

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2022; 8(1): 420-426
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www.orthopaper.com
Received: 17-11-2021
Accepted: 22-12-2021

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A study of primary total knee replacement using anthem knee system

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DOI: <https://doi.org/10.22271/ortho.2022.v8.i1f.3050>

Abstract

Background: Patients with O.A undergoing TKA were evaluated Pre-Op and Post-Op functional and objective outcomes using Oxford knee Society Score.

Patients and Methods: A prospective study of 20 patients suffering from OA of the Knee Jt. Having undergone TKA. The patients were evaluated up to 5 months.

Results: In this study most of the patients had quadriceps lag with pain in the first month of follow up. So, when compared the trial cups of Femur in Anthem and Genesis 2, it was found out that in the Anthem design of the Femoral Component it has a ridge causing impingement of Quadriceps and painful extension, which is not the case with the Genesis 2 design. Another observation noted was this knee system lacked the design of broad Femoral trial, with a narrow trial only which is very difficult during Surgery as the trial has to be pushed to medial side to take exact measurement.

Conclusion: Total Knee Replacement is an excellent method for patients with OA knee in providing pain free mobile knee joint and improving the functional ability significantly, thereby improving their quality of life significantly.

Keywords: Total Knee Replacement-TKR, Osteoarthritis-OA., Total Knee Arthroplasty, -TKA

List of abbreviations: AP- Antero- posterior, FFD- Fixed flexion deformity, KSS-Knee Society Score, Oxford Knee Society Score-OKS, Hospital for Special surgery Score-HSS, Mediolateral-ML, Anterior Cruciate Ligament-ACL, Posterior Cruciate Ligament-PCL, Postero-Anterior-PA, Pre-Op- Pre-operative, Post-Op- Post-Operative, Range of Motion-ROM., Rheumatoid Arthritis-RA., Road traffic Accidents-RTA, Patients-Pts., Polymethyl methacrylate-PMMA. Straight leg Raising-SLR, Months-Mts

Introduction

Osteoarthritis is the most common type of Arthritis afflicting the Knee Jt. Pain and functional impairment are the major symptoms associated with OA and the main reason for pts, to seek medical advice. Several innovative implant design and surgical techniques are available with specific features regarding the geometry of the components, the degree of congruity of the articular surfaces, which has helped in achieving the normal kinematics and functions of the knee after TKR. However, a fraction of pts, do not get relief from pain and functional outcomes even 6 mts. after surgery. Rates of ongoing knee pain and functional impairment following TKR very considerably seen in the literature, ranging from 14% to 44% of individuals reporting persistent pain from 20% to 50% of individuals reporting functional impairment in the first 12 to 24 mts. following surgery.

The pain relief following TKR depends on age at which surgery is done, the disease for which it is indicated and associated co-morbidities. This study was done to evaluate the benefits of TKA in different parameters like age, sex, disease and associated co-morbidities, by using OKS which involves both subjective as well as objective analysis of improvement, since there is varying percentage in functional outcome following TKR for OA of Knee in literature.

Patients and Methods

Twenty patients with OA knee aged above 50 yrs., were selected to undergo TKR. This is a prospective study done between Jan 2018 to June 2018 at Tertiary Care Regional Referral Hospital (Kind Fahad Specialist Hospital), Al-Qassim., K.S.A. Following exclusion criteria was adopted for not doing TKR. (1) Previous replacement, (2) High Tibial Osteotomy on the ipsilateral knee (3) Major Neurological/Psychological disorders, (4) Infections.

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Operative Procedure

Total Knee Replacement was performed in a Laminar Air Flow Operating Theatre, under General Anaesthesia (Pts. preference), and pt. was positioned supine, Operating leg was positioned in flexion, broad spectrum Anti-biotic Cephalosporin combination with Sulbactam of 1.5 gm was parenterally (Intra-venous) administered before applying tourniquet. A thorough scrub was given using liquid soap. Under absolute aseptic precautions the part was painted with betadine solution, sterile stockinette was used to drape the limb, exposing only the operating area. Sterile disposable drapes were used for draping the operating site.

