

ORIGINAL ARTICLES

HIP AND KNEE REPLACEMENTS IN GHANA: A 2-YEAR PROSPECTIVE ASSESSMENT OF OUTCOMES

Konadu-Yeboah D¹; Konadu P¹; Okrah H²; Kwasi K²; Sobotie J²; Gudugbe S²; Boadi S T²; Anarfi N²; Vormawor K²; Pokuaa M²¹Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; ²Komfo Anokye Teaching Hospital, Kumasi, Ghana.

Abstract

Objective: Our objective was to assess the outcomes of hip and knee replacements among patients at the Komfo Anokye Teaching Hospital in Ghana.

Methodology: We recruited consenting patients who underwent a hip or knee replacement at the KATH over a 3-year period and followed up each study participant for 2 years. Prosthetic joint function was evaluated at 2 years following joint replacement. Complications of surgery were recorded for each patient during the follow-up period.

Results: A total of 87 hip and knee replacements were performed in 78 patients over the 3-year period. Of the 78 patients enrolled in the study, 67.9% (53) were females and 32.1% (25) were males. Most, 47.2% (37), of the patients were aged between 61 and 80 years, with those less than 40 years constituting 7.7%. At 2 years follow-up, good to

excellent outcome was reported in 95.5% THA, 91.2% hip hemiarthroplasty, and 90% TKA patients. The satisfaction rates were 95.5% THA, 97.0% hip hemiarthroplasty and 90% TKA participants.

Conclusion: Women have a higher hip or knee replacement rate (67.9%) than men (32.1%) and the rate of hip or knee replacement increases with age for both men and women. Osteonecrosis of the femoral head is the most common indication for total hip arthroplasty in patients younger than 60 years. The presence of diabetes mellitus and sickle cell disease predicts less favourable patient reported outcomes following a hip or knee replacement. Arthroplasty of the knee or hip provides pain relief and improvement in function with a low complication rate and high patient satisfaction rate.

Key words: THA: Total Hip Arthroplasty, TKA: Total Knee Arthroplasty, ASA score: American Society of Anaesthesiologists score

Introduction

Arthroplasty is an orthopaedic surgical procedure that is performed to relieve pain in cases of late stage osteoarthritis or rheumatoid arthritis of the hip or knee, and in neck of femur fractures in the elderly. It may also be performed in limb reconstructions after tumour excision. Hemiarthroplasty is the treatment of choice for femoral neck fractures in elderly patients with a healthy acetabulum, not eligible for total hip arthroplasty. Total knee arthroplasty is one of the great success stories of orthopaedic surgery. In Great Britain, more than 30,000 TKAs are performed every year and in the US the number of TKAs performed annually is estimated to rise by 15.5% from 167,000 in 1992.¹ Joint replacement is an effective treatment for end-stage osteoarthritis of the

hip and/or knee. It has been shown that 90% of patients who undergo hip or knee replacement attain pain relief and/or improvement in function. Joint replacement has a mortality risk of 1% making it one of the safest routine surgeries. A successful joint replacement lasts from 10 to 20 years. In the US 1 in 115 Americans over the age of 65 has undergone a joint replacement and approximately 500,000 joint replacements are performed in the US per year. Osteoarthritis is the leading indication for joint replacement.² In an analysis of 5579 cases of THA in the US, Baron and his colleagues found that osteoarthritis was the indication for surgery in 83.3% of cases, rheumatoid arthritis accounted for 3.4% and osteonecrosis 6.6%. The authors reported that women had higher hip arthroplasty rate than men and that the rate of THA increases with age for both men and women. Furthermore, Baron and others observed that 2.5% of the patients they studied died within 6 months, 3.7% within one year and mortality was higher in male patients and in patients over 74 years of age and concluded that serious complications following THA were not common. In addition, the authors identified infections in less than 1% of patients and pulmonary embolism in 2% of cases.³ In a review of a national arthroplasty registry in Malawi, Lubega and co-workers, found that osteonecrosis accounted for THA in 47.9% (35 of 73) and

Corresponding Author: Dr. Dominic Konadu-Yeboah

Senior Lecturer, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, Orthopaedic and Trauma Surgeon, and Head, Directorate of Trauma and Orthopaedics, Komfo Anokye Teaching Hospital, P. O. Box 1934, Kumasi, Ghana

Email Address: domiyk@yahoo.com

Phone Number: (+233)206 300 663

Conflict of Interest: None Declared

osteoarthritis in 30.1% (22 of 73)⁴ of their cohort of patients.

