Unicondylar Knee Vs Total Knee Replacement: Is Less Better In the Middle Aged Athlete

Chair: Maurilio Marcacci, MD

Alois Franz "Basic principles and considerations of the Unis"

Joao M. Barretto "Sport activities and unicondylar replacement of the knee"

Fred Cushner "Total knee arthroplasty is best for the middle aged patient”

Chitranjan Ranawat “Tricompartmental total knee, fixed and mobile bearing, in the middle aged athletes: Evidence Based Justification

John Bartlett "Why UKA is better but also why you revise them more than TKA"
Sports activity and knee arthroplasty

The sports activity has been growing around the world, and increasingly elderly patients want to remain active, even after major orthopedic surgeries such as joint.

We, as surgeons, are always very worried about fractures, abrasions, drops, after performing any type of joint reconstruction. However, scientific studies and the patients' own initiative, has been extending our concepts of what is allowed to practice after knee replacement.

The theme is frequent object of discussions, and we cannot say that there is consensus. Our guideline comes from concepts drawn by knee Society exposed in the table below.

<table>
<thead>
<tr>
<th>Athletic Activity After Total Joint Arthroplasty</th>
</tr>
</thead>
</table>

William L. Healy, Sanjeev Sharma, Benjamin Schwartz and Richard Iorio

This table shows two distinct moments of evaluation, and noted that from 1999 to 2005, various sports have been included and considered safe after performing knee arthroplasty.

However, I think each case should be considered individually, because the variation of age, physical activity level pre-operative, general health, type of implant used, among other factors, must be considered.

I think that in those patients practicing sports, post operative evaluations, clinical and radiographic, should be held more frequently, in an attempt to detect early any problem.
Unicondylar Knee vs. Total Knee Replacement:  
Is Less Better in the Middle Aged Athlete?

Unicompartmental Knee Arthroplasty (UKA) is an established procedure but has been controversial for three decades. Initial results from NYC in the early 1970’s were discouraging, however, Introduction of newer techniques of exposure and design improvements have made this procedure quite popular in recent years. UKA is now being performed with increasing frequency in younger patients. Original selection criteria was:

1. Elderly Patient
2. Non-inflammatory osteoarthritis
3. Mechanical axis deformity <10 (varus)
4. Intact ACL without M-L subluxation
5. Flexion contracture <15 degrees
6. Body weight < 80-90 kilograms
7. P-F joint may have grade II-III changes

However, only 6% of patients fulfill these selection criteria.

We conducted a long-term follow-up report of all-polyethylene tibial components in 32 younger, active patients. Good to excellent results were achieved in 96% of patients. The mean WOMAC and KSS scores were 31 and 97 respectively. Sixty-two percent of patients were participating in sport activities such as running, gym exercises and playing tennis or golf, with a mean UCLA score of 7.2. There were no cases of malalignment, aseptic loosening, excessive wear or osteolysis. Seven patients (9 knees) had incomplete, non-progressive demarcation at the zone 1 tibial interface. Kaplan-Meier survivorship at 10 years for revision due to mechanical reasons and for all failures was 97.7% and 95.5% respectively.

In another prospective study we analyzed the long-term results uni-directional rotating platform posterior stabilized (RP-PS) design in young, active patients. Between January 2000 and October 2001, 117 near-consecutive patients (138 knees) received cemented RP-PS total knee replacements (TKR). All patients were followed prospectively using clinical and radiographic criteria as defined by the Knee Society. At 10 years follow-up 20 patients were deceased and 11 were lost to follow-up, leaving 89 patients (106 knees) for final analysis. Good to excellent results were achieved in 95% of patients. There were no cases of malalignment, spinout, aseptic loosening or osteolysis. The mean ROM improved from 111.2 to 119 degrees. The mean KSS scores improved from an average of 48 to 96. The incidence of any post-operative pain was 14%, half of which was anterior. The incidence of asymptomatic crepitation and painful crepitation requiring scar excision were 9.4% and 3.8% respectively. Kaplan-Meier survivorship at 10 years for revision due to failure for mechanical reasons was 100% and survivorship for failure for all causes was 97.8%.

