



DOES THE SURGICAL APPROACHES AFFECT PATIENT
CLINICAL OUTCOMES OF TOTAL KNEE ARTHROPLASTY- A
RETROSPECTIVE STUDY

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ABSTRACTS

Background: Total knee arthroplasty (TKA) is the major surgical treatment for end-stage osteoarthritis (OA). Surgical approaches for total knee arthroplasty (TKA) include the medial parapatellar (MPA), subvastus (SV), midvastus (MV), and lateral parapatellar approach (LPA); it remains unclear which approach is superior.

Aim: this study evaluates the affects of various TKA approaches on patient's clinical outcomes.

Methods: This study was conducted in the department of orthopedics, Smt. B.K Shah Medical Institute & Research centre and Dhiraj hospital, Gujarat. Patients having undergone

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TKA at our institution were retrospectively organized into matched groups according to surgical approach (MPA, MV, SV, or LPA). Outcomes between the groups were compared using the Short-Form 12 (SF-12), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Knee Society Score (KSS), and range of motion (ROM) up to 2 years postoperative.

Results: A total of Sixty-eight OA patients were enrolled in our study. Mean age was 62.4 years, predominantly female (62%), mean BMI were 33.5 Kg/m². Most participants (90% and 96%), improved ability to walk and reduced knee pain were very important TKA outcomes while 80%-86% improved ability to perform daily activities, climb stairs, participate in recreational activities and change position. There was no difference in outcomes between the MPA and MV groups up to 2 years. The SV group had significantly higher SF-12 Physical Composite Score (PCS) and WOMAC stiffness score at 2 years, but significantly lower flexion at 1 year than the MPA group. The LPA group had significantly lower SF-12 PCS and WOMAC function scores at 1 year than the MPA group.

Conclusion: There was no significant difference between the MPA and MV approach. The SV approach had some improved long-term outcomes over the MPA approach (SF-12 and WOMAC), but had significantly lower flexion at 1 year. The LPA group showed inferior outcomes than the MPA group but had more severe valgus preoperative deformity

Key words: Osteoarthritis, Total knee replacement, MPA, MV, SV, LPA, Outcomes

INTRODUCTION

Total knee arthroplasty (TKA) is the major surgical treatment for severe or end-stage osteoarthritis. The procedure relieves patients of pain and improves their quality of life. Despite good clinical evaluation by physicians, it has been reported that approximately 20% of patients

are dissatisfied with the outcome [1-2]. TKA is a preference-sensitive procedure, performed to improve patients' quality of life. Patients must weigh the benefits and risks of surgery in the context of their personal preferences and values [3]. Many approaches have been described for total knee arthroplasty (TKA), including the medial parapatellar (MPA), subvastus medialis (SV), midvastus (MV), and lateral parapatellar (LPA) approaches. The most commonly used of these is the MPA, which is considered the standard to which others are compared [4-5]. When discussing patient dissatisfaction following TKA a differentiation can be made between implant-related, patient-related and surgery-related factors [6]. Systematic reviews of the studies that examined the effectiveness of TKR reported that most of the studies were observational, and stated that the time to prosthesis failure or revision surgery were the main or only outcome measures, rather than patient-centred outcomes. The wide variations in the types of prosthesis and in the outcome measures used also made it difficult to come to a clear conclusion about the effectiveness of TKR [7-8]. In a standard MPA, a midline incision is used and a medial parapatellar arthrotomy is made. It allows for excellent exposure and is relatively straightforward to perform.¹ An SV approach typically also involves a midline skin incision, but the incision may be positioned more oblique and medially. From there, the border of the vastus medialis is visualized, its fascia is incised, and the vastus medialis is bluntly elevated from the medial intermuscular septum [9]. Each approach has advantages and disadvantages. For example, although the MPA provides an excellent view of the joint, it involves violating the extensor mechanism and medial structures.¹ The SV and MV approaches are "quadriceps sparing," but are more technically difficult to perform and often reserved for thinner patients [10-11]. More appropriate selection of TKA candidates offers the opportunity to improve both patient outcomes and the use of valuable healthcare resources [12].

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Aims and objectives: the aim of the current study to investigate the affects of patient's clinical outcomes by different approaches of TKA.

MATERIALS AND METHODS

This is a retrospective comparative study, carried out in the department of orthopedics, Smt. B. K. Shah medical institute & research centre and dhiraj hospital, Vadodara, Gujarat. Patients were included if they were older than 30 years and underwent primary TKA for severe osteoarthritis.

