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Patelloplasty or patella resurfacing? Answer to anterior knee pain after total knee replacement in Indian patients

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Abstract

Anterior knee pain remains one of the most common cause of dissatisfaction amongst post TKA patients and is a cause of revision in almost 50% cases. Management of patello-femoral joint is important to prevent anterior knee pain. Whether to resurface patella or not has been a contentious issue since inception of knee implants. Patelloplasty in recent times has shown to be a good alternative in retaining patella especially in Indians where patellar dimensions are smaller. In this study we have taken 40 patients who undergo bilateral TKA. We resurfaced patella on one side and did patelloplasty on the other in a randomly chosen manner. Both sides were compared on clinical and radiological parameters. After average follow up of 17.75 months, we found that knee society scores, patellar scores and functional outcome consistently improved with tkr and the results of both the procedures - patelloplasty or patellar resurfacing were comparable with no statistically significant difference between the two sides. In Indian population with smaller dimensions of patella, patelloplasty in an effective method to reduce anterior knee pain and prevents resurfacing related complications.

Keywords: Patelloplasty, patella resurfacing, anterior knee pain

Introduction

Anterior knee pain is reported in 4% to 49% of patients after primary total knee replacement (TKR). One of the strategy to reduce anterior knee pain is to do patelloplasty and other is to do patellar resurfacing. Aim of the study was to compare the effectiveness of the two strategies in Indian population.

Issues regarding patella in total knee arthroplasty are an important one with respect to incidence of postoperative anterior knee pain, clinical and functional knee scores, patella related complications and patient satisfaction. Different strategies include non-resurfacing resurfacing or patelloplasty.

Previously early symptoms of patello-femoral joint were treated by methods that included patellectomy or soft tissue realignment procedure. In 1975 the dome patella was developed at the Hospital for Special Surgery primarily to treat patellofemoral arthritis and severe chondromalacia patellae. Dome resurfacing decreased patella related complications by 10% to 25%. The findings led to recommendation that patella resurfacing should become a standard procedure in patients going TKA. The frequency of patellar resurfacing increased during the mid-1980s. However the numerous problems reported with resurfacing such as loosening of the patellar component with wear, patellar fractures, patello-femoral misalignment and patellar clunk syndrome increased inclination towards patellar retention. After TKA the articular surface of patella should adoptó to the geometry of the femoral component; this process is called 'remodelling'. Remodelling has been referred to as stress contour ring and is a biological response to the trochlea and the condyles of the femoral component. This process is minimized if the surface is exposed to an anatomically designed femoral component with a constant curve and uniform femoral geometry. For this reason Pipette *et al.* ^[1] proposed use of patella friendly components to reduce point loading and improve tracking. Hi flex knees with anatomical femoral design and patelloplasty serve to promote remodeling and decrease post-operative anterior knee pain.

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Some surgeons argue that the patella should always be resurfaced because patellar resurfacing completes knee joint resurfacing and gives predictable results. Other surgeons argue that the patella should not be resurfaced because patellar resurfacing leads to a potentially increased rate of complications like patellar fracture, patellar component loosening, or continuing anterior knee pain. Researchers have also argued that the results of not resurfacing are as good as the results after resurfacing. An alternative is to do patelloplasty. However most of the studies are retrospective and there is lack of any conclusive comparative prospective study between patella resurfacing and patelloplasty. Also most of the comparative studies are between different patients and biased by subjective variables in addition to bias arising from difference between surgical techniques, implants, surgeon's skills and expertise. So to know whether to go for patella resurfacing or patelloplasty in Indian patients we conducted a prospective study removing the bias by comparing the two techniques in a single patient operated for bilateral tkr and having patella resurfaced on one side and patelloplasty on other. Also all the surgeries were performed by a single surgeon and using the same implant, removing the other biases and making the study more reliable and conclusions valid. Very unique feature of this study is that we are comparing the effect of patella resurfacing and patelloplasty in a same patient.

Material and methods

40 patients undergoing bilateral tkr were studied. Pre-operative assessment included demographics, weight, height, sex, body mass index, knee deformity and range of motion, VAS score for pain, knee society score and patellar score. Informed consent was taken from all patients to be part of the study with detailed guidance on patellar resurfacing and patelloplasty and random allocation of side for the study.

Total knee replacement was performed by a single surgeon using a single knee implant at two centres. Mideast's approach was used for knee exposure. Tar was performed used measured resection and ligament balancing techniques. All the patients had patelloplasty on one side and patella resurfacing on other side. The decision of side allocation for patelloplasty or resurfacing was random. Patelloplasty involved removal of osteophytes and surrounding synovial tissue, smoothing of edges using bone file, partial rim cautery for peripheral neurectomy and subchondral decompression with multiple drill bit holes. Patellar resurfacing involved removal of osteophytes, patellar cut of 8 mm using cutting guide and placement of maximum size button towards super-medial aspect. Closure was done in layers over vacuum drain. Standard post-operative knee protocols were followed in all cases. These patients were assessed postoperatively for anterior knee pain, knee society score, VAS score and radiological parameters. Complications related to patella were noted.

