



A Prospective Study of Functional Outcome in Patients Undergoing Fixed Bearing Total Knee Arthroplasty VS Mobile Bearing Total Knee Arthroplasty

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ABSTRACT: Introduction: Total knee arthroplasty is a surgical procedure performed to reconstruct knees as it has high success rate. This has rapidly evolved with the introduction of TKA whereby improvements in patient satisfaction, as well as technology change to improve surgical outcomes and implant longevity have greatly increased acceptance for pain relief range, movement restoration function.

Aim and Objectives: To compare clinical, radiological outcomes between mobile bearing total knee arthroplasty and posterior stabilized fixed bearing total knee arthroplasty.

Materials and Methods: This study was done on 30 patients who underwent total knee arthroplasty from October 2022 to June 2024. Of which half were managed by successful TKA and fixed bearing posteriorly established and remaining by mobile bearing. 30 patients who underwent the procedure was confirmed, and every patient was asked to return for a follow up at our institute. Records of the inpatient and outpatient care were evaluated to document preoperative status of patients.

Results: The mean age was 67.3 ± 4.96 years. The mean KSS pre OP was 44.66 ± 7.30 . The mean KSS post OP was 94.33 ± 4.30 . Fixed bearing implants have a slightly higher average KSS Post-Operative score (94.67) compared to mobile bearing implants (94.0). The difference in scores between the two implant types is relatively small (0.67 points).

Conclusion: This analysis provides strong evidence that mobile bearing implants are associated with greater post-operative knee flexion compared to fixed bearing implants in this patient cohort. However, as with any surgical decision, the choice of implant should be made on a case-by-case basis, considering the full clinical picture and patient needs.

Keywords: KSS score, total knee arthroplasty, fixed and mobile bearing implants.

INTRODUCTION

Total knee arthroplasty is a surgical procedure performed to reconstruct knees as it has high success rate. This has rapidly evolved with the introduction of TKA whereby improvements in patient satisfaction, as well as technology change to improve surgical outcomes and implant longevity have greatly increased acceptance for pain relief range, movement restoration function [1-4]. In that time total knee arthroplasty was primarily reserved for the older, less active patients [5]. However, it has been demonstrated to perform well and last a long time in younger more active patient [6] as well the elderly. The first report of a patellar arthroplasty for arthritis was published by Fergusson in 1861. The first interposition arthroplasty of the knee is frequently accredited to Vermeil in 1863 and consisted mostly of a joint capsule flap between resected tibia and femur [7,



8]. Arthroplasty was first carried out by Campbell and Boyd in 1940 for mold of the knee followed later (in like manner) by Smtih-Peterson. Following a failed Cytobowl tibial trial, an attempt to joint packing with Fixion bone mix and Proximal Control Thin Red station Lifecell Orthothopedic Dynamic Compression Screw was broached. This prosthesis had a high rate of early loosening, like their femoral counterparts and all did badly in patients who have arthritis on both sides because there was still an untreated joint surface which could be the pain source [9]. Therefore, patients continue to pursue total knee arthroplasty for intractable pain and functional loss. Though these are indications for surgery, they represent less utility in the form of deformity or instability and loss of motion [10]. Patients should have been counselled that there are other causes of knee and leg pain to exclude, for example radicular back related symptoms (radicular from or above forth lumbar nerve), referred hip/sacroiliac joint pain on the same side as an arthritic painful knee, vascular claudication pains in bilateral calves provoked by walking attached with smoking habituates[11-13], peripheral bakers cysts/swellings when appropriate multiple features tend part correlate with meniscal pathology/buritis.

Before the option of surgery is looked into all conservative treatment must first be exhausted and some examples maybe using a cane to walk, taking anti-inflammatory drugs etc. It will not apply to younger patients but older individuals with severe knee arthritis could be candidates. The latter in particular (eg, chondrocalcinosis and pseudo-gout) will cause a significant amount of pain that is much more likely to be seen by an arthroplasty requiring our serum due to the complete cartilage preservation [14]. Although they have moderate pain and everything else suggests that patients not severe enough to realigned, considers them unlikely to benefit from arthroplasty (and therefore are being offered procedures such as unicompartmental or patellofemoral replacement), deformities within an acceptable ballpark detract adversely on the outcome. Few reports exist, but for the very old with severe patellofemoral arthritis improved functional expectation of arthroplasty may support this technique.

