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The Use of Unicompartmental Knee Replacements in the Elderly

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Abstract

Purpose: To investigate the outcomes of UKR in over 75-year olds in terms of peri-operative morbidity; length of hospital stay and patient reported outcomes (Oxford knee score).

Method: A six-year retrospective study of Unilateral Knee Replacements (UKRs) operated on by an experienced consultant orthopaedic surgeon assessed with serial Oxford Knee Scores. The patient selection criteria was based on age, over 75 years old. Secondary outcomes recorded included the length of stay and postoperative complications.

Results: Eighteen UKRs were implanted into 16 patients with 2 receiving bilateral UKRs. The mean age at the time of surgery was 77.6 (range 75-87 years). No intra-operative complications or major immediate post-operative complication was observed. No patients required a post-operative blood transfusion and the average length of hospital stay was 4.6 days (+/-1.34). At the 1-year post-operative follow-up the Oxford Knee Score was 34.7 (+/-8.3) increasing to a maximum score of 38.8(+/-4.4) at 4 years postoperative follow-up. During the 5th and 6th postoperative year, the Oxford Knee Score started to decline slightly at 33.5 (+/-6.4) and 32 (+/-11.3) respectively. No patients received revision surgery.

Significance: The scores from this study are comparable to that of a total knee replacement in a similar age group. As such UKRs can be a viable alternative to a total knee arthroplasty in an elderly population with multiple comorbidities who may benefit from a less invasive procedure.

Keywords: Arthroplasty; Elderly; Knee; Replacement; Unicondylar; Unicompartmental

Introduction

Treatment options for an elderly patient with multiple comorbidities presenting with unicompartmental knee arthritis are limited. The Unicompartmental Knee Replacement (UKR) conserves more of the normal knee kinematics compared to the total knee replacement by preserving the anterior cruciate ligament [1-2]. Since the introduction of the phase 3 Oxford Knee in 1998 the UKR technique has become a more minimally invasive procedure that can be performed through a short skin incision without eversion or dislocation of the patella [3]. Subsequently, patients undergoing UKR have been shown to recover faster, and report less perioperative morbidity and mortality due to the reduced soft tissue disruption and blood loss [4-5]. However, there are concerns with increased revision rates, and most orthopaedic surgeons consider unicompartmental surgery only appropriate for younger patients [6]. Yet, with its purported benefits the minimally invasive UKR may be an ideal solution for the elderly patient with unicompartmental knee arthritis.

This study selects a population of 75 years old and above to investigate the outcome of UKR in a single surgeon retrospective study. The validated oxford knee score over the period of follow-up was recorded as a primary outcome and the complication rate; length of hospital stays and overall patient satisfaction was also recorded.

Method

All patients over the age of 75 who received UKRs were included in the study. The surgical inclusion criteria for UKRs were symptoms consistent with severe knee osteoarthritis to include pain relatable to the involved compartment, less than 10° fixed flexion deformity, a clinically intact anterior cruciate ligament and a flexion arc to 90°. The selected patients also had to be fit for elective surgery. In the case of an inflammatory arthropathy, a fixed flexion deformity of more than 10°, a fixed varus deformity of more than 10°, a fixed valgus deformity of more than 5°, evidence

of bi- / tricompartmental osteoarthritis or previous menisectomy in the non-involved compartment, patients were excluded as recommended by the manufacturer [7-8].

Surgical Technique

The phase 3 Oxford knee (Biomet, Swindon, United Kingdom) was used to perform all UKRs. In line with the manufacturer's recommendation, a minimally invasive medial parapatellar approach was used and the patella was not inverted or dislocated [9]. Both femoral and tibial components were cemented using Palacos R40G cement (Schering Plough, Welwyn Garden City, United Kingdom). All procedures were carried out in a sterile environment with laminar airflow. Pre-operative and post-operative intravenous antibiotics were given in accordance with local microbiological guidelines. A tourniquet was applied proximally and a posterior capsule infiltration of chirocaine 0.5% was administered intra-operatively. Post-operatively patients underwent a 4-week course of low-molecular weight heparin injections for venous thrombosis prophylaxis and received daily physiotherapy from the first post-operative day. The discharge criteria included adequate control of pain, the ability to flex to 90° with no lack of extension.

