

Results after Patellar Resurfacing and Non-resurfacing in Total knee Replacement: Jordanian Data.

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ABSTRACT

Introduction: Total Knee Replacement (TKR) is the gold standard treatment for the osteoarthritic knee, however the decision to replace the patella or not is still controversial. Similarly, in the last decade prosthetic designs have become more “patella-friendly”.

Methods: Data from 171 patients who underwent unilateral TKR between January 2016 and December 2016, at the Jordanian Royal Medical Services Centre, were retrospectively analysed using Knee Society Scores (KSS), Knee Society Functional Scores (KSFS) and Visual Analogue Scales (VAS). Inclusion criteria required patients with degenerative osteoarthritis of the knee joint that had stopped responding to nonsurgical treatments. Exclusion criteria involved patients indicated for patellar replacement.

Results: The preoperative mean KSS in the patellar non-resurfacing (PNR) group (group A) was 29.2. After three years, this score increased to 86.6. In the patellar resurfacing (PR) group (group B), the score was 28.7 preoperatively, and after final follow-up three years later, this score increased to 86.4. In group A; KSFS was 25.8 preoperatively, and three years later, it was 87.9. In group B, this score was 27.2 preoperatively, and 86.5 three years later. VAS data showed that the first three criteria; (1) sitting in a chair, (2) going up and down stairs (3) and getting out of bed, improved significantly after three years of follow-up, in both groups. Anterior knee pain showed improvements in both groups, but these improvements were significantly more improved in group A than group B during the first year of surgery.

Conclusions: After a three year follow-up, there were no differences between PR and PNR, in terms of KSS and KSFS improvements. According to VAS, anterior knee pain showed improvements in both groups, but these improvements were significantly more improved in group A than group B during the first year of surgery. Therefore, we recommend that patella replacement is unnecessary, unless absolute indications are provided.

Keywords: Patellar, Resurfacing, Non-resurfacing, Total Knee Replacement.

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Introduction

Total knee replacement (TKR) is still gold standard treatment for the knee osteoarthritis^(1, 2, 3). In some instances, anterior knee pain is an inexplicable complaint after TKR, and could be caused by patellofemoral joint disorder, with many surgeons recommending patellar resurfacing (PR)⁽³⁾.

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However, this approach causes other complications, i.e. fractures, component loosening, instability, tendon rupture, patellar clunk syndrome and osteonecrosis^(3, 4, 5). Moreover, anterior knee pain is often a common complaint after PR, therefore studies have proposed patella non-resurfacing (PNR) procedures, unless there is absolute indication for patellar replacement, e.g. inflammatory arthritis, severe osteoarthritis of the patella or femoral component with non-anatomical trochlea^(4,5). Currently, this issue is controversial and undecided, as clinical trials and meta-analyses are equivocal in their conclusions^(4, 5).

Randomised controlled trials by Wood *et al* (2002), and Waters *et al.* (2003), have shown that 5%–16% of PR was associated with anterior knee pain, and that 20% of PNR was also associated with anterior knee pain^(1, 2). In Norway, between 1994 and 2011, 19% of revision cases were performed by secondary PR, due to anterior knee pain, however it was not clear whether the second surgery resolved the pain⁽³⁾.

This study was designed to compare data and results between PR and PNR in patients undergoing TKR. To our knowledge, no previous TKR studies have reported clinical outcomes for PR in a Jordanian context. Our hypothesis proposed that PR would improve TKR in terms of patient satisfaction and clinical outcomes.

METHODS

171 patients participated in the study. Ethical approval was provided by the Medical Ethics Committee of the Jordanian Royal Medical Services (JRMS) Centre. Written informed consent was obtained from all participants. The data from 171 patients who underwent unilateral TKR, due to a painful osteoarthritic knee were retrospectively analysed for outcome measures. All patients were treated between January 2016 and December 2016 in the JRMS centre, the PNR group A, n = 113 and the PR group B, n = 58. Patients decided which group to enter after a full explanation of the surgical procedure was provided. The first table shows the demographic distribution of patients (Table I) Preoperative and postoperative assessments were performed for all patients using KSS and KSFS indices. Also, VAS was used to collect data related to patellofemoral joint function and pain (Table II) Postoperative assessments were performed at one month, three months, six months, 12 months and 36 months. Although, patients were not blinded to group allocation, the evaluators were.

Table I: Demographic distribution of patients by group.

Characteristics	Group A (PNR) (n= 113)	Group B (PR) (n = 58)
Age (range)	75 (85–65)	74 (81–67)
Female:male	91:22	42:16
Side (right:left)	62:51	26:32
Body mass index	33	32.2
Mean follow-up	37.5 months (max 39–min 36)	36.8 months (max 38–min 36)

Table II: Visual Analogue Scale with specific queries for patellofemoral pain

Scoring difficulty for sitting in a chair.

Scoring difficulty for getting up and down stairs.

Scoring difficulty for getting out of bed.