There are limited data in most parts of the developing world and for that matter in Ghana on patient outcomes after hip or knee arthroplasty. Some traditions and myths in hip and knee arthroplasty have been shown to be unsupported by evidence, namely: the use of plastic adhesive tapes intraoperatively and the use of a separate skin knife.⁵ Drains are intended to reduce haematoma but have been found to be of no benefit in THA and TKA though they are still widely used routinely in some centres. Meta-analysis has found that they result in increased total blood loss and increased requirement for haemotransfusion without any difference in haematoma formation. The safety and efficacy of tranexamic acid to control haemorrhage is supported by meta-analysis. The association of tranexamic acid with increased risk of venous thromboembolism is unsubstantiated. Survivorship issues such as bearing-surface wear with polyethylene, acetabular loosening with cemented cups and liner fracture in ceramic-on-ceramic THA exist.⁵ The most commonly used approaches for hip arthroplasty are the posterior and lateral approaches. Controversies however, exist as to which of these approaches offers superior outcomes.⁵ In a review of 1009 total hip arthroplasties, de Vries and others⁴ found that the posterior approach was used in 51.1% of patients. They observed that there were no differences in the rates of surgical site infection and periprosthetic fracture between the approaches used. They found a relatively higher dislocation rate in patients who underwent THA via the posterior approach compared to the lateral approach, 2.9% vrs 1.4%. An uncemented hemiprostheses was employed in 62.7% of patients. They noticed that deep surgical site infections and periprosthetic fractures happened more commonly in the uncemented group compared to the cemented prosthesis group. The authors concluded that there were no differences in adverse outcomes between the lateral and the posterior approaches.⁵

However, evidence to support or refute these traditions and myths in the third world is scanty or in some areas non-existent. In addition, there is paucity of data on outcomes of THAs and TKAs that are performed in the developing world. This study was intended to examine the early to mid-term outcomes of hip arthroplasties (THAs and hip hemiarthroplasties) and knee arthroplasties in a tertiary hospital in a developing country. Following TKA, 19% of patients are dissatisfied with their outcome. These outcome measures comprise: re-operations, clinical outcome scores and complications. Walking with a limp, difficulty getting in and out of cars following TKA are factors of poor outcome.^{7,8} The dissatisfaction associated with the outcome of TKA occurs when patients experience post-operative complications, failure of the operation to meet pre-operative expectations and patients with less severe radiographic

osteoarthritis.^{7,8} Factors that predict poor function after TKA are depression, pre-operative pain and comorbidities.^{9,10} Peter Söderman and co-workers in an outcome assessment study reported that there were significant differences in Harris hip scores between patients with one affected hip, 96 (37-100) points and those with disabling systemic disease, 79 (34-98) points. A review of the Swedish THA registry showed a 10-year survival rate of 93%.¹¹

A study done in South Africa to assess the utility of DVT prophylaxis in patients undergoing elective hip replacement found that the use of DVT prophylaxis reduces mortality rate by 50%.¹² The rate of deep infection reported after knee arthroplasty varies from 1% to 11%.¹³ In a review of a national arthroplasty registry in Malawi, it was found that the mean pre-operative Harris hip score was 29 (9 to 59) and the mean post-operative Harris hip score was measured as 85 (79 to 91) giving a mean improvement of 56 points. In the said study in Malawi, it was reported that the mean length of hospital stay by patients was 10 days (7 to 19) days. The authors, in addition, recorded one case of superficial infection, 2 cases of dislocation in 6 months post operatively, 1 case of deep vein thrombosis, 1 case of aseptic loosening at 6 years and reported that the mean age of patients undergoing primary THA was 52 years. In a study of 180 patients, Deshmukh and others¹ found that previous surgery on the knee and the type of prosthesis used influenced re-operation rate after TKA. Deshmukh and colleagues concluded that the perception of the patient of the benefit and quality of life improvement after surgery is more important than the surgeon's evaluation of functional change and X-ray confirmation of optimal implant placement and stability. Therefore, the use of measures and scores to quantify patients' perceptions after arthroplasty is necessary.¹

