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COMPARISON OF FUNCTIONAL OUTCOME OF STAGED BILATERAL TOTAL KNEE ARTHROPLASTY AFTER FIRST AND SECOND KNEE REPLACEMENTS

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ABSTRACT:

Introduction: The purpose of this study was to compare the functional outcome between the first and second knee replacement in patients who underwent staged bilateral total knee arthroplasty**.**

Methods: 40 patients who had staged bilateral knee replacements were identified and post operatively followed for one, three and twelve months. Data on pain scores, walking ability, use of walking aids, range of movement, instability, muscle strength, and length of hospital stay (LOS) were recorded. The difference in data between the first and second knee was assessed.

Results: Between the first and second procedure, groups maintained their statistical comparability. There was a significant difference between the first and second knee in three results. In terms of postoperative walking ability, the second knee's mean score was 4.67, while the first knee's was 3.26 (p=0.029). The mean score for the need for a walking aid following surgery was 4.93 for the second knee and 5.48 for the first (p=0.01). Second knee mean LOS was 4.19 days, while first knee mean LOS was 5.92 days (p=0.05). Every other comparison of data was not statistically significant.

Conclusion: After second knee replacement, patients have a decreased LOS and continue to improve with regards to walking ability and use of walking aids.

Keywords: Stages, knee replacement, arthroplasty, bilateral.

INTRODUCTION

Osteoarthritis (OA) typically worsens over time and has the potential to be disabled. Although each person's clinical symptoms may vary in intensity, they often worsen over time and become more frequent, severe, and incapacitating. There are variations among individuals in the pace of advancement as well. Clinical symptoms that are common include gradual start, pain that grows

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worse with movement, knee stiffness and swelling, pain that worsens over time, and discomfort that becomes worse after prolonged sitting. When conservative therapy methods are ineffective, surgical options are taken into consideration for treating osteoarthritis of the knee. There are no proven disease-modifying drugs for the treatment of osteoarthritis, although therapy can help reduce the condition's course[1,2,3].

Primary and secondary knee osteoarthritis are distinguished by the reason for the degeneration of articular cartilage; primary osteoarthritis is thought to be the result of wear and tear and age-related degeneration. Degeneration of the articular cartilage due to a known cause results in secondary osteoarthritis[4,5].

Knee osteoarthritis is the most common type of arthritis found, and its frequency will rise along with rising life expectancy and obesity rates. Various sources estimate that 13% of women and 10% of men 60 years of age and older have symptomatic osteoarthritis in their knees. When a person is above 70, the frequency rises to 40%. Additionally, osteoarthritis in the knees is less common in men than in women. Surprisingly, not every person with radiographic evidence of osteoarthritis in the knee will have symptoms. Just 15% of patients with knee OA found on radiographs also experienced symptoms, per one study The annual incidence of symptomatic knee osteoarthritis is around 240 cases per 100,000 persons when age is not taken into consideration[6,7].

In the last three years, 1,856 consultant surgeons across 408 units in the UK completed 232,505 primary knee surgeries. This data was collected on January 1, 2020, and December 31, 2022 [8].A considerable percentage of these individuals require bilateral total knee replacements (BTKR) due to their bilateral osteoarthritis. This can be performed in two ways: either as a single stage BTKR, performed concurrently under the same anesthesia, or as a staged procedure, performed in stages with varying intervals between each arthroplasty.

There are various advantages to having multiple surgeries at the same time, including reduced expenses, only having to worry about one anesthetic, quicker recovery to normal function, and patient convenience [9]. Conversely, a TKR causes a stress reaction, and the degree of the reaction is related to the tissue harm [10,11]. In addition, compared to staged bilateral procedures, there is a larger risk of blood loss, which can raise the risk of significant cardiac problems, pulmonary difficulties, and mortality—especially in the elderly patient population.[12].

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The objective of our study is to present the functional outcome of staged bilateral total knee replacement from a main private hospital of Peshawar city and the difference in outcome between the first and second knee replacements.

