



(RESEARCH ARTICLE)



## Revision arthroplasty of the knee in Awka, southeast, Nigeria: Prevalence, etiology, and treatment outcome

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### Abstract

**Introduction:** Total Knee Arthroplasty (TKA) is effective for severe knee osteoarthritis, with a typical 10-year revision risk of around 5-5.5%. Rising revision rates are linked to increased TKA procedures and younger patient demographics. With improvements in implant design and reduction of implant wear, the main revision causes is now aseptic loosening. Others include instability, malalignment, and infection. Advances in implant technology have reduced polyethylene wear issues, but technical errors during surgery remain a problem. The study aims to examine the increasing need for revisions in Nigeria, considering the local context of varying surgical expertise.

**Methodology:** In Awka, Nigeria, 134 patients with 156 knees were assessed at an orthopedic center for knee pathologies. Evaluations included medical histories, physical exams, and tests like C-reactive protein screening and intraoperative aspirations to determine pathology causes. Three cases involved failed knee arthroplasties requiring revisions with specific prosthesis types, with follow-ups spanning 5 to 7 years.

**Result:** This study from Awka, Nigeria, focused on 156 knee surgery cases, showing a low revision rate of 1.92% compared to 5-5.5% internationally. The mean patient age was 60.33 years, indicating early onset complications. Technical failures, not implant wear, primarily drove revisions. Patients, all female, faced significant declines in quality of life and often presented late for surgery, leading to complex revision cases requiring intensive care and specific implants like the LCKK for aseptic loosening or tumor implants for severe osteolysis. Postoperative care included long-term follow-up, averaging 3 to 7 years, with generally positive outcomes.

**Conclusion:** The revision surgeries were due to technical failures rather than implant wear. There is remarkably low revision rate of 1.92% highlighting the regional success despite challenging conditions.

**Keywords:** Total Knee Arthroplasty (TKA); Aseptic loosening; Revision surgery; Surgical techniques; Postoperative outcomes

### 1. Introduction

Total Knee Arthroplasty stands as a highly effective and safe treatment for advanced knee osteoarthritis. Revision rates are generally low, with major arthroplasty registries reporting a 5% revision risk at 10 years. For instance, the Australian Joint Replacement Report indicates a 5.5% revision rate after a decade, while rates in the UK fall below 5%, and Sweden reports slightly over 5.5%. However, the number of revisions is rising due to an increase in overall TKA procedures, a shift towards younger patients, Revision TKA, a complex surgery often performed in specialized centers, contrasts with the more routine nature of primary TKA [1-5,18].

Aseptic loosening, instability, malalignment, and periprosthetic infection remain the main factors causing revision surgery. Some studies have found that there is a significant decrease in revisions linked to polyethylene wear. However,

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failure mechanisms such as periprosthetic infection, instability, and malalignment persist as frequent causes of early and intermediate-term revision surgeries.[7,8, 10,16] While primary total knee arthroplasty (TKA) generally demonstrates success, revision total knee arthroplasty falls short in comparison. Revision is expensive and yields inferior outcomes compared to primary TKA. [9]

With improvements in implant and polyethylene manufacture, polyethylene wear is no longer a leading cause of failure. Early mechanisms of failure are primarily technical errors. In addition to the improved implant longevity, surgeons' expertise is very much needed to decrease these technical errors.[7,11,12]

With an increasing number of total knee arthroplasties done in Nigeria in many less-than-ideal situations and varying degrees of expertise, there is bound to be an increasing number of patients needing revision arthroplasty in the coming years.[12,13,14,15]

This study aimed to determine the prevalence rate of revision arthroplasty in Akwa, Southeast Nigeria, and follow up on its outcome.

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## 2. Material and method

The patients with knee pathologies who presented with knee pain and various knee symptoms to an orthopaedic centre in Awka, Anambra State, Nigeria, were evaluated for various pathologies.

History, appropriate examinations, and investigations were conducted to ascertain the cause of the knee pathologies. The patients who had primary knee arthroplasty and presented with knee pain, swelling, and deformities were preoperatively screened for infection using C-reactive protein. The patients who qualified for revision arthroplasty also had an intraoperative knee aspiration, microscopy, culture, and sensitivity to rule out infection.

There were a total of 134 patients with 156 knees with varying degrees of presentation.

Out of these presentations, three patients were identified with loose femoral and tibia implants. Out of the three, one patient has had a failed revision surgery with extensive osteolysis of the distal femur and proximal tibia.

The two patients with failed primary knee arthroplasty underwent revision surgery with the Legacy Constrained Condylar Knee prosthesis(LCCK), while the patient with failed revision arthroplasty underwent revision with a tumour endoprosthesis of the distal femur and proximal tibia. These patients have been followed for 5 to 7 years.

The result is as presented below:

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## 3. Result

### 3.1. Socio-Demographic Profile of Patients

The study examined the socio-demographic characteristics of patients undergoing revision surgery for knee-related issues. The cohort documented three revision surgeries (Table 1). The mean age of the participants was 60.33 years (SD  $\pm$  1.53), ranging from 59 to 62.