The number of infections following revision total knee replacement is greater than that after revision total hip replacement. In a review of an arthroplasty registry in Sweden, Otto and others found that component loosening and infection were the most common indications for revision arthroplasty. The infection rate found by Otto and others was 2.2% in over 2,000 tricompartmental knee arthroplasties.¹⁴ In the US, the overall incidence of deep surgical site infection for both total hip arthroplasty and total knee arthroplasty has increased substantially between 1990 and 2003. In the year 2003, about 1.2% of total hip arthroplasties performed in the US were associated with deep surgical site infection. Total knee arthroplasty in the US was found to have a similar rate of deep infections. Deep infection of the surgical site is a devastating complication of both total hip and total knee replacement with tremendous economic cost.

A total of 27,076 primary hip arthroplasties done in the United States required revision. In Norway, 2.2% (937) of 41,823 primary total hip arthroplasties were revised. By the end of 2004, 2.1% (1154) of 55,519 primary knee implants in the U.S. compared with 3.8%

(532) of 13,969 primary knee implants in Norway necessitated revision. The revision rate for total hip arthroplasty was observed to be higher than that for total knee arthroplasty in the US. Contrary, in Sweden, there was a revision-free total hip arthroplasty survival rate of 96.8% and 96.4% in Norway which was significantly higher than the rate in the US. The rate of revision free survival of total knee arthroplasties was 93.9% in Norway which was lower than the revision rate in the US. Arthroplasties that are done at a younger age tend to need more revisions¹⁵. In a review of the Swedish Hip Registry, it was found that revision THA constituted 10% of hip arthroplasties and the most common indication for revision was aseptic loosening which accounted for 73% of revisions. The authors however, observed that serious complications and rates of revision of THAs had declined significantly in spite of increasing number of at risk-patients. Revision hip arthroplasties on account of aseptic loosening were commoner in the male gender and in young patients. Young female patients with rheumatoid arthritis and males with a previous fracture of the hip had revision rates that were five times higher than elderly patients. The quality of the surgical technique and implant choice were found to be the most significant factors in decreasing revision risk due to aseptic loosening.¹⁷

Henrick and others found that 92% of the patients they studied got discharged home within 5 days and 41% within 3 days. They found that patients' satisfaction and outcome after arthroplasty were influenced by age, gender, marital status, co-morbidity, use of walking aids before surgery, haemoglobin level before and after surgery, the need for blood transfusion, ASA score and time between surgery and mobilization. Of their cohort of patients, 5% required re-admission within 3 months post primary THA and 2% needed additional surgery. The indications for re-admission after THA were dislocation, deep infection, fractures and pain. With respect to total knee arthroplasty, 6% (19) of their patients were re-admitted within 3 months and additional surgery was required in 2% of them. Re-admissions following TKA were due to DVT and deep surgical site infections; blood transfusion was required in 22% of patients who underwent THA and 12% of patients who underwent TKA. Blood transfusion was related to co-morbidities, lack of mobilization on the day of surgery and increasing age.⁶

In a review of 1,231 THA patients, 12 to 18 months post-surgery, Nikolajsen and colleagues reported that 28.1% of patients had chronic pain in the operated hip which caused moderate, severe or very severe limitation of activities. They concluded that chronic pain appeared to be a significant problem in at least 12.1% of patients after THA and was influenced by genetic and psychological factors.^{18,19} In an outcome assessment of patients after TKA, Mannion and co-workers found that 46.2% of their patients had excellent outcome, 41.2% good outcome and 10.6%, fair outcome. They reported that 1.9% of their patients had a poor outcome. The

variation in outcome could not be explained by their data. The authors concluded that in the patients they studied, pre-operative expectation was overly optimistic and recommended that surgeons should relay realistic expectations to patients prior to TKA to improve post-operative patient satisfaction or patient-reported outcome.²⁰ Psychological factors play an important role in the functional outcome of patients after TKA. Increased body weight has been associated with patellofemoral complications after TKA as well as late loosening and the risk of re-operation. Obesity has been associated with increased perioperative and post-operative morbidity following TKA such as wound infections, prolonged hospital stay and the risk of venous thromboembolism.

