CLINICAL AND RADIOLOGICAL COMPARISON OF UNICOMPARTMENTAL VS PATELLOFEMORAL VS TOTAL KNEE ARTHROPLASTY

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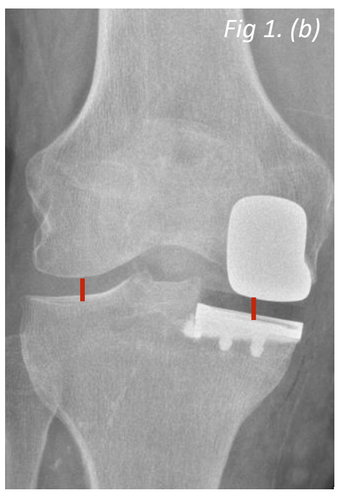
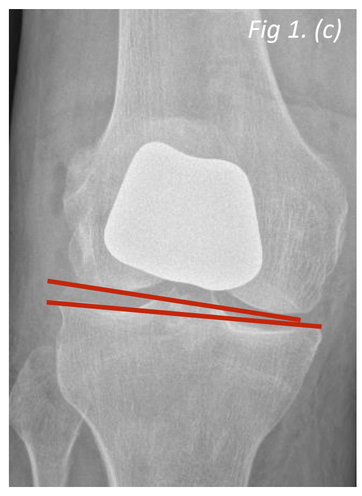
INTRODUCTION

Knee osteoarthritis is an age-related disease with significant burden on the UK population(1,2) The knee joint comprises of 3 compartments; the medial and lateral tibio-femoral joints (TFJ), and the patella-femoral joint (PFJ). Arthritis affects each compartments non-uniformly, and uni-compartmental disease is common.(3) Whilst total knee arthroplasty (TKA) is successful, in some cases it can be over-zealous due to resection of healthy joint tissue. Joint preserving arthroplasty, such as uni-compartmental/patello-femoral joint arthroplasty (UKA/ PFJA respectively), could potentially produce better outcomes by preserving native tissue.

TKA (AP view)
Joint Line Congruence Angle



UKA (AP view)
Joint Space Width



PFJA (AP view)
Joint Line Congruence angle

PFJA (Lateral view)
Insall-Salvati Ratio

AIMS

- ❑ Collate pre-op and post-op radiological measurements alongside Patient Reported Outcome Measures (PROMs) for TKA, UKA and PFJA.
- ❑ Complete **within** and **between** group statistical analysis of radiographic and clinical outcomes for the three surgeries followed by correlation analysis.
- ❑ Identify differences in outcomes across the operations and evaluate the merits of each operation.

METHOD

This study included 72 TKAs, 37 UKAs and 20 PFJAs. Key radiological measurements included femoral shaft- tibial shaft angle, hip–knee-ankle angle, joint space width (JSW), joint line congruence angle (JLCA), patellofemoral joint space, Insall-salvati ratio (image 4) and patellar tilt. Blood test data was also collected (FBCs and U&Es).

PROMS

- ❑ Oxford Knees Score (OKS)
- ❑ Knee Osteoarthritis Outcome Score (KOOS)
- ❑ 12 item short form survey (SF-12)
- ❑ Self-administered Co-morbidity Questionnaire (SCQ)
- ❑ Euro-Qol 5-Dimension 5-Level (EQ-5D-5L)

RESULTS

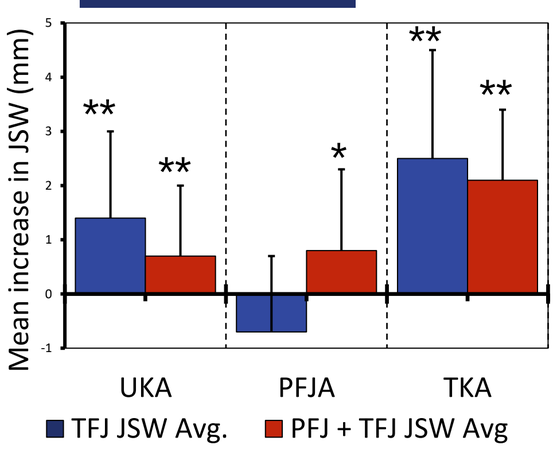


Fig. 2. Joint Space Widths (JSW) changes

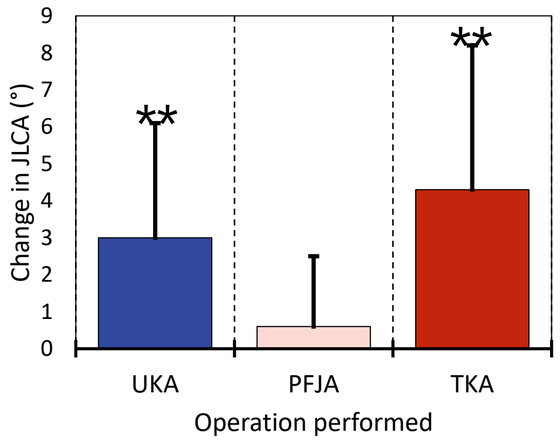


Fig. 3. Joint line congruence angle (JLCA) increase post-op

Radiographic Outcomes

UKA and TKA demonstrated improvements in mean tibiofemoral joint space width (TFJ JSW) and reduced JLCA, reducing TFJ asymmetry. This is not seen in PFJA knees as the TFJ is left untouched. All three surgeries caused significant increases in combined mean joint space.

