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A Prospective Study of Functional Outcome of Total Knee Replacement in Relation to Severity of the Varus

[1]B.R. Varun Kumar, [2]Rohith Reddy Kasam and [3]Mangalapuri Rajesh

[1]Department of Orthopaedics, Osmania Medical College, Hyderabad, Telangana, India

[2,3]Department of Orthopaedics, ESI Medical College, Hyderabad, Telangana, India

ABSTRACT

The concept of improving knee joint function by modifying the articular surfaces has received attention since the 19th century. The surgical techniques has varied from soft tissue interposition arthroplasty to resection arthroplasty to surface replacement arthroplasty. In surface replacement arthroplasty different types of prosthesis were developed to address the complex knee kinematics. Total Knee arthroplasty has brought to the field of orthopaedic surgery a successful and predictable procedure for the management of the painful and degenerative knee. Though there are procedures such as osteotomy, unicompartmental replacement, which could serve purpose in carefully selected patient populations, TKR remains by far the procedure of choice for many degenerative knees because of high reproducibility of predictable good to excellent results. A Prospective study was done after due approval of the ethical committee of kakatiya medical college. 26 patients who consented and underwent Total Knee Arthroplasty was done to analyze functional outcome of Total Knee Arthroplasty using Knee Society score using a Posterior Cruciate sacrificing Knee Prosthesis and were assessed clinically, functionally and radiologically using Knee Society score. The postoperative discharge follow up period was at 3, 6 weeks 3 months, 6 months and 1 year. According to the Knee Society Clinical Scoring system of the 28 patients assessed in this study 24 patients (92.8%) had Excellent, 3 patients (5.4%) had fair and 1 patient (1.8%) had good results.

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Key Words

Functional outcome, total knee replacement, posterior cruciate sacrificing

Corresponding Author

Rohith Reddy Kasam,
Department of Orthopaedics, ESI Medical College, Hyderabad, Telangana, India

Author Designation

[1]Senior Resident
[2,3]Assistant Professor

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INTRODUCTION

The knee varus deformity is the most frequent frontal malalignment in patients undergoing total knee arthroplasty. This deformity may generate technical difficulties when trying to restore simultaneously HKA angle of 180 degrees and a good alignment balancing. These technical problems depend on the type of deformity, which should be analyzed meticulously beforehand. This deformity includes three components which may be isolated or combined together: the bony deformity, the osteochondral wear and the laxity[1]. The bony deformity may be constitutional or posttraumatic and exists before the knee destruction by osteoarthritis. If this extra-articular deformity is severe, it makes the ligament balancing difficult to achieve and an osteotomy may be required beforehand or at the time of the knee replacement surgery. The medial compartment's wear, which may be purely chondral or osteochondral, Increases the varus deformity and is the direct consequence of osteoarthritis. A severe medial wear may generate technical problems for knee reconstruction especially for the medial tibial plateau[2]. The ligament laxity on the convex side appears secondarily and increases the dynamic deformity in the standing position when loaded. This lateral laxity is more often caused by the soft tissue retraction on the concave side (Medial ligament posterior medial capsule) rather than to a real stretching of the lateral structures which appear only in the advanced cases. This ligament laxity has to be taken into account for the ligament balancing, and if this balance is not achievable constrained prostheses should be used[3]. The literature review shows that it seems difficult to restore a normal knee alignment in the case of severe varus deformity, as a residual varus generally persists). A meticulous pre-operative analysis of the deformity has to be achieved in order to propose optimized technical solutions adapted to the varus type and which take into account the varus size and the site where the extra articular deformity is located. In most arthritic knees, some degree of instability, deformity, contracture or a combination of these elements, can be found. The common causes of arthritis of the knee include Osteoarthritis (OA), Rheumatoid Arthritis (RA), Juvenile Rheumatoid Arthritis, Post traumatic Arthritis or secondary. Osteoarthritis and other types of inflammatory arthritis. Osteoarthritis is thought to be the most prevalent chronic joint disease. The incidence of osteoarthritis is rising because of the ageing population and the epidemic of obesity. Pain and loss of function are the main clinical features that lead to treatment, including non-pharmacological, pharmacological and surgical approaches. The concept of improving knee joint function by modifying the articular surfaces has received attention since the 19th century. The surgical techniques has varied from soft tissue interposition arthroplasty to resection arthroplasty to surface replacement arthroplasty[4]. In surface replacement arthroplasty different types of prosthesis were developed to address the complex knee kinematics. Total Knee arthroplasty has brought to the field of orthopaedic surgery a successful and predictable procedure for the management of the painful and degenerative knee. Though there are procedures such as osteotomy, unicompartmental replacement, which could serve purpose in carefully selected patient populations, TKR remains by far the procedure of choice for many degenerative knees because of high reproducibility of predictable good to excellent results[5,6]. Total Knee Arthroplasty (TKA) is now a reliable treatment for severe arthritis. Various systems are available with specific features regarding the geometry of the components, the degree of conformity of the articulating surface and the anchoring technique.

