

## Outcomes of Total Knee Arthroplasty in Patients with Rheumatoid Arthritis

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### ABSTRACT

**Introduction:** The knee is one of the most commonly affected joints in patients suffering from chronic rheumatoid arthritis (20-30%) requiring operative intervention. The course of rheumatoid arthritis varies from mild disease to severe joint destructive variant that progress rapidly, leading to unremitting pain and joint deformity. We conducted this study to evaluate outcomes of total knee arthroplasty in patients with rheumatoid arthritis of knee.

**Materials and methods:** This is a Prospective study of 50 total knee replacements performed for Rheumatoid Arthritis Knee. Patients having less than 18 months follow-up, stress fracture tibia, previous unilateral TKR were excluded. The outcomes were measured by WOMAC and KSS scores. Comparison of outcomes was made with other similar studies of TKR in RA and OA knee patients.

**Results:** Rheumatoid arthritis of knee requiring operative intervention is more common in females as compared to males (~3:1) with average age at intervention being 63 years. Improvement of 27.5 and 37.75 points were noted in KSS and WOMAC scores respectively at the end of 18 months following arthroplasty. Complications are more frequent in patients having RA undergoing TKA when compared to OA group.

**Conclusion:** Total Knee Arthroplasty significantly improves functional outcomes of patients with rheumatoid arthritis of knee. However, complications are more frequent following the procedure and should be anticipated before operating such cases.

**Keywords:** Total knee replacement, Rheumatoid arthritis, Knee joint

**Abbreviations:** RA: Rheumatoid Arthritis; OA: Osteoarthritis; TKA: Total Knee Arthroplasty; TKR: Total Knee Replacement; MHC: Major Histocompatibility Complex; PS: Posterior Stabilized; KSS: Knee Society Score; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; DMARD: Disease Modifying Anti-Rheumatoid Drugs

### INTRODUCTION/OBJECTIVE

Rheumatoid arthritis is a chronic inflammatory disease of joints affecting 1% of the population worldwide. It is an auto-immune condition characterized by hyperplasia of the synovial lining cells, angiogenesis, and infiltration of mononuclear cells resulting in pannus formation, cartilage erosion and ultimately joint destruction [1,2]. This disease most often affects the distal joints symmetrically, for example, the small joints of hands, feet; wrists and knees. RA is 2 to 3 times more common in females than males [3,4]. RA typically manifests with signs in inflammation, with the affected joints being swollen, warm, painful and stiff, particularly early in the morning on walking or following prolonged inactivity. Increased stiffness early in the morning is often a prominent feature of the disease and typically lasts for more than an hour [5]. A family history of RA increases risk around three to five times. RA is strongly associated with genes of the inherited tissue type major histocompatibility complex (MHC) antigen HLA-DR4, HLA Dw16 are the major genetic factors implicated [6,7].

Knee is one of the most commonly affected joints in RA (30%) and the most common joint to undergo replacement arthroplasty [8]. We conducted this study to evaluate outcomes of total knee replacement in patients with rheumatoid arthritis and to compare the outcome of TKR in RA knee patients with that of OA knee patients especially complications.

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**MATERIALS AND METHODS**

This is a Prospective study of 50 total knee replacements performed for Rheumatoid Arthritis Knee during March 2016 to March 2017 operated at a tertiary care hospital by single surgeon and his team.

**Inclusion criteria**

- Patients having unilateral/bilateral knee pain with radiographic findings suggestive of arthritis of knee joint
- Patients fulfilling ACR-EULAR criteria<sup>9</sup> for diagnosis of RA with arthritis of knee
- Patients having documented seropositive RA with arthritis of knee

**Exclusion criteria**

- RA Patients with stress fracture tibia
- Less than 18 months follow up post-operatively

- Patient operated for unilateral TKR previously
- Patients with other associated systemic disease

Prior informed consent was obtained for all the patients before getting enrolled into the study. After routine pre-operative fitness, patients were operated for total knee replacement. DMARDs were modified/continued as per individual drug protocol. Mid para-patellar approach was used in all the patients with PS (Posterior stabilized) implants. Patelloplasty was performed in patients in whom patellar articular surface was found completely eburnated intraoperatively. Post operatively, patients were followed-up for minimum of 18 months and functional outcomes measured by KSS and WOMAC scores. Comparison of outcomes was made with our own data of operated knee replacement patients for osteoarthritis and other similar studies. Special note of all complications was made and their management and outcomes were also included in the study (**Table 1**).

