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A prospective study to review the functional outcome between patellofemoral resurfacing versus non resurfacing in total knee replacement

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ABSTRACT

Background: A prospective study to review the functional outcome between patellofemoral resurfacing versus non resurfacing in posterior stabilized TKR.
Methods: We studied a total of 63 patients with tricompartmental osteoarthritis of knee. These patients underwent total knee arthroplasty between April 2013 to September 2013 at Preethi hospital, Madurai. It was prospective study which was followed up for period of 1 year. There were two groups which were made randomly into patellofemoral resurfacing group (group A n=30) and the non resurfacing group (group B n=33). In the patellofemoral resurfacing group, patella was resurfaced with the help of cemented poly component and in the non-resurfacing group, the osteophytes of the patella was removed, it was reshaped to match the trochlea of the femoral prosthesis and circumpatellar denervation was done. Knee society score (KSS), anterior knee pain, knee society function score and patient satisfaction was compared between both the groups.
Results: There was significant difference in anterior knee pain scale and incidence of anterior knee pain was less as compared in the resurfacing group. However 1 year of follow up of both groups concluded that there was no significant differences for functional outcomes. Patient satisfaction scale was significant in patellofemoral resurfacing group.
Conclusions: Study showed that apart from significant improvement in anterior knee pain scale there was no significant difference for both groups after 1 year follow up in clinical outcome, except for patient satisfaction scale. For patellofemoral pain and severe patellofemoral arthritis it is recommended to perform patellar resurfacing, otherwise patellar resurfacing do not have any added advantage.

Keywords: Patellofemoral resurfacing, Patellar non resurfacing, Anterior knee pain, Total knee arthoplasty

INTRODUCTION

The role of universal patellar resurfacing in total knee arthroplasty remains controversial. Patellar resurfacing was not a feature of many early total knee arthroplasty designs.[1] Using such historic designs, anterior knee pain was problem in about 40% to 58% of patients.[2] Many Orthopedicians used to perform patellar resurfacing routinely only to decrease incidence of anterior knee pain and rate of revision caused by patellofemoral problems.[3] Patellofemoral problems seen in 5% to 30% of contemporary tricompartmental designs, have become a major cause of morbidity and reoperation in TKA with patellar resurfacing.[4] Patellar resurfacing can result in complications (including fracture, patellar, component failure, osteonecrosis, instability, tendon rupture and patellar clunk syndrome).[5] Because of such complications

now attention is being shifted to patellar non-resurfacing. Modern prostheses are designed to incorporate the patella in a way that it reduces contact stress between patella and prosthesis, so that they behave like normal patellofemoral joints, consequently reducing postoperative AKP.[6] The cause of anterior knee pain after replacement was may be due to soft tissue afflictions (such as tendinitis, bursitis, plica syndrome and neuroma), reflex sympathetic dystrophy and maltracking. Routinely performed patellar resurfacing has reduced patellofemoral-related pain but prospective randomised trials have not provided consistent results in the short- to medium-term.[7] Numerous controlled clinical trials have compared TKA clinical outcomes between patellar non-resurfacing and resurfacing procedures, but results have been inconclusive.[8] In this present study the nonresurfacing group patella was treated by removal of osteophytes. Patella was reshaped to match the trochlea of the femoral prosthesis and circumpatellar denervation was done. Whereas in resurfacing group the patella was resurfaced with a cemented component and the incidence of AKP and knee function between the patellar resurfacing and nonresurfacing groups was compared. The main aim of this study was to produce evidence-based indications for patellar resurfacing in knee replacement. Our hypothesis was that patellofemoral resurfacing would influence the disease- specific outcome of osteoarthritic patients undergoing knee replacement.

METHODS

A randomized prospective double-blinded control study was conducted using predetermined outcome measures of knee replacement with and without patellar resurfacing. A total of 63 patients suffering from tricompartmental osteoarthritis were treated with TKA between April 2013 to September 2013 at Preethi hospital, Madurai. Inclusion criteria were patients with primary unilateral/bilateral TKA and those with degenerative osteoarthritis of the knee that did not respond to nonsurgical treatment. Exclusion criteria were patients with patellar resection, a history of patellar fracture, patellar instability treated with extensor reconstruction, high tibialosteotomy, a history of septic arthritis and osteomyelitis, serious medical illness limiting walking ability, and other lower limb joint disease. Ethical approval was given by the Medical Ethics Committee of our hospital. Written informed consent was obtained from all study participants. Data obtained will be recorded in MS Excel sheets and statistical data analysed using Windows SPSS version 22 software program.

