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Observational study to evaluate functional out-come of total knee replacement in primary osteoarthritis of knee joint

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Abstract
Introduction: Osteoarthritis is thought to be the most prevalent chronic joint disease. Total knee arthroplasty is now s reliable treatment for severe arthritis and is commonly done for end stage arthritis of knee. The results of TKA are predictable in majority of cases, but with geriatric population, arthritis is often associated with other co-morbid condition along with age, which makes the results of TKA less predictable. So the present study was conducted to evaluate the clinical and functional outcome of TKA in this subset population.
Materials and Methods: This prospective study was done at a tertiary center of new civil hospital surat. A total of 25 Consecutive patients who consented and underwent TKA were assessed clinically, functionally using the knee society score at 6 months.
Results: The average pre-op knee Functional score was 65.8 which improved to an average post-op score of 83.68 At 6 month follow up, 19 patients (76%) had excellent, 2 patients (8%) had good, 2 patients (8%) had fair, and 2 patients (8%) had poor results as per KFS. The average pre op knee Clinical score was 47.4, which improved to a post op score of 83.84. At 6 month follow up, 18 patients (53%) had excellent, 5 patients (20%) had well, 1 Patient (4%) had fair and 1 patient (4%) had poor results as per KCS.
Conclusion: Total knee arthroplasty improves the functional ability of the old patient above 60 years 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.

Keywords: Primary osteoarthritis, knee replacement, chronic joint disease

1. Introduction
In most arthritic knees, some degree of instability, deformity, contracture or combination of these elements, can be found [1, 3]. 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 (OA) is a chronic degenerative joint disease and a major cause of disability in the elderly people [4]. The rapid increase in the prevalence of this disease suggests that OA will have a growing impact on health care and public health systems in the near future. 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 (TKA) is now a reliable treatment for severe arthritis. Various systems are available with features regarding the geometry of the components, the degree of conformity of the articulating surface. Total joint replacement (TJR) for the management of OA iswell-documented for improvements in patient benefits, reducing pain and improving physical function [5, 9]. With the advent of these varied types of prosthesis it became 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.

Materials and Methods

The study was done on 25 patients. Scoring system formulated by the Knee Society Knee Score were used to evaluate the patients before and after surgery. Both knee scores and functional scores are calculated with each amounting to a total of 100 points. Preoperative Radiological grading as advocated by Kellegren and Lawrence was used to evaluate the severity of the arthritis.

Inclusion Criteria

In our hospital total knee arthroplasty is being done for primary osteoarthritis. This includes varus as well as valgus knees.

1. Primary Osteoarthritis
2. Age> 60 year
3. Kellegran and Lawrence score Grade 3 and 4

Exclusion criteria

1. Infection, Non healing ulcer at same side or opposite limb
2. Systemic inflammatory arthritis
3. Neurological disorder
4. Any systemic infection
5. Preoperative patellectomy
6. Extension mechanism deficient
7. Secondary osteoarthritis of knee
8. Age <60 years
9. post traumatic osteoarthritis knee

The period of study is Retrospective data from 1st January 2017 to date of approval of this study. Prospective data the date of approval to till 31 may 2020. During the study period 30 knees were replaced (5 patients had B/L TKR) in 25 patients. Final study was on 25 patients.

Detailed history of all patients was taken. The preoperative medical evaluation of all patients was 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 contractures. The knee deformities were examined for any fixed varus or valgus deformities or presence of any fixed flexion contracture. Standard guidelines were utilized to get knee radiographs – standing anteroposterior view and a lateral view and a skyline view of the patella. Any collateral ligament laxity, subluxation of tibia, presence of osteophytes, any bone defects in the tibia and femur and the quality of bone is assessed. All patients after thorough pre-op evaluation were taken up for surgery by the same surgical team under general or regional anesthesia, patient in supine position with knee flexed to 90 degree. Tourniquet was applied at the thigh region and sterile preparation done from thighs to toes and draped. The patient was assessed 1 month post operatively for any signs of post-operative infection. Once post-operative infection was ruled out clinically the patient was assessed clinically and functionally using the Knee Society Score at an interval of 6 months.

Results

Postoperative follow up was done 1month, 3month, 6 month. All patients were evaluated postoperatively for the range of movements, relief of pain and scoring done as per Knee Society Knee Score, Knee Functional Score was done in all patients after an average of 6 months from the date of surgery

During the period of study from January 2017 to May 2020 all the patients who underwent TKR primary to OA of knee joint were included in the study criteria. There were 5 patients who underwent in bilateral TKR, in both group and 20 patients underwent in unilateral TKR. Out of 5 Patients who underwent in bilateral TKR, among them 3 patients developed post op complications. One patient developed post op deep surgical site infection, for that wound debridement done and antibiotics were given as per culture and sensitive report.

Second patient developed knee joint stiffness. For the same patient followed up with physiotherapy reference. Which was gradually improved with time. Third patient who had good functional outcome post operatively but developed difficulty in walking after systemic illness, which includes liver cancer.

Table 1: Complication was developed in only 3 patient after TKA.

Complication	Number of patient	%
Infection (deep surgical site infection)	1	4%
Joint stiffnes	1	4%
Associated with systemic illness.	1	4%
No complication	22	88%
Total pt	25	100%

Table 2: Mean pre and post op. Knee Clinical Score

Knee Clinical Score	Mean
Pre-op.	47.4
Post-op.	83.84

Table 3: Distribution of subjects based on post-op. knee clinical score.