METHODS:

The design of the case study was retrospective. For this study, 40 Staged BTKR cases performed from 1st January 2017 to 31st December 2023 by two senior orthopedic consultants at Northwest General Hospital and Research Centre Peshawar, Pakistan, were chosen from the hospital management information system (HMIS). The case notes of every patient were carefully reviewed to look at the specifics of the procedure, the anesthetic, the preoperative and after care, and to see if any complications occurred. By phone, these 40 patients were contacted. Patients received assurances regarding their anonymity as well as information about the review.

Every patient expressed their agreement to take part and expressed gratitude for the chance to do so. They all answered questions about their current health status, completed an Oxford Knee Score (OKS) conducted over the phone, and provided a personal narrative of their experience with the staged BTKR. Preoperatively, as well as one, three, and twelve months after surgery, data were gathered. One senior orthopedic resident and a physiotherapist kept track of all the evaluations and results.

Among the information gathered were the following: pain scores, ranging from 1-4, encompassing pain during rest, motions, and ascending staircases, range of movement, instability, muscle strength, length of postoperative hospital stays (LOS), overall satisfaction, capability to walk and rated 1-6 for walking with support and rated 4-5 for ability to walk on staircases, and overall satisfaction. Table 1 summarizes the data collected.

Table 1: The scoring scale to assess different outcome parameters in this study.

Score	Pain	Staircases	Walking aids	Walking ability
1	No	Incapable	Wheelchair	Incapable
2	Mild	unable to descend and up with rail	frame	Inside house
3	Moderate	With rail, up and down	crutches	400 yards
4	Severe	Rail down and normal up.	sticks	800 yards

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5		normal	One stick	1600 yards
6			unaided	unlimited

The results of 40 patients (16 women and 24 men) who had simultaneous knee replacement surgery for both knees between 2017 and 2023 were studied in this research study. The study provided a thorough comparison of the pre- and post-operative findings for both knees by analyzing data gathered prior to surgery and one year following the second knee replacement. At the time of surgery, the patients' ages ranged from 50 to 76 years, with a mean age of 65.21 (SD 7.46). Of the patients, 24 were male (60%), and 16 were female (40%). Patients were chosen for staged BTKR based on the radiographic confirmation of bilateral symptomatic knee arthritis. Rheumatoid arthritis was responsible for two (5%) and osteoarthritis for 38 (95%) of the causal diagnoses that led to the decision to have Staged BTKR surgery.

The Mann-Whitney U test was used to analyze the data and compare the first and second knees.

RESULTS:

The mean postoperative walking ability score for the second knee was 4.67, while the first knee's score was 3.26 ($p=0.029$). The mean score for the need for a walking aid following surgery was 4.93 for the second knee and 5.48 for the first ($p=0.01$). In the second knee, the mean postoperative length of stay was 4.19, while in the first knee, it was 5.92. A mean postoperative LOS of 4.19 ($p=0.05$) was seen in the second knee compared to the first. As a result, patients needed fewer walking aids, spent an average of one fewer day in the hospital, and had improved psychological outcomes.