A standard midline approach with knee in flexion from upper pole of patella till the tibial tuberosity. Deeper antero-medial dissection was followed for arthrotomy, medial, lateral, posterior soft tissue released either minimal or extensive was done for soft tissue balancing and correction of deformities. Tibial and femoral osteophytes were excised, tibial sectioning done using extramedullary cutting, cuts were done with appropriate femoral rotation with reference to epicondylar line or Whiteside line. Tibial defects were managed by autologous posterior condylar grafts with screws or with wedge augmentation. The alignment and soft tissue balancing was checked in extension and flexion.

Trial components were assembled for proper fit and checked for soft tissue tension and balancing in flexion and extension. Circum-patellar electrocautery in all knees and removal of osteophytes from patella without patellar resurfacing was done. Normal patellar tracking was noticed in all the cases, cementing of components was done by using 1 packet of bone cement (PMMA). Tourniquet was released, haemostasis achieved by small vessel cauterisation, suction drain applied wound closed in layers. Post-op antibiotics was continued for a period of 5 days.

List of instruments

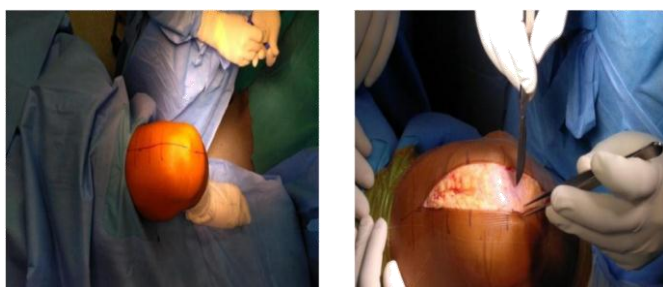


Fig 1: Marking and making midline incision

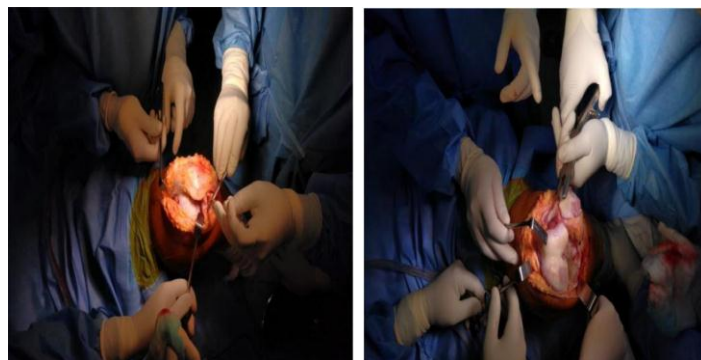


Fig 2: Arthrotomy by medial parapatellar Approach



Fig 3: Placing the Femoral Zig

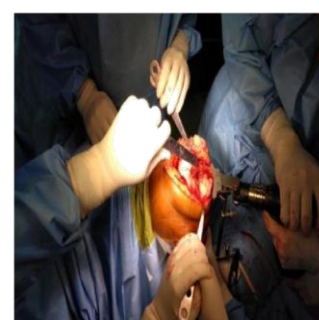
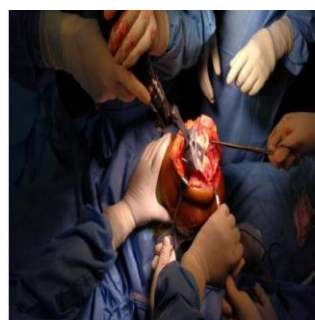
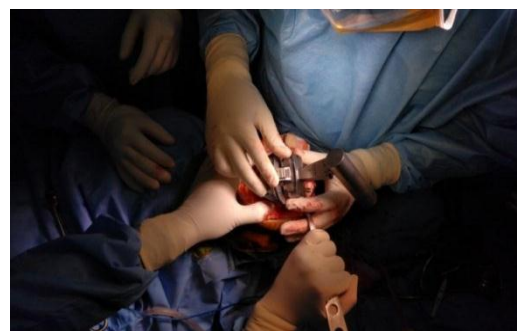


