Tibial Design Considerations in Unicompartmental Knee Arthroplasty

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TKA 68%

HTO 9%

Knee Surgery 12%

UKA 12%

Men Tx (incl. CMI) 71%

- Fixed-bearing vs mobile-bearing design
- Clinical results: Literature
- Conclusion

Implant types: Fixed-bearing vs Mobile-bearing Design

- Fixed-bearing Design
  - Metal-backed
  - All polyethylene

- Mobile-bearing Design

Fixed-bearing Designs

- Metal backing
  - 1980s (eg Robert-Brigham)
  - More even distribution of stress
  - Modular
  - Disadvantage: Thinner polyethylene liner or larger tibial cut is needed

Mobile meniscal bearing Designs

- Oxford (Biomet)
  - Fully congruent (ie constant radius)
  - Uncaptured straight track
- LCS (Depuy)
  - Dovetail radial track → reducing dislocation risk

- Purpose: optimize congruency → minimizing point tibial contact forces and stress at implant fixation interface
Minimise wear by increasing contact area without increasing constraint.

- Mobile bearing design
- Spherical femoral articulating surface
- Flat polished CoCr tibial plate
- Bearings designed to reduce anterior impingement

**Anatomy - Spherical condyles**

**Spherical condyles**

- Alignment of femoral and tibial component less critical

**Contact Area**

- Oxford
- LCS
- PFC
- MG1 F
- MG2
- MQ
- PEA
- TKA +
- AMK ±
- AAMK

**The results**

- Improve function by allowing rollback and working with soft tissues
  - Meniscal bearing design.
  - Movement of bearing dictated by ACL & PCL.
Metal-backed vs All-poly:
- No difference in clinical results or migration at short term
- Long-term undetermined


Clinical results: Mobile bearing

Price et al 2005:
- Oxford meniscal-bearing
- Thinnest polyethylene 3.5mm
- No degradation in outcome with thinner PE
- 93% survival at 15 year in 439 knees
- Congruency and resulting decrease in contact stress may obviate need for thicker (> 6mm) inserts → supports surgical principle of minimizing tibial bone cut thickness


Emerson et al 2002:
- Retrospective review, 2 time periods
- Loosening and revision
- Oxford mobile bearing 99% survival
- Robert-Brigham fixed-bearing (J&U) 93% survival


Clinical results: Mobile vs Fixed-bearing

- Lewold et al. 1995:
  - Swedish multicenter survival study
  - Oxford mobile bearing vs Marmor fixed-bearing
  - 6 year revision rate Oxford more than twice than Marmor
  - Most common: PE dislocation in Oxford (especially early in learning curve)


- Smith et al. 2009: Meta-analysis
  - Clinical, radiological and kinematic outcomes
  - No significant difference
  - Only 5 of 737 studies met inclusion criteria


Clinical results: Mobile vs Fixed-bearing

- Primary reasons for revision:
  - Fixed bearing: tibial component failure
  - Mobile bearing: progressive arthritis lateral compartment


Conclusions

- Survival rates between 90 and 98% at 10 years
- Fixed- vs mobile-bearing:
  - Overall comparative data remain mixed
  - Larger, long-term follow-up studies may be needed to determine any true difference

- Patient Selection
- Surgical technique & experience!!

Thank you for your attention!!!