Among the participants, all individuals were female, comprising 100% of the sample population.

The study sample exhibited diversity occupationally, with each occupational category representing one-third of the cohort. Specifically, one patient (33.3%) reported being a retired nurse, another (33.3%) was engaged in trading, and the remaining patient (33.3%) identified as a housewife.

All patients, accounting for 100% of the study population, reported Christianity as their religious affiliation.

### 3.2. Prevalence of Revision Surgery

The prevalence of revision surgery was calculated to be 1.92%, based on the observation of three patients who underwent revision surgeries out of a total sample size of 156 individuals.

**Table 1** Socio-Demographic Profile of Patients

Variable	Frequency	Range (min-max)
Mean Age (years)	60.33 ± 1.53	59-62
Gender		
Female	3	100.0
Occupation		
Retired Nurse	1	33.3
Trading	1	33.3
Housewife	1	33.3
Religion		
Christian	3	100.0

Table 2 details the surgical operations performed on knees, breaking down the data between the right and left knees. A total of 156 knee surgeries were reported, with 85 on the right knee and 71 on the left, resulting in 54.5% of the surgeries being performed on the right knee and 45.5% on the left.

Additionally, the table provides information on revision surgeries. Out of the total knee surgeries, only three were revisions, indicating a relatively low rate of revision. Two of these revision cases involved the left knee, and one involved the right knee.

The table lists two specific types: the LCKK implant and the tumor implant. The LCKK (Legacy Constrained Condylar Knee) implant, was used once in each knee (totaling two instances). The tumor implant was employed in one instance on the left knee.

**Table 2** Total Knees Operated On

	Right knee	left knee	Total
Side of knee	85	71	156
Percentage	54.5	45.5	100
Number of Revision cases and types of implant used	Right	left	Total
The number that had revision	1	2	3
Types of implant used LCKK	1	1	2
Tumor Implant	0	1	1

### 3.3. Clinical Characteristics of Knee Revision Surgery Cases

The clinical profile of patients undergoing knee revision surgery is summarized in Table 3.

The most common reasons for presentation among these cases were difficulty in walking and recurrent left knee pain, each reported by 100% of the patients. Knee infection and localized swelling were less frequently cited reasons, each reported by 33.3% of the cases (Figure 1).

Regarding referral sources, most patients (66.7%) were referred from India, with the remaining patients (33.3%) referred from Primus Int'l Super Specialist Hospital Abuja.

Regarding previous surgeries, two-thirds of the cases (66.7%) had both knees operated on before, while one-third (33.3%) had only the left knee operated on previously.

Pain onset varied among patients, with 66.7% reporting that it started on its own and 33.3% attributing it to a fall.

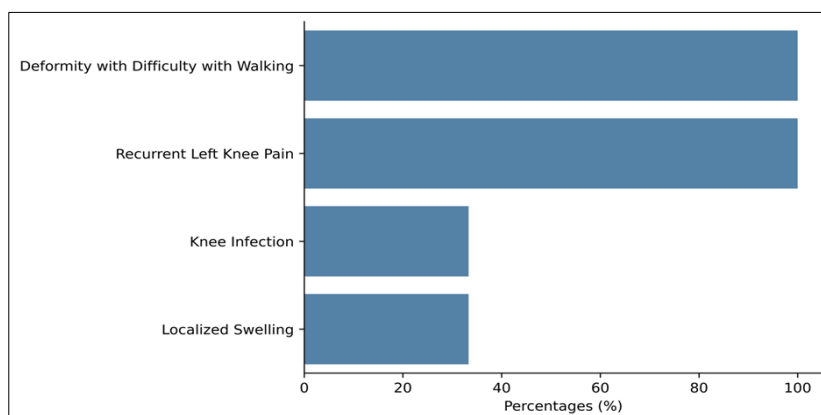
The average number of months since surgery before presentation was  $52.0 \pm 59.19$ , ranging from 12 to 120 months.

In terms of surgical interventions, each type of surgery—right total knee revision, left knee total revision surgery, and left total knee tumor implant arthroplasty following failed/loosened revision implant removal + debridement + antibiotics bone cement spacer—accounted for 33.3% of the cases.

During hospitalization, patients received an average transfusion of 1.5 units ( $\pm 0.5$ ), with a range of 1.0 to 2.0 units. The average hospital stay before discharge was 21.0 days ( $\pm 20.07$ ), ranging from 7 to 44 days. The follow-up period since revision surgery was 5 to 7 years.

