

A Prospective study of functional outcome after posterior cruciate retained total knee replacement

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Abstract -

OBJECTIVES:-

Prospective evaluation of functional outcome after Total knee Replacement using Knee Society score (Insall 1989).

MATERIALS & METHODS:-

50 patients with knee arthritis, 22 female & 28 male, mean age 64(45-80) assigned for TKR at department of orthopedic, Sanjay Gandhi Institute of Trauma & Orthopedic hospital, Bangalore. All patients were evaluated pre operatively & post operatively at 6 months, 12 months, 2 years with knee society clinical, functional score.

RESULTS:-

81% of our patients scored 85 points or better for a rating of excellent by knee society scoring system. 90% patients had little /no pain post operatively, whereas walking ability improved & was unlimited in 80% of the patients post operatively. Knee society clinical & functional score improved from 49 to 89 & 43 to 75 respectively. Average alignment of prosthesis was 5.9 degrees valgus. 81.5% -excellent, 14.85% -good, 3.7% -fair results. Poor results were not seen in any patient.

CONCLUSION:-

T.K.R provided excellent pain relief, adequate stability, remarkable range of motion in severely painful, refractory unstable knees. A significant improvement was seen at two year follow up ..

Index Terms- functional outcome, knee society score, total knee replacement, significant improvement

I. INTRODUCTION

Degenerative diseases like osteoarthritis knee leads to painful, unstable joint with decrease range of motion.¹ 40% of people over 70 years suffer from Knee Osteoarthritis (OA), 80% of OA patients have some degree of movement limitation. Women have more incidence than men. In osteoarthritis knee pain & instability in knees is greatly accentuated under certain circumstances like injury, loads, infection, Central Nervous System diseases and becomes extremely disabling.

Prosthetic replacement of the condylar articular surfaces is an established procedure and is the definitive treatment for osteoarthritis knee². Total knee arthroplasty in osteoarthritis while preserving motion, provides stability¹. There is need to evaluate functional results of total knee arthroplasty in knee joint disorders in Indian. The objectives of the current study are 1) To evaluate the efficacy of total knee replacement in terms of pain relief, range of motion and stability of the joint. 2) To study various complications of total knee replacement

II. MATERIALS AND METHODS

Our study was done in the department of Orthopedics, Sanjay Gandhi Institute of Trauma & Orthopedics, Bangalore. A total of 50 patients (M-28, F-22, with mean age of 61 years) who were admitted in our institute for the management of knee arthritis (osteoarthritis, rheumatoid arthritis etc.) between June 2012 to June 2014 were considered for the study. Patients who had met specific inclusion & exclusion criteria were enrolled in our study.

Inclusion criteria³:-

Age : > 45 years, Gender : Both, Primary osteoarthritis of knee:-- Severe Pain with or without significant deformity, deformity can become the principal indication in patients with moderate arthritis & flexion contractures >20 degrees, hampering gait significantly. Osteoarthritis of knee secondary to : rheumatoid arthritis, systemic arthritis with multiple joint involvement, crystal deposition diseases like gout & pseudo gout in elderly patient, primary synovial conditions such as osteochondromatosis and pigmented villonodular synovitis, juvenile rheumatoid arthritis, osteonecrosis with sub chondral collapse of femoral condyle, and post traumatic arthritis, patients with failure of a high tibial or supracondylar osteotomy are also candidates for total knee replacement.

Exclusion criteria³:-

Inability or unwillingness to comply with postoperative rehabilitation or follow up protocols, active knee infection, substantial neurological or musculoskeletal disorders that would adversely affect gait or early weight bearing after surgery. Extensor mechanism discontinuity/severe dysfunction. Genu recurvatum deformity secondary to muscle weakness. Psoriasis within operative field. Atherosclerotic diseases of operative leg. Venous stasis diseases with recurrent cellulitis.