Contraindications to TKA included the following: Patients in the most recent sepsis or were an infectious source will be excluded from assessment and should never have received a surgery (if applicable) for which they might not otherwise require it. In addition, inadequate soft tissue coverage of the knee joint (with or without a vascular insufficiency in sequence) is regarded as an absolute contraindication. Poor perfusion of limb and severe vascular disease with proportionally the least arthroplasty under treatment. Neuropathic arthropathy and an arthrodesed knee are relative contraindications.

AIM AND OBJECTIVES:

To compare clinical, radiological outcomes between mobile bearing total knee arthroplasty and posterior stabilized fixed bearing total knee arthroplasty.

MATERIALS AND METHODS:

This study was done on 30 patients who underwent total knee arthroplasty from October 2022 to June 2024. Of which half were managed by successful TKA and fixed bearing posteriorly stablished and remaining by mobile bearing.30 patients who underwent the procedure was confirmed, and every patient was asked to return for a follow up at our institute. Records of the inpatient and outpatient care were evaluated to document preoperative status of patients. Three surgeons performed the replacement surgeries: one surgeon conducted PFC procedures exclusively, a second only for LCS and 3rd did both PFC & LCS but with fairly similar case volume of 25-30 cases/year.Patients with unconstrained cemented total knee arthroplasty (TKA) in the nature of Low Contact Stress system or press Fit Condylar as used for severe primary osteoarthritis and for destructive rheumatoid arthritis due to pain & disability were included in the study.

Patients receiving revision total knee replacement, Patellar replaced patients, Knee Surgery- Total Knee Replacement for post septic or trauma sequelae, In Disabled polyarthralgia, Individuals who had ipsilateral total hip replacement and Patients Treated at Outside Facilities were excluded from study.

RESULTS:

TABLE 1: DISTRIBUTION OF MEAN AGE OF THE STUDY POPULATION

	MEAN	SD
AGE	67.3	4.96



The mean age was 67.3±4.96 years.