Inclusion criteria:

- Patients > 30 years of age
- Patients diagnosed severe osteoarthritis
- Patients willing for TKA and provide consent for that.

Exclusion criteria:

- Patients < 30 years of age
- Valgus deformity
- Occurrence of fractures in lower limbs receiving TKAs
- Progression of dementia during the follow-up period

Patient demographic characteristics were recorded. At the pre-operation interview, patients' views on the onset, etiology and experience of joint problems, referral and listing for TKR, and expectations of the TKR were explored. At the post operation interviews, patients discussed the experience of the hospital stay, operation and recovery, and their perception of the TKR outcome.

Short-Form 12 (SF-12), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Knee Society Score (KSS), knee function scores, and range of motion (ROM) were recorded at yearly intervals from the initial surgical date. The WOMAC scores were reported on

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a scale of 0 (worst) to 100 (best). Charts were retrospectively reviewed in order to organize patients by surgical approach used. The MV and SV approaches were generally chosen to offer a potentially less invasive approach to patients with varus or neutral alignment and lower body mass index (BMI). The LPA was used in cases of severe valgus deformity, as it is the lead surgeon's preferred approach for such cases. Patient groups were matched using propensity score matching for age, BMI, and gender.

Statistical analysis: Statistical analysis was done by using SPSS Statistics version 22. We used the Student t test and chi square test to compare the cohorts; A $p < 0.05$ considered statistically significant

RESULTS

A total of 50 patients of severe osteoarthritis eligible for TKR who met the inclusion criteria were enrolled in our study. Age ranged of the patients was 33 to 85 years, Mean age (SD) were 62.4 (8.1). Majority of the patients were female (62%), upper socio-economic class (38%), comorbidities was present in 54% patients and 34% were chronic smokers. Mean (SD) BMI were 32.5 (6.3) kg/m^2 [table: 1].

Table 1: Socio-demographic characteristic of the study Participant

| Participant characteristic | | N=50 |
|----------------------------|---------------|------------|
| Age (years), mean (SD) | | 62.4 (8.1) |
| Gender | Male, n (%) | 19 (38%) |
| | Female, n (%) | 31 (62%) |
| Socio-economic status | Lower | 15 (30%) |
| | Middle | 16 (32%) |

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|---------------------|---------|------------|
| | Upper | 19 (38%) |
| Comorbid conditions | Present | 27 (54%) |
| | Absent | 23 (46%) |
| Chronic smoker | Yes | 17 (34%) |
| | No | 33 (66%) |
| BMI, mean (SD) | | 33.5 (5.5) |

Most participants indicated that improved ability to walk and reduced knee pain were very important TKA outcomes (90% and 96%, respectively), while 80%-86% considered improved ability to perform daily activities, climb stairs, participate in recreational activities and change position very important. More variability was observed with respect to the importance of other outcomes [table: 2].

Table 2: TKA expectations, n (%) indicating a ‘very important’ TKA outcome

| TKA outcome | Frequency (%) |
|---|----------------------|
| Perform daily activities | 41 (82%) |
| Go upstairs | 43 (86%) |
| Walk | 48 (96%) |
| Relieve pain | 45 (90%) |
| Squat | 27 (54%) |
| Kneel | 30 (60%) |
| Change position, for example, get up from chair | 40 (80%) |
| Straighten knee/leg | 30 (60%) |

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|-----------------------------------|----------|
| Exercise or participate in sports | 32 (64%) |
| Walk without aids | 34 (68%) |
| Enjoy well- being | 33 (66%) |

Table 3: comparison of outcome scores in patients underwent various TKA approaches