Results

After average follow up of 17.75 month there was no correlation of anterior knee pain with age, sex, obesity, height or range of flexion achieved post operatively.

Patients operated had mean age of 61.4 years with range of 40 to 84 years with 93% operated for degenerative osteoarthritis, 5% for rheumatoid arthritis and 2 for post traumatic arthritis. There was significant improvement in Knee Society Scores in patients undergoing TKA. Average increase in scores was from 32 to 91 in patelloplasty side and 25 to 88 in resurfacing

side. The difference in improvement in both groups was not statistically significant. (Table-1) Similarly average functional score improvement was from 28 to 78 in patelloplasty side and 32 to 76 in resurfacing side, again the difference was statistically insignificant with Chi square test. Post-operative range of motion achieved at 6 months follow up was average of 134 degrees in patelloplasty side and 131 degrees in resurfacing side. No significant difference seen in both groups. It is imperative to note that factors associated with less post-operative flexion included obesity, pre-operative flexion less than 70 degrees. Both sides showed decrease in pain score from 7-10 pre-operatively to 0-3 post-operatively as per VAS scoring on a scale of 0 to 10. However the difference in patelloplasty and resurfacing group was statistically not significantly different. For anterior knee pain incidence of Grade I pain was 28% on patelloplasty side and 29% on resurfaced side, and Grade II pain was only 1 %. Here also difference was not significant. In no case we had to undergo resurfacing for intractable anterior knee pain. One patient had a patella fracture per operatively. None of the patients had repeat surgery.

Discussion

The knee society scores, VAS score and functional outcome consistently improved with tar and the results of both patelloplasty and patellar resurfacing were comparable with no statistically significant difference between the two sides.

Sanjay Agarwala *et al.* [2] in a similar study on 60 patients found no statistically significant difference in short term clinical, functional and radiological outcomes in both patelloplasty and resurfacing groups and therefore recommended that routine patellar resurfacing is not advantageous.

Several randomized clinical trials have reported same frequency of anterior knee pain in both patella retention group and resurfacing group. Burnett *et al.* [3] reported equivalent clinical results for resurfaced and non-resurfaced patellae in TKA in a 10 year randomized clinical trial. Also it cannot be presumed that the anterior knee pain before and after knee surgery is always due to patello-femoral pathology. Also there are many reports in favour that there is no any significant difference between resurfacing and retention in terms of overall function and knee pain. Therefore routine resurfacing of the all patients without acceptable indications is not advisable because of the complications related with patellar resurfacing as well as increase in operative time and cost. Many of the complications related to patellar resurfacing are difficult to treat and result in poor outcome and dissatisfaction. In our study there was one patient having per op patellar fracture (2.5%) in resurfacing group.

Also the patella thickness in Asian population is less than the western population and required residual thickness of the bone after cut must be set to a minimum level of 12-15 mm with final thickness of the component within 3 mm of native thickness. But decreasing the residual thickness of the bone can lead to increased risk of complications in longer follow up. So it is advisable to reserve resurfacing to selected indications. Prerequisites for a well-functioning patello-femoral joint are: a properly designed femoral component with a deep, well oriented trochlear groove and an elevated lateral flange, a well-positioned femoral component, proper positioning of the tibia component in rotation, adequate ligament balance in a well-aligned leg and a normally tracking extensor mechanism. The importance of "patella-friendly" femoral components designed with a more anatomic

constant radius femoral components in outperforming others in reducing anterior knee pain and patella complications is well stated by Karachalios *et al.* [4] in their 15 year follow up study and by Mat z *et al.* [5] in their monologue on understanding the patellofemoral joint in TKA. Also Matsuda *et al.* [6] in a laboratory and clinical study, stated the importance of the designs of the femoral component in three different implants for the unresurfaced patella, arguing that, given an appropriate trochlear geometry, patello-femoral function can be excellent with the unresurfaced patella articulating with the metal component. This study has shown that total knee arthroplasty results in a dramatic improvement in both pain and function. An extremely high percentage of patients are either satisfied or extremely satisfied with the arthroplasty. In the 6 month follow up, the Knee Society Clinical Ratings improved. We did not find significant differences between TKA's with resurfaced and patelloplasty side as to revision rates, KSS scores, patient satisfaction, anterior knee pain, patellofemoral and radiographic outcomes. Given an appropriate trochlear geometry, patellofemoral function can be excellent with the patelloplasty side articulating with the metal component. Other option may be to go for resurfacing the patella only for selected indications that would minimize the risk of complications and improve the outcome of the procedure.

Table 1: Change in various clinical parameters

	Patelloplasty	Resurfacing
KSS	32 to 91	25 to 88
Functional score	28 to 78	32 to 76
Postop ROM	134 degrees	131 degrees
Anterior knee pain (Gr I)	28%	29%

Conclusion

For Indian patients who have smaller patellar dimensions as compared to the western population patelloplasty is an effective way to decrease anterior knee pain. It also leaves the option of resurfacing the patella in future for anterior knee pain and avoids patella resurfacing related specific complications.

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