

Outcome of Patients in Term of Range of Motion after Total Knee Arthroplasty with all Poly Implants

FRAZ NOOR¹, KAMRAN SAEED², AGHA MOMIN³, NAEEM MEHMOOD MUGHAL⁴, ZULFIQAR ALI SOOMRO⁵, MEHTAB ALI SHAHANI⁶

¹Assistant Professor of Orthopaedics, Sahara Medical College, Narowal

²Associate Professor of Orthopaedics, Sialkot Medical College, Sialkot

³Assistant Professor of Orthopaedics, Pak Red Crescent Medical & Dental College, Dina Nath

⁴Associate Professor of Orthopaedic Surgery, M. Islam Medical & Dental College, Gujranwala

⁵Professor of Orthopaedics, GMMMC, Sukkur

⁶Assistant Professor, Department of Orthopaedics, Khairpur Medical College, Khairpur Mirs

Correspondence to: Fraz Noor, Email: drfraznoor@gmail.com, Cell: 0331-4548771

ABSTRACT

Objective: To evaluate the outcome of patients in term of range of motion after total knee arthroplasty with all poly implants.

Study Design: Retrospective study

Place and Duration of Study: Department of Orthopaedics, Sahara Medical College, Narowal from 1st April 2021 to 31st March 2022.

Methodology: Sixty various patients who came for total knee arthroplasty were selected on the basis of their conditions. Patients were divided into two inserts groups for understanding the better outcome results in terms of range of motion (ROM). Thirty patients having fixed bearing and other 30 patients having mobile bearing inserts will all poly implants. A standardized medial-parapatellar approach was taken for surgical procedure and resection of primary tibia was done. Pain function and evaluation was performed through knee society scoring (KSS) as well as VAS score and goniometer was used for analyzing range of motion which was defined as degree of flexion of knee subtracting from number of extension-defect.

Results: There was no significant difference in either the gender or ages of both implants selected patients. However the mobile bearing group patients has a better BMI value than the fixed bearing implant patients. In term of range of motion mobile bearing group patients had a higher ROM value than the fixed bearing operated patients in case of overall change in range of motion analysis. The Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Index, score showed a significant change with an increased value observed in mobile bearing implant patients.

Conclusion: Visual analogue pain score show significant difference in mobile and fixed bearing group. In terms of range of motion, mobile implants show better outcome in contrast to fixed bearing group.

Keywords: Knee implants, Mobile, Fixed bearing, Outcomes, Osteolysis

INTRODUCTION

Different types of inserts are used in knee arthroplasty which allow easy movement and motion in all directions. Extensive literature is already present on the use of mobile and fixed bearing inserts. According to available research, both of which have their own pros and cons on the basis of knee condition and surgery outcome. Mobile inserts allow rotation only in longitudinal axis from inset to tibial component.¹⁻⁵ It is also documented in the literature that, due to the mobility and movement of the insert, it decreases insert rate which lead to osteolysis due to implant loosening.^{6,7} Soft tissue impingement, insert dislocation and post-operative instability are the concerns which are widely associated with mobile inserts. On the other hand, few studies also highlighted that, post-operative joint function and rate of movement for mobile inserts are superior due to the fixation of rotational mismatch.⁸ These makes mobile insert more suitable and better option and surgeon mostly opt this method for knee arthroplasty.

To avoid post-operative insert dislocation, balancing method can be employed in extension and flexion. Hence, mobile inserts are technically and aesthetically a good option for knee implants. However, additional research and treatment method still need to be explored for better outcome.^{9,10} Various studies have been conducted to find the clinical and outcome difference between fixed bearing and mobile inserts. Results of most of the studies revealed no significant difference as a treatment for knee arthroplasty.^{11,12} Knee prostheses has considerably improved over the past few years in terms of both quality and fixation methods. The large randomized control trials reported no substantial difference in function, migration, range of movement and durability.

Present study was designed to evaluate the outcome and clinical difference in terms of range of movements, durability and function after knee arthroplasty with various poly implants. This study will help in considering and finding a better treatment option for knee implants and fixation.

MATERIALS AND METHODS

This retrospective study was conducted at Department of Orthopaedics, Sahara Medical College, Narowal from 1st April 2021 to 31st March 2022. A total of 60 patients who came for total knee arthroplasty were selected on the basis of their conditions. Thirty patients having fixed bearing and other 30 patients having mobile bearing inserts were selected. The sample size generation was done through consideration of 95% CI and 80% power of test. The selection was made randomly and was retrospective in design. Patients having knee arthritis or secondary surgery or having any varus or valgus disability with a degree greater than 20 were excluded from the study. The selected patient's consent of participation was received before inclusion in the study. All demographic details and clinical information were also documented. A standardized medial-parapatellar approach was taken for surgical procedure and resection of primary tibia was done. Cementing of all components was made and tourniquet applied. Replacement of articular patella surface was not performed. Physiotherapy was done in post operation and radiography was conducted since pre-operative time till six months after. Full weight-bearing with two crutches was done immediate after surgery and continuous passive motion was also initialized at the day one post operation. Pain function and evaluation was performed through knee society scoring (KSS) as well as VAS score and goniometer was used for analyzing range of motion which was defined as degree of flexion of knee subtracting from number of extension-defect. Reported outcomes of patients were assessed through WOMAC scoring including 24 various questions regarding pain and movement scores. Data was entered and analyzed using SPSS-26 where Chi square test was used for analyzing the significance between variables through p-value significance as less than 0.05.

