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Functional and radiological outcome of total knee arthroplasty in varus knee: a prospective observational study

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ABSTRACT

Background: Varus deformity in osteoarthritic knees causes medial compartment overload, pain, instability, and progressive functional limitation. Total knee arthroplasty (TKA) is an established treatment for advanced disease. This study evaluated the clinical and radiological outcomes of TKA in patients with varus knee deformity.
Methods: This prospective observational study was conducted in the Indian tertiary-care teaching hospital, from May 2023 to January 2025. Institutional ethical committee clearance and informed consent from patient was taken. Fifty knees in patients aged 45-80 years with primary or secondary osteoarthritis or rheumatoid arthritis associated with varus deformity underwent posterior-stabilized TKA through a standardized medial parapatellar approach.
Results: Mean knee society clinical scores improved from 48.2 to 84.6 and functional scores from 47.1 to 85.3. Alignment correction and outcome categories are to be reported as per final tables.
Conclusions: TKA provided significant functional improvement and reliable deformity correction.

Keywords: Total knee arthroplasty, Varus knee, Osteoarthritis, Knee society score

INTRODUCTION

Total knee arthroplasty (TKA) is an established treatment for end-stage knee osteoarthritis with varus deformity, aiming to relieve pain, restore function, and achieve durable alignment correction.[1] In varus knees, medial compartment overload and soft-tissue imbalance accelerate degeneration, alter gait, and compromise quality of life.[2]

The present study was undertaken in an Indian tertiary-care teaching hospital department of orthopaedics, to assess whether posterior-stabilized TKA could provide satisfactory functional recovery and radiological correction in patients presenting with varus knees. The study also sought to document complications and compare the observed outcomes with accepted functional benchmarks based on the knee society score system.

METHODS

This was a prospective observational study performed at Ballari Medical College and Research Centre, Ballari, Karnataka, from May 2023 to January 2025. Data was analyzed by statistical package for the social sciences (SPSS) 20.0 version software.

The study included 50 knees in patients aged 45-80 years with primary osteoarthritis, secondary osteoarthritis, or rheumatoid arthritis associated with varus deformity.

Exclusion criteria were revision arthroplasty, extra-articular deformity unrelated to osteoarthritis, active infection, and valgus knee deformity.

Institutional ethical committee clearance and informed consent from patient was taken.

Of the 50 patients, 32 were female and 18 were male; 49 had severe osteoarthritis and one had rheumatoid arthritis. The mean age was 60 years.

All patients underwent preoperative clinical and radiological evaluation including standing anteroposterior, lateral, and scanogram views. Functional assessment was based on the knee society clinical score and knee society functional score.

All procedures were performed in a modular operating theatre under combined epidural and spinal anaesthesia using a midline incision, medial parapatellar arthrotomy, and posterior-stabilized TKA technique. Follow-up was conducted at 4 weeks, 8 weeks, 3 months, and 6 months.

RESULTS

All patients had preoperative knee society clinical scores below 60. Postoperatively, 88% had excellent clinical scores of 80-100, 10% had good scores of 70-79, and 2% remained below 60; the mean clinical score improved from 48.2 to 84.6, which was statistically significant with p<0.0001.

All patients also had preoperative knee society functional scores below 60. Postoperatively, 84% achieved excellent functional scores of 80-100, 12% had good scores of 70-79, 2% had fair scores of 60-69, and 2% remained below 60; the mean functional score improved from 47.1 to 84.7, with p<0.0001. At final assessment, 42 knees (84%) were rated excellent, 6 knees (12%) good, 1 knee (2%) fair, and 1 knee (2%) poor. Forty-two patients could walk unlimited distances and climb stairs normally without support, while six patients could climb stairs with support (Table 1).

Postoperative alignment showed correction to 3 degrees valgus in 12% of knees, 4 degrees valgus in 24%, and 5-degrees valgus in 64%. The study also notes stable implant positioning without radiographic evidence of loosening or osteolysis during follow-up (Figure 1).

Post-operative range of motions were excellent with 0 to130 degree of flexion and extension (Figure 2).

No postoperative complications were seen in 84% of patients. Reported complications included postoperative stiffness in 8%, postoperative extensor lag of 10 degrees in 4%, late postoperative infection in 2%, and postoperative posterior dislocation or instability in 2%.