**Table 1.** Knee society score [10].

<b>Objective Scoring</b>	
<b>Pain</b>	<b>Points</b>
None	50
Mild or occasional	45
Stairs only	40
Walking and stairs	30
Moderate Occasional	20
Continual	10
Severe	0
Range of motion (5°=1 point)	25
<b>Stability (maximum movement in any position)</b>	
<b>Anteroposterior</b>	
<5 mm	10
5-10 mm	5
>10 mm	0
<b>Medio-lateral</b>	
<5 degrees	15
6-9 degrees	10
10-14 degrees	5
>15	0
<b>Deductions</b>	

<b>Flexion contracture</b>	
5-10 degrees	-2
10-15 degrees	-5
16-20 degrees	-10
>20 degrees	-15
<b>Extension lag</b>	
<10 degrees	-5
10-20 degrees	-10
>20 degrees	-15
<b>Functional Score Points</b>	
<b>Walking</b>	
Unlimited	50
>10 blocks	40
5-10 blocks	30
<5 blocks	20
Household	10
<b>Stairs</b>	
Normal up and down	50
Normal up; down with rail	40
Up and down with rail	30
Up with rail; unable down	15
Unable	0
<b>Deductions</b>	
Cane	-5
Two canes	-10
Crutches or walker	-20

**WOMAC score [11]**

The Western Ontario and McMaster Universities Osteoarthritis Index

Scale of difficulty: 0=none, 1=Slight, 2=Moderate, 3=Very, 4=Extremely

**Pain**

1. Walking
2. Stair Climbing
3. Nocturnal
4. Rest

5. Weight bearing

**Stiffness**

1. Morning stiffness
2. Stiffness occurring later in the day

**Physical function**

1. Descending stairs
2. Ascending stairs
3. Rising from sitting
4. Standing
5. Bending to floor

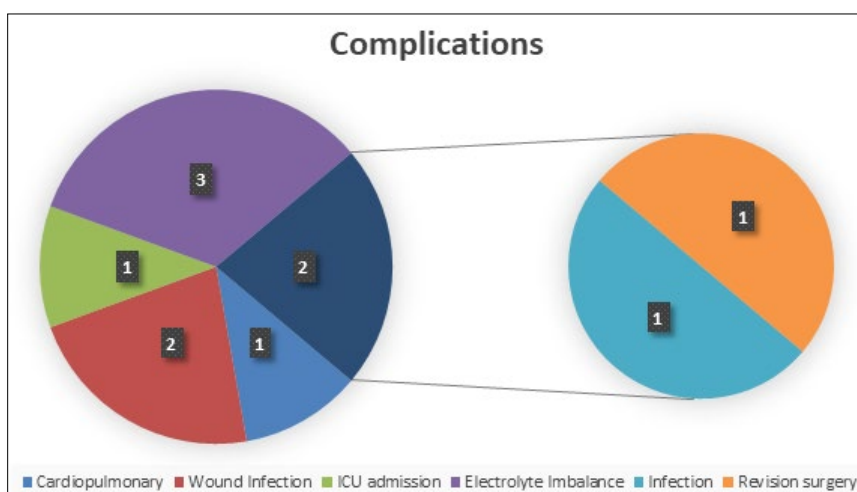
- 6. Walking on flat surface
- 7. Getting in/out of car
- 8. Going shopping
- 9. Putting on socks
- 10. Lying in bed
- 11. Taking off socks
- 12. Rising from bed
- 13. Getting in/out of bath
- 14. Sitting
- 15. Getting on/off toilet
- 16. Heavy domestic duties

17. Light domestic duties

Total Score: \_\_\_\_\_ / 96 = \_\_\_\_\_%

**RESULTS**

There were total of 50 patients enrolled in our study with average age of the patients being 63 years (range-55 to 71 years) at the time of surgery. There were 37 females and 13 males in our study with female to male ratio being 2.85:1. Average duration of hospital stay was 6 days. All the patients were mobilized on 1st post-operative day barring exceptions. Complications our studies are shown in the charts below (**Chart 1**). Cardiopulmonary complication, wound infection, ICU admission and electrolyte imbalance were the early observed complications while deep infection and revision surgery were the late complications.



