

ORIGINAL ARTICLE

Aetiology of Failure of Total Knee Arthroplasty and Functional Outcome of Revision Total Knee Arthroplasty

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ABSTRACT

Objective: The aim of this study is to determine the aetiology of TKA failure and to measure the functional outcome of patients underwent revision TKA.

Study Design: Prospective study

Place and Duration: In the department of Orthopedic, Mardan Medical Complex, Mardan, Fauji Foundation Hospital, Rawalpindi and Muhammad Medical Hospital, Mirpurkhas for duration of one year August 2020 to July 2021.

Methods: Total sixty patients of both genders were presented in this study. Age of the patients was between 25-75 years. This research included all patients who had previously had a primary total knee replacement and had subsequently had a revision total knee arthroplasty. Revision arthroplasty was warranted based on the evidence. WOMAC questionnaire was used to evaluate the functional outcomes of revision total knee arthroplasty after 8 months of follow-up treatment. Pre and post-operative WoMAC scores were compared using the Student-t test and a P value was determined. Statistical significance was defined as a p-value of 0.05 or less. We used SPSS 20.0 to analyze all data.

Results: There were majority females 48 (80%) and 12 (20%) patients were males. Mean of the patients was age 61.5±4.45 years and had mean Body mass index was 26.31±7.42 kg/m². Majority of the cases 42 (70%) had left knee revision arthroplasty. Bilateral revision was performed in 9 (15%) cases and unilateral revision was done in 51 (85%) cases. Before revision arthroplasty function score, stiffness score and WOMAC pain score was significantly higher 70.8±6.12, 10.1±3.17 and 20.5±6.14 as compared to post revision 11.7±6.19, 4.1±6.3 and 3.0±5.11 with p value <0.05. We found infection was the most common aetiology of revision found in 27 (45%) cases followed by stiffness in 15 (25%), loosening in 13 (21.7%) cases and periprosthetic fracture found in 5 (8.3%) cases.

Conclusion: The results of our investigation led us to the conclusion that infection was the most prevalent reason for revision arthroplasty in our study population. When we performed revision arthroplasty, the majority of our patients had satisfactory functional outcomes.

Keywords: Revision TKA, Aetiology, Outcomes

INTRODUCTION

If you've been suffering from chronic knee pain for some time, you may be a good candidate for primary total knee arthroplasty (TKA). In the second decade, primary TKAs had a survival rate of more than 90%. Failures of TKA, on the other hand, may need revision arthroplasty [1,2]. It is realistic to foresee an increase in the yearly number of revision TKAs as the number of primary TKAs done each year continues to rise [3].

It is well accepted that revision TKA is an effective technique with a predictable result. Revision TKA, on the other hand, has a lower success rate than primary TKA because of a variety of variables, including complications related to bone loss and soft tissue, the necessity for bigger and more restrictive prostheses, and so on [5]. Revisions for total knee arthroplasty (TKA) cost nearly twice as much as the first operation, because of the additional technical demands (implants and allografts), the duration of hospital stay, the higher complication rate, and the longer recovery time. A better understanding of the processes and predictors of TKA revision failure will aid future efforts

aimed at resolving these failure mechanisms and improving the final result of TKA revisions, given the procedure's technical difficulty and financial load.

After a total knee arthroplasty, previous research looked at the failure reasons and compared early (within the first two years after main TKA) and late revisions (thereafter). As a result of polyethylene deterioration and aseptic loosening, late revisions were identified to be the most prevalent reasons. Some of the most prevalent reasons for early failure were infection and instability [9]. Polyethylene wear has reduced as a cause of failure in the recent decade. On the other hand, the rate of infection was on the rise [10]. Arthroplasty registries or data from healthcare providers may give general information on TKA survival and revision reasons in big populations. These statistics, however, are vague and come from a wide range of sources, all of which may have differing perspectives on what constitutes a valid revision reason [11]. A more complete picture of the reasons for revision may be obtained from studies conducted at single or many centres

that provide researchers access to the patients' medical records.

