

Frequency of wound infection after total knee replacement surgery

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Abstract

Background: Total Knee Replacement (TKR) is a standard orthopaedic procedure that helps patients with severe knee arthritis decrease pain and enhance function.

Material and Methods: This is a retrospective study was carried out from March 2021 to December 2021 at the Orthopaedic department. 50-patients who met the inclusion criteria received medical treatment at the Ghurki Hospital's Orthopaedic department in Lahore. Utilising the Southampton Wound Scoring System, each patient was monitored to evaluate wound infection 3-months after surgery. Using SPSS version 27.0, all the data were input and analysed. A, p-value of 0.05 or below was deemed significant in the post-stratification chi-square analysis that was used to examine the influences on the result.

Results: A total of 50-patients underwent total knee replacement surgery. The male-to-female ratio was (1:2), indicating that 44% were male cases while 56% were female cases. The mean age of patients was 57.2 ± 10.72 , ranging from 22-81 years. More than half of the cases (60%) were bilateral; both knees were affected, while the same proportion of cases was found with the right and left sides affected (20%). The majority (92%) were diagnosed with OA (osteoarthritis), while 8% were diagnosed with RA (rheumatoid arthritis). Out of 50-patients, comorbidities of diabetes Mellitus were found in 6-cases; hypertension was in 4-cases, smokers were 2, and 1 with other comorbidities. According to Southampton Wound Scoring System, 46-cases were observed in Grade 0, 4 with Grade I (Normal healing with mild bruising or hematoma). It means wound infection was observed in 4 cases (8%). There is no significant association between the frequency of wound infection and demographic features of patients after total knee replacement as the p-value is greater than the significance level at 5%.

Conclusion: With adequate standard practice, the infection incidence of primary total knee replacement is minimal, proving that prevention is preferable to treatment. The risk of infection in total knee replacement is increased in diabetic people.

Keywords: Total knee replacement (TKR), southampton wound scoring system, wound infection.

Introduction:

All healthcare systems struggle with the difficult issue of hospital-acquired infections. They need broad-spectrum antibiotic therapy, which causes more pain, lengthier hospital stays, and higher death.¹ Surgical therapy, which frequently involves internal fixations and prostheses, is received by the majority of patients hospitalised in Orthopaedic Departments. A foreign body that

is infected frequently necessitates removal during a second surgery, a lengthy period of immobilisation, antibiotic therapy, and a subsequent third procedure. In surgeries when foreign bodies are implanted, it is crucial to prevent infections. The key to enhancing results is routine self-evaluation to ascertain the frequency of wound infections and related risk factors.²

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Infection following total knee replacement is disastrous for patients and surgeons alike. It can end in ongoing discomfort, especially during rest and at night. Additionally, it impairs walking capacity and causes repeated knee swelling. Even worse, it damages the periarticular bone, leads to prosthesis loosening, and may have other potentially fatal effects including septicemia. In the literature, reported rates of deep infection are around 2%,² and around 0.4% for cases occurring within 3-months of the procedure. Several strategies have been developed to reduce the likelihood of this problem, and risk factors have been identified.¹⁻⁴

Total knee replacement (TKR) surgeries for treating osteoarthritis are being performed much more often due to population ageing and improvements in surgical methods.⁵ The number of yearly arthroplasties is predicted to increase between the early 2000s and 2025.⁶ Kurtz et al,⁷ reports that complete hip replacements are significantly out numbered by total knee replacement. It would be logical to assume that this surgery will increase the total number of problems.

Surgical wound dehiscence or delayed healing, hematoma development, deep vein thrombosis, residual prosthesis instability, stiffness or range of motion loss, aseptic loosening, and postoperative infection are the primary and most often described total knee replacement-related problems in the literature.⁴ Galat et al,⁸ observed a 0.33% complication rate directly linked to the surgical site, including delayed healing, dehiscence or necrosis, development of subcutaneous hematomas, and persistent surgical wound drainage in their analysis of more than 17,000 knee prostheses. Although they can lead to a chain reaction of new difficulties and grave repercussions, surgical wound issues brought on by stressful events in the early post-operative period are rarely discussed in the literature.^{9,10}

In a group of about 28,000 patients, Sershon et al,¹¹ found a rate of just 0.05% for traumatic exposure to the prosthesis; nonetheless, it was shown that this occurs frequently and results in problems. There are no specifics on the most ef-

fective method of prevention or kind of therapy because this occurrence is rare. Keeping this in mind, it is necessary to strengthen the procedures for such situations' care, treatment, and preventive strategies.

Any surgical treatment, including total knee replacement (TKR) surgery, has the risk of wound infection. Although it seldom happens following total knee replacement surgery, wound infections can nevertheless happen sometimes. Several variables, including those relating to the patient, the surgical method used, prophylactic antibiotics, implant-related factors, and post-operative care, might affect the likelihood of wound infection following total knee replacement surgery. To help Orthopaedic surgeons take the necessary precautions to prevent infection in their patients, this study will give proof.

