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A study of clinical, functional and radiological assessment of knee after posterior cruciate sacrificing total knee replacement using the knee society knee score

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Abstract
Introduction: Total Knee Arthroplasty (TKA) is now a proven and reliable treatment for severe osteoarthritis of knee joint with the incidence of the same increasing day by day.
Material and Methods: 60 patients with primary osteoarthritis knee were included in the study between February 2013 and June 2015 at a tertiary care hospital in Mumbai city. Revision cases, Post-traumatic and Inflammatory arthritis were excluded from the study.
Results: Clinical, functional and radiological outcome were assessed by Knee Society Knee Score. Paired T-test and Pearson correlation co-efficient formula were used. The mean pre-op Knee Clinical Score (KCS) was 28.28 which improved to 94.23 post-operatively. 52 patients (86.67%) had excellent results and 08 patients (13.33%) had Good results. The mean pre-op Knee Functional Score (KFS) was 41.67 in this study which improved to 87.33 post-operatively. 50 patients (83.34%) had Excellent, 08 patients (13.33%) had Good and 2 patients (03.33%) had Fair results respectively. KCS and KFS were found to be statistically significant (P<0.001).The value of R^2 co-efficient of determination was 0.5938(P<0.00001).
Conclusion: Total Knee Arthroplasty improves the functional ability of the patient and gets him back to the pre-disease state, which is to have a pain free mobile joint, as reflected by the improvement in the post-op KCS and KFS.

Keywords: Knee joint, osteoarthritis knee, arthroplasty, replacement

1. Introduction
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 [1].
Total Knee Arthroplasty (TKA) is now a proven and reliable treatment for severe osteoarthritis of knee joint with the incidence of the same increasing day by day [1]. In most arthritic knees, some degree of instability, deformity, contracture or a combination of these elements, can be found [2-4]. With the advent of the varied types of knee prosthesis available today, it has become necessary to conduct studies for assessing the outcome of different prosthesis. Hence different scoring systems were devised for assessing the outcome of total knee replacement. We decided to assess the results of total knee arthroplasty patients using the Knee Society Score System, which is subdivided into a knee score that rates only the knee joint itself and a functional score that rates the patient's ability to walk and climb stairs. The dual rating system eliminates the problem of declining knee scores associated with patient infirmity [5].

2. Material and Methods
60 patients with primary osteoarthritis knee were included in the study. Revision cases, Post-traumatic and Inflammatory arthritis were excluded from the study. The study was carried out at a tertiary care hospital in Mumbai between February 2013 and June 2015. Well written informed consent was taken from all the patients enrolled in the study. Prior ethical committee approval was obtained.

2.1 Operative Technique

All the necessary pre-operative work-up was done for all the patients. Spinal, combined with Epidural anaesthesia was used in majority of the cases. The standard surgical steps were followed. All the patients were administered three doses of second generation cephalosporin (one within 30 mins before the procedure and two doses at 12 hourly interval postoperatively). Three doses of 1gm Intravenous Tranexamic acid (One pre-operatively and two post-operatively at an interval of 12 hours) was given to all the patients. Anterior midline incision and medial parapatellar approach was used for all the cases. Pneumatic Tourniquet was used in all the cases and was deflated prior to closure to catch the bleeders. Local infilteration with 0.5% sensoricaine (Bupivacaine), 2ml Ketorolac (NSAID) and 80mg of Tobramycin (Aminoglycoside) diluted in 30ml of Normal saline was infiltrated locally in each knee just before cementing. Nexgen® LPS-Flex (Zimmer, Warsaw, USA) was used in all the cases. Patella was not replaced in any of the case. Bone cement Palacos® low viscosity (Zimmer, Warsaw, USA) was used in all the cases. Closed suction drain number 10 Romovac® (Romsons, India) used in all cases. Thick compression dressing was done in all the patients post-operatively. Drain removal was usually done between 24-48 hours. Standard post-operative mobilization protocol was followed for all the patients. Follow up done at 6 weeks for initial assessment and then at 3, 6 12, 18 and 24 months respectively.

3. Results

The mean age of the patient was 62.07 years. 60% of the patients in the present study were females whereas 36.67% patients had right side involvement predominantly.

The mean pre-operative Knee Clinical Score (KCS) was 28.28 which improved to 94.23 post-operatively. As per the Knee Society Clinical Scoring system, 52 patients (86.67%) had excellent results and 08 patients (13.33%) had good results.

The mean pre and post-operative knee functional score (KFS) was 41.67 and 87.33 respectively. 50 patients (83.34%) had Excellent, 08 patients (13.33%) had Good and 2 patients (03.33%) had Fair results as per the knee functional society scoring system.

The difference between the mean of pre and post-op KCS was 65.95 (62.65 to 69.25, 95% CI). It was statistically significant ($P<0.001$).

The difference between the mean of pre and post-op KFS was 45.67 (43.39 to 47.95, 95%CI). The value was statistically significant ($P<0.001$). There was a strong positive co-relation found between the KCS and KFS scores (R-0.7706).The value of R^2 co-efficient of determination is 0.5938.

