Partial and Total Knee Replacement

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Disclosures

- Consultant, Depuy
- Consultant, Medtronic
- Consultant, Smith and Nephew
- HealthTrust PG Orthopaedic Advisory Board
Goals for Knee Reconstruction

- Pain Relief
- Improved Function
  - Good Stability
  - Good ROM
- Durable
- Reproducible
- Efficient
- Cost-effective

The knee is three articular compartments!
With complex ligament dynamics!
Follow pioneers... but not blindly!

Remember: What are we treating?

- Arthritis = joint destruction = PAIN
  - Osteoarthritis
  - Inflammatory
  - Post-traumatic
- Stiffness / Loss of ROM
- Instability / Ligament Dysfunction
- Deformity
Partials cannot…

- Take away pain from a global joint problem
- Improve significant contractures
- Improve significant deformities
- Improve cruciate ligament dysfunction
- Improve collateral ligament dysfunction

How many patients do not have any of these problems?
• If out of alignment, tread gone everywhere = TKA
• If, *and only if*, reasonable alignment, isolated disease, intact stability, then *partial* is successful…
Indications for a Uni – 5%

“Intraoperative findings in varus osteoarthritis of the knee”


- 4021 patients with preop isolated varus OA
- 247 patients (6%) intraop isolated medial disease
- 168 patients (4.3%) met clinical criteria
Possibly more Uni’s

- Retrospective Analysis of Total Knee Arthroplasty Cases for Visual, Histological, and Clinical Eligibility of Unicompartmental Knee Arthroplasties
  - Sally Arno, MSc,* Diana Maffei, BA,* Peter S. Walker, PhD,* Ran Schwarzkopf, MD,* Panna Desai, MD,y and German C. Steiner, Mdy
  - Journal of Arthroplasty in press

- 97 patients undergoing TKA, 7 surgeons
- Visual look at lateral and Patellofemoral
- Histology
- Absence of contraindications for UNI
- 21% were candidates for UNI
DeBoer’s Warning….

- Very few patients meet the strict criteria for Unicondylar knee replacement.

- Most inferior results occur when the surgeon expands the indications for partial knee replacement.
TKA Results

- Pubmed search – Long term results of TKA
- Greater than 30 English articles
- Usually 10 – 20 years
- Survivorship 80% +, often > 90%!
- Knee scores mid 90’s

- All this means: many “happy patients”
Why bother with partials?

- **Minimally invasive?**
  - Less blood loss, faster recovery, shorter inpatient stay
    - Remember these are people with less disease
    - TKA is a big operation, but getting better and better

- **More natural kinematics: normal feeling knee?**
  - TKA’s do feel mechanical, but designs are improving

- **Categories of patients that are not great for TKA?**
  - Elderly: low demand, high risk from operation
  - Young: high demand, high risk for TKA wear: “bridge”
Partials often fall short (aka contraindications)

- Inflammatory arthritis
- ACL insufficiency (will wear)
- Multiple compartment wear
- Cannot correct deformity
- Stiffness
- Subluxation
- Obesity (tibial loosening)
UNI Results

- 10+ article of 5-13 year results, not as long F/U
- Excellent outcome scores, lower survivorship:
  - around 80 to 95% at ten years across studies
- Early failures related to patient selection / surgeon
- Late failures due to progression of OA
- Outcomes much more implant & surgeon specific
  - Design, Generation / Evolution, Instrumentation
Volume Effects

- **Oxford Uni results**
  - Low volume surgeons ( < 10 uni’s / yr) – 15-25% failures less than 5 years
  - High volume surgeons (> 30 uni’s / yr) - < 5% failures at 8 years.
  - Overall around 90% survivorship at ten years

- **Confirmed across all UNI designs in Norwegian registry data, Furnes, JBJS 2007**

Data collected from 1994 to 2004
Revision UNI to TKA

- Not so simple!

  - 50% of cases required long stems and revision implants.

  - 9-23% metal augmentation
  - 27-45% bone grafting
13% to 75% required stems and metallic augments

- Revision reason
- UNI type
Uni Revision to TKA

  - Järvenpää J, Kettunen J, Miettinen H, Kröger H.
  - 49 pts, pain and stiffness higher in uni revisions
  - WOMAC scores worse than primary TKA
UNI Revision to TKA 2012

- Revision of Minimal Resection Resurfacing Unicondylar Knee Arthroplasty to Total Knee Arthroplasty: Results Compared With Primary Total Knee Arthroplasty.
  - 2 to 4% stems and augments
  - 40% bone grafting

- Unicompartmental knee arthroplasties revised to total knee arthroplasties compared with primary total knee arthroplasties.
TKA in Young Patients


Compare UNI vs. TKA

Octagon Matchup...20th round

- **Unicompartmental versus total knee arthroplasty database analysis: is there a winner?**
  - Lyons MC, MacDonald SJ, Somerville LE, Naudie DD, McCalden RW.
Save the partials for these guys!