Fig 4: Distal Femoral Cut and Proximal Tibial Cut



Fig 5: Condylar cuts and Chamfer cuts

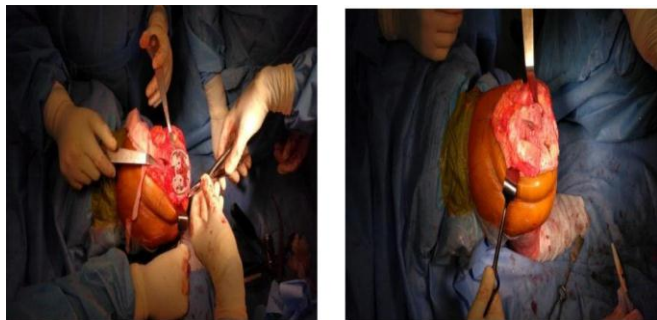


Fig 6: Tibial tray Placement



Fig 7: Measuring extension gaps and placement of Components



Fig 8: Reduction and Repair of Extensor Mechanism



Fig 9: Final Closure

Evaluation

Standard post-op protocol was used to develop Quadriceps apparatus, to improve the range of motion and early weight bearing ambulation. Sutures were removed at the end of 2 weeks. Immediate post-op follow up both clinical and radiological evaluation was done at regular intervals. Final evaluation was done using OKS system. The period of Follow up was 10 days, 1 mt, 3 mts, 5 mts,

The following standard post-op protocol was used to assess the patients.

DAY-1: Static quadriceps strengthening exercises and active SLR as permitted by pain.

DAY 2: Suction drain was removed if collection was less than

50 ml on day 2 or on day 3. Active and passive assisted flexion as tolerated by the pt. using CPM machine and less than 90 deg.

DAY 3: Ambulation was encouraged with the help of Zimmer frame (Walker).

DAY 4: Gait training

DAY 5: Discharge from Hospital

DAY 15: Follow up and suture removal.

DAY 21: Walking assisted with Tripod stick.

Statistical Analysis

In this study average age of the pt. was 60.5 yrs. (ranging from 51 yrs. to 70 yrs.). Majority of the pts. were Females (16) and Males (4). 55% was Rt. Side and 45% was Lt. side. Primary OA of the Knee was the indication for TKR. Pre-op OKS for pain was 17.7 and post-op score was 37.2, which showed a significant improvement. Average pre-op range of movement was 0 to 77 deg. of flexion and average post-op range of movement was 0 to 100.5 deg. of flexion, with difference of 23.5 deg. of flexion from pre-op to post-op.

We had 2 Knee with FFD > 20deg, 1 knee jt with FFD of 16-20 deg. 2 knee with FFD of 11-15 deg. 5 knee with FFD of 5-10 deg. pre-op. post-op 17 knees did not have FFD, 2 knees had FFD of 11-15 deg. and 1 Knee had FFD of 5-10 deg. Pre-op 2 knees had severe deg. of varus, 12 knees with moderate deg. 6 knees with mild deg. of varus. Post-op 19 knees with normal valgus of 5-10 deg. and 1 knee with valgus of 11-15 deg. Two pts. were house bound, 12 pts who could walk < 5 Blocks and pts. with walking ability of 5-10 blocks pre-op., post-op 12 pts. Could walk unlimited distance, 6 pts. > 10 blocks and 2 pts. 5-10 blocks.

Pre-op no pts. were able to walk stairs up and down normally, 11 pts. Climbed up the stairs with the support of railings and unable to climb down. Six pts. Were able to walk stairs up and down with the support of railings and 3 pts. were unable to walk up and down the stairs.

Post-op, 5 pts, had normal climb up and down the stairs, 11 pts. Could climb up and down the stairs with the support of railings and 4 pts. climb up the stairs with support of railings and could not climb down. Pre-op 10 pts. were using a cane and 4 pts were using walker and 6 pts without any support. Post-op 6 pts are using cane, 2 using Zimmer frame(walker) and 12 pts. walking without any support.

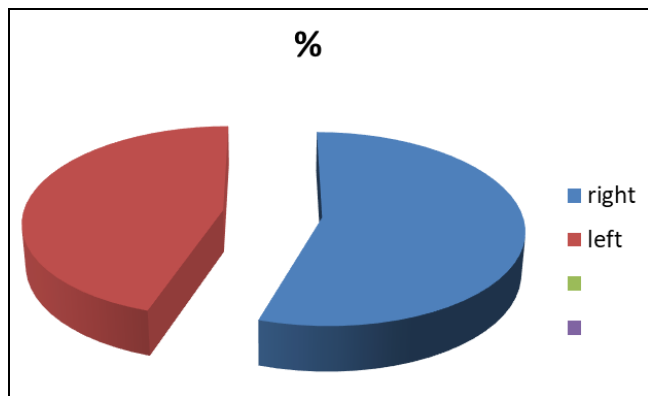
In this study average OSS score pre-op was 17.7 and post-op average was 37.2 after 5 mts. post-op 11 knees had an excellent OSS score and 6 knees had good OSS score, 2 knees had a satisfactory score and 1 pt. had poor results. Pre-op 20 knees had poor functional score. Post-op 12 pts had excellent score (80-100). 5 pts. with good score of (70-79), 2 pts. had satisfactory score (60-69) and 1 pt. had poor score (<60). Post-op mean score of 29.5 increased to 75 after 5 mts. post-op, indicating significant improvement in functional score following TKR.