Post-operative Outcome

A retrospective review of hospital records from April 2007 to February 2014 were used to obtain the length of stay in hospital and any complications. Subsequent follow-up clinic appointments were used to obtain the range of movement, and an Oxford knee score. Patients who could not attend clinic appointments, received a telephone consultation to obtain an Oxford knee score. Patient satisfaction was also assessed by a telephone consultation whereby patients were asked, "Are you satisfied with the outcome of your knee replacement?" They were then given the options of "yes" or "no".

Results

In the period under study, an experienced consultant orthopaedic surgeon in a tertiary hospital performed eighteen UKRs. There were no deaths at the time of review. Of the 18 UKRs implanted in to 16 patients, 2 were bilateral procedures. The mean age at the time of surgery was 77.6 years (range 75-87). The study group consisted of 10 females and 6 males. The pre-operative co-morbidity was described using the American Society of Anaesthesiologist physical status classification system. Two patients were categorised as class I (normal healthy patient), and the remaining 15 were Class II (mild systemic disease). The average BMI for the whole study group was 28.0 (+/-2.9). Of the 18 UKRs performed, 15 were for the medial compartment and 3 were for the lateral compartment.

All 18 UKRs were carried out without intra-operative complications or major immediate post-operative complications (e.g. pulmonary embolism, deep vein thrombosis, pneumonia, myocardial infarction, arrhythmia). No patients required a post-operative blood transfusion, and the average length of stay was 4.6 days (+/-1.2).

Two patients continued to experience on-going anterior knee pain, and one patient developed a stitch abscess, which resolved with a short course of oral antibiotics. Of the 2 patients who continued to experience anterior knee pain, one had a further diagnostic procedure, which was an on-table fluoroscopic examination revealing a stable implant. It was suspected that the nature of the pain may have been neuropathic in origin and the neurology team was involved.

The second patient reported an intermittent anterior knee pain, although at the latest follow-up she was satisfied with the outcome of the operation and was happy she underwent the operation. The pain was described as "liveable," and her Oxford knee score at that time was consistent with a mild to moderate arthritis. The radiological and serological findings did not reveal any evidence of infection or loosening.

The mean follow-up time for the study was 2.16 years (range 1 - 6 years). In total, 32 scores were obtained for the 16 patients following the UKR (Figure 1). There is an improvement in the UKR scores for the first 4 years, with the average scores increasing to a peak of 38.8 in the 4th year. The scores then decreased slightly in the 5th and 6th year to 33.5 and 32.0 respectively. The patient satisfaction questionnaire showed an 89% satisfaction rate with the operation. None of the cohort required revision surgery.

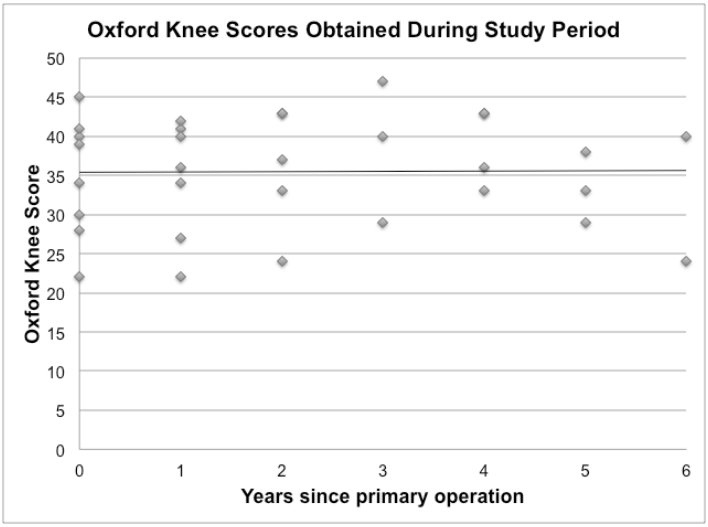

Figure 1: A Graph to Show the Oxford Knee Scores Obtained Plotted Against Time Since The UKR.