Blood Tests

TKA patients experience greater falls in Hb and platelets than UKA, **(Fig.4.).** 31% of TKA patients were anaemic post-op. (Defined as <130 g/L males and <120 g/L females).

This suggest that there is a greater level of blood loss in TKA.

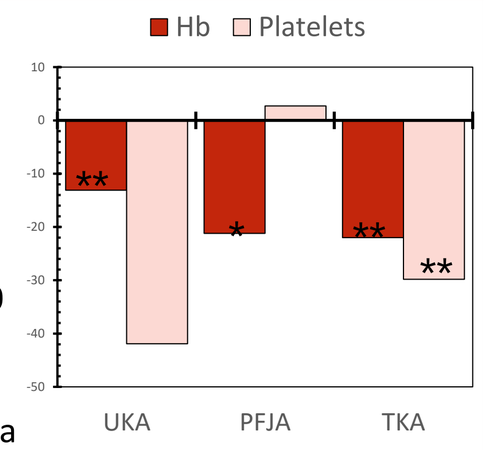


Fig. 4. Post-op change in platelets/ Hb

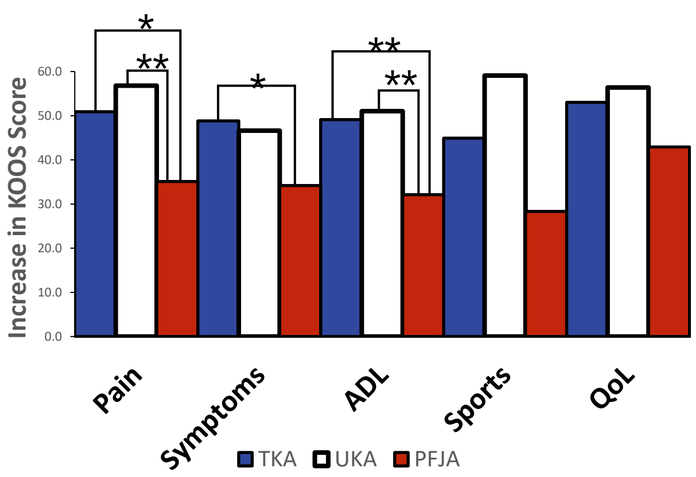


Fig. 5. Increases within KOOS subsection.

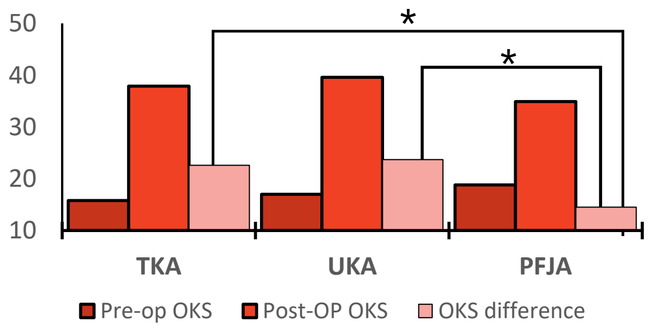


Fig. 6. Comparing increases in OKS.

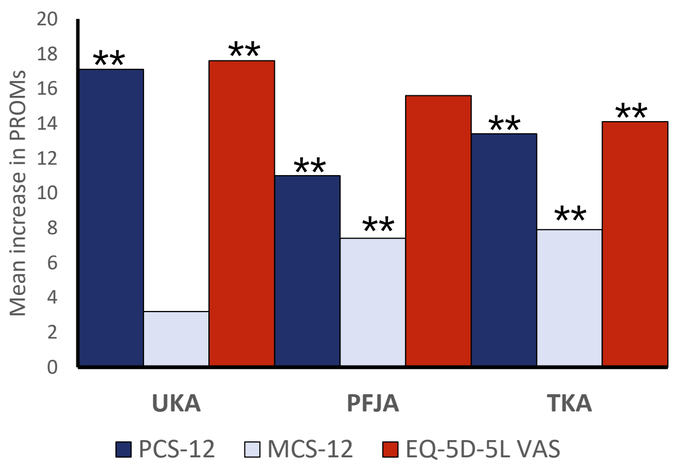


Fig. 7. Comparing increases in PROMs.