Materials and Methods

Sampling: Consecutive sampling method

Study Site

The study was conducted at the trauma and orthopaedic directorate of the Komfo Anokye Teaching Hospital (KATH). The KATH serves as a referral centre for people across Ghana and some neighbouring countries. It provides Trauma and Orthopaedic care for patients 24 hours a day and seven days a week. The centre provides highly specialized trauma and orthopaedic services which include hip and knee arthroplasties. However, arthroplasty cases at the centre, prior to the commencement of this study, August 2015, remained few and undocumented.

Data Gathering

In this study, we enrolled patients who underwent hip hemiarthroplasty, total hip arthroplasty and total knee arthroplasty at the KATH over a 3-year period, from 1st August 2015 to 31st August 2018 and who offered participation consent and followed-up each participant for 2 years. The two-year follow-up was concluded in 2020. Sociodemographic data such as age, gender and occupation of participants were recorded. The indication for arthroplasty was recorded as well as existing comorbidities of participants. In addition, for hip arthroplasty, the surgical approach that was used was recorded for each patient. Whether the procedure was a primary or revision arthroplasty was captured as well. For revision arthroplasties, the indications for revision were recorded.

Surgical and Post-operative Management

Hip arthroplasty (total and hemi), was performed with the use of modified hardinge (lateral), moore (posterior) or watson-jones (anterolateral) approach to the hip. Aesculap B. Braun hip prosthesis was used in the total hip arthroplasties in our cohort. Cemented cup and stem were utilized in patients with inadequate bone stock. Patients with adequate bone stock, received cementless cup and stem. Non-modular bipolar hip prosthesis with a cemented stem was employed in the hip hemiarthroplasties. Total knee arthroplasty was performed via the anterior approach to

the knee and with the use of DePuy Synthes cemented total knee prosthesis. Patella resurfacing was performed in all the TKAs. Tranexamic acid, 1g statim was administered intraoperatively in patients with significant bleeding risk. Patients were mobilized full weight bearing on the affected limb on post-operative day one following primary total hip arthroplasty, hip hemiarthroplasty or total knee arthroplasty, with the aid of a walker (zimmer frame) or a pair of axillary crutches. In revision total hip arthroplasties weight bearing on the prosthetic joint was allowed either on post-operative day 1 or at 6 weeks, depending on the stability of the fixation. No case of revision total knee arthroplasty was performed during the study period. The mean length of hospital stay after a hip or knee replacement was 5 days. No drain was used in any of the primary hip or knee arthroplasties. Following surgery, participants received subcutaneous enoxaparin until post-operative day 7 and continued with oral aspirin for the next 5 weeks. Upon hospital discharge, participants who had not completed their course of enoxaparin, had a written note issued to them by the authors, to be taken to the nearest health facility to complete the 7-day course of subcutaneous enoxaparin. Above knee thromboembolic deterrent stockings were worn on both lower limbs for 6 weeks. The duration of formal physiotherapy ranged from 6 to 8 weeks. All the surgeries were performed by the same team of surgeons using similar techniques.

Physical examination at clinic visits and radiographs were used as tools to gather post-operative data. Furthermore, at each clinic visit, participants who had had total knee arthroplasty completed Tegner activity score and those who had had total hip arthroplasty and hip hemiarthroplasty completed Harris hip score. Telephone calls were used to capture follow-up information in cases where patients missed clinic visits. Outcome data gathering -clinical and radiographic assessment of patients -were conducted by the authors. Study participants were evaluated at 2, 6, 12, 24 weeks, 1year and at 2 years after surgery. Complications of surgery were recorded for each patient. The Likert satisfaction scale was employed to measure the satisfaction of participants with the surgical procedure they had undergone. The validity and reliability of the Harris hip score and the Tegner knee function scale have been proven in several studies.²¹

Study design

Prospective cohort study.

Inclusion criteria

All consenting patients who underwent primary or revision total hip arthroplasty, hip hemiarthroplasty or total knee arthroplasty and who gave informed consent were included in this study.

Exclusion criteria

Patients who refused consent to participate in the study as well as those with pathological neck of femur fractures were not considered for this study.

