

Mid-Term Results of Total Knee Replacement in Patients with Rheumatoid Arthritis

Dr Shaival Dalal, Dr Aditya Banta, Dr Zulfikar Patel, Dr Kalpesh Mehta, Dr Hareesh Bhalodiya, Dr Mohit Patel

Abstract: Knee is among the most commonly affected joints in rheumatoid arthritis, which is the most common form of inflammatory arthritis, affecting 1% of men and 3% of women. Total Knee Arthroplasty in the rheumatoid patient presents unique challenges, such as the systemic nature, poor bone quality as a result of prolonged steroid use soft-tissue deformities, valgus fixed deformities and flexion contractures and the disease process itself. The purpose of our study is to look out for clinical outcomes in midterm and long term follow up of rheumatoid patients operated for total knee replacement. This is a retrospective study of 100 consecutive primary TKR in 61 patients with rheumatoid arthritis. A total of 61 patients, (49 females, 12 males) with a mean age of 58.4 years underwent the surgery. All-Poly, high flexion, LCKK and metal back varieties were used in such patients. The mean duration of follow up of patient was 3.7 years. 97% of patients showed improvement in their preoperative pain. The mean range of movement improved from 78.3 to 109.27. 70 percent of patients achieved a ROM of 100 degrees and above. Fixed flexion deformity, extensor lag, and mediolateral instability almost disappeared. The mean knee score improved from 35.22 to 83.01. Statistically significant improvement occur in Postoperative limb functions as shown by increase in WOMAC score from 52.01 to 81 and Knee society functional score improved from 36.4 to 75.1. Late infection was the most common complication, with an overall satisfactory outcome of the study.

I. Introduction:

Rheumatoid arthritis (RA) is a chronic inflammatory disorder characterized by synovial hyperplasia and resulting joint destruction. It is the most common form of inflammatory arthritis and affects 1% of men and 3% of women¹. The knee is among the most commonly affected joints in RA, and it is estimated that up to 90% of patients with RA will eventually have the involvement of the knees

Total Knee Arthroplasty is the gold standard treatment for patients with advanced osteoarthritis. However, in the rheumatoid patient, it presents unique challenges, such as the systemic nature, poor bone quality as a result of prolonged steroid use soft-tissue deformities, Valgus fixed deformities and flexion contractures and the disease process itself. In our present study we plan to look out for clinical outcomes in midterm and long term follow up of rheumatoid patients operated for total knee replacement.

II. Materials And Methods:

This is a retrospective study of 100 total knee replacements performed in 61 patients with rheumatoid arthritis. Our study is a multicentric study. Patients were enrolled into study based on the scrutiny of hospital's operative records.

Inclusion criteria:

- Documented RA patients with total knee replacement

Exclusion criteria

- Less than 18 months follow up
- Patients expired due to an unrelated cause

Preoperative clinical findings were obtained from extensive scrutiny of available records in form of operative records, pre operative X-rays and case sheets. These were supplemented by use of questionnaires for patient regarding their preoperative status in terms of functional capabilities.

Patients were assessed for pain, deformity, range of motion, activity level and functional capabilities preoperatively. Methotrexate was discontinued one week before the surgery and started after SR. Those patients on corticosteroids were shifted to IV steroids perioperatively. Medial parapatellar incision was used for all our surgeries. Choice of implant was guided by pre op stability and deformity of patient's knee and economic considerations.

III. Special Consideration For Total Knee Replacement In Rheumatoid Knee

It has been common practice to administer stress-dose steroids at the time of surgery to patients who take chronic maintenance steroids. The purpose of this is to prevent adrenal insufficiency. We discontinued methotrexate and other similar agents 1-2 weeks before surgery and restarted them 1-2 weeks after surgery. Medial parapatellar incision being in line with skin cleavage lines is the preferred incision ²¹We used PCL substituting knees in all our patients.

No patellar resurfacing was done however we routinely performed patelloplasty. Soft tissue release as required was done for deformity correction. Patients that had persistent flexion contracture post operatively were given posterior knee brace. Aggressive rehabilitation was started in form of electronic stimulation in patients in whom extensor lag did not improve with regular rehabilitation protocol.

Special note was made for events like delayed wound healing, post operative infections, nerve palsy or periprosthetic fracture.

At follow up patients were examined clinically for deformity, laxity, extensor lag, residual flexion deformity and any patellar complaints were noted. Functional assessment was done by using KSS and WOMAC score. KSS score of 85 or more was considered excellent, score of 61-84 was considered good and <60 was considered poor outcome.

Radiological assessment was done in form of AP, lateral xrays and skyline view. Postoperative varus valgus was calculated from AP radiograph

End point of survival was removal or revision of any component for any reason. Thereafter we calculated a crude survival rate from the collected data.

IV. Observation And Results:

We have made these observations and done statistical analysis of data collected from 100 patients of total knee replacement in rheumatoid population.