Knee Clinical Score	Frequency (%)
Excellent	18(72%)
Good	5(20%)
Fair	1(4%)
Poor	1(4%)
Total	25(100%)

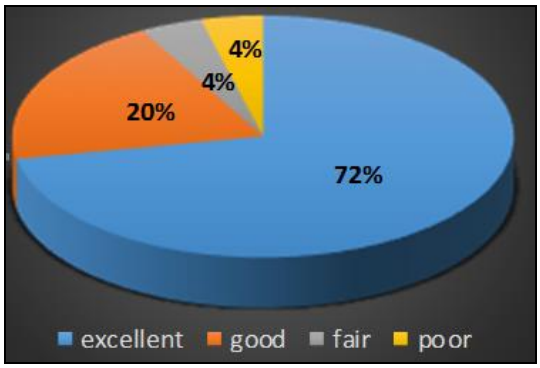

Fig 1: Knee clinical score

Table 4: Mean pre and post op. Knee Functional Score.

Knee Functional Score	Mean
Pre-op.	65.8
Post-op.	83.68

Table 5: Distribution of subjects based on post-op knee clinical score

Knee Fuctional Score	Frequency
Excellent	19(76%)
Good	2(8%)
Fair	2(8%)
Poor	2(8%)
Total	25(100%)

Fig 2: Pre-Operative and Post-Operative X Ray

Fig 3: Clinical picture after 6 month post-operative

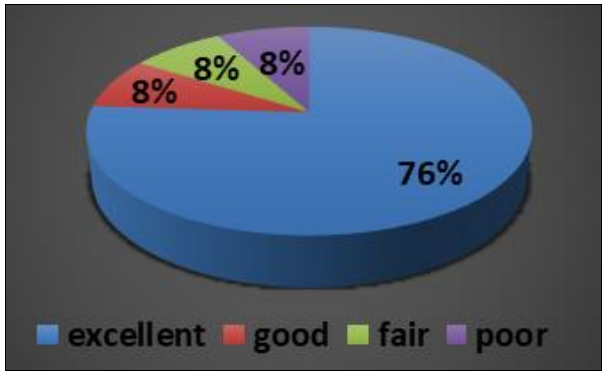

Fig 4: Knee functional score

Discussion

Total knee arthroplsty, is a surgical procedure to replace the weight-bearing surfaces of the knee joint to relieve pain and disability. It is most commonly performed for osteoarthritis and also for other knee diseases such as rheumatoid arthritis and psoriatic arthritis. In patients with severe deformity from advanced rheumatoid arthritis, trauma, or long standing osteoarthritis, the surgery may be more complicated and carry higher risk.

Most common indication for total knee arthroplasty is primary osteoarthritis. Various factors are associated with the onset and progression of clinical osteoarthritis. These include genetic factors, age, sex, abnormal loading of the joint as in kneeling, squatting and cross legged sitting.

This study was conducted to assess the clinical and functional outcome of TKA using knee society score and to find association between knee functional score and knee clinical score. Nowadays, total knee arthroplasty is becoming a standard treatment for arthritic knee in terms of relief from knee pain free as well as it stabilize the knee with an appropriate range of motion and associated with substantial functional improvement. Significant advances have occurred in the type and quality of the metals and understanding of biomechanics, polyethylene, and, more recently, ceramics used in the prosthesis manufacturing process, leading to improved longevity. As with most techniques in modern medicine, more and more patients are receiving the benefits of total knee arthroplasty (TKA) [10, 11].This advances in the knee implant design and the surgical techniques for total knee replacement achieved successful results in reducing the pain and providing with a stable joint. After total knee arthroplasty, good relief was observed in older patients who were having difficulty in mobility because of degenerative arthritis. There was a substantial relief of joint pain, increased mobility, correction of deformity and an improvement in the quality of life of patients following total knee arthroplasty.

The knee society score is used to assess the outcome of total knee arthroplasty. The knee society score rating system is a logical outgrowth of the hospital for special surgery rating system. In our study, on clinical and functional evaluation of the patients, assessed by the KSS score significant improvement was observed in both KCS and KFS score

during follow up at 1, 3 and 6 month as compared to preoperative value. There was significant association between KFS and KCS at every interval.

The Knee Society Score system is subdivided into a knee clinical score that rates only the knee joint itself and a knee functional score that rates the patient's ability to walk and climb stairs. As such the knee clinical score is not artificially affected by co-morbid conditions. The scoring system combines a relatively objective knee clinical score that is based on the clinical parameters and a knee functional score based on how the patients perceives that knee function with specific activities [12]. In our study there was significant improvement of Knee Clinical Score and Knee Functional Score following primary Total Knee Arthroplasty in patients above 70 years. At 6 month follow up, the component position and knee alignment was well maintained. We recommend long term follow up studies to further strengthen the study findings. Similarly in the study conducted by Farahini *et al* significant improvement in knee society score was observed [13]. Our findings also correlates well with study conducted by Yaratapalli *et al*. showing increased in Knee society score after TKA [14].

In our study, only three patients showed postoperative complication leading to poor KCS and KFS score in this patient.

Buz-Swanik *et al*, found that after total knee arthroplasty, most of the patients were able to reproduce joint position and significant improve in mobility was observed. These changes may result due to retensioned capsule ligamentous structures and reduced pain and inflammation. There was also significant improvement in the balance index postoperatively. In our study, all the patient treated with the posterior stabilized prosthesis, reproduced joint position more accurately when the knee was extended from a flexed position [15].

Conclusions

Primary Total Knee Arthroplasty improves the functional ability of the old patient above 70 years 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. Also, Knee Society Score is an effective scoring system as it incorporates clinical and functional outcome following Total Knee Arthroplasty.

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