Statistical analysis

Data were analysed using STATA version 16. Our primary analysis looked at knee or hip pain, stiffness and knee instability as well as excessive wound discharge suggestive of surgical site infection. Descriptive statistics: means, standard deviations and ranges were used to assess demographics, physical examination and outcome data. The analysis of data was performed with 95% confidence intervals. P-values less than 0.05 were considered statistically significant. Chi square test were performed to test association between treatment method and outcomes as well as demographic data; significance was set at $p < 0.05$.

This study was approved by the Komfo Anokye Teaching Hospital Institutional Review Board, KATH IRB/AP/116/20.

Results

A total of 87 hip and knee replacements were performed in 78 patients over the 3-year period. Of the 78 patients enrolled in the study, 67.9% (53) were females and 32.1% (25) were males. Most, 47.2% (37), of the patients were aged between 61 and 80 years, 74.4% (58 of 78) were older than 60 years of which 37 were females and 21 males. Participants younger than 40 years constituted 7.7% (6). Overall, the 2-year functional outcome assessment involved 66 patients (4 of the 78 patients died and 8 were lost to follow-up).

Total hip arthroplasty

There were 30 total hip replacements in 25 patients, 14 females, 11 males. Among the 25 patients who underwent THA, 5 had bilateral THA and two of these five patients had both hips replaced at the same sitting. Osteoarthritis of the hip was the indication for surgery in 64% of THA patients (16 of 25 THA patients), femoral neck fracture accounted for 32% (8 of 25 THA patients) and chronic traumatic hip dislocation was the indication in 1 patient, 4%. Out of the 16 patients with osteoarthritis of the hip, primary osteoarthritis was the indication for THA in 31.3% of patients (5 of 16 patients) and osteonecrosis of the femoral head was the indication for THA in 68.8% of patients (11 of 16 patients). Of the 11 patients with osteonecrosis of the femoral head, 36.4% (4 of 11 patients) had sickle cell disease (3 had genotype SC and 1 genotype SS) and 27.3% (3 of 11 patients) had used over-the-counter

topical (2 patients) or oral corticosteroid (1 patient). The use of steroid in these 3 patients was unprescribed. In 4 patients the cause of the femoral head osteonecrosis could not be established. All the femoral neck fractures that underwent total hip replacement occurred following low energy trauma (fall from standing height).

The mean age of the patients with osteonecrosis of the femoral head was 39.3 years (4 males and 7 females). Among the THA patients, 24% (6 of 25) were below 40 years of age. Of the THA patients aged below 40 years, 66.7% (4 of 6) had sickle cell disease and 33.3% (2 of 6) had used over-the-counter corticosteroid.

Overall, 74.4% (58 of 78) of participants who met inclusion criteria were older than 60 years. Cemented cup and stem total hip replacement was performed in 4 hips in 3 patients. Cementless cup and cemented stem hip arthroplasty was carried out in 1 hip in 1 patient. All the other THAs, 83% (25 of 30) involved cementless cup and stem. Complaint of chronic pain in the prosthetic hip was recorded in 16% (4 of 25) THA patients (1 bilateral THA cemented, 3 unilateral, cementless THA). Prosthetic joint dislocation was observed in 1 THA patient at 18 months post operatively. The dislocation occurred during physiotherapy and involved a patient with chronic kidney disease on dialysis, who underwent bilateral THA on account of osteonecrosis of both femoral heads. Cemented cup dislocation was recorded in one patient. Periprosthetic fracture occurred in 2 THAs in two patients (1 was vancouver type AG and the other, vancouver type C). Non-fatal venous thromboembolism was registered in 1 patient (a 64-year-old male with a previous history of pulmonary tuberculosis, who presented with a six-month history of bilateral femoral neck fracture). Two patients underwent revision surgery, one for the revision of a cemented cup dislocation and the other for the fixation of a periprosthetic fracture, vancouver type C with plate and screws. The average modified Harris hip score for total hip replacement patients at 2 years was 92 (range: 54 to 100). Of the patients who underwent THA, 95.5% had good to excellent outcome with a satisfaction rate of 95.5% (i.e participants who were either satisfied or very satisfied).

