The Impact of Constraint on Revision after Primary Total Knee Arthroplasty for Osteoarthritis; A Ten Year Review of 113,001 Cases using the Most Commonly Implanted Knee System from the UK National Joint Registry

Patrick Hickland[1], Roslyn Cassidy, Richard James Napier, Owen J Diamond
[1]Outcomes Unit, Primary Joint Unit, Musgrave Park H

INTRODUCTION:
Traditionally, the constraint required when performing primary total knee arthroplasty (TKA) was in part dependent on whether the approach was cruciate-retaining (CR) or –sacrificing, with the latter affording easier surgical access and gap balancing, but requiring the use of a posterior-stabilised (PS) implant. This increase in constraint is an attempt to diminish any resultant instability, but may be at the expense of increasing aseptic loosening, particularly with the cam-post interaction potentially transferring stress to the tibial component-bone interface. Modern knee systems have introduced meniscal bearings with increased congruency, theoretically allowing cruciate sacrifice without the need for a post. This study aims to investigate survivorship after each of these three implant designs within a single knee system
METHODS:
We obtained data from the United Kingdom (UK) National Joint Registry (NJR), on patients undergoing primary TKA for osteoarthritis between 1st January 2010 and 31st December 2019, using the now most commonly used TKA system in the UK. We excluded patients with an implausible body mass index (BMI, <10 or >60 kg/m^2), or where there was use of bone graft, revision implants or a hybrid approach to cementation.
RESULTS:
113,001 relevant cases were identified; 68,373 (60.5%) were CR, 25,804 (22.8%) were CS, and 18,824 (16.7%) were PS. There were the following differences in baseline characteristics (all $p<0.001$); female gender (56% vs 57% vs 58%), median age (70 vs 70 vs 71 years), use of cement (96% vs 97% vs 94%), patella resurfaced (36% vs 46% vs 61%), and time from implantation (6.6 vs 5.7 vs 6.8 years). Revision rates were highest in PS knees ($p<0.001$); all-cause (2.2% vs 1.9% vs 2.8%) and aseptic loosening (0.3% vs 0.3% vs 0.6%), but not for instability or dislocation/subluxation. Use of a PS implant was independently associated with a greater risk of all-cause revision (adjusted cox regression HR 1.36, 95% CI 1.21-1.53).
DISCUSSION AND CONCLUSION:
Analysis of this large registry level dataset of a single implant system has demonstrated that the use of a primary PS-TKA to treat osteoarthritis is associated with poorer implant survival at a median of 6.5 years post-operatively. Given that high congruency meniscal bearings can permit cruciate sacrifice and its resulting benefits, it may be that there is less of a role for PS implants in this patient population.