Scoring the improvement of anterior knee pain.

Inclusion criteria required patients to have degenerative osteoarthritis of the knee joint that had stopped responding to nonsurgical treatments. Exclusion criteria involved patients with inflammatory arthritis, severe knee deformities (Varus angulation $> 15^\circ$ and valgus $> 15^\circ$), high tibial osteotomy or distal femoral osteotomy, old patellar fractures, ruptured extensor mechanism, traumatic osteoarthritis, history of patellar dislocation or instability, septic arthritis, symptomatic lumbar disc herniation at lumbar levels, patellectomy, old hip operations or deformities, post-operative infections, post-operative deep venous thrombosis, post-operative fractures, and any other medical or neurological illnesses that limited walking ability.

All surgical operations were performed by the same five surgeons that have the same experience in primary TKR taking into consideration that the complex cases were excluded from this study, and all patients were operated on using a cemented posterior cruciate sacrificing prosthesis (PS, Sigma, and DePuy Orthopaedics, USA). All surgeries were performed by a classical medial parapatellar approach and under tourniquet. All bone cuts were performed in the same sequence, and soft tissue release was performed as required. In the PNR group (A), the patella was reshaped, osteophytes removed and circumpatellar denervation, using an electroscalpel to cauterise soft tissue around the patella was performed. Also, patellar tracking was checked during soft tissue balancing, and lateral release performed when required. In the PR group (B), the height of the patella was always measured pre- and post-replacement, it never differed by more than 2 mm. A cemented insert PFC Sigma® oval dome component (DePuy Orthopaedics) was used for both groups. One day after surgery, patients were encouraged to start partial weight bearing using a walker, initiating leg straightening and raising and extending-flexing motions.

All patients were discharged two days after surgery.

KSS evaluated clinical profiles with regard to knee pain intensity, range of motion and stability in the anteroposterior and mediolateral planes, flexion deformities, contracture and poor alignment. The KSFS evaluated movement ability with regard to walking distances, problems with going up and down stairs and using walking aids. Categorical variables were compared using the chi-square or Fisher's exact test. Within-group comparisons were performed using Wilcoxon and Mann-Whitney tests. All statistical analyses were performed using SPSS v.18.0 (IBM Corp., Armonk, NY, USA).

RESULTS

After a three year follow-up of 171 patients, patient demographic distribution showed that the female to male ratio was 91:22 in the PNR group (A), and 42:16 in the PR group (B). The mean body mass index (BMI) was 32–33 kg/m² for both groups. Also, the mean age was 74–75 for both groups ^(Table 1). No significant differences were found between groups in terms of age, gender, BMI and preoperative patellofemoral disease. The preoperative KSS, KSFS and VAS means were almost similar for both groups in general.

The preoperative KSS mean for the PNR group (A) was 29.2. After three years, this score increased to 86.6 (P value 0.04). For the PR group (B), the score was 28.7 preoperatively, and at final follow-up three years later, this score increased to 86.4 (P value 0.037) (Table III).

Table III: Mean Knee Society (KSS) scores

	Pre-op	1 month	3 months	6 months	1 year	2 years	3 years
Group A: PNR	29.2	62.9	74.6	84.7	85.9	86.3	86.6
(SD)	(10.5)						(9.1)
(P)	(0.030)						(0.041)
Group B: PR (SD)	28.7 (9.2)	60.1	69.9	83.1	85.5	86.1	86.4
(P)	(0.046)						(7.5)
							(0.037)

PNR: Patellar Nonresurfacing. PR: Patellar Resurfacing. P: P value. SD: Standard Deviation.

The KSFS in the PNR group (A) was 25.8 preoperatively, and after final follow-up, it was 87.9 (P value 0.045). In the PR group (B), this score was 27.2 preoperatively, and 86.5 at final follow-up three years later (P value 0.041). (Table IV).

Table IV: Mean Knee Society Function (KSFS) scores

	Pre-op	1 month	3 months	6 months	1 year	2 years	3 years
Group A: PNR	25.8 (6.1)	56.6	73.8	84.1	85.0	85.4	87.9
(SD)	(0.21)						(4.9)
(P)							(0.045)
Group B: PR	27.2	54.2	75.1	81.8	82.7	85.2	86.5
(SD)	(5.7)						(3.4)
(P)	(0.087)						(0.041)

PNR: Patellar Nonresurfacing. PR: Patellar Resurfacing. P: P value. SD: Standard Deviation.

VAS results showed that the first three criteria; (1) sitting in a chair, (2) going up and down stairs (3) and getting out of bed, improved significantly, going from 2–3 preoperatively, to 7.7–8.3 after three years of follow-up. The fourth factor (anterior knee pain) showed improvements in both groups, going from 1.5–1.7 before surgery, to 8.5–8.6 after surgery (P value < 0.05). But this improvement was significantly better during follow up visits in first year of surgery in the PNR (A) group than PR (B) group (Table V) (P value 0.03).