Hip hemiarthroplasty

There were 44 hemiarthroplasties in 42 patients (two of the hemiarthroplasties were bilateral and were performed at different operative sittings), 29 females, 13 males. There were 3 cases of periprosthetic fracture among the 44 hemiarthroplasties that were performed,]

all of which were Vancouver type AG. There was revision of one hemiarthroplasty to a THA on account of breakage of a cemented bipolar femoral stem, 2 years post operatively. The average modified Harris hip score in patients who had hemiarthroplasty was 84 (range 52 to 100). Chronic hip pain was recorded in 1 patient with, bilateral cemented hemiarthroplasty. Overall, good to excellent outcome was reported in 91.2% of hip hemiarthroplasty patients with a satisfaction rate of 97% (satisfied and very satisfied).

Total knee arthroplasty

There were 13 TKAs performed in 11 patients, all on account of osteoarthritis of the knee. The youngest patient who had TKA was 56 years and the oldest was 93 years with a mean age of 72 years. There were 10 females (90.9%) and 1 male (9.1%). Five patients had osteoarthritis of both knees, with equivalent disease severity, and 6 patients had unilateral disease. All the knee replacements were performed under spinal anaesthesia. Of the 13 TKAs, deep surgical site infection was observed in 1 case at 9 days post-surgery. The surgical site infection was recorded in a 57-year old woman with diabetes mellitus. *Escherichia coli*, sensitive to ciprofloxacin, was isolated from the prosthetic knee joint. The patient underwent washout of the surgical site and put on a course of ciprofloxacin. She got lost to follow-up 2 weeks after the knee washout. One intra-operative periprosthetic fracture at the tip of the femoral component was recorded during TKA in a 93-year-old woman who had a poor bone stock. Patient-reported functional outcome at 2 years following TKA was good to excellent in 90% of patients with a satisfaction rate of 90% (satisfied and very satisfied). A complaint of chronic knee pain was encountered in one patient who had bilateral TKA on account of late stage osteoarthritis of both knees. The Tegner knee score in 10 TKA patients at 2 years ranged from 7 to 10, with a mean score of 9.

In all, 92.3 % of the 78 patients in this study were discharged on post-operative day 3 and eight of the 78 patients (10.3%) were lost to follow-up during the study. One of the THA patients (sickle cell disease patient, genotype SS) and 3 of the hemiarthroplasty patients were dead by 2 years, giving an overall death rate of 5.1% (4 of 78). These deaths happened at home and were reported during follow-up telephone calls. The cause of death in these patients was not known. The mean age of those who died in this study was 87 years. No case of surgical site infection was recorded in the 74 (30 THAs and 44 hemiarthroplasties) hip replacements that were

performed over the 3-year inclusion period at 2 years.

Table 1. The distribution of 87 hip and knee replacements in 78 patients by gender, age, type of procedure performed and indication.

Variable	Frequency (n=78)	Percentage (%)
Gender		
Female	53	67.9
Male	25	32.1
Age (years)		
<40	6	7.7
40-60	14	18.0
61-80	37	47.2
>80	21	26.9
Procedure performed	Frequency (n=87)	
THA	30	34.3
Hip Hemiarthroplasty	44	56.4
TKA	13	16.7
Indication for Total Hip Replacement	Frequency (n=30)	
Osteoarthritis of hip	16	64
Femoral neck fracture	8	32
Chronic Traumatic Hip Dislocation	1	4

Table 2. Two-year functional outcome and satisfaction level assessment of 66 patients per surgical procedure

Total hip arthroplasty (n=22, 1 was dead and 2 were lost to follow up) Functional outcome	Frequency (n=22)	Percentage (%)
Fair	1	4.5
Good	2	9.0
Excellent	19	86.4
Level of patient satisfaction		
Unsatisfied	1	4.5
Neutral	0	0.0
Satisfied	0	0.0

Hip hemiarthroplasty (n=34, 3 were dead, 5 were lost to follow up) Functional outcome	Frequency (n=34)	Percentage (%)
Fair	3	8.8
Good	9	26.5
Excellent	22	64.7
Level of patient satisfaction		
Unsatisfied	1	2.9
Neutral	0	0.0
Satisfied	8	23.5
Very satisfied	25	73.5

Total knee arthroplasty (n=10, 1 was lost to follow up) Functional outcome	Frequency (n=10)	Percentage (%)
Fair	1	10.0
Good	2	20.0
Excellent	7	70.0
Level of patient satisfaction		
Unsatisfied	1	10.0
Neutral	0	0.0
Satisfied	2	20.0
Very satisfied	7	70.0

Table 3: Likert scale of satisfaction level

Very satisfied	Satisfied	Not sure	Not satisfied	Not satisfied at all
5	4	3	2	1

The lateral approach to the hip was used in 62 out of 74 hip replacements that were performed. The posterior approach was used in 10 hip replacements and the anterolateral approach was used in 4 THAs in 2 patients. These 2 THAs were performed at the same sitting in each patient. For patients who had hip replacement on account of a fracture of the femoral neck, the left

femoral neck was involved in 67.3% and the right femoral neck in 28.8% of patients. Bilateral femoral neck fracture was present in 3.8% of patients.