**Chart 1.** Complications.

Comparison of KSS and WOMAC score observed in our study were as shown in **Table 2** [10,11].

**Table 2.** Scoring analysis.

Modality	KSS score		
	Pre-operative	Post-operative (6 months)	Post-operative (18 months)
KSS score	45	81.5	72.5
WOMAC score	79.75	33	42

**DISCUSSION**

This is a prospective study of 50 total knee arthroplasty performed in patients with RA knee. The average age of patients in our study at the time of intervention was 63 years. Out of the 50 patients in our study 37 were females and 13 were males, stressing on the fact that more of the females ultimately get the total knee replacement done than male. All the patients were mobilized on 1st post-operative day barring few restrictions like, lack of confidence on patient’s behalf, ICU admissions.

All the patients in our study underwent a thorough preoperative investigations – ECG, chest X-ray, 2D echo, all the relevant blood investigations, medical and surgical advises taken in case of respective comorbidities. Bilateral knee anteroposterior (standing) lateral radiographs were taken. Pre op evaluation of deformity was done by measuring tibiofemoral angle and Hip knee axis (**Table 3**). When such radiographs were not feasible, pelvic radiographs were used to determine the distal femoral valgus cut. Valgus deformity was more common occurrence in RA when compared to OA which is similar to findings of other studies

[12]. All the patients were given antibiotic prophylaxis described in table below [13]. preoperatively. Protocols we followed for DMARDs is

**Table 3.** DMARDs with perioperative modifications.

Medications	Comments
NSAIDs	Discontinue 5 half-lives before surgery. Aspirin should be stopped 7-10 days before surgery.
Corticosteroids	Individualized based on the magnitude of surgery and the severity of patient’s illness
Methotrexate	Continue perioperatively for all procedures. Consider withholding 1-2 doses for patients with poorly controlled diabetes; the elderly; and patients with renal, liver or lung disease
Leflunomide	Withhold 1-2 days before surgery and restart 1-2 weeks later or withhold 2 weeks before surgery and restart 3 days later
Sulfasalazine	Withhold 1 day before surgery and restart 3 days later
Hydroxychloroquine	Continue for all procedures
TNF antagonist	Withhold intercept for 1 week and plan surgery for the end of the dosing interval for adalimumab and infliximab. Restart 10-14 days postoperatively
IL-1 antagonist	Withhold 1-2 days before surgery and restart 10 days post-operatively

The results obtained in our study are compared with various previous established studies [14,15] (Table 4).

**Table 4.** Comparison with other studies.

Study	Female:Male	Average age	Average pre-op deformity angle	Knee Society Score (KSS)
Our study	37:13	63	21	45-81.5
Reddy et al. [15]	28:6	61	23	38.5-89.6
Memon et al. [14]	31:8	58	22.5	37-90

Reddy et al. [15] study did not show any complication while our study showed a few complications described above. Wound complications and infection in RA patients were noted to be one of the most common and statistically significant complications in our study over OA patients (p<0.05). Apart from it, hemoglobin level was lesser in this group and required more average units of transfusion. Bone was found comparatively weaker in RA patients as compared to OA patients intra-operatively and skin of RA patients was observed to be thinner and more fragile than OA patients as per authors’ observation. However, no quantifiable measurement could be stated for the same. Though we did not replace patella in most of the patients, it was observed by the authors that patella was shallower in RA patients and there can be higher chances of fracture due to this attribute. RA also is associated with the increased risk of peri-prosthetic fracture [16], but no such case was observed in our study. However, as many as 21 patients were put on AK-BK brace post-operatively for walking to have added support while walking. Other complications in our study included cardiopulmonary, electrolyte imbalance.

However, their occurrence was not statistically significant over OA patients.

Average KSS score at the 18 months follow-up was 72.5 with average improvement of 27.5 points over pre-operative scoring. Average WOMAC score at the 18 months follow-up was 42 with average improvement of 37.75 points over pre-operative scoring. Both these improvements were noted to be statistically significant (p<0.05) when compared to pre-operative status suggesting improved quality of life of RA patients post-TKR.

**CONCLUSION**

Total Knee Arthroplasty significantly improves functional outcomes in patients of RA knee. Complications like wound complications and infection, though less, are more common following TKA when compared to OA. So appropriate patient counselling along with properly performed operative procedure are advisable for TKA in RA knee patients.

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