| Outcome | MPA (mean ± SD) | MV (mean ± SD) | SV (mean ± SD) | LPA (mean ± SD) |
|------------------------|----------------------------|---------------------------|---------------------------|----------------------------|
| SF-12 MCS | 52.3 ± 10.4 | 52.3 ± 10.9 | 58.0 ± 2.3 | 43.0 ± 7.1 |
| SF-12 PCS | 41.0 ± 10.1 | 44.0 ± 10.4 | 43.1 ± 13.1 | 34.5 ± 3.7 |
| WOMAC pain | 80.0 ± 20.7 | 81.4 ± 18.2 | 86.4 ± 19.3 | 71.7 ± 10.4 |
| WOMAC stiffness | 70.4 ± 24.1 | 72.1 ± 19.4 | 75.0 ± 21.6 | 66.3 ± 7.5 |
| WOMAC function | 78.5 ± 20.2 | 78.9 ± 18.3 | 84.6 ± 18.7 | 61.7 ± 4.5 |
| WOMAC total | 77.8 ± 19. | 78.9 ± 16.6 | 83.3 ± 18.5 | 67.0 ± 6.6 |
| Extension | 0.2 ± 1.4 | 0.5 ± 1.8 | 0 ± 0 | 2.5 ± 2.9 |
| Flexion | 119.4 ± 10.3 | 114.7 ± 19.3 | 114.0 ± 8.2 | 110.0 ± 11.5 |
| KSS function | 83.2 ± 21.2 | 85.2 ± 18.9 | 85.0 ± 28.1 | 43.8 ± 54.4 |
| KSS knee | 91.5 ± 11.6 | 93.0 ± 9.8 | 94.8 ± 2.9 | 95.3 ± 2.5 |
| KSS total | 173.5 ± 28.9 | 176.3 ± 25.6 | 176.8 ± 31.5 | 139.0 ± 56.1 |

MPA = medial parapatellar approach; MV = mid-vastus approach, sub-vastus approach, lateral parapatellar approach, SF-12 MCS = Short-Form 12 Mental Composite Score; SF-12 PCS = Short-Form 12 Physical Composite Score; WOMAC = Western Ontario and Mac-Master Universities Osteoarthritis Index, KSS = Knee Society Score

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Table 4: Overall outcomes or satisfaction scores in patients underwent various TKA approaches

| Overall satisfaction with TKA results | Percentage score % |
|--|---------------------------|
| Very satisfied | 74% |
| Somewhat satisfied | 17% |
| Somewhat or very satisfied | 91% |
| Somewhat or very dissatisfied | 9% |
| OMERACT–OARSI and somewhat/very satisfied | 78% |

DISCUSSION

This study has shown that patients had a strong desire to state that their TKR outcome was successful despite the continued experience of pain and immobility. Different reasons and rationalizations were made by the participants in an attempt to diminish any disappointment with their remaining pain and disability. As a result of these explanations, and despite the fact that they had considerable pain and disability, they continued to consider the TKR with high regard [13].

Present study has variably found that younger patient age, greater BMI and the presence of comorbidities were associated with worse TKA outcomes. Despite wide variability in age, BMI and comorbidities, none of these variables independently predicted our TKA outcome. A possible explanation for this finding is that these factors influence TKA outcome through their effects on TKA need, readiness and willingness and expectations [14-15].

In our study majority of the participants indicated that improved ability to walk and reduced knee pain while most of them considered improved ability to perform daily activities, climb stairs,

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participate in recreational activities and change position were very important TKA outcomes, our findings were correlate with many other studies [16-18].

Although there are several randomized controlled trials comparing the MPA, MV, SV, and LPA approaches, many are small in sample size, report mixed results, and have short follow-up duration [19-20].

In our study of MV patients, we found no significant difference in SF-12, WOMAC, ROM, or KSS scores at 1 year postoperative. This was consistent with the results of prior studies, which tend to show short-term benefits of quadriceps-sparing approaches, but no difference in long-term outcomes [21-22].

Current study observed SV approached patients showed some promising results. The SV group had higher SF-12 PCS and WOMAC stiffness scores at 1 year postoperative, concordance to S.P. Sidhu et al [23].

The MPA group did, however, have significantly higher flexion at 1 year postoperative as compared to MV, SV and LPA, accordance with the Varela et al [24].

Our comparison of the MPA and LPA in valgus knees actually showed significantly lower SF-12 PCS ($p = 0.011$) and WOMAC function scores ($p = 0.022$) at 1 year postoperative for the LPA group. There was no significant difference in other components of the SF-12, WOMAC, ROM, or KSS, our results comparable with the other studies [25-26].

Overall satisfaction level after TKA are majority of the participants have very or somewhat satisfied with their surgical results, our finding were similar with study conducted by other researchers [27-28].

CONCLUSION

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We have concluded that patient age, BMI and the presence of comorbidities were associated with TKA outcomes. Compared with a standard MPA, the MV approach shows no significant difference in outcomes up to 2 years. The SV approach shows superior SF-12 and WOMAC scores at 2 years postoperative, but worse flexion at 1 year. The LPA for valgus knees had inferior SF-12 and WOMAC scores than the MPA, but selected for a more severe preoperative valgus deformity. Overall outcomes of TKA were very or somewhat satisfied.

CONFLICTS OF INTEREST: none

SOURCE OF FUNDING: none

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