ORIGINAL ARTICLE

Outcome of patients in term of range of motion after total Knee Arthroplasty with all poly implants

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Abstract

Background: Worldwide millions of people undergo joint replacement surgery to decrease the morbidity. The main indication for these surgeries is loss of function and pain. Similarly, knee replacement is done when degeneration and destruction of the knee create disability and decrease function of the knee. There are a number of implant types available but the use of an all-polyethylene tibial component in primary total knee replacement remains an attractive option, considering the durability and lower cost.

Objective: The objective of the study was to evaluate the pre-operative and post-operative range of motion (ROM) after total knee replacement at 6th, 12th and 48th weeks follow up using all poly implants.

Material and Method: It is a prospective case series in which 111 subjects with total knee replacement in whom all poly implants were used and were assessed for range of motion at knee using simple goniometry examination at regular intervals were included. All data were analyzed using SPSS 17.0 version

Results: On goniometry examination, ROM at 6 weeks averaged 700 and at 12 weeks averaged 1,000 and on last follow up was 1,100

Conclusion: Total knee replacement with all poly implants has excellent results in terms of range of the motion of the knee.

Keywords: All poly implants, goniometry, range of motion, total knee replacement.

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Introduction:

Knee and hip joints mostly destroy due to degenerative process or rheumatoid disease or due to some other cause. When these joints are affected upto grade 3 or 4, replacement surgeries are needed.[1] Knee arthroplasties (KA) are surgical procedures that have become more common in the last few decades in part due to the aging population. Approximately 700,000 knee replacement procedures are performed annually in the United States. The demand for primary total knee arthroplasties (TKAs) is projected to grow by 67.3% to 3.48 million procedures by 2030.[2] In 2008, 650,000 TKA procedures were performed in the United States.[3] More than 77,500 primary TKAs were performed in the United Kingdom in 2009.[4] Range of motion (ROM) is the most important outcome that defines the functional ability after total knee arthroplasty (TKA). A minimum range of knee flexion of 90° is essential to daily activities with about 67° required in swing phase, 83° in climbing stairs, 90° in descending stairs, and 93° in rising from a chair.[3] ROM after TKA is influenced by numerous factors including pre-operative ROM, age, it is also dependent on variables such as implant type and anesthesia modalities.[5] Stiffness following total knee arthroplasty is relatively common.[6]

With variations in prosthetic design, bearing mode, patellar resurfacing, materials, fixation method, and surgical technique, there are over 150 different knee implant designs in current

Table-1: Demographic Characteristics and surgical outcome of patients

		Frequency (n)	Percentage (%)
Sex	Male	25	22.52%
	Female	86	77.48%
Side of Arthroplasty	Right	67	60.36%
	Left	34	30.63%
	Both	10	9.01%
Cause of Arthritis	Osteoarthritis	74	66.67%
	Rheumatoid Arthritis	32	28.83%
	Others	5	4.50%
Co morbidities;	Nil	33	29.72%
	Diabetes	27	24.32%
	Hypertension	11	9.91%
	Ischemic Heart Disease	8	7.21%
	Others or Multiple Co Morbids	32	28.83%
Knee Society Score	Pre-operative	47	
	Post -perative	95	
Knee range of motion	6th Week	70 degree	Range (60–90)
	12th Week	100 degree	Range (70–110)
	48th Week	110 degree	Range (90 –120)

use.[7] Uncertainty still exists concerning the optimal design of the tibial component in total knee replacement (TKR). Metal-backed modular tibial prostheses are most commonly used, with survival data demonstrating satisfactory long-term performance.[8]

The main aim of our study was to analyze the range of motion after total knee arthroplasty using all polyethylene tibial component in our population.

Materials and Methods:

It was a prospective case series study carried out in the Department of Orthopedics and Spine Centre of Ghurki Trust Teaching Hospital, Lahore between Jan uary 2013 to December 2016. 111 patients with mean age of 71.6 years, ranging from 54 to 91 years presented through out patient department and admitted for TKR with any primary osteoarthritis or rheumatoid arthritis of knee were included in the study. Patients with complex knees with ROM less than 50°, severe varus or valgus deformity >20°, or bone defect requiring bone grafting or those who lost in follow up before 12 months were excluded from the study. This was done to minimize the bias because of the effect of these factors on the ROM and get a relatively homogeneous cohort. All patients underwent TKA using standard median parapatellar approach after taking permission from Hospital ethical committee and consent from the patient. A uniform post-operative rehabilitation protocol was employed for every patient. Knee ROM of all patients was evaluated using a standard goniometry. Knee ROM was assessed pre-operatively and at 6 weeks and 12 weeks and then after every 3 months of follow-up.

Subgroup analysis was performed dividing the cohort based on following factors: Gender (males/females), pre-operative diagnosis (OA/RA), patella replacement (yes/no). Other factors like age, body mass index, pre-operative ROM, pre-operative flexion deformity. The data was initially entered on pres -formed performa and Knee Society score and then analyzed using SPSS 17.0 version. Frequencies and percentages were calculated. Data represented in the table where necessary.