The average age of patients in our study was 58.44 years. Out of the total 61 patients in our study 49 were females and 12 were males. Our study included a total of 39 patients of bilateral TKA and 22 patients of unilateral TKA. The mean duration of follow up of patient was 3.7 years.

We used all poly variety of prosthesis in 20 knees, hiflex in 53 knees, lck type in 9(2 revisions and 7 primary) patients and metal back variety in 18 patients. Choice of implant was based on preoperative knee deformity and laxity. No statistically significant difference in functional results with different type of implant was observed.

TYPE OF IMPLANT	Mean improvement	
	KSS(k)	KSS(f)
All poly	87.15	76.75
HIFLEX	82.54	75.6
Metal back	85.27	80
Lck	75.88	58.88

Pain score

Patients preoperatively experienced moderate to severe. Post operative majority of patients showed improvement in pain. Those with moderate pain were mostly those with complications post TKA 93(97%) patients showed improvement in their preoperative pain. And 82(85%) patients had no pain or just mild pain.

Parameter	Pre-op	Post-op	Significance
WOMAC Score	52.01	81	yes
KSS Knee Score	35	83	yes
KSS Functional Score	36.4	75.1	yes
ROM	78.3	109.27	yes
Flexion Deformity	9 degrees	1 degree	yes
Extensor Lag	6 degrees	1 degree	yes
Alignment	1 degree varus	5 degrees valgus	yes

V. Complications

Late infections were the most common complication noted in our study after anterior knee pain with an incidence of 5 percent., Wound Necrosis(4), Quadriceps failure(3), Immediate infection(2) and Periprosthetic fracture(1) were the other noted complications. Crude survival rate of implant in our study was 95 percent.

VI. Discussion:

This is a retrospective study of 100 total knee arthroplasty in 61 patients of rheumatoid arthritis. Patients from multiple centres were included in our study.

The mean age of patients in our study was 58.4 years. Ranawat et al¹ studied TKA in young population of less than 55 and 45 years respectively. He reported rheumatoid arthritis as the diagnosis in more than 80% of their cases. Rheumatoid arthritis affects knee at an earlier age than degenerative arthritis.

Out of the total 61 patients in our study 49 were females and 12 were males. Dr R.S. Laskin² in his study on condylar knee replacement in rheumatoid arthritis had 91 patients with rheumatoid arthritis of these 78 were females and just 13 were male. This female preponderance is seen acutely in rheumatoid population.

The mean duration of follow up of patient was 3.7 years with a minimum follow up of 18 months and a maximum of 11 years. Lee et al⁵ had a mean follow up of 38 months with a range from 24 months to 64 months..

We used all poly variety of prosthesis in 20 knees, hiflex in 53 knees, lock type in 9 patients and metal back variety in 18 patients. Choice of implant was based on preoperative knee deformity and laxity. No statistically significant difference was found in our study.

Laskin et al² in their study provided an upper limit of 20 degree valgus and 35 degree varus for use of condylar knee beyond this they recommended use of constrained knee.

Because of contracture of the ITB, a fixed external rotation deformity often accompanies asymmetrical valgus instability, particularly in patients with rheumatoid arthritis, while the medial soft tissues become stretched. Clark suggested the pie crust technique for soft tissue balancing for mild to moderate fixed valgus deformity of 20 degrees or less. No post operative instability was found in the study population. In patients with severe valgus of more than 20 degrees sequential soft tissue release was advised by Miyasaka¹⁰ in his study.

Various intraoperative measures can be used to correct a flexion contracture, including removal of osteophytes, stripping of the posterior capsule and distal femoral resection. Pre-operative flexion contracture of 27.5° is an important threshold and patients should be operated before that stage to gain maximum benefit with minimal gait abnormalities.

VII. Infection In Ra

Rand⁶ reported that the most important complication affecting the results of total knee replacement in patients with RA is infection. Rates of infection have been reported to be approximately three times greater in patients with RA than in those with OA

Post operative Quadriceps status

Total knee arthroplasty (TKA) predictably reduces knee pain, but it has had limited success in restoring quadriceps femoris muscle force-generating capacity and function.

Both atrophy and failure of volitional activation of the quadriceps femoris muscle have been suggested as causes of decreased muscle force in people with knee arthritis.

Post operative flexion contracture

The current consensus among knee surgeons is that flexion contractures should be corrected to the maximum extent possible at the time of TKA.

Patients were followed-up and compared for survival, range of motion, knee society score, function, anterior knee pain, patellar or any other complication and radiological evaluation.

The mean KSS knee score improved from 35 to 83. KSS Functional scores were improved from 36.4 to 75. Womac score improved from 52.01 to 81.1 All scores showed a statistically significant improvement. These can be compared with studies done by Klemmens³ et al and Yamanaka⁴ et al. Those with average or poor results belonged to that group of patients who suffered from complication in form of periprosthetic fracture and infections

Pain is the most common indication for total knee replacement surgery. 97% of patients showed improvement in their preoperative pain. Studies by Lee⁵ and Laskin² demonstrated similar remarkable

reduction in pain scores of patient. In our study 15 knees had moderate pain post operatively while none had severe pain. Those with persistent moderate pain were mostly the ones with complications post TKA.