In the multi-dimensional QOL, "health" is not defined as the absence of sickness but rather as a state of overall physical, social, and mental well-being [12]. Using this method, not only physical function but also psychological and social elements that may affect the surgery's results must be considered when evaluating the effectiveness of a knee replacement treatment and the QOL of a patient thereafter. Few studies have examined the outcomes of various kinds of knee replacements, and the results that have been acquired so far are often contradictory [13-15], despite evidence highlighting how important it is to use a multi-dimensional approach.

The objective of our study was to determine the aetiology of total knee arthroplasty (TKA) failure and assessment of the functional outcome of patients who underwent revision total knee arthroplasty.

MATERIAL AND METHODS

This prospective study was conducted at Orthopedic, Mardan Medical Complex, Mardan, Fauji Foundation Hospital, Rawalpindi and Muhammad Medical Hospital Mirpurkhas for duration of one year August 2020 to July 2021 and comprised of 60 patients. Demographically details of enrolled cases were obtained after informed written consent. Patients with morbid obesity and those who were hesitant to undergo revision surgery were excluded from the study.

In our analysis, we included patients of any gender or age who had had a complete knee replacement for osteoarthritis during the previous decade and had issues that necessitated a revision. As each case was unique, the kind of revision arthroplasty that was employed differed based on the degree of bone loss and the condition of the ligaments and soft tissues. Debridement or implantation of a cement spacer were used in infective instances until clinical and biochemical markers indicated that infection had been eliminated. In all cases, post-operative supervised physiotherapy was recommended. The functional outcome of all patients was evaluated at the 8th month using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). The WOMAC scores before and after surgery were compared using a Student-t test and the P value was computed. Statistical significance was defined as a p-value of 0.05 or less. Analyses were performed using the latest version of SPSS (version 20). Categorical data were analysed using frequency and percentage, whereas quantitative variables were analysed using mean and standard deviation.

RESULTS

Table 1: characteristics of enrolled cases

Variables	Frequency	Percentage
Gender		
Female	48	80
Male	12	20
Mean age (years)	61.5±4.45	
Mean BMI (kg/m ²)	26.31±7.42	
Side of Knee		
Left	42	70
Right	18	30

In our study females were 48 (80%) and 12 (20%) patients were males. Mean age of the patients was 61.5±4.45 years and had mean BMI 26.31±7.42 kg/m². Majority of the cases 42 (70%) had left knee revision arthroplasty. (table 1)

We found infection was the most common aetiology of revision found in 27 (45%) cases followed by stiffness in 15 (25%), loosening in 13 (21.7%) cases and periprosthetic fracture found in 5 (8.3%) cases. (fig 1)

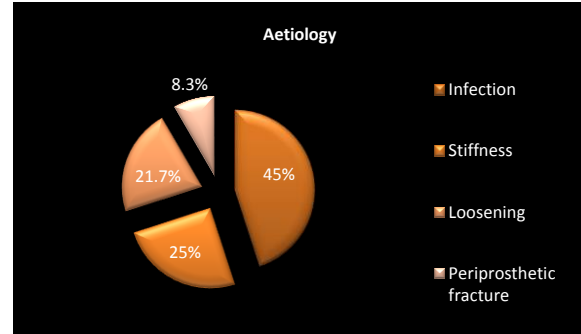


Figure 1: Association of etiology of revision among enrolled cases

Bilateral revision was performed in 9 (15%) cases and unilateral revision was done in 51 (85%) cases. (fig 2)

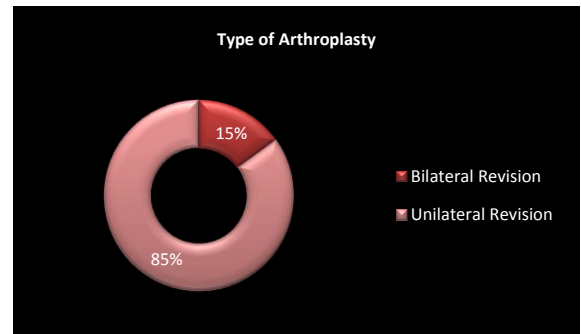


Figure 2: Type of revision arthroplasty

Before revision arthroplasty functional score, stiffness score and WOMAC pain score was significantly higher 70.8±6.12, 10.1±3.17 and 20.5±6.14 as compared to post revision 11.7±6.19, 4.1±6.3 and 3.0±5.11 with p value <0.05. (table 2)