The P value at the end of 1 year follow-up was highly statistically significant ($P<0.00001$).

4. Discussion

Total Knee Arthroplasty is generally an effective procedure and is associated with substantial functional improvement. Albeit, the subject of Posterior cruciate sacrificing (PS) Vs Posterior cruciate retaining (CR) is debatable since the time of its inception, many studies prove the superiority of Posterior cruciate sacrificing knees. Patients with PS Knees have better range of motion [5], easier in ligament balance, and more reliable femoral rollback [6, 7]. Whereas the patients who undergo CR knees have better post-operative knee proprioception and kinesthesia [8, 9].

With the varied amount of implant designs available the posterior cruciate substituting design was found to be effective [10]. Swanik *et al* found that following PS total knee arthroplasty, the balance index improved significantly from the preoperative to the postoperative evaluation. The group treated with the posterior stabilized prosthesis more accurately reproduced joint position when the knee was extended from a flexed position [9]. Retention of the posterior cruciate ligament does not appear to significantly improve proprioception and balance compared with those functions in patients with a posterior stabilized total knee design [11]. In the present study, all the patients were operated using the posterior cruciate sacrificing design.

Robert L Barrack *et al* in their study found that with the retention of patella after total knee arthroplasty, the clinical results were comparable with those after total knee arthroplasty with patellar resurfacing. They also concluded that postoperative anterior knee pain is related either to the Component design or to the details of the surgical technique, such as component rotation, rather than to whether or not the patella is resurfaced [12, 13].

Nutton in his study concluded that knee function was not improved by patella resurfacing when compared to a matched group of patients without resurfacing [14].

Wood *et al* concluded that total knee arthroplasty with patellar resurfacing exhibited inferior clinical results as compared to total knee arthroplasty with patellar retention. Total knee arthroplasty with patellar resurfacing exhibited significant limitation of knee extension, which was significantly associated with the presence of post-surgery anterior knee pain [15].

In the present study, patella was resurfaced in all the patients. Circumferential denervation was done in all the patients. No case of anterior knee pain was found in the present study.

In 1989, The Knee Society scoring system was developed as a simple, but objective scoring system to rate the knee and patient's functional abilities such as walking and stair climbing before and after Total knee arthroplasty [16]. It was a logical outgrowth of the Hospital for Special Surgery (HSS) rating system.

The KSS has two components: a knee rating (0–100 points) and function (0–100 points) worth a total of 200 points. The knee rating is divided into pain (0–50 points) and a knee score which assesses range of motion, stability, and alignment (0–50 points). A higher score indicates a better outcome.

The validity of KSS has been questioned by few authors recently [17, 18] and thus, a revised knee society scoring system has recently been developed [19] and validated [20] for measuring outcomes after TKR.

Despite validity issues, the KSS remains one of the most popular rating systems for measuring outcomes in TKR [19]. It is one of the few outcome measures that include assessment of clinical measures that are deemed important in terms of implant survival and functional outcomes [21].

In the present study, there was significant improvement in the Knee Clinical Score and Functional Score, following Posterior Cruciate Sacrificing Total Knee Arthroplasty. The Knee Society Roentgenographic evaluation and scoring system was developed for uniform reporting of roentgenographic results of Total Knee Arthroplasty. In our one year follow up study the component position and knee alignment was well maintained.

Short term follow-up and less number of sample size were the limitations of the present study.

Fig 1: Pre-operative X ray AP and Lateral View

Fig 2: Post-operative X ray AP and Lateral View

Knee Society

Knee Society Rating	Points	Patient Score
Pain (50 points)		
None	50	= 50
Mild or occasional	45	
Stairs only	40	
Walking and stairs	30	
Moderate occasional	20	
Moderate continual	10	
Severe		
Range of Motion5 degrees = 1 point	25	= 25
	0	
Anteroposterior Stability (maximum movement in any postion)		= 10
<5mm	10	
5-10mm	5	
10mm	0	
Medial lateral Stability		= 15
<5 degrees	15	
6-9 degrees	10	
10-14 degrees	5	
15 degrees	0	
Deductions		= 0
Flexion contracture		
5-10 degrees	2	
10-15 degrees	5	
16-20 degrees	10	
>20 degrees	15	
Extension lag		
<10 degrees	5	
10-20 degrees	10	
>20 degrees	15	
Alignment		
5-10 degrees	0	
0-4 degrees	3 points each	
11-15 degrees	3 points each	
Other		
Function Rating		
Walking		= 50
Unlimited	50	
>10 blocks	40	
5-10 blocks	30	
<5 blocks	20	
Housebound	10	
Unable	0	
Stairs		= 50
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	
Deductions		= 0
Cane	5	
Two canes	10	
Crutches or walker	20	

Score

Knee Rating= 100

Function= 100

(Adapted from: Insall JN, CORR 1989; 248: 12)

5. Conclusion

Total Knee Arthroplasty improves the functional ability of the patient and the ability 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. The simplicity and free availability makes the Knee society scoring system on of the most user friendly scoring system with at ease interpretation.

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