Material and Methods:

We conducted a retrospective assessment of the medical records of two concurrent and consecutively operated cohorts of patients who received primary total knee replacement (TKR) from March 2021 to December 2021 after receiving consent from the Institutional Assessment Board. The evaluation was accessible to all patients who were hospitalised for primary total knee replacement. Patients with an underlying malignancy who had previously been injured or had an incision in the surgical field were not allowed to undergo the procedure. A consultant orthopaedic surgeon (with at least 5-years of post-fellowship experience) carried out all surgical operations. After receiving general anaesthesia, the patient was placed on the operating table. With the aid of an antiseptic solution, the knee is washed and sterilised. Over the knee, a significant incision was made, revealing the knee joint. On the surfaces of the knee joint, the diseased cartilage and bone were removed, leaving the good bone in its place. The femur and tibia ends were shaped to accommodate the prosthesis. A specialised glue or cement was used to put the artificial joint into position and fix it. A plastic button can potentially be used to replace the patella (kneecap). A sterile bandage was put on the wound after the incision was closed with

Table:

Grade	Definition
0	Normal healing
I	Normal healing with mild bruising or haematoma
II	Erythema plus other signs of inflammation
III	Clear or haemoserous discharge
IV	Pus
V	Deep or severe wound infection with or without tissue breakdown; haematoma requiring aspiration

Table 1: Distribution of TKR patients according to the demographic profile of patients

Parameters	n(%)	Mean±SD
Gender		
Male	22(44.0)	
Female	28(56)	
Age		57.2±10.72 (22-81) years
Side		
Left	10(20.0)	
Right	10(20.0)	
Both	30(60)	
Pathology		
OA	46(92)	
RA	4(8.0)	
Comorbidity		
DM	6(12.0)	
HTN	4(8.0)	
Smokers	2(4.0)	
Others	1(2.0)	
No	37 (74.0)	
Wound Infection		
Yes	4(8.0)	
No	46(92.0)	
Southampton Wound Scoring System		
Grade 0	46(92.0)	
Grade I	4(8.0)	

stitches or staples. In the recovery room, where their vital signs were being watched, the patient was brought. As required, antibiotics and painkillers are administered. To assist the patient restore strength and range of motion in the knee joint, physical therapy and rehabilitation start as soon as the operation. Without being aware that the patients and their results were going to be included in the research, surgical wound care and closure were carried out. All post-operative procedures carried out in our hospital followed

the standardised protocol that was the same for all patient groups, including deep vein thrombosis prevention, wound dressing and removal, and postoperative rehabilitation. All wounds were closed using absorbable and non-absorbable sutures at the level of the arthrotomy and an absorbable suture in the subcutaneous layer. The skin was re-approximated using steri-strips and either staples or a running subcuticular absorbable suture. Only the treating surgeon's choice for sutures or staples was taken into consideration when deciding which procedure to perform on a patient. Cases, when the doctors' usual closure technique wasn't employed, were the result of support personnel preparing the alternate technique and using it to cut down on waste. All primary total knee replacements were included in the analysis, therefore these patients were also taken into account.

The operational record provided information about skin closure, which was then confirmed by post-operative and clinical documentation. The surgical record was used to determine the length of the procedure, which was measured from the time of the first incision to the completion of the skin closure. Then, problems such as wound dehiscence, surgical site infection (SSI), repeat operations for debridement and re-closure, and evidence of tissue reactivity to the closure material was examined in the patient's medical records and clinic notes from follow-up visits. 3-months after surgery, each patient was monitored to determine the severity of wound infection using the Southampton Wound Scoring System. The classification was carried out as indicated in the image below. The SPSS version 27.0 will be used to enter and analyse all of the data. A, p-value of 0.05 or below was regarded as significant when using the post-stratification chi-square to examine the influences on the result.

Results:

A total of 50-patients underwent total knee replacement surgery. The male-to-female ratio was (1:2), indicating that 44% were male cases while 56% were female cases. The mean age of patients was 57.2±10.72 ranging from 22-81

Table 2: Demographics stratified of wound infection

Variables		Wound Infection		p-value
		Yes	No	
Gender	Male	2(9.1)	2(90.9)	.801
	Female	2(7.1)	26(92.9)	
Age	22-50 years	1(7.1)	13(92.9)	.889
	51-85 years	3(8.3)	33(91.7)	
Pathology	OA	3(6.5)	43(93.5)	.191
	RA	1(25.0)	4(75.0)	
Side	Left	-	10(100.0)	.235
	Right	-	10(100.0)	
	Both	4(13.3)	26(86.7)	
Comorbidity	DM	3(50.0)	3(50.0)	
	HTN	-	4(100.0)	
	Smoke	1(50.0)	1(50.0)	
	Others	-	1(100.0)	
	No	-	37(100.0)	

*Statistically significant at 0.05 level of significance.