Table V: Visual Analogue Scale (VAS) results

	Sitting in a chair				Going up and down stairs				Getting out of bed				Improvement in anterior knee pain			
	Pre-op	1 y	2 y	3 y	Pre-op	1 y	2 y	3 y	Pre-op	1 y	2 y	3 y	Pre-op	1 y	2 y	3 y
Group A: PNR	2.1	7.4	7.8	8.3	3.1	6.6	8	7.9	2.8	7.7	7.9	8	1.7	8	8.3	8.5
<i>(P)</i>	0.035				0.040				0.022				0.030			
Group B: PR	2.3	7.5	7.9	8.5	3	7.5	7.7	7.7	1.9	7.5	7.8	7.9	1.5	6	8.4	8.6
<i>(P)</i>	0.028				0.030				0.035				0.01			

PNR: Patellar Nonresurfacing. PR: Patellar Resurfacing. P: P value. SD: Standard Deviation.

DISCUSSION

After three years of follow-up, there were no significant differences between PR versus PNR, with respect to KSS and KSFS outcomes, Therefore, our results and data suggest it is unnecessary to replace the patella unless there is an absolute indication.

TKA includes tibio-femoral replacement, with or without patellofemoral replacement. However, while surgeons agree that TKA is the gold standard treatment for the osteoarthritic knee, the decision to replace the patella or not is controversial^(1, 2, 3, 4, 5). There is no doubt that the patella should be replaced in some selected cases, such as inflammatory arthritis, old patellar fractures, severe patellar maltracking, previous unicondylar knee arthroplasty, high tibial osteotomy, non-anatomic trochlear groove on femoral components, traumatic osteoarthritis and in patients with a history of patellar instability^(4, 5, 6). Our study exhibited several strengths. Firstly, all patients with absolute indications to replace the patella were excluded, therefore only patients with moderate to severe osteoarthritis were included; this category covered the majority of study patients. Secondly, patient numbers were adequate to generate clear statistical data/results. Thirdly, our follow-up period was long (3 years), therefore we were able to comprehensively compare short and long term results. Finally, patients were evaluated by blinded evaluators, unaware of group allocation. The limitations of this study; there was no randomization due to ethical issues and the five different surgeons.

This study examined the efficacy, short term and long term results (up to three years) of TKA with or without patellar replacement using KSS, KSFS and VAS metrics. Our results showed no statistical differences between the PNR group (A) and the PR group (B), regarding clinical and functional outcomes. However, it is worth mentioning that anterior knee pain showed improvements in both groups, but this improvement was significantly better during follow up visits in the first year of surgery, in group A (Group A: 8/10, Group B: 6/10). But after two years and three years, anterior knee pain showed similar results in both groups^(table 5).

We also compared our results with previous reports, but found that some studies chose different indications and pathologies in their methods. Also, in the last decade, prosthetic designs have become more “patella-friendly”; the femoral components have deep, well oriented grooves with elevated lateral flanges which offer better tracking and less point loading^(7, 8). These technological advancements suggest that for some novel, well designed implants, PR could be unnecessary^(9, 10, 11, 12).

In their RCT, Van Jonbergen *et al.*⁽¹³⁾ showed that patients in their PR group had greater anterior knee pain than NPR group when climbing stairs, but this was statistically insignificant. Barrack *et al.*^(14, 15) stated that PR had higher incidences of late onset anterior knee pain. In a meta-analysis by Arirachakaran *et al.*⁽¹⁶⁾, non-significant lower functional scores were observed in the PR group (609 patients) when compared to the PNR group (660 patients).

The meta-analyses by Pavlon *et al.*⁽¹⁷⁾ and Nizard *et al.*⁽¹⁸⁾ showed that revision rates surgery were equal in both PR and PNR groups. Burnett *et al.*⁽¹⁹⁾, Campbell *et al.*⁽²⁰⁾ and Myles *et al.*⁽²¹⁾ identified no significant differences between PR and PNR. In their study, Boyd *et al.*⁽²²⁾ recommended selective patellar replacement in patients with inflammatory arthritis and patellar osteoarthritis.

A recent study by Aunan *et al.*⁽²³⁾ showed significantly improved outcomes for patellar replacement after three years of follow-up. Forster⁽²⁴⁾ and Pakos *et al.*⁽²⁵⁾ in their meta-analyses of RCT, found that re-operating for patellofemoral disorders was significantly more likely for NPR groups. Also, the meta-analysis by Parvizi *et al.*⁽²⁶⁾ showed that the NPR group experienced greater anterior pain and less outcome satisfaction.

CONCLUSION

After three years of follow-up, there were no significant differences between PR versus PNR, with respect to KSS and KSFS outcomes. According to VAS outcomes, anterior knee pain was improved in the PNR group, after one year of surgery. This improvement was similar in both groups, after two and three years follow-up. Therefore, our results and data suggest it is unnecessary to replace the patella unless there is an absolute indication.

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