Reasons for failure in UKA

1. Patient Selection
2. Difficult learning curve, esp. with MB UKA
3. Prosthetic Design
4. Component positioning
5. Cement technique
6. Over or under correction
7. Mechanically overloaded

Level I and II Evidence for UKA:
- Short-term good to excellent results in 90%
- Failure Rate increases with longer follow-up
- At 10 - 15 years failure rate is between 15% - 30%

Australian Registry 2009:
- UKA Failure 12 - 18% At 8 yrs in younger pts (<65)
- TKA Failure 7 - 12% At 8 yrs in younger pts (<65)

British National Joint Registry 2010:
- Uni failure 9.4% At 5 yrs
- TKR failure 3% At 5 yrs

Finnish Registry: UKA of 1,819 patients:
- UKAs had a 27% (95% CI: 70-76)
- revision rate at 10 years

Swedish Registry, 2009:
- 3 times higher revision rate in UKA
- UKA Learning curve/revision rate did not change over last 3 decades

Positive Features of UKA:
- Improved kinematics
- Preserves cruciates
- Quick recovery
- Better quality and activity level than TKA

Negative Features of UKA:
- Limited and precise indications
- Steep learning curve
- Experience and volume matters
- Cement technique - difficult
- Unexplained pain
- Higher failure due to wear and loss of fixation
- Progression of lateral or PF compartment

UKA indications:
- Antero-medial OA
- Intact ACL
• Full thickness lateral
• Correctable varus
• FFD less than 15°

Conclusion: UKA is
• Extremely variable learning curve
• Indications should be precise
• Technically somewhat difficult
• Experience and volume matters
• Higher failure rate compared to TKA
• Results of fixed and mobile are similar

Future Direction:
1. Precise Indications for UKA
2. Cementless Fixation
3. Design improvement:
   Mobile vs. Fixed Bearing
4. Computer Assisted Surgery
5. Patient specific instruments/implants (Conformis)
6. Haptic Robotic UKA (MAKO)
7. Specialized centers and high volume surgeons

Precision of bone preparation with newer instrumentation and haptic robots along with proper cement technique have increased its durability. However, patient selection to identify isolated unicompartmental disease, proper execution of the procedure due to long learning curve and overloaded interface progression of the disease in other compartments, remain challenging issues. Registry data suggest that the learning curve is steep and with all the improvement in patient selection, design and techniques, still has a higher failure rate than conventional total knee replacement in 5 – 10 year follow-up. A well-aligned and properly fixed UKA in selected patients provides earlier recovery, better kinematics with higher satisfaction compared to TKR.
Abstract / Handout:

Dr. Alois Franz
ISAKOS ID& 64407

Basic Principles and Considerations of Unicompartmental Knee Replacement

Dr. Alois Franz
Hospital for Orthopedic Surgery and Sportmedicine
D- Siegen Germany

In the last ten years the interest in unicompartmental knee replacement is increasing regarding the advantages over total knee arthroplasty. Several studies have shown a better range of motion and ambulatory function; similar kinematic patterns to normal knees, ACL retention for better proprioception or joint position sense and preserves more of the articular geometry.

To be successful with uni compartmental devices you have to be aware of the indications of a unicompartmental osteoarthritis with preservation of other compartments and ligaments and no major fixed deformity. The indications including an intact/sufficient ACL/PCL, less than 10° to 15° flexion contracture, correctable deformity less than 10° varus or valgus, an asymptomatic patellofemoral disease – you could ignore small areas of full thickness loss in opposite compartments.

It is important to take into consideration of the contraindikation: inflammatory arthritis, extraarticular deformities, fixed flexion contracture more than 10°, significant patellofemoral pain and functional ACL laxity.

At uni knee arthroplasty you can ignore age, sex, weight, chondrocalcinosis, and especially small areas of full thickness loss in opposite compartment if clinical asymptomatic.
The principles of the surgical technique based on a neutral or slightly varus tibia cut with $3^\circ - 7^\circ$ posterior slope for medial uni arthroplasty and a internal rotated sagittal tibia cut with $0^\circ$ slope for the lateral uni replacement.

Using fixed bearing Unis as resurfacing type or resecting type or using mobile bearing Unis a lot of studies have shown a long term survivorship over 10 years more than 90%.

In conclusion the principles of Unicompartmental surgery are a correct indications combined with careful and precise technique getting a successful result and an excellent clinical outcome.