Of the cohort of patients studied, 24% (19 of 78) patients had an intercurrent chronic disease. Systemic hypertension was the most common comorbidity among the participants of the study accounting for 31.8% of comorbidities. Diabetes mellitus and sickle cell disease followed systemic hypertension in frequency, each accounting for 18.2% of comorbidities. Asthma made up 9.1%. There was a statistically significant association between the presence of a comorbidity and patient outcomes in terms of re-operation, deep surgical site infection, periprosthetic fracture, survivorship of the prosthetic joint and patient survival at 2-years following a hip or knee replacement, $p=0.04$. Moreover, there was a statistically significant association between age and functional outcome, being poorer in patients older than 80 years, $p=0.03$. Infection rate of hip or knee replacement in this study was 1.1% (1 of 87). The overall periprosthetic fracture rate was 5.7% (5 of 87 arthroplasties: 2 out of 30 THAs and 3 out of 44 hemiarthroplasties). The overall prosthetic hip dislocation rate was 2.7% (2 out of 74 hip replacements, 1 THA, 1 hemiarthroplasty). The dissatisfaction rate for THA was 4.5% (1 out of 22 THA patients). No patient was dissatisfied with their TKA at 2 years of follow up. The revision rate for THA was 6.7% (2 out of 30 THAs) and no hip replacement associated infection was recorded. The revision rate for hemiarthroplasty was 2.3% (1 out of 44). Prosthetic hip dislocation rate for THAs was 4.5% (1 of 22 THAs).

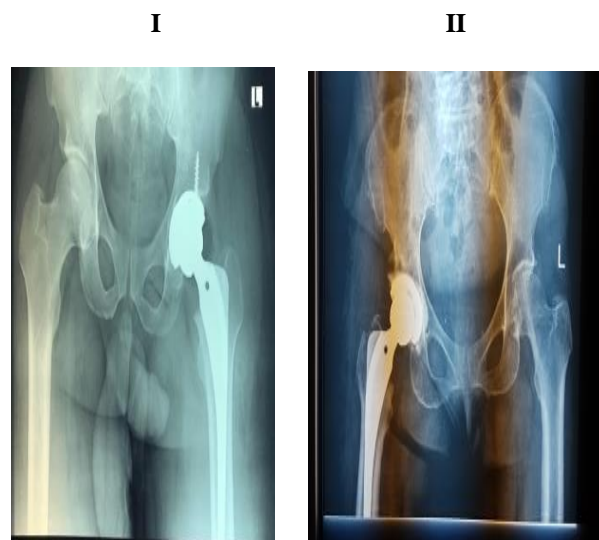


Fig 1: Post-operative x-rays: I cementless left primary total hip replacement, II cemented cup and cementless stem total hip replacement.



Fig 2: I: revision left total hip replacement, II: right hip hemiarthroplasty



Fig 3: I: implantation of the femoral component in a total knee replacement, II: post-operative x-ray of a left total knee replacement.

Discussion

It was found in this study that 67.9% (53 of 78) of patients studied were females and 32.1% (25 of 78) were males. Most, 47.2% (37), of the patients were aged between 61 and 80 years, with those less than 40 years constituting 7.7% (6). The female preponderance and the higher rate of total joint arthroplasty with increasing age have been demonstrated in several studies.