TABLE 2: DISTRIBUTION OF KSS PRE OP

	MEAN	SD
KSS PRE OP	44.66	7.30

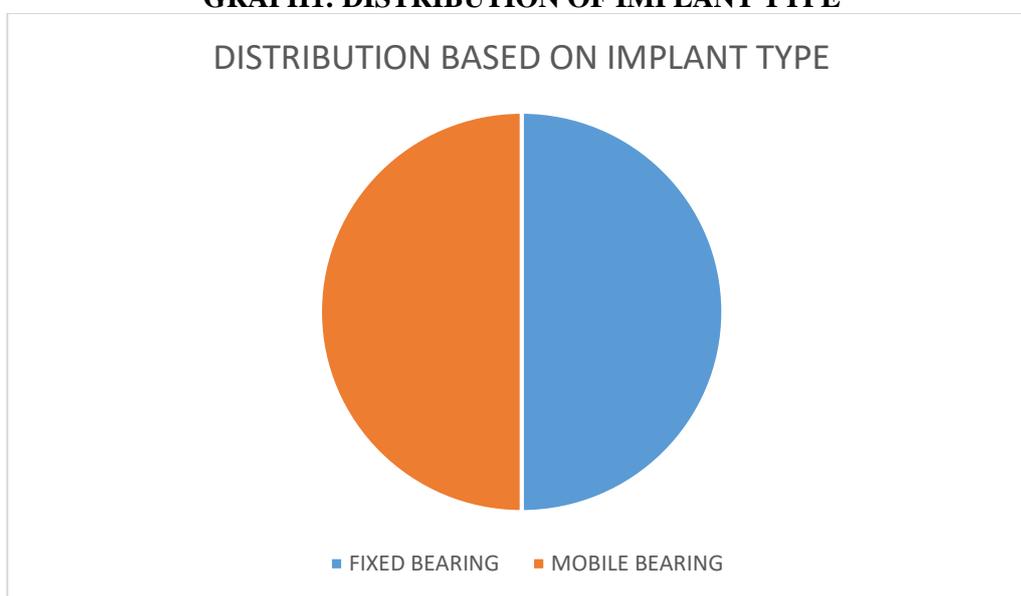
The mean KSS pre OP was 44.66±7.30

TABLE 3: DISTRIBUTION OF KSS POST OP

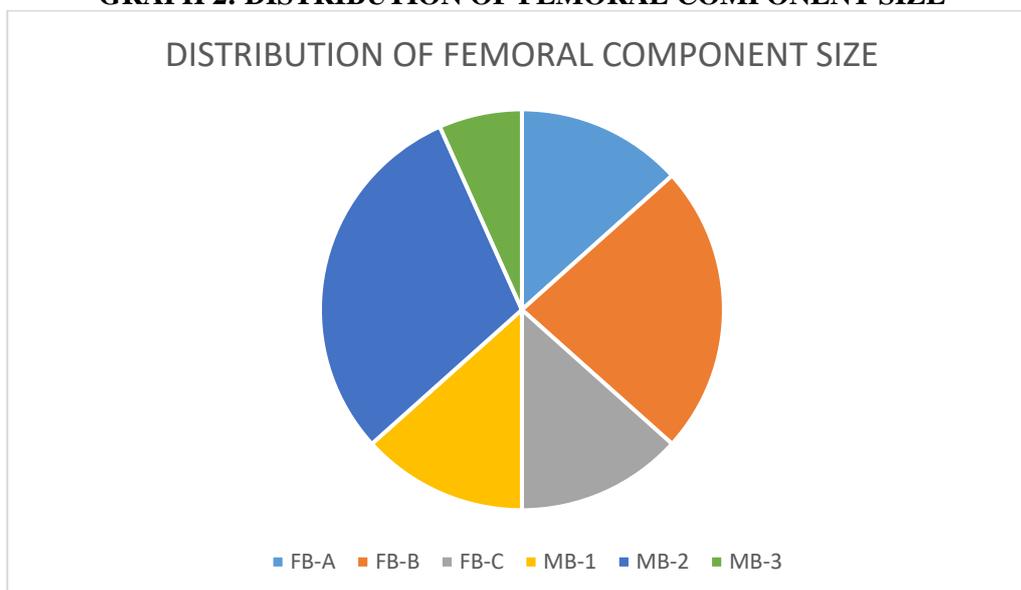
	MEAN	SD
KSS POST OP	94.33	4.30

The mean KSS post OP was 94.33±4.30

GRAPH1: DISTRIBUTION OF IMPLANT TYPE

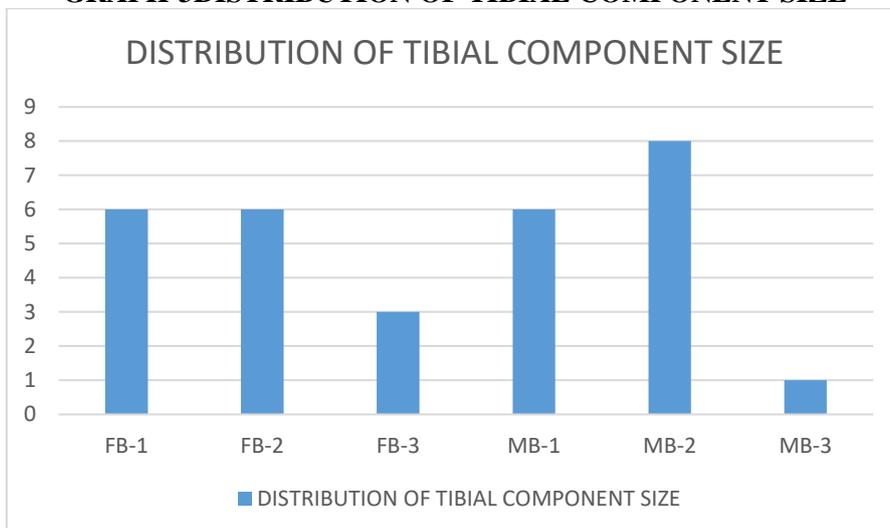


GRAPH 2: DISTRIBUTION OF FEMORAL COMPONENT SIZE





GRAPH-3 DISTRIBUTION OF TIBIAL COMPONENT SIZE



GRAPH 4: DISTRIBUTION OF INSERT SIZE

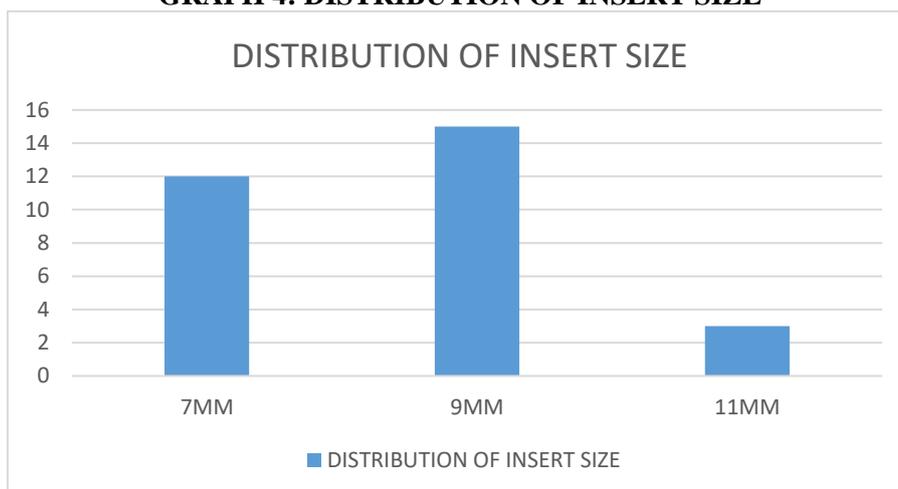


TABLE 4: COMPARISON OF GRADE AND KSS POST OP

K-L GRADING	AVERAGE KSS POST OP SCORE	P-VALUE
GRADE 3	94	0.58
GRADE 4	93	

Based on the KSS, the severity of osteoarthritis (as measured by K-L Grading) does not seem to significantly impact the post-operative functional outcomes. This suggests that patients with more severe osteoarthritis (Grade 4) can potentially achieve similar functional outcomes to those with less severe osteoarthritis (Grade 3) after knee replacement surgery.

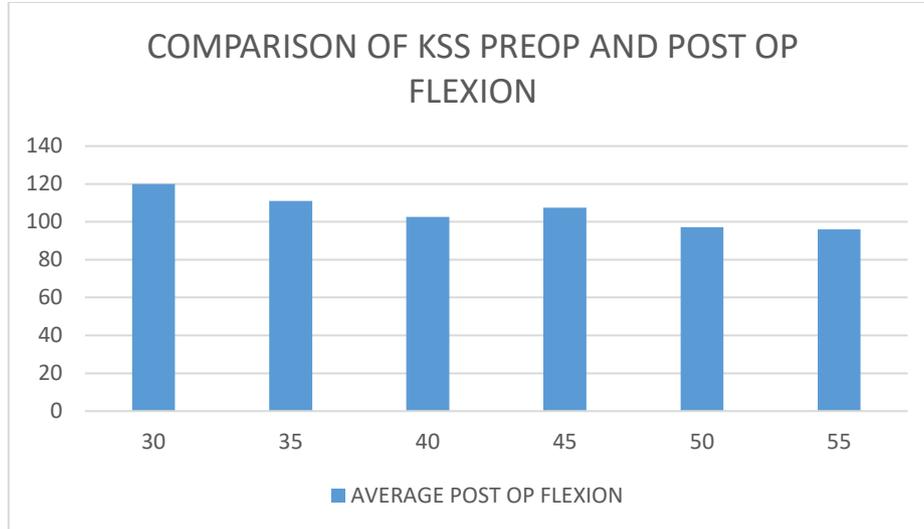
TABLE 5: COMPARISON OF IMPLANT TYPE AND FLEXION POST OP

IMPLANT TYPE	AVERAGE POST OP FLEXION(DEGREES)	P-VALUE
FIXED BEARING	92.7	2.89
MOBILE BEARING	113.7	



