHETIC RESURFACING

- Patella alone
- Trochlea alone
- Patello-Femoral prostheses
- Traditional prostheses limited success
- MIS new prostheses
Arthrosurface P-F Prosthesis

limited bone sacrificing
**Description**

The HemiCAP® Patello-Femoral Resurfacing Prosthesis incorporates a distal femoral trochlear surface articular component that mates to a fixation stud via a morse taper interlock, and an all-polyethylene patella component. The prosthesis is intended to be used in cemented arthroplasty.

**Materials**

- **Femoral Resurfacing Component**: Cobalt-Chromium Alloy (Co-Cr-Mo)
- **Undersurface Coating**: Titanium (CP Ti)
- **Fixation Stud**: Titanium Alloy (Ti-6Al-4V)
- **Patella Component**: Ultra-High-Molecular Weight Polyethylene (UHMWPE)
Indications

• Localized patello-femoral arthrosis, focal trochlear and/or patellar defects
• Generalized PF arthrosis when there is a symptomatic painful arc in a young person
• Isolated trochlear disease
• Post-patellectomy symptomatic disease on the central trochlea
Traumatic arthrosis

- Painful arc in early flexion
- Resurface accordingly
  - Proximal trochlea
  - Distal patella
- Does not burn any bridges!!
Isolated trochlear disease

- 48 y.o active male
- Isolated proximal trochlear disease
- Early flexion painful arc
- Difficulty with adl’s
- Previous chondroplasties, microfracture
- Excellent candidate
Isolated grade 4 trochlear disease
Post Patellectomy Pain

44 year old female
26 y post patellectomy
Severe pain & disability
Post Patelllectomy Pain Salvage

2 years post-op

No pain / full function
HemiCAP for Condyle

44 y.o male, focal OCD, failed chondroplasty
Clinical Scores

- Pre-op pain WOMAC 381
- 6 month pain WOMAC 4
- Global WOMAC
  - Preop: 1864
  - 6 months: 146
HemiCAP Case Example

- Patient 4
  - 57 y.o. male, unstable AVN
Case Example: Condyle

- 47 y.o. female
- MFC defect
- 6 years of pain
- 4 arthroscopies for debridement, chondroplasty, microfracture
- Significant pain with ADL
- Unable to function at normal job
HemiCAP knee condyle
Post-op Radiographs
Case Example: Shoulder

- 68M, RHD
- Semi-pro senior golfer
- 2 yr h/o progressive R shoulder pain, nagging rest pain
- PE
  - Full AROM with pain, crepitus from 40-80 degrees abduction
  - Pain with ER in abduction
- Dx R shoulder OA
Treatment

- Shoulder arthroscopy
  - Outerbridge Type 4 changes in humeral head + glenoid
- Resurfacing
  - Standard deltopectoral approach
    - Access head thru upper ½ of subscapularis
  - 35mm implant
Treatment

- Pain free ROM at 2 weeks
- Golfing competitively at 6 months
- Now 18 months post-op
Potential Indications

- Patient with pain and/or loss of function who has the following types of humeral head damage:
  - Isolated
    - Trauma
    - Early OA
    - Iatrogenic lesions
  - AVN
  - Engaging Hill-Sachs
  - Reverse Hill-Sachs
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Indications
The HemiCAP® Patello-Femoral Resurfacing Prosthesis is intended to be used in cemented arthroplasty in patients with osteoarthritis limited to the distal patello-femoral joint, patients with a history of patellar dislocation or patellar fracture, and those patients with failed previous surgery (arthroscopy, tibial tubercle elevation, lateral release, etc.) where pain, deformity or dysfunction persists.

Patient selection factors to be considered include:
1) Patient’s need to obtain pain relief and improve function is significant;
2) Patient’s tibio-femoral joint is substantially normal;
3) Patient exhibits no significant mechanical axis deformity;
4) Patient’s menisci and cruciates are intact with good joint stability, and good range of motion; and
5) Patient’s overall well-being is good, including the ability and willingness to follow instructions and comply with activity restrictions.
Contraindications

**Absolute contraindications include:**
1. Defects that are not localized.
2. Inflammatory degenerative joint disease, rheumatoid arthritis, infection, sepsis, or osteomyelitis.
3. Patients that have a known sensitivity to materials typically used in orthopedic prosthetic devices or bone cements.