In this study we had 1 pt. with delayed wound healing post-op, which healed with regular dressings after 20 days. 1 pt. had diabetes mellitus with hypothyroidism, 2 pts. had superficial infections.

Patients showing the side of involvement:

Table 1: Right side involved was 55% and Left side involvement was 45%

Side	No. of Pts.	Percentage
Right	11	55
Left	9	45



Number of Males and Females in the study

Table 2: Total of 16 Female and 4 Male Patients

Sr. No.	No. of Patients	Percentage
Females	16	80%
Males	4	20%

Table 3: Average age of patients

Age in years	Number	Percentage
51-60	13	65%
61-70	6	30%
>70	1	5%
Total	20	100%

Average Values at Various Follow Ups

Table 4: Mean value of OKS at each Follow Up

Values	Follow Up
Pre-op	17.7
Post-op OKS	23.5
1 st Month OKS	27.5
3 rd Month	33.2
5 th Month	37.2

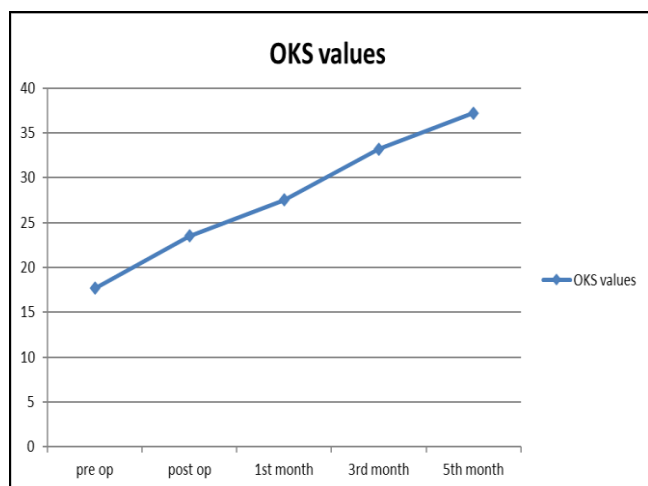


Table 5: Average values of FSS at various Follow Ups

Follow Up	Values
Pre-op FSS	29.5
Post-op FSS	39.8
1 st Month FSS	52.3
3 rd Month FSS	63
5 th FSS	75

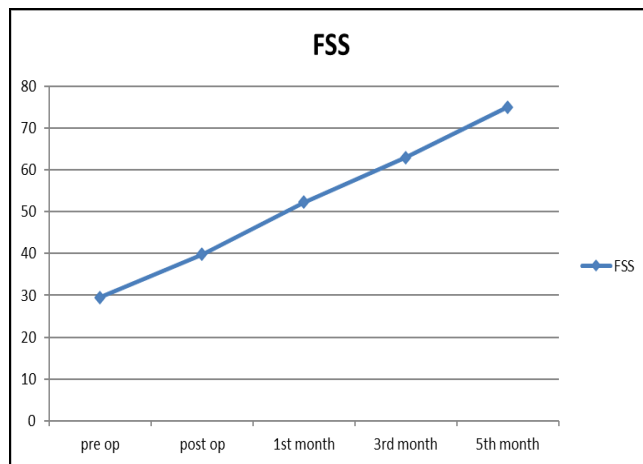
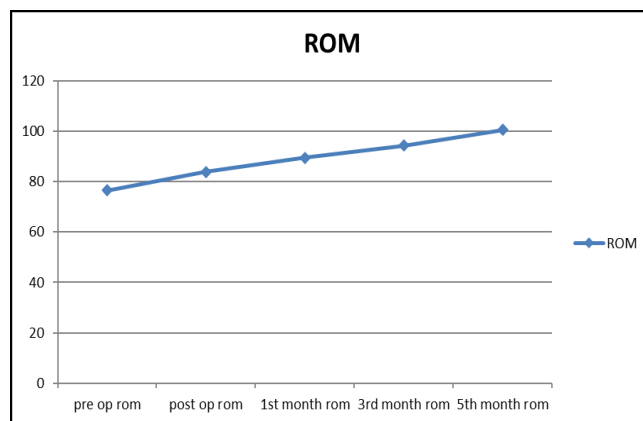


