

Outcomes of Total Knee Arthroplasty (TKA)

Moderator summary of key points from Dr. Glen Richardson's presentation at the 3rd CAS Introduction to Arthroplasty Fundamentals Course – Knee Module

1. Evolution of Implant Design

- **Early Designs:** Primitive interpositional devices aimed at reducing pain with poor fixation and function.
- **Modern Designs** (post-1970s): Introduction of polyethylene for bearing surfaces and focus on kinematics, including patellofemoral joint function. Current implants are right/left specific with more anatomic alignment for better patellar tracking.

2. Implant Geometry

- **Sagittal Radius:**
 - Traditional implants use a J-curve with changing radius (multi-radius designs).
 - Some newer implants adopt a **single-radius** design, debated for better feel/stability in flexion.
- **Ligament Considerations:**
 - The posterior cruciate ligament (PCL) may be retained or removed, influencing implant selection.
 - Medial pivot designs replicate natural knee kinematics with a stable medial side and mobile lateral side.

3. Types of Polyethylene Inserts

- Posterior stabilized (PS): Uses a post to replace PCL.
- Cruciate retaining (CR): Requires intact PCL.
- Cruciate substituting: Designed for deficient PCL without a post.
- Medial pivot: Conforming medial side, flat lateral side.
- Constrained implants: For more complex or revision cases.

4. Fixation Methods

- **Cemented** (most common): Both femur and tibia.
- **Cementless:** Allows bone ingrowth, increasingly effective with modern porous materials like trabecular metal and 3D-printed titanium.
- **Hybrid:** Cemented tibia, cementless femur.

5. Unicompartamental and Bicompartmental Arthroplasty

- Target specific knee compartments (medial, lateral, or patellofemoral).
- Preserves more bone and ligaments, may offer more natural knee function.

6. Outcomes and Registry Data

- **Patient-Reported Outcomes:** TKA shows excellent improvements in Oxford scores and EQ-5D, though slightly lower satisfaction rates than total hip arthroplasty.
- **Failures:** Most common causes include infection, aseptic loosening, and instability.
- **Revision Rates:**

- Younger patients and males have higher revision rates.
- Patellofemoral replacements and unicompartmental knees show higher failure rates.
- CR implants with patella resurfacing perform best in terms of survivorship.
- PS implants without patella resurfacing perform worst.

7. Fixation Insights from Registries

- Cementless fixation may be less reliable in CR implants but performs comparably to cemented fixation in PS designs.
- In men <65, cementless fixation appears to have lower revision rates than cemented; in older patients and women, the difference diminishes.