RESULTS

There were more males in both implants' group than females. The mean age of fixed bearing and mobile bearing receiving knee

arthroplasty patients was 65.8±12.5 and 67.6±15.2 years respectively. There was no significant difference in either the gender or ages of both implants selected patients However the mobile bearing group patients has a better BMI value than the fixed bearing implant patients (Table 1).

In term of range of motion mobile bearing group patients had a higher ROM value than the fixed bearing operated patients in case of overall change in range of motion analysis. The KSS score however did not represent any significant variance among both implant group results. The KSS function change also interpreted an insignificant variance within groups (Table 2).

The Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Index, score showed a significant change with an increased value observed in mobile bearing implant patients. The VAS pain score had insignificant difference within fixed bearing patients as well as mobile bearing patients (Table 3).

Table 1: Demographic characteristics of fixed and mobile bearing implant patients

Demographics	Fixed-bearing	Mobile-bearing	P value
Gender			
Males	10 (33.3%)	14 (46.6%)	0.16
Females	20 (66.6%)	16 (53.3%)	0.159
Age in years (range)	65.8 (54–77)	67.6 (52–78)	0.347
Mean BMI kg/m ² (range)	31.7 (23–45)	29.4 (24–38)	0.051

Table 2: Comparison of ROM, KSS pain and function score in fixed and mobile bearing insert patients

Variable	Fixed-bearing	Mobile-bearing	P value
ROM			
Pre-operative	100.8±14.6	104.7±18.4	0.082
Post-operative	114.1±10.2	109.3±7.3	0.013
Change in ROM	13.4±18.4	54.8±18.5	0.018
KSS			
Pre-operative	56.8±9.4	58.8±15.5	0.099
Post-operative	92.5±10.4	94.1±5.9	0.645
Change in KSS pain	35.8±13.6	35.6±16.7	0.386
KSS function			
Pre-operative	47.3±13.4	48.6±13.8	0.871
Post-operative	83.2±20.6	86.6±16.9	0.601
Change in KSS function	36.1±24.5	38.1±18.8	0.790

Table 3: Comparison of WOMAC and VAS pain score in fixed and mobile bearing insert patients

Variable	Fixed-bearing	Mobile-bearing	P value
WOMAC			
Pre-operative	57.8±11.1	51.1±13.9	0.033
Post-operative	86.2±14.8	90.4±9.51	0.386
Change in WOMAC	28.4±17.2	39.4±14.52	0.018
VAS pain			
Pre-operative	6.7±2.1	7.3±1.9	0.162
Post-operative	1.8±1.5	1.7±1.1	0.975
Change in VAS	4.9±2.6	5.7±2.1	0.225

DISCUSSION

In the present research it was conclusively observed as a major finding that whichever type of implant was used for the total knee arthroplasty the end results regarding post-operative results was similar in both implants. However, considering the range of motion the results showed significant improvement and higher values for mobile bearing implants in comparison to the fixed bearing implant cases. This interprets that mobile bearing implants with all poly implants have a better result for improved range of motion than any other implants available in patient's long term outcome results. The similar findings have been reported from various other literatures where range of motion has also been improved in cases with polyethylene based mobile bearing implants. The survival rate and satisfactory level has been indeed reported in both implant types.¹³⁻¹⁶

Variance in Range of Motion in fixed bearing implant patients and mobile bearing implant patients is interpreted as a post-

operative normal range of knee motion. There are certain observed reservations in cases of superior result of mobile bearing implants in context of ROM. Aglietti et al¹⁷ presented superior results in terms of ROM with mobile bearing implants than fixed bearing implants. On the contrary there is also available studied where no variance has been reported in ROM in both implant types. One such research was conducted as a systematic literature reviewing various authentic literatures.¹⁶ Studies have also reported that in cases of short term follow up or in researches with long term follow up the results of advantages as well as disadvantages from any of the implant are similar with no significant superiority of one type over the other.^{18,19}

Both implant groups presented satisfying results in terms of pain scoring and mobility in long term follow up in the current study results. Similar results were elaborated in another randomized control trial. However, the level of satisfaction by patient in the current study was higher than reported in the other literature. The result of WOMAC score were however closely relatable.^{20,21}

CONCLUSION

VAS pain scoring show significant difference in mobile and fixed bearing group. In terms of range of motion, mobile implants show better outcome in contrast to fixed bearing group.