Lifestyle of rheumatoid population is affected by the multisystemic and polyarticular nature of the disease. In particular the involvement of knee joint in late stages leads to severe limitation of activity to the extent that many a times patient becomes bed ridden. There was statistically significant improvement ($p < .05$) in activity of rheumatoid patient operated with TKA. Patients with complications continued to have poor activity level. However none of the patients with complication were bedridden at follow up. All were able to do household work with or without assistive devices.

The mean range of movement improved from 78.3 to 109 degrees.

Ole et al showed a ROM of >95 degree in 88 percent of patient their median range was 104 -111 degree. Klemmens et al had an average active range of movement of 98 degree.

Before and after surgery the mean FFD in our series of patients improved from 9 degrees to 1 degree. These can be compared with Lee et al and Abernethy et al.

Rheumatoid patients develop weakness of quadriceps muscle due to disuse. The average extensor lag improved from 6 degree to 1 degree, comparable to studies of Laskin et al and Kaltas.

Though valgus deformities are commonly seen in rheumatoid population still majority present with a varus deformity only. The mean deformity pre operatively was 1 degree varus, At follow up, the mean was 5 degrees valgus.

Varus valgus deformities seen in rheumatoid arthritis patients are almost always due to asymmetrical loss of articular cartilage.

Late infections were the most common complication noted which were a direct cause of failure of implant requiring removal of implant and revision surgery or arthrodesis. Superficial infections were seen in 3 patients all these patients responded to regular dressing. Rheumatoid patients have a weakened immune system because of disease per se and effect of steroids and other DMARDs on immunity. Similar results can be seen in studies of Kaltas et al, Yamanaka and Laskin.

VIII. Conclusion:

Total knee replacement was responsible for pain relief, which is the most common indication, in majority of the patients. ROM improved in patients after TKA in general, however most significant improvement were seen in patients who were bedridden preoperatively because of severe deformities. Both increased ROM and decreased pain were responsible for increased activity in all patients post TKA. Different types of implant did not show significant variation in functional scores, however absolute number of constrained knees in our study was less thus making the comparison less reliable. Larger sample size is required for further studies. The most common complication following total knee replacement for rheumatoid arthritis was infection. Periprosthetic fracture and quadriceps extension mechanism failure and other skin related complications like delayed healing and necrosis occur more frequently than in Total knee arthroplasty of degenerative arthritis. There was no case of loosening of implant noted in our study. This may be due to short duration of follow up in our study which was a major limitation of our study.

Bibliography

- [1]. INSALL JN, RANAWAT CS, SCOTT WN, et al, Total condylar knee prosthesis: Preliminary report, Clin Orthop 120: 149, 1976
- [2]. Richard Laskin: Total condylar knee replasment in RA. The journal of bone and joint surgery
- [3]. K. K. Anbari, J. P. Garino: Understanding the Rheumatoid Knee: Total Knee Arthroplasty 2005
- [4]. Yamanaka, Hajime, Ken-ichiro Goto, and Munetaka Suzuki. "Clinical results of Hi-tech Knee II total knee arthroplasty in patients with rheumatoid arthritis: 5-to 12-year follow-up." Journal of orthopaedic surgery and research 7.1 (2012):
- [5]. LEE H. RILEY, DAVID S. HUNGERFORD: Geometric Total Knee Replacement for Treatment of the Rheumatoid Knee The Journal of Bone and Joint Surgery VOL. 60-A, NO. 4. JUNE 1978 523
- [6]. J A Rand et al. "Long-term results of various treatment options for infected total knee arthroplasty." Clinical orthopaedics and related research 248 (1989): 120-128
- [7]. Trib K, Schmid M, Stulnia t: long term outcome of total knee replacement in patients with rheumatoid arthritis. Joints bone spine(2008) 163-166.
- [8]. Abernethy, P. J. "Surgery of the rheumatoid knee." Annals of the rheumatic diseases 49.Suppl 2 (1990): 830-836.
- [9]. Kaltas D, Klugman D: Total knee replacement in osteoarthritis and rheumatoid arthritis : Journal of the royal society of medicine
- [10]. Miyasaka, Kenji C., Chitranjan S. Ranawat, and Arun Mullaji. "10-to 20-year followup of total knee arthroplasty for valgus deformities." Clinical orthopaedics and related research 345 (1997): 29-37.
- [11]. Laskin RS and O'Flynn HM (1997) Total knee replacement with posterior cruciate ligament retention in rheumatoid arthritis: problems and complications. Clin Orthop 345:24-28 CrossRef
- [12]. Ranawat CS, Padgett DE, Ohashi Y. Total knee arthroplasty for patients younger than 55 years. Clin Orthop Relat Res. 1989;(248) Kristensen, O., et al. "Long-term results of total condylar knee arthroplasty in rheumatoid arthritis." Journal of Bone & Joint Surgery, British Volume 74.6 (1992): 803-806.