The individuals presenting with osteoarthritis of knees were approached about the study participation. Once the patients agreed to participate, informed consent was taken & the subjects were then included in the study. All documentation was performed using a standard set of proforma questionnaires (according to Knee society clinical & functional scoring)⁴. All patients underwent operative treatment with Total knee replacement (Exatech, posterior cruciate retained implants). In all patients midline skin incision was given & joint opened through median para patellar approach³. Standard total knee replacement protocol was followed during the surgery. Average operation time was 01hr.45 min. post operative rehabilitation was done as per standard protocol³. Average stay in the hospital was 10 days. All patients were given post operative injection clexane 40mg subcutaneously for 10 days & tablet. Ecosprin for the next 4 weeks⁹. All patients

were evaluated pre operatively & post operatively(6 months,12months,2 years)with knee society clinical score and knee society functional score(Insall 1989)⁴. Our study was an observational prospective orthopedic study.

Statistical Methods:

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5% level of significance. The following assumptions on data are made: **Assumptions:** 1. Dependent variables should be normally distributed 2. Cases of the samples should be independent.

. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale .

Significant figures :-

- + Suggestive significance (p value: 0.05<p<0.10)
- * Moderately significant (p value: 0.01<p≤0.05)
- ** Strongly significant (p value: p≤0.01)

III .RESULTS.

Out of 50 patients, 4 patients underwent bilateral TKR (Total 54). The main indication for TKR was Osteoarthritis(O.A) (40 patients) followed by Rheumatoid Arthritis (6 patients) ,2 with O.A secondary to pseudo gout& 2 patients with O.A secondary to septic arthritis knee. The follow up period ranged from 1 month to 2 years. Ninety percent of patients had little or no pain postoperatively, whereas 99% of the knees had moderate to disabling pain preoperatively . Walking ability similarly improved and was unlimited in 80% of the patients post operatively . Pre operatively Genu varus deformity was present in 10 patients, maximum varus correction being done was 25°, Genu valgum deformity in 4 patients, fixed flexion deformity in 14 patients with maximum correction being done was 40°. Knee instability was present in 20 patients and extension lag in 14 patients. The mean preoperative knee clinical score was 47.56 which improved to 84.33 after T.K.R operation. The mean pre operative functional score was 46.52 which improved to 80.81 post operatively.

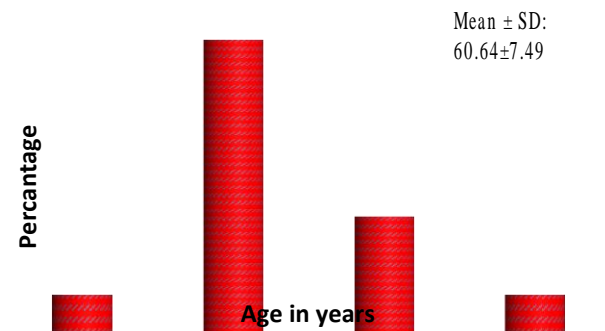


Fig.1 Age distribution of patients studied

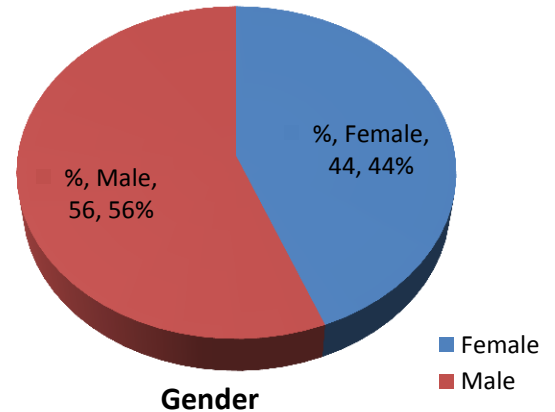


Fig.2 Gender distribution among study group

Tab.1 Diagnosis of patients among group

Diagnosis	%
O-A Knee	77.8
O-A Knee 2 ⁰ to pseudo gout(b/l T.K.R in 2 patients)	7.4
O.A knee 2 ⁰ to septic arthritis	3.7
Rheumatoid arthritis	11.1
Total	100

Tab.2 preoperative deformities among study group

Pre op deformity	%
Nil	48.1
Fixed flexion deformity	29.6
Varus deformity	14.8
Valgus deformity	7.4
Total	100

