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Review

Mean Patellar Thickness in Punjab Population in Patients Undergoing Total Knee Arthroplasty

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ABSTRACT

Total Knee Arthroplasty is a common and generally successful operation. Anterior knee pain following Total Knee Arthroplasty (TKA) remains one of the important reasons for patient dissatisfaction. The management of patellofemoral joint is controversial and a decision whether to resurface the patella or not is important. This is a hospital-based, prospective, comparative study where 60 TKA cases (in 38 patients, 22 were bilateral TKA and 16 were unilateral procedures) were recruited with 40 knees in 25 female patients and 20 knees in 13 male patients. Each patient was followed up to 1 year for KSS, Functional Score, ROM and AKP to understand the difference in clinical and functional outcome between patellar non-resurfacing and resurfacing cases after total knee arthroplasty in subsequent periods. There was no statistically significant difference in short-term clinical, functional, and radiological outcomes in the two groups and therefore, routine patellar resurfacing for a patient undergoing TKA is not advantageous. The question of patellar thickness after Total Knee Arthroplasty (TKA) is an important issue. Numerous studies have analyzed factors influencing its success.[1-4] As a major functional index, Knee range of motion has been reported by several studies to influence many daily activities and patient satisfaction.[5-8] There is paucity of studies regarding patellar thickness in Indian population and whether to resurface the patella during Total Knee Arthroplasty.

Keywords: *Anterior Knee Pain; Knee Society Score; Patellar Resurfacing; Total Knee Arthroplasty.*

INTRODUCTION

Total Knee Arthroplasty is one of the most commonly performed procedures in the field of adult reconstructive surgery and the number of procedures continues to increase. It gives satisfactory and durable results in treating advanced knee joint arthritis, even at long-term follow-up.[9,10] The optimal treatment of the patella in primary Total Knee Arthroplasty (TKA) for Osteo Arthritis (OA) remains unclear. The controversy about whether to resurface the patella or to leave the native patella unresurfaced continues to be debated by orthopedic surgeons performing total knee arthroplasties. Resurfacing of the patella was not a feature of many early designs of total knee prostheses. When the original total knee prostheses were designed, the patellofemoral articulation was not taken into consideration as a potential source of pain, and the results were complicated by patellofemoral symptoms despite an otherwise well-performed knee arthroplasty. Subsequent designs incorporated a femoral flange for the patellofemoral articulation and provided the option for patellar resurfacing. With the advent of modern condylar components, resurfacing of the patella became a standard part of total knee arthroplasty.[11] The function of the patellofemoral articulation is known to have a significant impact on the outcome of the TKA procedure.[12] Employing the proper technique when resurfacing the patella, is essential to avoid over-stuffing and mal-tracking which can result in anterior knee pain and sub-optimal range of motion. Yet, there is no consensus on the exact relationship between the patella–implant thickness and the biomechanical function (including a range of motion) of the knee after TKA. The purpose of the present study is to determine and analyze the patellar thickness during TKA.

MATERIALS AND METHODS

It was a hospital-based prospective, comparative study that was conducted from February 2014 to October 2015, at the Department of Orthopaedics, SPS Apollo Hospitals, and Ludhiana.

Senior surgeons in the laminar flow operating rooms performed all surgeries. The standard operative techniques were used,

including the anterior midline skin incision with a medial parapatellar approach, resection of menisci, the osteophytes, and the anterior and posterior cruciate ligaments. All the femoral, tibial and patellar components were fixed using the bone cement.

A total of 145 TKA procedures were performed in the time between February 2014 to October 2014 out of which 88 underwent PS-TKA (Posterior Stabilized Total Knee Arthroplasty) and 57 underwent CR-TKA (Cruciate Retaining Total Knee Arthroplasty). The patients with only posterior stabilized-TKA were included in our study and CR-TKA were excluded. 60 TKA out of 88 PS-TKA were chosen and followed up for one year.

Sixty TKA cases (in 38 patients, 22 were bilateral TKA and 16 were unilateral procedures) were recruited with 40 knees in 25 female patients and 20 knees in 13 male patients. Each patient was followed up to 1 year for Knee Society Score, Functional Score, Range Of Motion and Anterior Knee Pain to understand the difference in clinical and functional outcome between patellar non-resurfacing and resurfacing cases after total knee arthroplasty in subsequent periods.

RESULTS

The patellar thickness was measured intra-operatively in all the patients using calipers.

Patellar Thickness

The mean patellar thickness (in millimeters) in females and males in our study is shown in Table 1 and Figure 1. This study shows that the mean patellar thickness in females is 21.050 (SD=0.959) and that in males is 23.400(SD=0.754)

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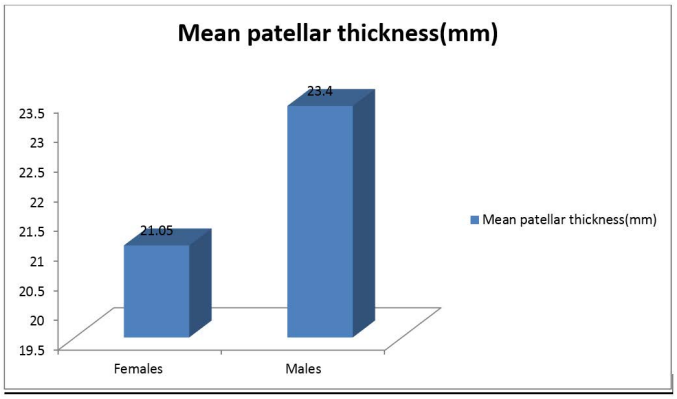
Table 1. Mean Patellar thickness (in millimeters) in females and males

	Females		Males		Total		*p* value
	Mean	SD	Mean	SD	Mean	SD	
Patellar thickness	21.050	0.959	23.400	0.754	21.833	1.428	< 0.001

Figure 1. Mean Patellar thickness (in millimeters) in females and males.