Results:

There were total 111 patients on whom total 121 arthroplasties done. 86(77.48%) were women and 25(22.52%) were men with female to male ratio of 3.44:1. Sixty-seven (60.36%) arthroplasties have been performed on the right side, 34(30.63%) on the left side and 10(9.01%) on both knees. The diagnosis of osteoarthrosis was provided to 74(66.67%) cases and rheumatoid arthritis to 32(28.83%) and others 5(4.50%). Average post-operative follow-up was 18 months, with the longest being 24 months and the shortest 12 months. The patients were discharged from hospital in average of 7th day with a minimum post-operative hospital stay of 4 to a maximum of 10 days. The prosthesis survival with a follow up of 12 months minimum were found 100%. All prosthesis were cemented preserving the posterior cruciate ligament.

The mean preoperative Knee Society score (ob-

jective and functional) was found to be respectively 47 while post-operative score was found to be of 95. The average post-operative ROM at 6 weeks were 70^0 and at 12 weeks averaged 100^0 and on last follow-up was 110 degrees (range, 80-120 degrees). 3(2.27%) having superficial wound infection which was managed accordingly. The demographic characteristics and surgical outcome are summarized in table-1;

Discussion:

Joint replacement is a life-enhancing procedure for millions of people world wide each year. Successful joint replacement provides pain relief, restores function and independence, and improves patient quality of life.[9]

When joint arthroplasty was introduced as a treatment for an arthritic disease, relief of pain was the primary goal. Since the late 1970's more attention has been drawn towards restoring normal function. Restoration of knee flexion is an important factor in determining the functional outcome after total knee arthroplasty (TKA). Because of this, range of motion (ROM) is widely used as an outcome measurement to describe the success of treatment. Many efforts have been made to improve ROM including new prosthetic designs (e.g. high-flex prosthetic designs) and postoperative rehabilitation protocols. Studies have shown that high degrees of knee flexion can be achieved following TKA surgery.[10]

Gioe TJ discussed the different issues with all-polyethylene tibial components. Advantages of an all-polyethylene tibial component over a metal-backed modular component include lower cost, avoidance of locking-mechanism issues and backside wear, and increased polyethylene thickness after identical bone resections. Disadvantages of an all-polyethylene tibial component compared with a metal-backed modular component include a lack of modularity, limiting intraoperative options; no option for liner removal in the setting of acute irrigation and debridement; and no option for late liner exchange.[11] Browne JA et all in their meta-analysis concluded that there are no significant differences in clinical and radiographic outcomes between metal-backed and all polyethylene components. Moreover it is less expensive.[12] Similarly Tao-Cheng et all in their meta analysis found similar results in the two groups in terms of knee scores, ROM, quality of life, implant alignment, and post-operative complications.[13]

The study conducted in Sweden also found that the all-polyethylene tibial components were at least as good as or superior to metal-backed tibial components with respect to implant survivorship at ten years in cruciate-retaining total knee replacements and these less expensive all-polyethylene tibial components can be safely and effectively used in total knee arthroplasty.[14] R Valentini et al in their uni-condylar knee prosthesis study concluded that the prosthesis survival of all polyethylene with a follow-up of 5 years is found to be the 100%, while in the Allegretto (Zimmer)with "metal back were 96%.[15] In our study the mean pre-operative Knee Society score (objective and functional) was found to be respectively 47 while post-operative score was found to be of 95. The average post-operative ROM at 6 weeks were 70^0 and at 12 weeks averaged 100^0 and on last follow up was 110 degrees (range, 80-130 degrees) while in Kaushal R. Patell et al in his study the ROM improved from 72^0 to 106 degree in all polyethylene total knee replacement, placed knee. The mean clinical knee score improved from 35 to 83 for metal back component and 32 to 81 in all polyethylene component.[16] While the study of K.Pail et al study the mean knee society knee score and function scores were 84 and 58 with all polyethylene.[17]

Previous studies have shown that a minimum of 110 degrees of flexion is needed to complete activities of daily living such as walking normally, rising from a chair and ascending/descending stairs[18-20] Studies also show that increased flexion beyond 110 degrees leads to increased functional ability[19,21] and Ritter et al. found that patients with ROM of 128 – 132 degrees achieved the best functional results.[22] However, studies have not been able to show that increased flexion beyond 110 degrees have a significant influence on patient satisfaction.

There are some limitations in our study. The duration of follow up was very small, it should be more than our follow up. Moreover their should be a comparative study in our population with other implants for better results. So, further studies needed to get more information.

Conclusion:
All-polyethylene tibial components can be safely and effectively used in total knee arthroplasty. All polyethylene implants are less costly and durable. It should always be considered while during total knee arthroplasty.

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Role and contribution of authors:
Dr Muhammad Farrukh Bashir, collected the data, references and did the initial write up

Dr Umair Nadeem, collected the data, and helped in compiling the result.

Dr Ashfaq Ahmed, collected the references and helped in the interpretation of data.

Dr Rizwan Akram, collected the references, and helped in introduction writing.

Dr Atiq Uz Zaman, collected the references, and helped in discussion writing.

Dr Shahzad Javed, critically went through the article, and helped in discussion writing.

Dr Naeem Ahmad, critically went through the article and helped in conclusion writing.

Dr Amer Aziz, critically went through the article and made the final changes.

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