

Original article:

Feasibility of Patellar resurfacing in total knee replacement in Indian patient with the presently available implants

DR. RAJESH LALCHANDANI, DR ROHAN KRISHNAN, DR. RAGHAV TANDON

Department of Orthopedics, PSI Hospital, Basaidarapur, New Delhi - 110015

Corresponding author - DR ROHAN KRISHNAN

ABSTRACT

Total knee arthroplasty is a highly successful procedure that can reduce pain and improve range of motion and function by correcting angular deformities and restoring the integrity of the articular surface. Patellar resurfacement was not considered of much use in early 1950's to 1970's but the thrust to resurface patella was started by the reports suggesting that 24-50% of patient suffer from ant. Knee pain in unsurfaced patella. To achieve ideal patellar resurfacement and to avoid patellar fracture was established by McEvan'setal that residual bony patellar thickness after patellar osteotomy should not be less than 15mm. To have a residual patellar thickness of more than 15mm after patellar osteotomy the nature patellar thickness should be 24-25mm as the smallest available implant is of 8mm thickness. It is well known fact that various anatomic parameters vary among people from different race and gender , but the implant available in India are mainly designed for caucasian population and are not suitable for large number of Asians especially female gender. In our study we did intraoperative morphometric analysis of patella of Indian patients of different ages, sex and gender and found out that 87% of patients of our study group did not have the desired size of patella and could not undergo patellar resurfacement due to unavailability of improper size of implant.

INTRODUCTION

T.K.A is a highly successful procedure that can reduce pain and improve range of motion and function by correcting angular deformities and restoring the integrity of the articulating surfaces . Since 1950s T.K.A has become the standard method to treat the late stage OA and RA of knee joint. The primary purpose of T.K.A is to restore normal knee function. Initially, patella was not resurfaced in T.K.A but the thrust to resurface patella was started by the reports suggesting 24-50% of patients suffering from anterior knee pain in unresurfaced patella after T.K.A. It was established in various studies that patellar resurfacement is successful with no patellar strains such as ant. Knee pain and patellar fracture when bony residual patellar thickness after patellar osteotomy is more than 15 mm.

However, to achieve a residual patellar thickness of more than 15mm after resection, the nature patellar thickness should be atleast 25-25mm as the smallest available implant is of 8mm. It is a well known fact that various anatomic parameters vary among people from different races,gender,hence the morphometry of patella Indian patient cannotbe same as the morphometry of patella of Caucasian patient. We undertook the study of 55 pts of grade iv OA of Indian population to do a free operative (radiological) and intra-operative morphometric study of patella of a patient of T.K.A to understand the feasibility of patellar resurfacement in Indian pts undergoing T.K.A with presently available implants which are designed for Caucasian population.

MATERIALS AND METHODS

STUDY DESIGN: Prospective Cohort Study

DURATION OF STUDY: Oct.2017 – March 2019

The study was carried out in the Department of Orthopaedics, Employees State Insurance – Post Graduate Institute of Medical Sciences & Research (ESI-PGIMSR), Basaidarapur, New Delhi after the clearance from the Ethics committee.

SAMPLE SIZE: 55 cases.

INCLUSION CRITERIA:

Age: >50 years

Sex: Both the genders

Diagnosis: OA knee having less than 30° varus and flexion deformity going in for primary TKA.

EXCLUSION CRITERIA:

- 1) Revision cases or patients with flexion contracture more than 30°,
- 2) Previous complex knee surgery,
- 3) Retained metal hardware at the hip and Knee
- 4) Ankylosis of ipsilateral hip, knee or ankle,
- 5) Extra-articular deformity of the knee,
- 7) Patients who refuse to give consent.
- 8) Cases involving semi constrained / constrained implants.

RESULT

In our study it was observed that out of 55 patients 8 patients ie 14.55% were of age 50, and 29 patients ie 52.73% of the patients were of age between 51-60 years and 18 patients ie 32.73 % of the study group were more than 60 years old.

In our study 25 patients that is 45.45 % of the population were females whereas 30 patients that is 54.55 % were males.

The mean value of patellar morphometry in Anteroposterior diameter was found to be 23.18 which is lower than the required value ie 24 mm for patellar resurfacement, whereas the mean value of Mediolateral diameter was found to be 44.71mm and Super-inferior was found to be 34.09 mm in diameter.

Here we observed that patellar morphometry in patient is corelated to height of the patient and as the height of the patient increases the patellar thickness also increases and is statistically significant, whereas it seen that age of the patient do not affects patellar morphometry.

Here, we observed that as the height of the patient increases the patellar size increases too with the mean height of </ 164.66cm has patellar thickness less than 23mm, and the mean height of >/175.17cm has patellar thickness greater than or equal to 23mm.

Here the graph depicts that the thickness of patella (AP) is increasing with the height of the patient in cms and is statistically significant.