Surgical procedures

All patients received the same type of cemented posterior stabilized prosthesis (PFC; Depuy Orthopaedics, Warsaw, USA). A standard anterior midline skin incision taken and medial parapatellar approach was adopted to open the knee joint. Bone cuts and soft-tissue balancing were performed in the sequential manner. In the patellar resurfacing group, patellar resurfacing was performed with a cemented inset oval dome component. The height of the patella was measured before and after operation with help of callipers, and in no case differed by more than 2 mm (Figure 1 group A). In the patellar non-resurfacing group, patellar osteophytes were removed, the patella was reshaped to match the trochlea of the femoral prosthesis, and the soft tissue around the patella was cauterized using an electro cautery to destroy the patellar innervation (circumpatellar denervation) (Figure 2). Optimal patellar tracking was ensured by appropriate soft-tissue balancing. If the patella subluxated during passive testing of the range of movement, a lateral release was performed ≥2.5 cm from the lateral patellar border.A standardized perioperative regimen was used for all patients. In detail, second generation 3 g/day cephalosporin was injected intravenously for 5 days from 1 day prior to the operation. After surgery, active static quadriceps strengthening exercise, active straight-leg raising and knee range of movements (flexion-extension) was encouraged in the immediate postoperative period. Walking with partial weight bearing was permitted 24 h postoperatively under the supervision of a physiotherapist and full weight bearing was started from postoperative day 3.

Figure 1 (A-C): Group A.

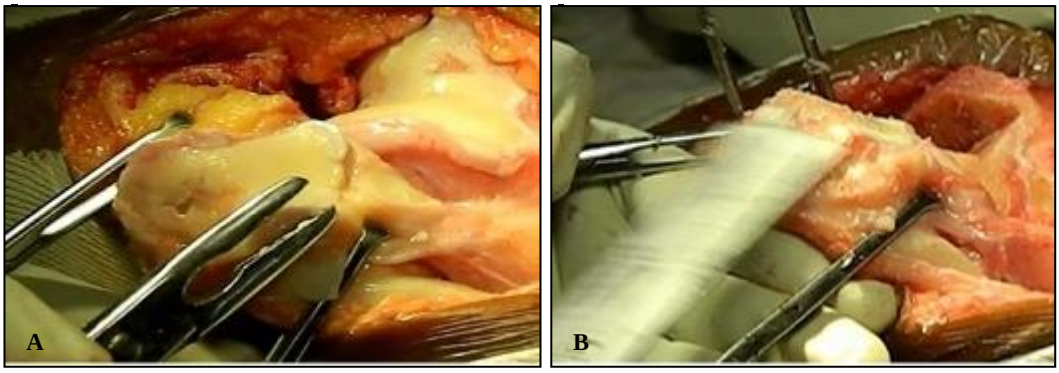

Figure 2 (A and B): Group B.

Figure 3: Circumpatellar denervation.

Study evaluation

A total of 63 patients were included in this study and were randomized in a two groups (group A patellar resurfacing group n=30. group B patellar non-resurfacing n=33). Preoperative evaluation was performed using the Anterior knee pain scale, knee society score, knee society function score and patient satisfaction score. Postoperative follow-up assessments were performed at 3 months, 6 months and 1 year respectively. Data was collected at the end of 1 year, and was analysed in this present study.

RESULTS

Total of 63 patients participated in this study and data from these patients were reviewed. During follow-up for the period of 1 year. In non resurfacing group there were 33 patients and 30 in the patellar resurfacing group were considered. In the resurfacing group, the difference between pre- and postoperative heights of the patellae was <2 mm for each patient. There were no statistically significant between-group differences regarding age, gender, body mass index, complaints of anterior knee pain, preoperative knee society scores (Table 3 and Table 4 respectively). The mean±SD duration of surgery was 80.3±20.4 min in the nonresurfacing group and 83.7±27.8 min in the resurfacing group; this difference was not statistically significant. Lateral retinacular release was performed in three patients in the nonresurfacing group and in one patients in the resurfacing group, with no significant between-group differences.

The findings of postoperative clinical evaluations are summarized in Table 4.