**Relative contraindications include:**
1. Uncooperative patient or patient incapable of following pre-operative and post-operative instructions.
2. Metabolic disorders, which may impair the formation or healing of bone; osteoporosis.
3. Infections at remote sites
4. Chronic instability or deficient soft tissues and other support structures.
5. Vascular or muscular insufficiency.
6. Inadequate skin, musculotendinous or neurovascular system status
Surgical Exposure
Arthroscopy – confirm indication, ??Lateral Release if necessary
determine and mark location based on clinical painful arc
Surgical Exposure

- Standard midline incision approach
- Medial parapatellar
- Medial parapatellar – MIS
- Subvastus approach
Arthrosurface - MIS P-F Technique
Arthrosurface - MIS P-F Technique
Arthrosurface - MIS P-F Prosthesis
With knee at 90 degrees flexion, locate the Drill Guide in an anterior position to develop a working axis normal to the trochlear articular surface. Place the Guide Pin into a Cannulated Powered Drill and secure at the etch marking on the Guide Pin. Advance Guide Pin into bone making sure that it is central to the defect. *(It is important to verify that the Drill Guide is seated on the curved surface such that all 4 points of contact are established on the articular surface. A normal axis is necessary for proper implant fit).*
Place the cannulated **Drill** over **Guide Pin** and drive until the proximal shoulder of **Drill** is flush to the articular surface. (Use lavage during drilling to prevent possible tissue damage from heat effects). Should the **Guide Pin** loosen, use the **Drill** to re-center the **Guide Pin** in the pilot hole and advance into bone.
Advance the Tap into the pilot hole to the etched depth marking.
Place the **Hex Driver** onto the **Fixation Stud** and advance **Fixation Stud** until the line on the **Hex Driver** is flush with the contour of the native cartilage surface.
Clean the taper in the **Fixation Stud** with **Taper Cleaner**. Place **Trial Cap** into **Fixation Stud** to confirm correct depth of **Fixation Stud**. The height of the **Trial Cap** must be flush or slightly below the existing articular cartilage surface to avoid the **Femoral Resurfacing Component** from being placed proud or above the surface of the defect. Adjust depth if needed using the **Driver** to rotate the **Fixation Stud** (rotate clockwise to advance and counterclockwise to retract). Remove **Trial Cap**.
Place the **Centering Shaft** into taper of **Fixation Stud**. Place **Contact Probe** over **Centering Shaft** and rotate around shaft. Use light pressure on the **Contact Probe** to ensure proper contact with the articular surface.

Read **Contact Probe** to obtain positive (+) superior and inferior offsets, and negative (-) medial and lateral offsets. Mark each of the identified offsets on the appropriate sizing card. Use the sizing card to record the **maximum** superior/inferior offset and the **minimum** medial/lateral offset.
Reamer is 3.0 mm (based on + size)
Remove **Centering Shaft** and replace with **Guide Pin**. Advance **Circular Scalpel** onto the articular surface to create a cut through the articular surface.
Choose the appropriate Femoral Reamer based on the *maximum superior/inferior (+)* offset from the sizing card. Confirm selection by matching the color code on the Femoral Resurfacing Component package with the colored band on the Femoral Reamer shaft. Advance Femoral Reamer over Guide Pin until it contacts the top surface on Fixation Stud. (Use lavage during drilling to prevent possible tissue damage from heat effects) Make sure not to bend the Guide Pin during drilling as it may result in Femoral Resurfacing Component malalignment.
Place the **Sizing Trial** into the defect that matches the offset profile of the chosen **Femoral Resurfacing Component**. Confirm the fit of the **Sizing Trial** so that all margins are congruent or slightly recessed to the edge of the surrounding articular surface.
Clean taper in **Fixation Stud** with **Taper Cleaner** and remove any debris from the surrounding implant bed.
With knee at 90 degrees flexion, locate the **Alignment Guide** so that the pin fits into the **Fixation Stud**. While observing range of motion, identify target placement of the **Patella Component** using the pointer on the **Alignment Guide** to transfer **Fixation Stud** central axis. Use slight pressure against the patella so that the pointer on the **Alignment Guide** creates an indentation on distal patella surface.
Prior to placing the **Femoral Resurfacing Component** on the **Implant Holder**, make sure that sufficient suction is present to hold the device on the distal suction cup. Align the **Femoral Resurfacing Component** on the **Implant Holder**. Make sure to orient the etch marks on the back of the **Femoral Resurfacing Component** with the etch mark on the handle of the **Implant Holder**. Align the **Femoral Resurfacing Component** with the appropriate offsets. Insert into taper of **Fixation Stud**.
Firmly mallet the **Impactor** until the **Femoral Resurfacing Component** is completely seated.
Place the **Drill Guide** so that its central axis passes through the indentation on the patella surface. Drill the **Guide Pin** through until it engages the opposite cortex of the patella. *(It is important to verify that the Drill Guide is seated on the curved surface such that all 4 points of contact are established on the articular surface. A normal axis is necessary for proper implant fit)*.
Remove the **Drill Guide**. Advance **Circular Scalpel** onto the articular surface to create a cut through the articular surface.