Table 6: Average values of ROM at various Follow-up

Follow -Up	Values
Pre-op ROM	76.5
Post-op ROM	83.8
1 st month ROM	89.5
3 rd Month	94.3
5 th Month	100.5



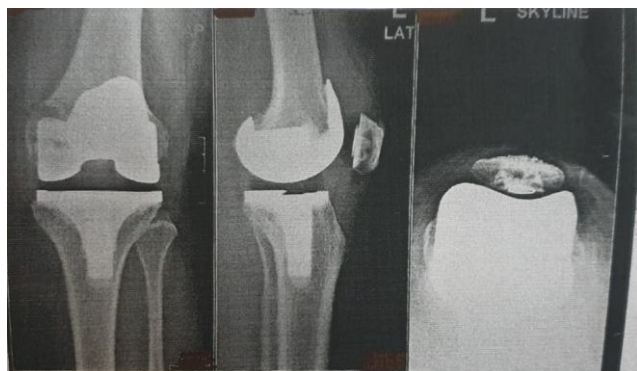
Results & Observation

In this study most of the patients had quadriceps lag with pain in the first month of follow up. So, when compared the trial cups of Femur in Anthem and Genesis 2, it was found out that in the Anthem design of the Femoral Component it has a ridge causing impingement of Quadriceps and painful extension, which is not the case with the Genesis 2 design. Another observation noted in this knee system was it lacked the design of broad Femoral trial, with a narrow trial only which is very difficult during Surgery as the trial has to be pushed to medial side to take exact measurement.

Pre-op X-Ray

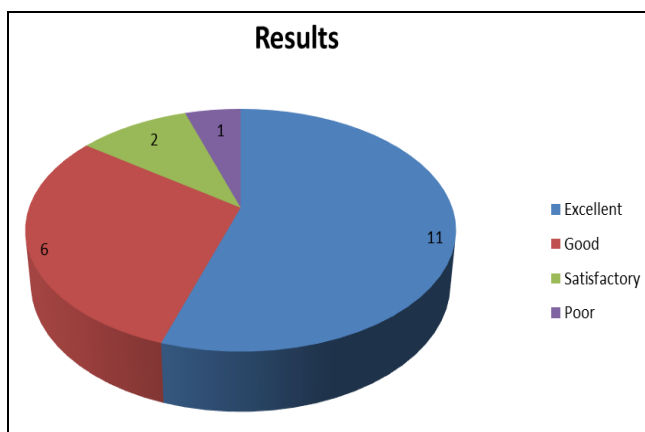


Post -op X-Ray



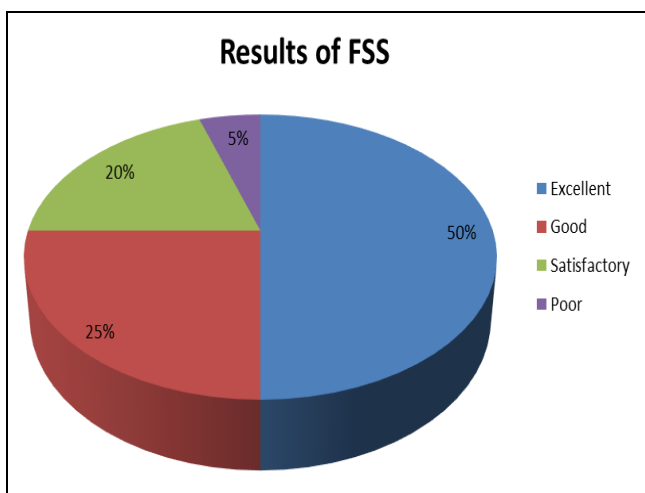
Results of OKS Score

Results of OKS	Knee Jts.	Percentage
Excellent	11	55%
Good	6	30%
Satisfactory	2	10%
Poor	1	5%