Discussion

These findings support the case for UKRs in over 75-year olds as a safe and viable alternative to a total knee replacement. In the period under study, no deaths or peri-operative complications were observed. Moreover, no patients required a blood transfusion and no revision procedures were necessary. This is in keeping with pre-existing literature that supports the use of UKR in elderly patients as well [10-11]. Elderly patients have less of a physiological reserve

and are more at risk during arthroplasty surgery [12]. Indeed, a prospective review of 3,144 primary total knee replacements in 2015 revealed that incidences of chest infection and mortality at 1-month postoperative was highest in the 75-80 year old age group [13]. This underlines the importance of considering safer less invasive options when treating patients in this age group.

Recent registry data has shown that more and more centres are offering unicompartmental knee replacements. The national joint registry reports that 97.5% of all surgical units across England and Wales offer UKR surgery [6]. However, it has typically been used more often in younger patients due to its cruciate-retaining and bone conserving technique [14-15]. In contrast, a registry analysis examining 25,982 UKRs found that Oxford Knee Scores improved more significantly in older patients and had lower revision rates compared to their younger counterparts [11]. Despite this, the latest National Joint Registry data shows that the UKR is becoming less popular with surgeons of today accounting for only 8.1% of all knee arthroplasty [6].

The decline in popularity could be related to the steep learning curve and experience required for better outcomes. Baker et al. reported that a lack of experience in this technique could be detrimental to revision rates following his registry-based cohort study of 234,000 Oxford medial UKRs [16]. He concludes that surgeons would require a minimum of 13 cases per year for their revision rates to be at par with the higher volume operators [16]. In this study the surgeon was reported to perform a minimum of 30 UKRs per year.

If UKRs in the elderly became common practice outcomes would improve with more confidence and familiarity. Systems such as the Zimmer Unicondylar Knee (ZUK) replacement (Zimmer Inc., Warsaw, Ind) utilise a fixed-bearing and benefit from a simpler operative technique. The ZUK could represent an ideal implant choice for these low demand patients. At 7-years the ZUK also demonstrates a better survivorship than the Oxford Knee according to latest registry data [6].

The general movement away from UKRs can be explained by the reported revision rates in the National Joint Registry: At 10-years the UKR has a risk of revision of 12.46% (95% CI 11.93-13.01%) compared to 3.37% (95% CI 3.29 - 3.46%) of all cemented TKR at 10-years[6]. However, these figures reflect a population where the median age is 63 years, and includes revisions for progressive arthritis patients. UKR has also been considered as a temporary procedure, and has been suggested as a procedure not suited for those over 60 years of age [17-18]. In 2009, Newman et al published a randomised controlled trial with a 15-year follow-up comparing the use of total knee replacements and UKRs in unicompartmental arthritis. His results revealed that at the final follow-up the UKR demonstrated better survival at 15 years than the TKR, in both cohorts the mean age was 69 years. Further to this, the UKR group had less perioperative morbidity, less blood loss, and had a shorter hospital stay [19]. This study reported an average length of stay of 4.6 days compared to 6.4 days as reported in the literature for arthroplasty procedures [20]. Moreover, a cost-effectiveness analysis performed in the US concluded that UKRs could be a more cost-effective alternative to TKR if the correct patient is selected [21].

The survival of UKRs in well-selected patients has been re-affirmed in other studies [7-24]. Our present study selects for an elderly cohort. Published literature regarding UKRs in elderly patients is limited. In one study of octogenarians 38 consecutive UKRs, the average survival of the prosthesis based on patient death or revision was 11.9 years, outlasting the patient in the majority of cases[10]. More recently, a systematic review of 20 studies concluded the 10-year implant survival rate to be 87.5 - 98% and the revisions for periprosthetic infection to be 0.13 - 0.30% [25]. Given that the 11-year risk of death following primary knee replacement in this age group is 67.58% for males, and 57.27% for females [6]; one might argue that implant survival of 10 years is acceptable.