MATERIALS AND METHODS

A Prospective study was done after due approval of the ethical committee of kakatiya medical college. 26 patients who consented and underwent Total Knee Arthroplasty was done to analyze functional outcome of Total Knee Arthroplasty using Knee Society score using a Posterior Cruciate sacrificing Knee Prosthesis and were assessed clinically, functionally and radiologically using Knee Society score. The postoperative discharge follow up period was at 3, 6 weeks 3 months, 6 months and 1 year. The patients were divided into three study groups based on increasing severity (<10 degrees, 10-20 degrees and above 20 degrees). The study was conducted at the Department of Orthopaedics.

Inclusion Criteria:

- Varus deformity, Stiffness, rest Pain, not relieved by analgesics, Physiotherapy and change in life style habits.
- Age greater than 50 years.
- Both sexes.

Exclusion Criteria:

- Age <50 years
- Patient having neurological comorbid conditions like hemipelgia, Quadriplegia and cerebral palsy.
- Inadequate skin coverage at operative site/poor distal circulation.
- Extensor mechanism discontinuity or severe dysfunction.
- Recuvratum deformity secondary to muscular weakness.
- Presence of a painless well-functioning knee arthrodesis.
- Recent or current knee sepsis.
- Remote source of ongoing infections.

Pre-Operative Evaluation Clinical Assessment: Detailed history of all patients was taken. All patients were assessed clinically and functionally using the Knee Society Score[5]. The preoperative medical evaluation of all patients were done to prevent potential complications that can be life-threatening or limb-threatening. Any limb length discrepancies were noted. Presence of any hip and foot deformities was assessed. The extensor mechanism was assessed for any quadriceps contractors. The knee deformities were examined for any fixed varus or valgus deformities or presence of any fixed flexion contractor.

Radiographic Assessment: Standard guidelines were utilized to get knee radiographs-standing antero posterior view and a lateral view and a skyline view of the Patella and presence of osteophytes, any bone defects in the tibia and femur and the quality of bone is assessed. Radiographs were evaluated for overall alignment and radio lucence using the Knee Society TKA radiographic evaluation and scoring system. Radiographs were evaluated before and after surgery and at annual interval follow-up examination. Radiographs were assessed for overall tibiofemoral and prosthetic alignment in the coronal and sagittal planes using anteroposterior and lateral view radiographs.

RESULTS AND DISCUSSIONS

Of the 28 Arthroplasties performed 2 patients (2 knees) were lost to follow-up for various reasons 26 patients (26 knees) were available for clinical review. The mean follow up period was 11.6 months (range 3-18 months).

Table 1: Age Distribution

Age (Years)	Frequency	Percent
56-60	16	60%
61-65	7	28%
66-70	1	4%
71-75	0	0%
76-80	2	8%
Total	26	100%

The mean age of the patients at the time of surgery was 61.33 years (rang 50-68). The mean age of male patients was 61.57 years (range 55-65) and that of female patients was 61.00years (range 50-68).

Table 2: Gender Distribution

Gender	Frequency	Percent (%)
Female	18	70%
Male	8	30
Total	26	100.0

There was a female predominance in our study, accounting for 55% of the patients.