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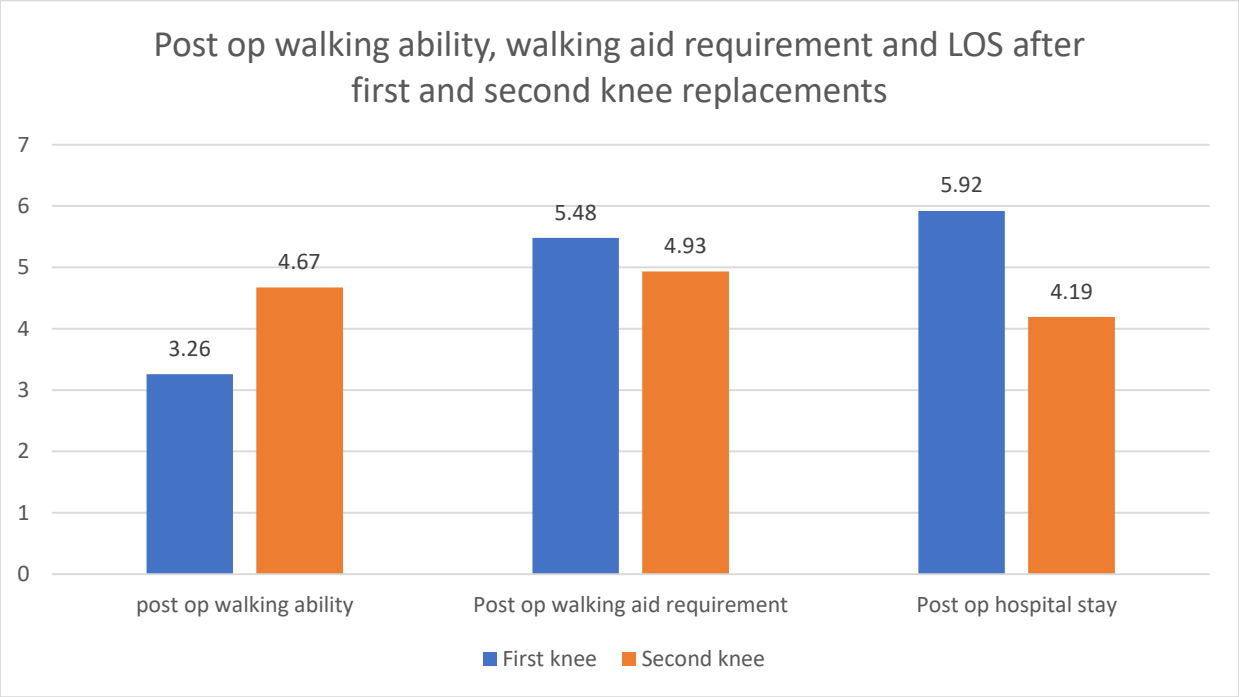

Between the first and second operation, there were statistically negligible differences in postoperative discomfort, range of motion, instability, muscular strength, procedure satisfaction, and Knee Society radiological assessments.

DISCUSSION:

There is evidence to suggest that the prosthesis survival rates and knee scores following staged and simultaneous bilateral TKRs are comparable in terms of their functional outcomes[13], with a shorter length of stay for patients undergoing simultaneous procedures.[9]. However, it has been advised to carry out staged procedures because doing both at once carries greater hazards.[4,7] Patients undergoing staged operations first undergo surgery on their worst knee, and once fully recovered, they move on to having their second knee replaced. While some studies indicate that a 4–7-day interval is a practical and safe option, "There is currently no clear consensus on the ideal timing between stages of bilateral TKR surgeries.[8, 9, 14],

Comparing simultaneous versus staged operations has been the main focus of research on bilateral total knee replacements (TKRs), with a particular emphasis on the safety advantages of staged surgery. But little is known about the differences in functional results between initial and follow-up TKR operations, and there is not many research that address this important topic.Our intention was to share this information so that preoperative planning and consent might be made

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easier. Our data indicates that after their second TKR, patients spend 4.19 days instead of 5.92 days, a 1.73-day reduction in length of stay. This data reflects the level of nursing care required in the postoperative phase and offers direction for preoperative planning. The data is also beneficial for hospital budgeting.

We are unable to compare LOS in these situations since it was not our department's policy to carry out concurrent processes. Other research, however, has contrasted the LOS differences between unilateral and simultaneous, staged bilateral TKRs. The study's result was that, in contrast to staged bilateral TKR, simultaneous bilateral TKR lowers LOS.[15, 16] Those who had simultaneous bilateral total knee replacement (TKR) stayed in the hospital longer than those who had unilateral TKR. 514 patients with unilateral TKRs and 255 patients with simultaneous bilateral TKRs were evaluated by Bullock et al.[17] Patients undergoing simultaneous bilateral total knee replacements (TKRs) spent an average of 5.11 days in the hospital, 0.69 days more than patients undergoing unilateral TKRs, who spent an average of 4.42 days there.

Patients who have had a prior knee replacement typically experience greater comfort and less anxiety throughout the postoperative physical therapy and rehabilitation phase because they are acquainted with the procedure and know what to anticipate.

CONCLUSION

Our research answers the question of whether a person having a second total knee replacement (TKR) will have a similar experience to their first operation by offering insightful information. Our research enables medical professionals to better prepare patients for anticipated outcomes, such as a possibly shorter hospital stay and improvements in their gait pattern after the second knee replacement procedure. In addition, their psychological state is probably better now than it was following their initial TKR. Surgeons may find these findings useful when obtaining consent for patients having bilateral TKRs.

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