REFERENCES

- Bistolli A, Massazza G, Lee GC, Deledda D, Berchiolla P, Crova M. Comparison of fixed and mobile-bearing total knee arthroplasty at a mean follow-up of 116 months. *J Bone Joint Surg Am* 2013;95(12):e83.
- Callaghan JJ, Insall JN, Greenwald AS, Dennis DA, Komistek RD, Murray DW, et al. Mobile-bearing knee replacement: concepts and results. *Instr Course Lect* 2001;50:431-49.
- Kalisvaart MM, Pagnano MW, Trousdale RT, Stuart MJ, Hanssen AD. Randomized clinical trial of rotating-platform and fixed-bearing total knee arthroplasty: no clinically detectable differences at five years. *J Bone Joint Surg Am* 2012;94(6):481-9.
- Mahoney OM, Kinsey TL, D'Errico TJ, Shen J. The John Insall award: no functional advantage of a mobile bearing posterior stabilized TKA. *Clin Orthop Relat Res* 2012;470(1):33-44.
- Shi X, Shen B, Yang J, Kang P, Zhou Z, Pei F. In vivo kinematics comparison of fixed- and mobile-bearing total knee arthroplasty during deep knee bending motion. *Knee Surg Sports Traumatol Arthrosc* 2014;22(7):1612-8.
- Buechel FF Sr. Long-term followup after mobile-bearing total knee replacement. *Clin Orthop Relat Res* 2002;404:40-50.
- McGonagle L, Bethell L, Byrne N, Bolton-Maggs BG. The Rotaglide+ total knee replacement: a comparison of mobile versus fixed bearings. *Knee Surg Sports Traumatol Arthrosc*. 2014 Jul;22(7):1626-31.
- Abdel MP, Tibbo ME, Stuart MJ, Trousdale RT, Hanssen AD, Pagnano MW. A randomized controlled trial of fixed- versus mobile-bearing total knee arthroplasty: a follow-up at a mean of ten years. *Bone Joint J* 2018;100-B(7):925-9.
- Fisher DA, Bernasek TL, Puri RD, Burgess ML. Rotating platform spinouts with cruciate-retaining mobile-bearing knees. *J Arthroplast* 2011;26(6):877-82.
- Sadoghi P, Liebensteiner M, Agreiter M, Leithner A, Böhler N, Labek G. Revision surgery after total joint arthroplasty: a complication-based analysis using worldwide arthroplasty registers. *J Arthroplast* 2013; 28(8):1329-32.
- Pagnano MW, Trousdale RT, Stuart MJ, Hanssen AD, Jacofsky DJ. Rotating platform knees did not improve patellar tracking: a prospective, randomized study of 240 primary total knee arthroplasties. *Clin Orthop Relat Res* 2004;428:221-7.
- Franceschetti E, Torre G, Palumbo A, Papalia R, Karlsson J, Ayeni OR, et al. No difference between cemented and cementless total knee arthroplasty in young patients: a review of the evidence. *Knee Surg Sports Traumatol Arthrosc*. 2017;25(6):1749-56.
- Pagnano MW, Trousdale RT, Stuart MJ, Hanssen AD, Jacofsky DJ. Rotating platform knees did not improve patellar tracking: a prospective, randomized study of 240 primary total knee arthroplasties. *Clin Orthop Relat Res* 2004;428:221-7.
- Franceschetti E, Torre G, Palumbo A, Papalia R, Karlsson J, Ayeni OR, et al. No difference between cemented and cementless total knee arthroplasty in young patients: a review of the evidence. *Knee Surg Sports Traumatol Arthrosc* 2017;25(6):1749-56.

15. Bellamy N, Buchanan WW, Goldsmith CH, Campbell J, Stitt LW. Validation study of WOMAC: a health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. *J Rheumatol* 1988;15(12):1833-40.
16. Goslings JC, Gouma DJ. What is a surgical complication? *World J Surg* 2008;32(6):952.
17. Van der Voort P, Pijls BG, Nouta KA, Valstar ER, Jacobs WC, Nelissen RG. A systematic review and meta-regression of mobile-bearing versus fixed-bearing total knee replacement in 41 studies. *Bone Joint J* 2013;95-B(9):1209-16.
18. Aglietti P, Baldini A, Buzzi R, Lup D, De Luca L. Comparison of mobile-bearing and fixed-bearing total knee arthroplasty: a prospective randomized study. *J Arthroplast.* 2005; 20(2): 145-53.
19. Fransen BL, van Duijvenbode DC, Hoozemans MJM, Burger BJ. No differences between fixed- and mobile-bearing total knee arthroplasty. *Knee Surg Sports Traumatol Arthrosc* 2017; 25(6):1757-77.
20. Pijls BG, Valstar ER, Nouta KA, Plevier JW, Fiocco M, Middeldorp S, et al. Early migration of tibial components is associated with late revision: a systematic review and meta-analysis of 21,000 knee arthroplasties. *Acta Orthop* 2012;83(6):614-24.
21. Gioe TJ, Glynn J, Sembrano J, Suthers K, Santos ER, Singh J. Mobile and fixed-bearing (all-polyethylene tibial component) total knee arthroplasty designs. A prospective randomized trial. *J Bone Joint Surg Am* 2009; 91(9): 2104-12.