Table 3: Side Distribution

Side	Frequency	Percent
Left	18	70%
Right	8	30%
Total	26	100%

There was a predominance of lt side in our study, accounting for 55% of the patients there was a predominance of Primary osteoarthritis in this study, accounting for 94% of the Patients

Table 4: Grading of Knee Clinical Score

	Frequency	Percent
Excellent	24	92%
Fair	-	-
Good	2	8
Total	26	100

According to the Knee Society Clinical Scoring system of the 28 patients assessed in this study 24 patients (92.8%) had Excellent, 3 patients (5.4%) had fair and 1 patient (1.8%) had good results

TKA can provide excellent pain relief and restoration of function for patients with primary or secondary osteoarthritis. The success of the procedure is based on prosthesis survival, in addition to pain relief and restoration of function. This study found fair-to-excellent short-term results with cemented cruciate sacrificing Total condylar knee arthroplasty system.

Age: The mean age of the patient at the time of surgery was 61.33 years.

Sex Distribution: Females (70%) and males (30%) were almost equal in number. In all the studies females outnumbered males. This discrepancy may be due to small sample size.

Knee Clinical and Functional Scores: The mean post-operative Knee clinical score and knee function scores in the present study were 93.2 and 77, respectively, with mean follow up period of 10.5 months, whereas, Rodriguez[7] with Total Condylar prosthesis reported 88 and 58 respectively at 20 years. Martin *et al.* with PFC Sigma reported 88 and 72, respectively, with mean follow up period of 5-9 years. Claytol[8] reported the medium American Knee Society score of 93/100 at 5 years. Asif[9] with PFC Sigma reported average post-op knee score of 87 and function score of 72. Alemparte[1] with AGC Total knee arthroplasty reported 89 and 64 points and Buchler[10] with PFC PCL retaining design reported 96 and 68 points with mean follow up of 9 years. Dixon et al. reported 96 and 78 at minimum 15 years follow up. Considering the classification of result, Knee score is within the range of excellent (85-100 points).

Post-Operative Instabilities and Deformities: In this study no knee had >10 mm of antero-posterior instability post-operatively similar to the observation made by Martin *et al.* and Asif *et al.* Post-operatively, no knee had flexion deformity >100.

Pain and Walking Abilities: In a study by Ranawat[11] with 79% of patients had no pain. Pain is an important parameter not only as an indication for TKA, but also for the evaluation of the results. Martin[12]. With PFC reported 84% pain free patients at final follow up, 51% of patients could walk farther than 10 blocks at 71 used no assistive devices for ambulation. Asif[9] reported than at last follow up 82% had no pain or very mild pain, 59% could walk farther than 10 blocks and 91% did not use assistive devices for ambulation. In this series, we found similar results, i.e. excellent pain relief in 24 knees, mild or occasional pain in 2 knees. 24 patients were able to walk farther than 10 blocks and 100% used no assistive devices for ambulation.

Type of Fixation: Wright[13] reported re-operation rate of 3% in their study of hybrid fixation with uncemented femoral component in a 2-4 year period of cruciate sparing condylar TKA. Rand *et al.* did a comparative study of cemented vs cement less fixation at 2.8 years follow-up and reported good or excellent results in 98% of cemented compared with 90% of cement less knees and re-operation in 7% of cemented and 19% of cement less knees. Duffy *et al.* compared cemented and cement less knees at follow-up of 10 years and estimated survivorship at 10 yrs as 88% for cement less and 96% for cemented knees.