Table 2: Comparison of functional outcomes pre and post revision arthroplasty

Variables	Pre-Revision	Post Revision	P value
Functional score	70.8±6.12	11.7±6.19	<0.03
Stiffness score	10.1±3.17	4.1±6.3	<0.04
WOMAC pain score	20.5±6.14	3.0±5.11	<0.05

DISCUSSION

As a rule, younger patients who have total knee arthroplasty have a more active lifestyle and a higher functional demand, both of which contribute to a longer expected lifespan. As a result, younger patients have a higher risk of experiencing prosthetic device failure than older ones. Kim2 had found a failure rate of 7% in patients under the age of 55, and 2% in patients over the age of 55,

for Kim1. At 10 years, Laski and O'Flynn [16] found that the survival rate with primary TKA was 81 percent. An individual's underlying health conditions can affect how long a prosthesis lasts. A first total knee arthroplasty survival rate of 81% to 97% was observed in Rheumatoid arthritis patients, but a revision total knee arthroplasty failure rate of 19% to 28% was recorded in Rheumatoid arthritis patients. [18]

In this prospective study 60 patients of both genders were presented in this study. There were majority females 48 (80%) and 12 (20%) patients were males. Mean of the patients was 61.5 ± 4.45 years and had mean BMI 26.31 ± 7.42 kg/m². Majority of the cases 42 (70%) had left knee revision arthroplasty. Bilateral revision was performed in 9 (15%) cases and unilateral revision was done in 51 (85%) cases. Our results were comparable to the previous studies.[19,20] Aseptic complications, in previous study are less serious. Antibiotics and infection control know-how have improved, but additional research into periprosthetic infection is required. [21] We found infection was the most common aetiology of revision found in 27 (45%) cases followed by stiffness in 15 (25%), loosening in 13 (21.7%) cases and periprosthetic fracture found in 5 (8.3%) cases. Fehring[22] found that 38 percent of patients who had original TKAs had to have revision surgery due of infection, 27 percent had instability, and 7 percent had osteolysis. The most common reason for failure after TKA, according to Bae DK [23], was polyethylene wear, followed by deep infection and aseptic loosening. Kasahara [24] found that the most prevalent reasons for revision were mechanical loosening in 40%, infection in 24%, osteolysis in 9%, and instability in 9%. The polyethylene wear in 44.1% of the infected 38.7% of the knees and the loosening in 12.1% of the knees, according to Kim. Among the 499 TKA revision patients studied by Mortazavi [27], 20.4 percent required a re-operation or a re-revision due to infection (44.1 percent). Only 32% of patients with periprosthetic joint infections had never had an infection before, and 58% had already undergone a revision as a result of an infection. 81.6 percent of our patients who underwent PJI re-revision had previously had PJI re-revision. Treatment for PJI is challenging, as evidenced by these figures. For a variety of reasons, treating patients who have had re-revisions is more challenging.

Bilateral revision was performed in 9 (15%) cases and unilateral revision was done in 51 (85%) cases. Before revision arthroplasty functional score, stiffness score and WOMAC pain score was significantly higher 70.8 ± 6.12 , 10.1 ± 3.17 and 20.5 ± 6.14 as compared to post revision 11.7 ± 6.19 , 4.1 ± 6.3 and 3.0 ± 5.11 with p value < 0.05 . Revision total knee arthroplasty performed by Mulhall [25] and colleagues showed remarkable results during a six-month follow-up period. An study of 1356 patients conducted by Sheng [26] found an increase in the knee score from 49 to 84 following revision. Loosening was the primary cause of revision in his series, whereas infection was the primary reason of revision in ours.

CONCLUSION

The results of our investigation led us to the conclusion that infection was the most prevalent reason for revision arthroplasty in our study population. When we performed

revision arthroplasty, the majority of our patients had satisfactory functional outcomes.

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