Table 3: Knee society Clinical score among study group

Knee society Clinical score	Pre op(%)	Post op(%)	% change
<60	100	0	100.00%
60-69	0	7.4	7.40%
70-79	0	14.8	14.80%
80-100	0	77.7	77.7%
Total	100	100	-

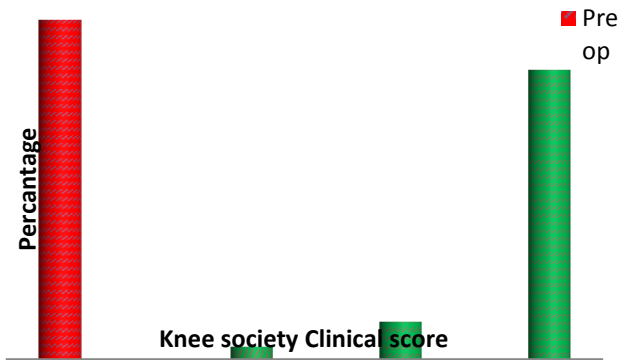


Fig.3 Graphical comparison of preoperative & post operative knee society clinical score

Table 4 : Knee society Functional score among study group

Knee society Functional score	Pre op(%)	Post op(%)	% change
<60	100	0	-100.00%
60-69	0	7.4	7.40%
70-79	0	14.8	14.80%
80-100	0	77.8	77.80%
Total	100	100	-

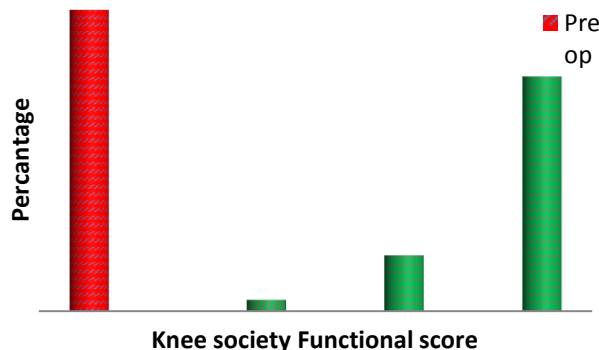


Fig.4 Graphical comparison of knee society functional score preoperatively and post operatively.

In 77.8% of patients no post operative complications were seen. Among the remaining patients 11.1% had post operative stiffness, 7.4% had post operative extensor lag, 3.7% had post operative infection. No evidence of Deep Vein Thrombosis/pulmonary embolism, periprosthetic fractures, neurovascular complications^{10,11,12}. On radiological examination, over all alignment⁵ averaged 5.9° valgus, mean femoral angle was 95° and mean tibial angle 90°. Mean femoral flexion was 12°. Mean lateral tibial angle 87.5°⁶

Table.5 post operative complications in our study group

Complications	%
No	77.8
Yes	22.2
Post op extension lag-10 degrees	7.4
Post op infection	3.7
Post op knee stiffness	11.1

No radiolucencies were seen after two year follow up⁸. Our study reveals, post operatively 77.8% patients had excellent, 14.8% patients had good and 7.4% patients had fair results clinically & functionally. There were no poor results. There was one patient with post operative infection to operated knee, we did debridement of the affected knee. Later patient has developed severe knee stiffness, pain during walking. Complications like deep vein thrombosis were absent due to thromboprophylaxis with Inj. Clexane 40mg SC. for at least one week postoperatively followed by Tablet. Ecosprin 75-300mg once a day for 4 – 6 weeks⁹. Other complications like vascular injuries, skin necrosis, thromboembolism, fat embolism, joint instability, patellar fractures, peri prosthetic fractures were absent.^{10,11,12}

IV . DISCUSSION

The posterior cruciate retained knee prosthesis has enjoyed a proven track record of excellent results in total knee arthroplasty⁷. The posterior cruciate retaining knee design was developed to improve stair climbing ability, range of motion and to prevent posterior subluxation. The range of motion of the knees with a posterior retained design was improved from average from average 90° to 110°⁷. This impression is further documented by the fact that 77.8% of our patients scored 80 points or better for a rating of excellent by knee society scoring system.