Fixed bearing implants have a slightly higher average KSS Post-Operative score (94.67) compared to mobile bearing implants (94.0). The difference in scores between the two implant types is relatively small (0.67 points).

GRAPH 5: COMPARISON OF KSS PREOP AND POST OP FLEXION



The overall mean flexion indicates that patients generally achieve good flexion post-surgery, with mobile bearing implants showing a notable advantage.

TABLE 6: COMPARISON OF IMPLANT TYPE AND POST OP COMPLICATION

COMPLICATIONS	PAIN	P-VALUE
FIXED BEARING	73.3%	0.384
MOBILE BEARING	86.7%	

This analysis provides strong evidence that mobile bearing implants are associated with greater post-operative knee flexion compared to fixed bearing implants in this patient cohort. However, as with any surgical decision, the choice of implant should be made on a case-by-case basis, considering the full clinical picture and patient needs.

TABLE 7: CORRELATION OF P-VALUES

COLUMN	TEST TYPE	P-VALUE
AGE/SEX	ONE-WAY ANNOVA	0.341
WEIGHT(KGS)	PEARSON CORRELATION	0.0479
VAS PAIN SCORE	PEARSON CORRELATION	0.2421
ROM-FLEXION	ONE-WAY ANNOVA	0.7918
ROM-EXTENSION	PEARSON CORRELATION	0.0048
KSS PRE OP	PEARSON CORRELATION	0.0046
POST OP FLEXION	ONE-WAY ANNOVA	0.042