The Oxford Knee Scores observed in this study compared favorably to published scores of TKRs. Williams et al reviewed 5600 Oxford Knee Scores in patients who underwent total knee replacements. He reports an average pre-operative score of 19.5 and or years 1 to 6 an average score of 34.3 and 32.6 respectively [26]. In comparison to this, the scores in this study correlates well with that of TKRs (Figure 2).

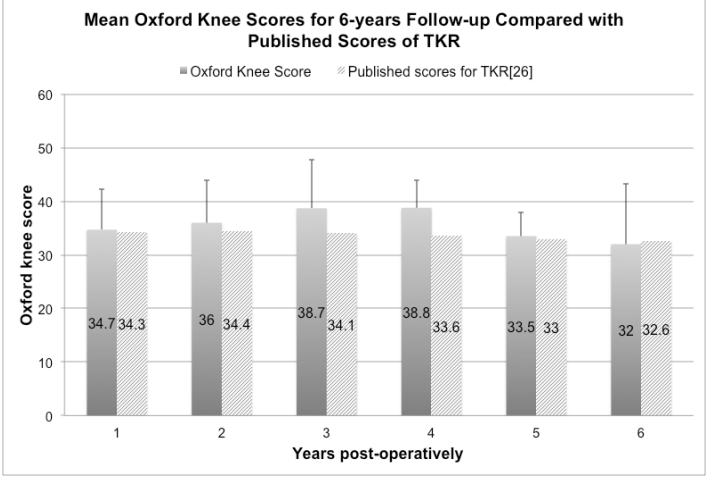

Figure 2: A graph to show the mean Oxford Knee Scores from our cohort UKR of 75-years and over versus the published scores of patients receiving a TKR from the study of Williams et al. [26].

However, this study is limited by the relatively small sample sizes and the inherent limitations of a retrospective study. Furthermore, some patients did not have a recorded Oxford Knee Scores at their follow-up and so were obtained by telephone consultations.

Conclusion

Our paper supports previous published literature that the UKR is a viable alternative to a TKR especially in elderly patients who will benefit most from the reduced perioperative morbidity and shorter recovery time.

Conflict of Interest Statement

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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References