99% of the knees had moderate to disabling pain preoperatively, after total knee replacement 90% of patients had little or no pain postoperatively. Walking ability similarly improved and was unlimited in 80% of the patients postoperatively. The posterior cruciate retained implant has resulted in substantial improvement over the preoperative range of motion (an average of 19°). One of the significant factors in the relative universal success of any knee design is better instrumentation developed to help the surgeon achieve acceptable alignment⁵. It was a consideration around 1979-80 that the ideal alignment of prosthesis should be 0°, a relative varus alignment⁵. But it has been well proved that the ideal alignment should be between 5°-10° of valgus by Insall and Burstein et al in 1978⁵. In this study the overall average alignment of prosthesis was 5.9° valgus. Short, localized, standing films, while better than supine radiography, do not always depict an accurate limb alignment, nor allow an absolute correlation to normal gait⁶. The importance of long leg radiography and their relationship to the mechanical axis has been repeatedly reinforced⁸. It has generally been recognized that

the patella should routinely be resurfaced in rheumatoid arthritis; the practice of replacing it in osteoarthritic patient is still somewhat controversial. In this study all most all patients with osteoarthritis, rheumatoid arthritis & pseudo gout underwent patellar resurfacing. The success of total knee arthroplasty depends not only on surgical technique, prosthesis and material design but also on patient selection and a good rehabilitation programme³ In this study the goals of the rehabilitation were:

- Prevention of hazards of bed rest like deep vein thrombosis, pulmonary embolism, pressure ulcers etc.,
- To achieve adequate and functional range of movement
- To train in functional daily living activities.

A rehabilitation specialist involved in preoperative planning and patient selection can influence the outcome of the surgery. In our study we carried out extensive preoperative patient selection and planning with postoperative extensive rehabilitation programme to achieve above mentioned goals which resulted in **77.8%** excellent results according to the knee society clinical and functional scoring system. Our study is compared to other studies conducted by Christopher, Callahan et al, Martin, Richard Fitch et al & our study has shown same results. pre operative clinical score was 47.56 which improved post operatively to 84.33

Total pain, range of motion, stability score.(clinical score)

Study	Pre-op mean	Postop mean
Our study	47.56	84.33
Fitch et al(2014) ^[13]	46	84
Richard.scott(2006) ^[14]	48	86
Martin et al(1997)	51	89
Callahanetal	40	80
(J arthroplasty 1995) ^[15]	45	89
Christopher(1994) ^[16]		
Krray et al (1991)	32	93
Rand (1991) ^[17]	32	84

Total functional score (knee society functional score) preoperatively it was **46.52** which improved to **80.81** post operatively.

Study	Pre-op mean	Postop mean
Our study	46.52	80.81
Fitch(2014) ^[13]	48	87
Richard(2006) ^[14]	44	82
Martin et al(1997)	49	72
Study	Preop mean	Post op mean
Callahanetal	38	79
(J arthroplasty 1995) ^[15]	42	78
Christopher(1994) ^[16]		
Krray et al (1991)	47	79
Rand (1991) ^[17]	49	86

V . CONCLUSION

Total knee arthroplasty have in the past four decades revolutionized the treatment of osteoarthritic and rheumatoid knee& other arthritic knees. With these excellent results we conclude that total knee arthroplasty provided total relief, adequate stability, remarkable range of motion in severely painful, refractory unstable knees, if performed taking into consideration pre-operation selection of patients, intra operative soft tissue balancing, correct overall alignment of prosthesis and postoperative proper rehabilitation of patients.

We are slowly entering into a generation where we would have to “Revise the Revision” which would pose the greatest of all the challenges to the institution of joint replacement. It is but certain the difficulties about to be faced would generate even more than ever research and development in this field, perpetuating the benefits of this wondrous surgery.

Total knee arthroplasty is a relatively safe and sure procedure in the hands of the experienced or the guided. It forms the integral part of the general orthopedic set up and with proper patient selection, proper procedure and rehabilitation could continue to achieve the same promises as we have seen it to show.

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