years. More than half of cases (60%) were bilateral; both knees were affected, while the same proportion of cases was found with right and left sides affected (20%). The majority (92%) were diagnosed with OA (osteoarthritis), while 8% were diagnosed with RA (rheumatoid arthritis). Out of 50-patients, comorbidities of diabetes Mellitus were found in 6-cases; hypertension was in 4-cases, smokers were 2, and 1 with other comorbidities. According to Southampton Wound Scoring System, 46-cases were observed in Grade 0, four with Grade I (Normal healing with mild bruising or hematoma). It means wound infection was observed in 4-cases (8%). Stratification of wound infection concerning demographic profile shows that 2-males and 2-females were observed with wound infection, and 8.3% were between ages 51 and 85. 4-cases with both sides affected were found with wound infection, and one case with smoking history and three with DM was found with wound infection, so it is concluded that there is no significant association between frequency of wound infection and demographic features of patients after total knee replacement as the p-value is greater than the level of significance at 5%.

Discussion:

Total knee replacement (TKR) is a standard orthopaedic procedure that helps patients with

severe knee arthritis decrease pain and enhance function. However, wound infection is still a serious consequence of total knee replacement surgery despite improvements in surgical methods and aftercare. This section will address empirical research and references while reviewing the prevalence of wound infection following total knee replacement surgery.

Some studies indicate rates as low as 0.5% and others as high as 5% for the reported incidence of wound infection following total knee replacement surgery. However, the majority of research cites rates of 1% to 2%. Numerous elements, including patient characteristics, surgical technique, perioperative care, and prophylactic medications, might influence the incidence of wound infection.^{11,12}

Depending on the infection criteria and the group analysed, the reported incidence of wound infection following total knee replacement surgery varies greatly. The total pooled incidence of superficial surgical site infection (SSI) following primary total knee replacement was 1.7%, while the incidence of deep SSI was 0.9%, according to a systematic review and meta-analysis of 97 studies published in 2019. A more serious and devastating consequence, prosthetic joint infection (PJI), occurred 1.2% of the time. However, in some high-risk groups, such as people with a history of infection, diabetes, obesity, or immuno-suppression, these percentages may be significantly higher.¹³

The prevalence of wound infection was discovered in a recent study (4 8%). An analysis of all subsequent total knee replacements during 2-years was done retrospectively by Babkin et al, in 2007. 10-(5.6%) of the 180 patients who had total knee replacement developed a superficial (3, 1.7%) or deep (7, 3.9%) SSI.¹⁴

A retrospective assessment of 6489 instances following total knee replacement was conducted by Peersman et al, 86% of these knees (97) had deep periprosthetic infections, whereas the other 16 had superficial wound infections, according to the data. Within the first 3-months following surgery, one-third of the deep infections developed, while the remaining two-thirds oc-

curred after three months. Patients having first knee replacements experienced an overall early deep infection rate of 0.39%, whereas patients having revision knee replacements experienced an early deep infection rate of 0.97%.

According to Fan et al,¹⁶ analysis of the infection rate and risk factors associated with primary total knee replacement, the overall infection rate was 3.0% (14/472); the acute deep infection rate (within four weeks) was 0.2% (1/472); and the delayed deep infection rate (four weeks to two years) was 0.6% (2/345). The rate of superficial infection was 1.9% (9/472), while the rate of late deep infection was 0.6% (2/345) (both after two years).

The current study contains several drawbacks. First, the retrospective nature of the study and the limited sample size may have underreported wound infection. Although under-diagnosis of superficial SSI is a possibility, we feel that deep or organ-space infection could not have been overlooked because 100% 1-y follow-up was obtained. Even if they were overlooked, such mild infections did not necessitate additional hospitalisation or reoperation and did not cause any reported problems with ambulation. In this investigation, the risk factors for wound infection were not found.

In an orthopaedic practice context, research on the frequency of wound infection following total knee replacement (TKR) surgery has various consequences. In the first place, it gives surgeons useful data to assess their surgical methods and make the required modifications to lower the risk of wound infections. Second, it emphasises how crucial it is to pick patients carefully and do the proper pre-operative screening to reduce the risk of post-operative infections. Thirdly, it emphasises the need for aseptic procedures during surgery and appropriate wound care following surgery to lower the risk of infections. Fourthly, it stresses the need for appropriate antibiotic prophylaxis to stave off illness. The study also emphasises the importance of diligent surveillance and monitoring of patients post-operatively to identify and address any infections as soon as they arise.

Conclusion:

With adequate standard practice, the infection incidence of primary total knee replacement is minimal, proving that prevention is preferable to treatment. The risk of infection in total knee replacement is increased in diabetic people.

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Role and contribution of authors:

Muhammad Naveed, conceptualization and framework of study.

Zain Muhammad, study design and methodology.

Atif Ali, data collection.

Farrukh Bashir, supervisor of the study.

Ammar Dogar, supervisor of the study.

Rehman Ali, help in discussion writing.

Shahzad Javed, critical review.

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