Table 1: Knee society functional scoring system.[11]

Function	Points
Walking	
Unlimited	50
>10 blocks	40
5-10 blocks	30
<5 blocks	20
Housebound	10
Unable	0
Stairs	
Normal up and down	50
Normal up; down with rail	40
Up and down with rail	30
Up with rail; unable down	15
Unable	0
Subtotal	_
Deductions (minus)	
Canes	5
Two canes	10
Crutches or walker	20
Total deductions	_
Function score	_

At 1 year postoperatively, there were no significance - group differences in terms of Knee Society Pain Score, Knee Society Function Score and Total Knee Society Score, but incidence of anterior knee pain was significantly reduced in patellar resurfacing group. All patients in this study underwent suture removal in post operative day 12th however in 2 patients in non resurfacing group suture removal was delayed upto post operative day 15th due to delayed healing problems as the patient were highly diabetic.

Table 2: Knee society score.[11]

	Points
Pain	
None	50
Mild or occasional	45
Stairs only	40
Walking and stairs	30
Moderate	
Occasional	20
Continual	10
Severe	0
Range of motion	
(5 degree=1 point)	25
Stability(maximal movement in any position)	
Anteroposterior	
<5 mm	10
5-10 mm	5
10 mm	0
Mediolateral	
<5 degree	15
6-9 degree	10
10-14 degree	5
15 degree	0
Subtotal	_
Deductions (minus)	
Flexion contractures	
5-10 degree	2
10-15 degree	5
16-20 degree	10
>20 degree	15
Extension lag	
<10 degree	5
10-20 degree	10
>20 degree	15
Alignment	
5-10 degree	0
0-4 degree	3 points each degree
11-15 degree	3 points each degree
Other	20
Total deductions	_
Knee score	_

Table 3: Demographic data of patients.

Characteristics	Age (years)	Mean age	Males	Females	Left side	Right side	BMI (kg/m^2)	Range of movements
Non-resurfacing group (n=33)	55-70	60.5	13	17	16	14	31	10-90 (terminally painful)
Resurfacing group (n=30)	52-75	65	15	18	14	19	30.5	5-100 (terminally painful)

Table 4: Final results.

Characteristic	Non resurfacing group (n=33)		Resurfacing group (n=30)	
Anterior knee pain (yes/no)	11-yes	21-no	7-yes	23-no
Anterior knee pain score	12.1		6.5	
Total knee society score	58.1		60.5	
Knee society function score	36.5		38.1	
Patient satisfaction scale	62		75	

DISCUSSION

Whether to resurface the patella during a primary total knee arthroplasty performed for the treatment of degenerative osteoarthritis remains a controversial issue. Parameters that have been suggested as being useful in guiding this decision include patient height and weight (body mass index), the presence of anterior knee pain preoperatively. This present study compares the clinical outcomes of two modalities: patellofemoral resurfacing and patellar non-resurfacing. In our study there was no differences found in relation to knee society score and knee society function score between the two methods at the end of 1 year.

Anterior knee pain is a key search term when looking for literature describing optimal patellar treatment in Total knee arthroplasty. Patient having patello femoral arthritis and sever patellar degeneration have complaints of anterior knee pain. Various study show incidences of anterior knee pain with the patellar resurfacing regimen as 3.1% and in patellar non resurfacing group as 42%. The postoperative AKP rate in our present study was 12.1% in the non-resurfacing group and 6.5% in the resurfacing group. Study stated that there is significant difference in terms of anterior knee pain relief in patellar resurfacing group. In this present study, patella was replaced with the cemented polythene oval dome implant after proper assessment of patellar thickness with caliper measurement. Implant is more medialised to prevent lateral tracking of patella and to prevent alteration in biomechanics of patellar tracking, this also prevents incidence of anterior knee pain post TKA. In patellofemoral osteoarthritis, the patella get shifted laterally due to the loss as well as damage to the cartilage on the lateral facet, this increases the pressure in the lateral patellofemoral joint.[9] In the study conducted by Liu reports that patellar thickness in the Asians is less than that of Western populations, with the thinnest part being only 13–14 mm.[10] Hence patient selection for patellar resurfacing is very important. It is recommended to resurface patella only if patellar size is about 20-22 mm. It has been suggested that patients be stratified to receive patellar resurfacing by the condition of their patellar articular cartilage and the presence of pre-operative anterior knee pain.

CONCLUSION

The result of study showed that there was significant improvement in anterior knee pain scale and incidence of anterior knee pain is comparative less in resurfacing group. However there is no significant difference for both group in functional outcome after period of 1 year follow up, except the patient's satisfaction scale. Patellofemoral resurfacing should always be performed in patients who have symptoms of patellofemoral pain and severe degeneration in patellofemoral side. The use of an appropriate prosthetic design and careful surgical technique can provide good results of TKA even with or without performing patellar resurfacing. Resurfacing should only be done if patella size is about 20-22mm otherwise patellar resurfacing doesn't have any added advantage nor an added benefit.

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