- Isolated Unicompartment OA
- Intact ACL
- Varus Deformity < 10 degrees (deformity should be passively correctable after removal of osteophytes)
- Valgus Deformity < 15 degrees
- Flexion contracture < 5 degrees
- Weight < 80 kg (180 lbs)
- ROM > 90 degrees

Why TKA is Preferred to Uni

1. Ideal indications for a Unicondylar Arthroplasty are uncommon (*The general orthopaedic surgeon would have 2 to 3 candidates per year*)
2. The long-term survivorship have been inferior when compared to TKA, especially in young patients.
3. The surgical technique is more difficult than with tricompartment arthroplasty.
4. Revision to conventional TKA can be complex.
HOLD IT! WAIT A MINUTE!
Performance to patient expectations

- 2 Arms (TKA v Normal Knee)
- Age and Gender matched arms


- 243 TKA Patients v 257 individuals
- Performance to expectations was poor
Performance/Satisfaction of TKA’s v THA?

- Post THA: sports activities increased from 36% to 52%
- Post TKA: sports activities decreased from 42% to 34%

*The Ulm Osteoarthritis Study- K Huch*

- Up to 20% of patients are not satisfied with the outcome following total knee replacement
- Only 82% to 89% of primary TKA patients are satisfied

*J Bone Joint Surg Br. 2010 Sep;92(9): Scott CE, Howie CR, MacDonald D, Biant LC*
*Clin Orthop Relat Res. 2010 Jan;468(1):57-63: Bourne RB, Chesworth BM, Davis AM, Mahomed NN, Charron KD*
Is gait altered after TKA?

- Velocity ↓
- Stride length ↓
- Mid-stance knee flexion (quad avoidance gait)
- Max knee flexion during stance and swing phases

Dorr, CORR 1988
Kramers, JOA 1997
Saari, Acta Orthop 2005
Andriacchi, JBJS-A 1982
Does any of this affect muscles?

- Consistent greater quadriceps muscular effort on the Conventional TKA versus non-operated leg (7231.1 vs 2547.3 at p=0.0267)

- The average EMG amplitude was greater for the Conventional TKA versus the non-operated leg (43 vs 16 at p=0.035)

- Conventional TKA displayed 3x quad effort versus non-operated leg

Lester DK. Objective Sagittal Instability of CR-TKA by Functional EMG During Normal Walking.
AAOS. 2012; Presentation No. 810
Why Uni is Preferred to TKA

1. Less Risk:
   - infection, stiffness, bleeding, DVT/PE

2. Faster Recovery
   - less pain, off aids, back to work

3. Higher postoperative function

4. Feels better with more normal kinematics

5. Higher patient satisfaction
The Future

- More randomized, controlled trials
- Mixed compartment resurfacing
- Knee reconstruction with preservation of ligamentous structures to improve kinematics
- Better Uni, Dual, and Tricompartmental Designs!
- Have to balance new theoretical improvements with long-term success rates:
  - Patient Outcome Measures and Survivorship
Back to the Present...

basic needs are unchanged

- Good patient selection, right operation
- Good technical execution
- Appropriate postoperative care
  - Medical
  - Surgical
  - Physical Therapy
  - Psychosocial

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**BASIC NEEDS FOR SURVIVAL**

**THEN**

- FOOD
- WATER
- SHELTER
- CLOTHING

**NOW**

- FOOD
- SHELTER
- WATER (optional)
- INTERNET

PUBLIC WIFI!!
Awww YEAH STARBUCKS!
• **Postoperative Care**
  – **AVOID**
    • Infection
    • Wound breakdown
    • DVT / PE
    • Stiffness
  – **GAIN**
    • Pain control
    • Independence
    • ROM, stability, strength, and function
Knee Recovery Priorities

1) Avoid medical complications
2) Avoid wound problems / drainage / infection
   Hold ROM / PT 24-48 hours and restart when dry
3) Gain ROM    (100 degrees by 4 weeks, 120 by 8)
4) Gain function / independence
5) Gain strength
Summary

• Both UNI and TKA improve patient outcome measures significantly
• UNI is less morbid operation with faster recovery
• TKA survivorship is better than partial knees!
• Conversion of Uni is a complex (not primary) TKA
• Patient selection, implant design, surgical technique and postoperative care are critical for success!
Thank You

The “Scenic City”

Chattanooga, Tennessee

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