PROMs

TKA had greater improvements than PFJA in KOOS pain, symptoms and ADL scores. UKA also experienced greater improvements than PFJA in KOOS pain and ADL subcategories, **(Fig. 5.)** The increase in OKS scores post-operatively is significantly larger in UKA and TKA groups than PFJA, showing PFJA generates smaller increases in OKS score **(Fig. 6.)** All surgeries resulted in significant improvements in OKS, KOOS, SF-12 (PCS), and both components of the EQ-5D-5L score. Additionally, TKA and PFJA knees showed improvements in their SF-12 (MCS) scores **(Fig 7.)**

Key: *= p<(0.05), ** = p<(0.01), *N.S.*= p>0.05

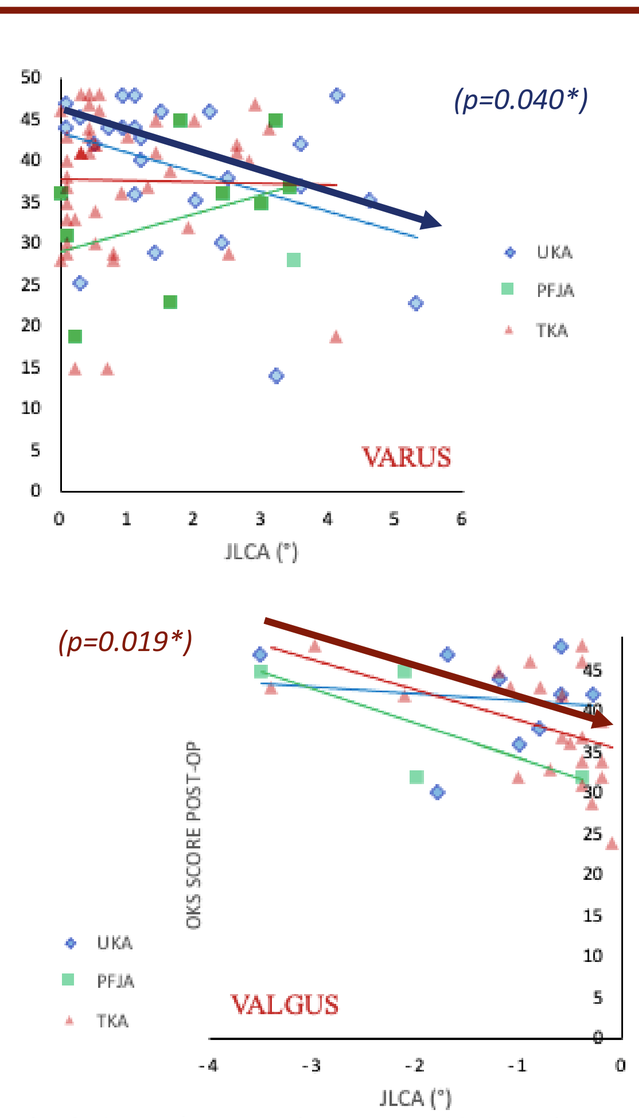


Fig. 8. A graph comparing post-op JCLA against Post-op OKS scores when separated into varus and valgus alignment.

Correlation analysis

JLCA showed improved OKS when the knee was in valgus for TKA. For UKAs, greater scores were seen when the knee was in more varus.

CONCLUSION

All compared surgeries improved their target joint space width and PROM scores however poor correlation is seen between them. This is supported by other studies showing a weak relationship between outcome scores and radiological measurements.(4)

TKA patients experience significant loss in Hb and platelets post-op and 31% are anaemic as a result.

PFJA showed smaller increases in OKS and KOOS scores than TKA and PFJA, **(Fig. 5, Fig. 6.)**

JLCA correlation suggests that UKAs and TKAs have better results when they are in varus and valgus, respectively. More investigation is required to determine the ideal JLCA for each surgery.

The data suggests UKA and TKA achieve similar patient-reported outcomes. Considering factors from existing literature, UKA would seem as the more effective option. Due to PFJAs demonstrating weaker improvements in OKS and KOOS, more data is necessary to assess PFJAs as an alternative to TKA.

References.
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2. Swain S, Sarmanova A, Mallen C, Kuo CF, Coupland C, Doherty M, et al. Trends in incidence and prevalence of osteoarthritis in the United Kingdom: findings from the Clinical Practice Research Datalink (CPRD). Osteoarthritis and Cartilage. 2020;28(6):792-801.
3. Stoddart JC, Dandridge O, Garner A, Cobb J, van Arkel RJ. The compartmental distribution of knee osteoarthritis – a systematic review and meta-analysis. Osteoarthritis and Cartilage. 2021;29(4):445-55.
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6. Case courtesy of Henry Knipe, Radiopaedia.org, rID: 97195