1. Noticewala MS, Geller JA, Lee JH, Macaulay W (2012) Unicompartmental knee arthroplasty relieves pain and improves function more than total knee arthroplasty. The Journal of arthroplasty 27: 99-105.
2. Price AJ, Rees JL, Beard DJ, Gill RHS, Dodd CAF, et al. (2004) Sagittal plane kinematics of a mobile-bearing unicompartmental knee arthroplasty at 10 years: A comparative in vivo fluoroscopic analysis1 1Benefits or funds were received in partial or total support of the research material described in this article. These benefits and/or support were received from Biomet Limited, Bridgend, UK. The Journal of arthroplasty 590-597.
3. Price AJ, Webb J, Topf H, Dodd CAF, Goodfellow JW, et al. (2001) Rapid recovery after Oxford unicompartmental arthroplasty through a short incision. The Journal of arthroplasty 16: 970-976.
4. Brown NM, Sheth NP, Davis K, Berend ME, Lombardi AV, et al. (2012) Total knee arthroplasty has higher postoperative morbidity than unicompartmental knee arthroplasty: a multicenter analysis. The Journal of arthroplasty. 27: 86-90.
5. Liddle AD, Judge A, Pandit H, Murray DW (2014) Adverse outcomes after total and unicompartmental knee replacement in 101 330 matched patients: a study of data from the National Joint Registry for England and Wales. The Lancet 384: 1437-1445.
6. Board TNJRE. The 12th Annual Report: National joint registry for England, Wales, Northern Ireland and the Isle of Man. The National Joint Registry 2014.
7. Newman JH, Ackroyd CE, Shah NA (1998) Unicompartmental or total knee replacement? Five-year results of a prospective, randomised trial of 102 osteoarthritic knees with unicompartmental arthritis. J Bone Joint Surg Br 80: 862-865.
8. Kozinn SC, Scott RICHARD (1989) Unicondylar knee arthroplasty. J Bone Joint Surg Am 71: 145-150.
9. Ltd BUK. Oxford Partial Knee: Manual of the Surgical Technique.
10. Sah AP, Springer BD, Scott RD (2006) Unicompartmental knee arthroplasty in octogenarians: survival longer than the patient. Clin Orthop Relat Res 451: 107-112.
11. Liddle AD, Judge A, Pandit H, Murray DW (2014) Determinants of revision and functional outcome following unicompartmental knee replacement. Osteoarthritis and Cartilage 22: 1241-1250.
12. Laskin RS (1999) Total knee replacement in patients older than 85 years. Clinical orthopaedics and related research 367: 43-49.
13. Maempel JF, Riddoch F, Calleja N, Brenkel IJ (2015) Longer hospital stay, more complications, and increased mortality but substantially improved function after knee replacement in older patients. Acta Orthop 86: 451-456.
14. Martin JG, Wallace DA, Woods DA, Carr AJ, Murray DW, et al. (1995) Revision of unicondylar knee replacements to total knee replacement .The Knee 2: 121-125.
15. Bert JM (2005) Unicompartmental knee replacement. Orthopedic Clinics of North America 36: 513-522.
16. Baker P, Jameson S, Critchley R, Reed M, Gregg P, Deehan D, et al (2013) Center and Surgeon Volume Influence the Revision Rate Following Unicondylar Knee Replacement. The Journal of Bone & Joint Surgery.95:702-709.
17. O'Connor JJ, Goodfellow JW, Dodd CAF, Murray DW (2007) Development and clinical application of meniscal unicompartmental arthroplasty. Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine 221: 47-59.
18. Dejour H, Neyret P, Boileau P, Donell ST (1994) Anterior cruciate reconstruction combined with valgus tibial osteotomy. Clinical orthopaedics and related research 299: 220-228.
19. Newman J, Pydisetty RV, Ackroyd C (2009) Unicompartmental or total knee replacement: the 15-year results of a prospective randomised controlled trial. J Bone Joint Surg Br 91: 52-57.
20. Forrest G, Fuchs M, Gutierrez A, Girardy J (1998) Factors affecting length of stay and need for rehabilitation after hip and knee arthroplasty. J Arthroplasty 13: 186-190.
21. Soohoo NF, Sharifi H, Kominski G, Lieberman JR (2006) Cost-Effectiveness Analysis of Unicompartmental Knee Arthroplasty as an Alternative to Total Knee Arthroplasty for Unicompartmental Osteoarthritis. The Journal of Bone & Joint Surgery 88: 1975-1982.
22. Pandit H, Jenkins C, Gill HS, Barker K, Dodd CA, et al. (2011) Minimally invasive Oxford phase 3 unicompartmental knee replacement: results of 1000 cases. J Bone Joint Surg Br 93: 198-204.
23. Keys GW, Ul-Abiddin Z, Toh EM (2004) Analysis of first forty Oxford medial unicompartmental knee replacement from a small district hospital in UK. The Knee 11: 375-377.
24. Svärd UCG, Price AJ (2001) Oxford medial unicompartmental knee arthroplasty a survival analysis of an independent series. Journal of Bone & Joint Surgery, British Volume 83: 191-194.
25. Howieson A, Farrington W (2015) Unicompartmental knee replacement in the elderly: a systematic review. Acta Orthop Belg 81: 565-571.
26. Williams DP, Blakey CM, Hadfield SG, Murray DW, Price AJ, et al. (2017) Long-term trends in the Oxford knee score following total knee replacement. Bone Joint J 95: 45-51.