Here, the graph depicts that the SI diameter of patella does not corelate with the height of the patient and is statistically insignificant.

Here the graph depicts that ML diameter of patella increases with increase in the height and is statistically significant.

In the study we observed that at the age of 50 years , 25% of the population were having patellar thickness of less than 23mm and 75 percent of the population was having patellar thickness more than or equal to 23mm. At the age between 51-60 it was observed that 41.38 % of population were having patellar thickness less than 23 whereas 72.22% of the population was having patellar thickness more than or equal to 23mm. At the age of 60 and above 34.55 % of the population were having patellar thickness of less than 23 and 65.45 % of the population were having patellar thickness more than or equal to 23mm. hence it is safe to say that age is not a factor that affects the thickness of Patella.

Here the graph depicts that with increase in age of the patient the patellar thickness remains constant and is statistically insignificant.

Here the graph depicts that the SI diameter of patella does not changes with age and is statistically constant.

Here the graph depicts that ML diameter of the patella remains same with age and is constant.

Hence we conclude that age of the patient is not statistically significant and does not affect patellar morphometry.

Here we see that out of 55, 36 patients that is large amount of patient about 65.45 percentage is having patellar morphometry less than or equal to 23mm however, 34.55 % of study were having less than 23mm thickness.

Here we see that only 3 % of the study group was having patellar thicknes of 17-20mm whereas a maximum study group of about 70.91% are having patellar thickness of 21-23mm making it impossible to do patellar resurfacement in a huge population due to implant design. Whereas, 25.45 % of population are having patellar thickness of about 24-26mm where patellar resurfacing was done.

Here we have observed that 56%of the female population is having patellar thickness less than 23mm and 44% of the female population is having patellar thickness greater than or equal to 23mm, whereas 16.67 % of males are having patellar thickness less than 23mm and 83.33 % of the male population were having patellar thickness (intra op) greater than 23mm. hence it can be safely said that females have less thickness of patella and patellar morphometry of females vary with that of males.

Here, we see that in females 8 % of the population are having patellar thickness between 17-20mm and 92 % of the female population are having patellar thickness of 21-23, hence 100% of females in our study group were having patellar thickness less than 24mm which is the required patellar thickness for patellar resurfacing to avoid complication and hence patella was not replaced in the population in view of the unavailibility of properly designed implants for Indian patients.

Here it seen that in males 0 % of the population were having patellar thickness in the range of 17-20 whereas 53.33 % were having patellar thickness of 20-23mm and 46.67 % of population was having patellar thickness more than 23mm.

The correlation coefficient is a statistical measure that calculates the strength of the relationship between the relative movements of two variables. Here it is seen that Radiological assessment of patellar morphometry is related to intra operative assesement of patellar morphopmetry and is statistically significant and a positive co relation exists between the two variables.

DISCUSSION

T.K.A. is a safe and highly rewarding surgery in experienced hands. A lot of research is continuously been done to update our existing knowledge about the surgery and to give better outcomes. In the above study we have established that 100 % of females in the study group, because of their short stature was having patellar thickness less than or equal to 23mm and hence was not suited to undergo patellar replacement due to lack of small size patellar implant. About 56 % of the male population were also having patellar size less than or equal to 23mm and patellar resurfacing was not done in them too.

The smallest available patellar implant in India is about 8 mm in size which is not suitable for Indian patient. Hence in this study we conclude that there is a need of better designed implants for Indian patients as the presently available implants are mainly designed for western population.

In the study we also established that a positive correlation existed between the radiological findings and intra op measurement of patella.

CONCLUSION:

Hence, we can inform the patients priory about the tentative size of implant they will need and also whether or not they can undergo patellar resurfacing. In our study we also established that a co relation existed between the height of the patient and size of the patella. Patients of smaller size had small thickness patella and larger height had large thickness patella.

REFERENCES:

1. Barrack RL, Wolfe MW. Patellar resurfacing in total knee arthroplasty. *J Am Acad Orthop Surg.* 2000;8:75–82.
2. Patel K, Raut V. Patella in total knee arthroplasty: To resurface or not to – A cohort study of staged bilateral total knee arthroplasty. *Int Orthop.* 2011;35:349–53.
3. Gomes LS, Bechtold JE, Gustilo RB. Patellar prosthesis positioning in total knee arthroplasty. A roentgenographic study. *Clin Orthop Relat Res.* 1988 Nov;236:72–81.
4. Rosenberg AG. Management of the failed metal-backed patella. *Orthopedics.* 1996;19:813–5.
5. Rand JA. Extensor mechanism complications following total knee arthroplasty. *J Bone Jt Surg.* 2004;86-A:2062–72.
6. Calvisi V, Camillieri G, Lupporelli S. Resurfacing versus nonresurfacing the patella in total knee arthroplasty: A critical appraisal of the available evidence. *Arch Orthop Trauma Surg.* 2009;129:1261–70.