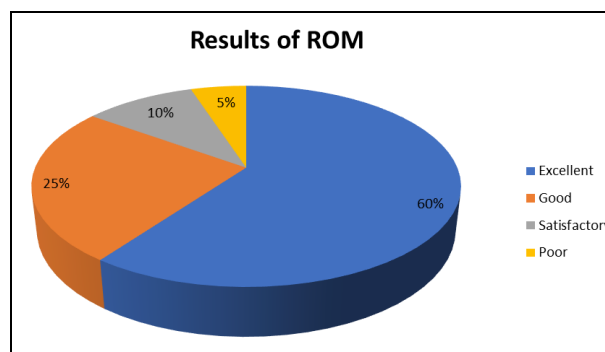
Results of FSS

Results of FSS	Knee Jts.	Percentage
Excellent	10	50%
Good	5	25%
Satisfactory	4	20%
Poor	1	5%



Results of ROM

Results of ROM	Knee Jts.	Percentage
Excellent	12	60%
Good	5	25%
Satisfactory	2	10%
Poor	1	5%



Conclusion

Total Knee Replacement is an excellent method for patients with knee OA in providing pain free mobile knee joint and improving the functional ability significantly, thereby improving their quality of life significantly.

Discussion

This study was done to evaluate pts. who underwent TKR with Anthem knee system. Sixteen (80%) were female pts. four (20%) were male pts. More number of female pts. were seen in this study, age of the pts. 51-60 yrs. in 13 pts, 6 pts. with age group of 61-70 and 1 pt. > 70 yrs. of age respectively. Mean age of the pt. was 60.5 yrs. Pre-op OKS for pain was 17.7 and post-op score was 37.2 which showed a significant improvement. Average range of motion in pre-op pts. was 0-77 deg. of flexion and average flexion from pre-op to post-op. All the knees were operated for primary OA this was the only indication for TKR in all the cases.

Pre-op 2 knees had FFD>20deg. 1 knee had FFD of 16-20 deg. 2 knees had FFD of 11-15 deg. 5 knees with FFD of 5-10 deg. post-op 17 knees did not have FFD, 2 knees had FFD with 11-15 deg. and 1 knead FFD of 5-10 deg. Pre-op 2 knees had severe deg. of varus, 12 knees with moderate deg. 6 knees with mild deg. of varus. Post-op 19 knees with normal valgus of 5-10 deg., 1 knee with valgus of 11-15 deg. valgus. Two pts. Were confined to home, 12 pts. who could walk <5 blocks, 6 pts who could walk 5-10 blocks, 12 pts. Post-op could walk unlimited distance, 6 Pts. >10 blocks, 2 pts. Between 5-10 blocks.

Pre-op no pts. In this study were able to walk stairs up and down. Eleven pts. Walked up with the help of railings and unable to walk down, 6 pts. Were able to walk stairs up and down with the help of railings and 3 pts. Were unable to walk up and down stairs. Post-op 5 pts. Have normal climbing up and down stair, 11 pts. Had climbed up and down with the support of railings, 3 pts. Could climb up with support of railings and could not climb down. Pre-op 10 pts. we're using a cane and 4 pts. were using Zimmer frame(walker) and 6 pts. Without any support. Post-op 6 pts. Are using a cane, 2 pts. Using Zimmer frame(walker) and 12 pts. Walking without any support.

In this study average pre-op OSS was 17.7 and post-op average OSS was 37.2 after 5 mts. post-op 11 knees had an excellent OSS score and 6 pts had a good OSS score of, 2 pts. had a satisfactory score and 1 pt. had poor results. Pre-op 20 pts. had poor functional score; post-op had excellent score (80-100). Five pts. with good score of (70-79), 2 pts had satisfactory score (60-69) and 1 pt. with poor score of (<60). Pre-op mean score of 29.5 increased to 75 after 5 mts. post-op, indicating significant improvement in functional score following TKR. One pt. with delayed wound healing post-op which healed with regular dressings in 20 days. Out of these 1 pt. had DM with hypothyroidism, 2 pts had superficial infection of the wound.

Conflicts of Interest: There are no conflicts of interest.

Acknowledgements:

Sincere thanks to: Dr. Abdul Salam, Dr. Mohammed Fahad, Dr.K.T. Rajasekhar.

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