DISCUSSION

This dataset from 30 patients presents an average net gain of 49.67 points in Knee Society Score (KSS) post-operation also. This improvement in knee function also represents a win for joint replacement surgery as a whole, showing that patients experience less pain and more mobility following the procedure. The results point to joint replacement as having a major positive impact on quality of life in this subgroup of patients with severe knee disease. These results were further validated with statistical tests. The t-test for the improvement in KSS



gave a t- stat 33.64, $p = 0.0000$ (Indicating that change seen Pre-op to post- op is statistically significant) thus additional confirmation of the fact joint replacement surgery is major patient relevant venture and doing it further adding on large functional gains due to surgical intervention. The relationship between the pre-op and post-op KSS score was supported by a weak r value of 0.1024 ($p = 0.5901$). This may suggest that pre-operative KSS scores are not a good predictor of postoperative outcome, as other factors have an important share in the overall determination of recovery. Sixteen patients complained of pain as the predominant postoperative complication. Rarer side effects were bleeding and wound healing problems. This reinforces the importance of effective pain introduction strategies as an aspect of post-operative management for new joint. Appropriate control of pain can lead to significant improvement in patient satisfaction and ultimately, the entire outcomes from recovery.

Implants types utilized in the surgeries were evenly distributed with 15 patients designated to fixed bearing implants, and another set of 15 for mobile bearing. Besides, this similar representation in the cases data will allow future studies to make outcome comparisons by type of implant and hence may provide clues towards best surgical practices. Master chart analysis demonstrated a significant gain in KSS activity score post joint replacement. The poor ability of preoperative scores to predict post-operative returns implies that other factors must also play a role in the recovery process, however this does emphasize effective surgical management can contribute towards optimal patient outcomes. The average rise in Knee Society Rating (KSS) pertaining to repaired human body enhancements was around 47.33 whilst a little bit increased outcome received along with Versus augmentation that is something like being fifty-two about, Guna Shekar M, Seock-Chun K, Chandrasekharan M Nair and Kimberly A (2010). Therefore, in a functional sense it is probable that there may be little difference between mobile bearing and fixed bearing implants.

The difference in KSS improvements between both prostheses types was also assessed using a t-test. This shows a t-statistic of -1.624 and p value = 0.1155, which suggests that although there is no evidence at $\alpha = 0.05$ (13) for group difference in improvement post-KSS between groups after surgery with respect to release date, it warrants further study depend on different sample size. The need including implant as a variable in predicting outcome measures during follow-up design has been reinforced whilst caution be advised when interpreting these data based on present dataset. Similarly, the trend of compartmental analyses according to type of implant was noteworthy for complications than functional outcomes. The resulting most prevalent cause within the fixed bearing population were pain (11 instances), bleeding (2 occurrences) and osteophytes (> 1 instance). In comparison, those in the mobile bearing arm encountered 13 events of pain and subsequently one event each for osteophytes or wound healing. It is also notable that no intra-operative bleeding, procedural complications occurred in the mobile bearing group. Chi-square tests were used to compare complication distributions between both implant types. The chi- square statistic was 4.1667, $p = 0.3839$ and this approach to combine these two datasets should decrease the number of data levels for other variables since only some sites overlap. That means to say that there is 1:1 complication percentage between both the implants. The data submitted does suggest however that while there are risks to both forms of implant phasing possibly as a result from their deployment in partly 78-81 because they are not single stage implants, these complications may differ qualitatively and quantitatively which could affect the decision-making of clinicians hesitating between different types. In conclusion, the results of this pooled analysis clearly show that prosthetic type is an important factor determining outcomes and complication rates following arthroplasty. Although mobile-bearing was associated with a slightly higher function, there were no differences in complication rates between mobile and fixed-bearing implants.

CONCLUSION

It should be noted that the MB design was implemented with theoretical advantages in mind as it provided a more conforming articulating surface, reduced contact stresses and decreased backside wear. It was also constructed to divide stress wear in two separate compartments and augment flexions for posterior translation, which encourage knee kinematics advancing more nearby the natural gait. We also anticipated that correction of the rotational alignment would be a self-aligning mechanism by improving patellofemoral mechanics. However, clinical efficacy was poorly validated in clinical studies demonstrating no significant kinematic improvement during step-up activity [14], higher kneeling scores and gait function combined with significantly different patellofemoral kinematics (kinetic pattern) compared to FB designs. Moreover, the M1 and MB inserts



in PCR designs induced a more pronounced release of partial PCL. The fact that MB inserts had a site contact point more anteriorly but these did not affect functional and pain scores.

Finally, no clinical or literature supported theoretic benefit has been demonstrated with TKA using MB inserts, but associated complications and revision rates are higher. Current available evidence is poor at worst and does not support a systematic recommendation concerning the type for MB insert in implants used within TKA based on literature review.

CONFLICT OF INTEREST: NIL

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