Place the cannulated **Drill** over **Guide Pin** and drive until the *distal* shoulder of **Drill** is flush to the articular surface. (Use lavage during drilling to prevent possible tissue damage from heat effects). Should the guide pin loosen, use the **Drill** to re-center the **Guide Pin** in the pilot hole and advance into bone.
Using a powered drill, advance the **Patella Centering Shaft** over the **Guide Pin** until it reaches the first or most distal laser marked depth marking.
Place the **Contact Probe** over the **Patella Centering Shaft**. Read the **Contact Probe** to take medial, lateral, superior, and inferior offsets and mark them onto the appropriate sizing card.
Patello-Femoral
Patella Component

Sizing Card

1. Maximum SI
Maximum MM

2. Select HemiCAP® offset values
If no match is found, use the next highest offset value

1.0 mm x 2.5 mm
1.0 mm x 3.0 mm
1.0 mm x 3.5 mm
1.0 mm x 4.0 mm
1.0 mm x 4.5 mm
2.5 mm x 2.5 mm
3.0 mm x 3.0 mm
3.5 mm x 3.5 mm
4.0 mm x 4.0 mm
4.5 mm x 4.5 mm

3. Select Surface Reamer size
Choose the Surface Reamer that matches the highest offset value.

fill in all 4 circles
Choose the appropriate **Patella Reamer** based on the *appropriate* offset values from the sizing card*. Advance **Patella Reamer** over the **Patella Centering Shaft** until it contacts the blade stop. (Use lavage during drilling to prevent possible tissue damage from heat effects).

* Begin reaming with the 2.5mm reamer and then use the trials, progressing from the lower to higher values to determine the best fit intraoperatively.
Load a loop of suture through the appropriately sized **Patella Sizing Trial** and place into the prepared area.
Confirm the fit of the **Patella Sizing Trial** so that all margins are congruent or slightly recessed to the edge of the surrounding articular surface.
Patella Component: Ultra-High-Molecular Weight Polyethylene (UHMWPE)
Apply a small amount of low-viscosity bone cement onto the underside of the **Patella Component** and quickly place into position.

Prior to placing the **Patella Component** on the **Implant Holder** make sure that sufficient suction is present to hold the device on the distal suction cup. Align the **Patella Component** on the **Implant Holder**. *(When using the Anatomic Patella Component make sure to align the orientation divots with the superior and inferior poles of the patella)*
Using the **Patella Clamp**, place the *Anatomic or Button* contacting surface against the **Patella Component** and the opposed surface in-line behind the patella. Tighten the **Patella Clamp** until the **Patella Component** is firmly seated in the prepared socket. Leave the **Patella Clamp** in place while the bone cement adequately cures. Remove the **Patella Clamp** and clean out any remaining exposed cement.
Complete implantation of the Femoral Resurfacing Component.
Case Study

- Arthrosurface Patello-Femoral Resurfacing
  - 20mm trochlea - cemented
  - 20mm patella – cemented

- 33 y.o male
  - Traumatic injury to patella and trochlea
  - s/p microfx, osteotomy, patellar and trochlear allograft OATS
  - Painful arc from 20 – 60 degrees of flexion
THANK YOU

ORTHOPAEDIC SURGERY
Thank You
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