Survivorship: The definition of failure of a total joint arthroplasty has not been consistent in the literature, but revision of arthroplasty has been the most commonly used criterion in this study included all re-operations for any indication, to comment about the survivorship in our study. In this study series, the survival rate of implants without revision or a need for re-operation was 100%. However, the sample size of our study (26 knees) and the duration of follow up 10.5 months are too small to compare with the studies in the literature. Morever no survivorship analysis has been done. Important issues related to survivorship analysis include the number and outcome of patients lost of follow-up and the number of subjects followed each year. Ranawat[11] reported a prosthetic survivorship of 94% at 15-year follow-up. E. Rinonapoli *et al.* had 15 year survival of 95% with total condylar knee prosthesis. According to survivorship study of Insall[14] Total Condylar series had an average annual failure rate of 0.46% and a 21-year success rate of 90.77%. In this study results show good-to-excellent clinical outcome comparable with other studies. However, as the results are short term, further follow-up studies are required to see if this performance is maintained in the long term.

Complications: Only 1 patients had delayed wound healing which healed on prolonging IV antibiotics for one week and oral antibiotics for another 2 weeks. No patient had deep infections. No patient required re operation in the study period. No specific comorbidities like fusion effect outcome.

CONCLUSION

Total Knee Arthroplasty improves the functional ability of the patient and the ability of the patient to get back to pre-disease state, which is to have a pain free mobile joint, as reflected by the improvement in the post-op Knee Clinical Score and Knee Functional Score. With the use of posterior cruciate substituting design, at one year follow up an average pre-op Knee Clinical Score of 35.8 improved to an average post-op Knee Clinical Score of 93.2 and an average pre-op Knee Functional Score of 30.3 improved to an average post -op Knee Functional Score of 77. There was significant association between the Knee Clinical Score and Knee Functional Score at one year follow up.

REFERENCES

1. Vail, T.P. and J.E. Lang., 2006. Insall and Scott surgery of the knee. In: Churchill Livingstone, Elsevier, Philadelphia, 0 pp: 1455-1521.
2. Insall, J., C.S. Ranawat, W.N. Scott and P. Walker., 1976. Total condylar knee replacement. Preliminary report. Clin Orthop Relat Res., 120: 149-154.
3. Kim, R.H. and W.N. Scott., 2009. Operative techniques: total knee replacement. Philadelphia: Saunders-Elsevier., 91-103.
4. Bijlsma, J.W., F. Berenbaum and F.P. Lafeber, 2011. Osteoarthritis: An update with relevance for clinical practice. The Lancet, 377: 2115-2126.
5. INSALL, J.N., L.D. DORR, R.D. SCOTT and W. NORMAN, 1989. Rationale, of The Knee Society Clinical Rating System. Clin. Orthop.s Related Res., 248: 13-14.
6. Stuart, M.J., 2003. Anatomy and surgical approaches in Joint replacement arthroplasty. 3rd ed. Edn., Pages: 945.
7. Laskin, R.S., 2001. The Genesis Total Knee Prosthesis. Clin. Orthop.s Related Res., Vol. 388 .10.1097/00003086-200107000-00014.
8. Walldius, B., 1957. Arthroplasty of the Knee Using an Endoprosthesis. Acta Orthop.a Scand., Vol. 24 .10.3109/ort.1957.28.suppl-24.01.
9. Kettlekamp, D.B., P. Pryor and T.A. Brady., 1979. Selective use of the variable axis knee. Clin Orthop Relat Res., 3: 301-302.
10. Pagnano, M.W., R.T. Trousdale and M.J. Stuart., 2004. Rotating platform knees did not improve patellar tracking: A prospective, randomized study of 240 primary total knee arthroplasties. Clin Orthop Relat Res., 428: 221-227.

11. Ranawat, C.S., 1993. Long term results of total condylar knee arthroplasty: a fifteen years survivorship study. Clin Orthop., Vol. 286.
12. Scott, R.D., A.G. Cobb and F.G. McQueary., 1991. Unicompartmental knee arthroplasty: 8 to 12 years follow-up with survivorship analysis. Clin Orthop Relat Res., Vol. 271.
13. Rose, R.M., A. Crugnola and M. Ries., 1986. On origins of high in vivo wear rates in polyethylene components of total joint prostheses. Clin Orthop Relat Res., Vol. 10.
14. Insall, J.N., C.S. Ranawat, W.N. Scott and P.S. Walker., 1976. Total condylar knee replacement: preliminary report. Clin Orthop., 120: 149-154.