**Table 3** Clinical Characteristics of Knee Revision Surgery Cases

	Frequency	Percentage (%)
Reason for Presentation (multiple responses)		
Difficulty in Walking	3	100.0
Recurrent Left Knee Pain	3	100.0
Knee Infection	1	33.3
Localized Swelling	1	33.3
How Did the Pain Start?		
Just started on its own	2	66.7
Fall	1	33.3
Average Number of Months Since Surgery before Presentation	$52.0 \pm 59.19$	12-120
Type of Surgery		
Right total knee revision	1	33.3
Left knee total revision surgery	1	33.3
Left Tumour implant Arthroplasty Following Failed/Loosened Revision Implant Removal + Debridement +Antibiotics Bone Cement Spacer	1	33.3
Average Transfusion During Hospital Stay	$1.5 \pm 0.5$	1.0-2.0
Average Hospital Stay Before Discharge (days)	$21.0 \pm 20.07$	7-44
Average Months Since Revision	$36.0 (30.0-36.0)$	24-36



**Figure 1** Reasons for Presentation

#### 4. Discussion

The clinical outcomes of patients presenting with knee pathologies at an orthopaedic centre in Awka, Anambra State, Nigeria, were examined. The patient cohort comprised individuals experiencing knee pain and other symptoms, prompting a thorough evaluation to diagnose specific knee pathologies. This review included a detailed medical history, relevant physical examinations, and specific diagnostic investigations.

The assessment protocol for patients undergoing primary knee arthroplasty involved preoperative screening for infections using C-reactive protein and general blood screening with complete blood count, erythrocyte sedimentation rate, and other relevant tests. In contrast, those qualifying for revision arthroplasty underwent intraoperative knee aspiration, microscopy, culture, and sensitivity tests to exclude infection further.

Our study involved 134 patients, accounting for 156 knees presenting with diverse symptoms and degrees of severity. Among these, we identified three patients with loose femoral and tibial implants. Notably, one of these patients experienced a failed revision surgery characterized by extensive osteolysis of the distal femur and proximal tibia. The remaining two patients, having unsuccessful primary knee arthroplasties, received revisions using the Legacy Constrained Condylar Knee (LCKK) prosthesis. In contrast, the patient with a failed revision underwent another revision surgery using a tumour endoprosthesis targeting the distal femur and proximal tibia. We have monitored these patients throughout 5 to 7 years, and they are pain-free with knee stability.

The study shows a relatively narrow age range of 59 to 62 years with a mean age of 60.33 years. This age demographic suggests patients experiencing complications at a younger age. The onset of pain was spontaneous in 2 cases; one started at a fall, though there was no fracture. The reported prevalence of revision knee surgery in this study is 1.92%, which indicates a relatively low rate. This is calculated based on three revision surgeries among a total sample of 156 individuals. This may be due to the small sample size, presentation to other centres rather than this study centre, or the use of alternative and complementary medicine, which is usually seen amongst our people.[24,26] The prevalence rate noted in Sweden, UK, and Australia, ranging between 5 to 5.5%, may be due to the volume of cases done in the year and other environmental factors playing out in these regions.[1,2,3,4]

The range in the time since surgery before presentation for revision, 12 to 120 months, may indicate the technical failure in the primary operation. This was corroborated by researchers who said that technical failure is overtaking implant wear as the cause of failure of primary arthroplasty. This is because intraoperatively, none of the implants was found to have undergone wear. The lone case of a fall also had signs of poor cementation on removing the loose implant intraoperatively. The fact that all participants were female may suggest a higher incidence of knee problems or surgeries in women, but this might also be coincidental given the small sample size.[8,9,10,11]

Patients presenting for revision primarily had recurrent knee pain and difficulty in walking, pointing to a decline in the quality of life and functional status post-initial surgery. The pain and swelling persist and progress to deformity, leading to their presentation since many patients in this environment present late to surgery.[16,17,18]

A significant proportion of patients being referred from centers other than the study center may indicate a difference in expertise between operating surgeons at the study center and referring centers since no case of failure was yet to be observed within the study period.

The LCKK, often used for severe arthritis with deformity and ligament compromise, was employed in 2 aseptic loosening cases, but the tumor implant was specifically used for the cases with extensive osteolysis of the femur and tibia. This underscores the proper study of the index cases and employment of the appropriate implant for them. Good outcomes start with this.[19,20,21,22]

The average blood transfusion requirement and length of hospital stay further underline the invasiveness and intensive care associated with revision cases. However, all cases were done with pneumatic tourniquets. Transfusion was only necessitated by reduced hemoglobin levels from post-tourniquet hidden hemorrhage.[24,25]

These patients have been followed up for a period of 3 to 7 years after revision surgery, with no significant complaint. The patient with a tumor implant has a wound site abscess 2 years post-surgery which was drained and dressed with antibiotics therapy and is being followed up to presently.[22,27]

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## 5. Conclusion

This study in Awka, Nigeria, illustrates the effectiveness of Total Knee Arthroplasty (TKA) and the complexities involved. The revision surgeries were due to technical failures rather than implant wear. There is remarkably low revision rate of 1.92% highlighting the regional success despite challenging conditions. This underscores the critical need for continued advancements in surgical techniques and patient care to maintain high standards of orthopedic treatment and patient outcomes.

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## Compliance with ethical standards

### *Statement of ethical approval*

Ethical approval was sought and received for this study.

### *Statement of informed consent*

This was freely given by all the patients.

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