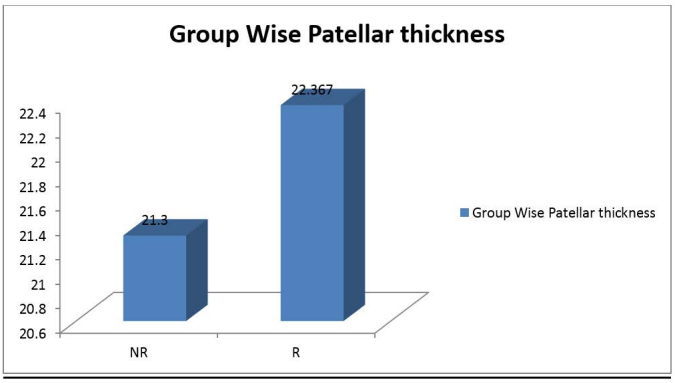
Patellar Thickness

The mean patellar thickness (in millimeters) in non-resurfacing and resurfacing groups in our study is shown in Table 2 and Figure2. This study shows that the mean patellar thickness in the non-resurfacing group is 21.300(SD=1.601) and that in the resurfacing group is 22.367 (SD=0.999)

Table 2. Mean Patellar thickness (in millimeters) among non-resurfacing and resurfacing groups

	NR		R		Total		*p* value
	Mean	SD	Mean	SD	Mean	SD	
Patellar thickness	21.300	1.601	22.367	0.999	21.833	1.428	0.003

Figure 2. Mean Patellar thickness (in millimeters) in non-resurfacing and resurfacing groups



Anterior Knee Pain

The mean Anterior Knee Pain improved from 5.07±2.840 to 1.53±2.013 for the non-resurfacing group and 4.23±3.421 to 0.87±1.925 for resurfacing group at 1-year follow-up and this was not statistically significant (p>0.05). The prevalence of pre-operative Anterior Knee Pain was 73.3% in non-resurfacing group and 63.3% in the resurfacing group. At 1-year follow up, the prevalence decreased to 36.6% in non-resurfacing group and 20% in the resurfacing group.

DISCUSSION

The mean patellar thickness (in millimeters) in females and males in our study is shown in Table 1 and Figure 1. This study shows that the mean patellar thickness in females is 21.05mm and that in males is 23.4mm.

The mean patellar thickness (in millimeters) in non-resurfacing and resurfacing groups in our study is shown in Table 2 and Figure 2. This study shows that the mean patellar thickness in the non-resurfacing group is 21.3mm and that in the resurfacing group is 22.3mm.

In a study conducted by R.L. Barrack et al.[13] on 89 patients (118 knees), the patellar thickness was found to have a mean value of 23.4mm.

In an Indian study by S. Bhan et al.[14] on 80 patients (139 knees), the mean patellar thickness was 23.0 mm.

Another study by A.J. Smith et al.[15] concluded that the mean patellar thickness was 25.9 mm in those with and 24.3 mm in those without patellar resurfacing. The higher mean value of patellar thickness in their study may be due to different demography and topographically different study population.

The mean Knee Society Score improved from 48.87 points pre-operatively to 76.47 points at 1-year postoperatively in the patellar non-resurfacing group and from 49.53 points to 75.87 points in a patellar resurfacing group at 1-year follow-up and this was not statistically significant (p>0.05).

The mean Functional score improved from 40.17 points pre-

operatively to 68.50 points at 1-year postoperatively in the patellar non-resurfacing group and from 39.83 points to 68.67 points in patellar resurfacing group at 1 year follow-up and this was not statistically significant ($p>0.05$).

The mean Total Knee Society Score improved from 89.03 points pre-operatively to 144.93 points at 1-year post-operatively in patellar non-resurfacing group and from 89.37 points to 144.53 points in patellar resurfacing group at 1-year follow-up and this was not statistically significant ($p>0.05$).

The mean Knee Range of Motion in our study improved from 103.80 degrees pre-operatively to 118.30 degrees at 1-year postoperatively in patellar non-resurfacing group and from 109.17 degrees to 120.23 degrees in patellar resurfacing group at 1-year follow-up and this was not statistically significant. ($p>0.05$).

The prevalence of pre-operative anterior knee pain was 73.3% in non-resurfacing group and 63.3% in the resurfacing group. At 1-year follow up, the prevalence decreased to 36.6% in non-resurfacing group and 20% in the resurfacing group. The results of the present study are similar to a study by David J Wood et al.[16] in which there was a significantly higher incidence of anterior knee pain in the knees that did not have patellar resurfacing (31%) as compared to knees with patellar resurfacing (16%) at 4-year follow-up.

CONCLUSION

In order to avoid adverse biomechanical and functional consequences, it is recommended to restore patellar thickness to that of the native knee during Total Knee Arthroplasty. There is a decreased prevalence of Anterior Knee Pain at 1-year follow up which must be due to the selection of patients with severe Tri-Compartmental Knee Arthritis. However, there is no significant difference between Resurfacing and Non-Resurfacing groups in terms of Knee Range of Motion, Knee Society Score or Functional knee score at 1-year follow up. So, we recommend selective Patellar Resurfacing during Total Knee Arthroplasty keeping in mind the thickness of patella(should be more than 20mm), presence of Patellar osteophytes as in Tri-compartmental knee arthritis and presence of Anterior Knee Pain. Routine Patellar Resurfacing is not recommended, as it does not offer any significant advantage in terms of Range Of Motion, Knee Society Score or Functional Knee Score at 1-year follow up.

CONFLICTS OF INTEREST

Authors declare that there is no conflict of interest in this study.

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