One patient with 20 degrees of preoperative varus developed late infection at 1.5 years and was managed with implant removal, debridement, and antibiotic spacer placement. Another patient developed posterior dislocation after a self-fall at 3 weeks with superficial infection and weakness of toe extension and foot eversion; reduction under sedation, temporary flexion positioning, casting, antibiotics, and later walker-assisted mobilization achieved knee flexion up to 90 degrees (Table 2).

Table 1: Knee society score improvement.

Outcome	Preop-erative	Postop-erative	Significance
Knee society clinical score, mean	48.2	84.6	p<0.0001
Knee society functional score, mean	47.1	84.7	p<0.0001
Clinical score <60	100%	2%	Paired proportion test, p<0.001
Functional score <60	100%	2%	Paired proportion test, p<0.001
Excellent final result	—	84%	—

Table 2: Varus deformity correction and complications.

Parameter	Finding (%)
Preoperative varus 8-10 degrees	52
Preoperative varus 11-15 degrees	32
Preoperative varus >15 degrees	16
Postoperative 3 degrees valgus	12
Postoperative 4 degrees valgus	24
Postoperative 5 degrees valgus	64
No complication	84
Knee stiffness	8
Extensor lag	4
Late infection	2
Posterior dislocation/instability	2

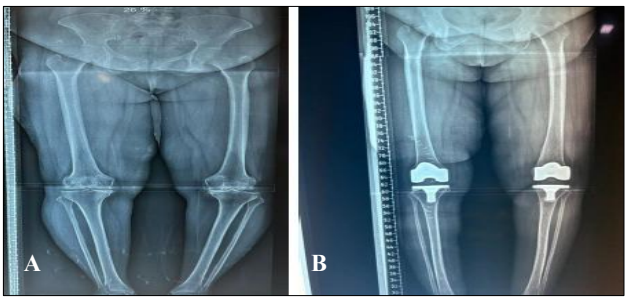

Figure 1 (A and B): Pre-op and post-op scanogram.

Figure 2 (A-D): Pre-op post-op clinical pictures.

DISCUSSION

This study demonstrated a marked improvement in both clinical and functional knee society scores (KSS) after posterior-stabilized TKA in varus knees, similar to the findings by Chaudhary et al.[3]

The shift from universally poor preoperative scores to predominantly excellent postoperative scores, together with correction to mild valgus alignment in all cases, suggests that the operative strategy achieved both biomechanical realignment and functional recovery in most patients.

The final distribution of outcomes, with 84% excellent and 12% good results, is in line with the studies conducted by other authors. The study emphasizes proper soft-tissue balancing, accurate component alignment, and rehabilitation adherence as the main determinants of success. The radiological observation of stable implants without loosening or osteolysis during follow-up supports the technical adequacy of the procedure within the study period.

Although isolated cases of late infection and postoperative instability occurred, most complications were limited, and 84% of patients had no postoperative complication recorded.

In our study we used posterior stabilizing knee prosthesis, has shown 84% excellent results. In 1992 Scuderi et al, reported; cemented TKA has evolved to be the gold standard.[13]

In our study both knee society clinical and functional score improve from 47.48 to 84.6 and 48.22 to 85.28 respectively. In comparison to studies conducted by other authors like Mohamed et al, Hafeez et al, Mathew et al, and Josh et al, we have got comparatively same results.[14-17] In 2019 Mohamed et al emphasized the necessity of reconstructing medial tibial defects in severe varus deformity with bone grafts or augments.[14]

In our cohort, all patients underwent posterior-stabilized TKA, suggesting that with meticulous soft tissue balancing, PS implants remain adequate for most cases of moderate to severe varus deformity. Whereas Hafeez et al highlighted the need for constrained condylar knee (CCK) prostheses in cases of severe varus with instability.[15]

Radiologically, correction of varus alignment was achieved successfully in the majority of patients, similar to results reported by Jose et al and Saini et al who demonstrated near-normal mechanical axis restoration post-TKA with good radiological outcomes.[17,18]

Limitations

Limitations of our study was, short duration and less sample size. Longer follow-up studies are recommended to evaluate prosthesis longevity and functional outcomes over the long-term, also comparative studies are recommended to correlate the outcomes with other means of fixation.

CONCLUSION

Posterior-stabilized TKA for varus knee deformity provided significant clinical and functional improvement, dependable correction of deformity, and predominantly excellent short-term outcomes in this prospective series.

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