In an assessment of total hip replacement in the U.S. medicare population, Baron and colleagues³ found that women had higher hip arthroplasty rate than men and the rate of THA increases with age for both men and women. Osteoarthritis of the hip was the indication for surgery in 64% of the THA patients (16 of 25 THA patients), femoral neck fracture accounted for 32% (8 of 25 THA patients) and chronic traumatic hip dislocation was the indication in 1 patient, constituting 4%. Moreover, the 13 TKAs that were performed were all done on account of osteoarthritis of the knee. The finding of osteoarthritis as the most common indication for total joint arthroplasty in our study is corroborated by several other studies. Baron and colleagues³ in their study of 5579 cases of THA concluded that osteoarthritis (both primary and secondary) is the leading indication for total joint arthroplasty accounting for 83.3% of cases, rheumatoid arthritis accounted for 3.4% and osteonecrosis 6.6%. In Sweden {6}, primary osteoarthritis accounted for 78% of THAs and osteoarthritis secondary to trauma made up 11%.

Out of the 16 patients with osteoarthritis of the hip, primary osteoarthritis was the indication for THA in 20% of patients (5 of 25 patients) and osteonecrosis of

the femoral head was the indication for THA in 44% of patients (11 of 25 patients). Of the 11 patients with osteonecrosis of the femoral head, 36.4% (4 out of 11 patients) had sickle cell disease, 27.3% (3 out of 11 patients) had used over-the-counter topical or oral steroid. In 4 patients the cause of the femoral head osteonecrosis could not be established. The mean age of the patients with osteonecrosis of the femoral head was 39.3 years. The high rate of osteonecrosis of the femoral head as the indication for THA was found in a similar study in Malawi⁴, where a review of a national trauma registry by Lubega and colleagues found that osteonecrosis of the femoral head accounted for 47.9% (35 of 73) of THAs and primary osteoarthritis for 30.1% (22 of 73) THAs.

In our study, deep surgical site infection rate for hip and knee arthroplasties was found to be 1.1% (1 of 87), the overall periprosthetic fracture rate was 5.7% (5 out of 87, 2 out of 30 THAs and 3 out of 44 hemiarthroplasties), non-fatal venous thromboembolism occurred in one patient. The overall prosthetic hip dislocation rate was 2.7% (2 of 74 hip replacements (1 THA, 1 hemiarthroplasty). The infection, periprosthetic and dislocation rates of our study are similar to those found by several other studies. Studies done in the US¹³, have reported a deep surgical site infection rate of between 1 and 11%, pulmonary embolism rate of 2% and mortality risk for joint replacement of 1%. Similarly, studies done in Sweden,¹⁴ have reported a deep surgical site infection rate of 2.2%. In addition, the study by Lubega and others⁴, in Malawi, on THAs similarly found a prosthetic hip joint dislocation rate of 2.7% (2 of 73), one case of superficial infection, 2 cases of dislocation, 6 months post-surgery and one case of DVT. The mean age of patients undergoing THA in this study was 39.3%. However, Lubega and colleagues⁴, in their study in Malawi found a mean age of patients undergoing THA to be 52 years. In Sweden,¹³ the mean age of patients undergoing THA was 70 years. The lower mean age of patients undergoing THA in our study is likely due to the occurrence of osteonecrosis of the femoral head in sickle cell disease patients at a younger age, who accounted for 27.3% of patients with osteonecrosis of the femoral head who had THA.

In this study, we found a statistically significant association between age and functional outcome, being poorer in patients older than 80 years, $p=0.03$. Moreover, a statistically significant association was observed between the presence of a comorbidity and outcomes in terms of re-operation, deep surgical site infection, periprosthetic fracture and patient survival at 2-years following a hip or knee replacement, $p=0.04$. Bourne and colleagues found in their study that depression and comorbidities predict poor function after TKA. One of the THA patients and 3 of the hemiarthroplasty patients were dead by 2 years giving an overall death rate of 5.1% (4 of 78). The mean age of those who died in this study was 87 years. In a similar study by Kristenson and others,¹³ 3.7% of the patients

they studied, died within 1 year; they found the mortality rate to be higher in male patients and in patients over 74 years of age. The mean length of hospital stay following hip or knee replacement in our series was 5 days and 92.3% of the 78 patients were discharged on post-operative day 3. Henrick and others,⁶ similarly found that 92% of the patients they studied got discharged home within 5 days and 41% within 3 days.

In a study to determine the optimal approach in hip hemiarthroplasty, de Vries and others⁵ found a relatively higher dislocation rate in patients who underwent hip arthroplasty via the posterior approach, 2.9% as compared to the lateral approach, 1.4%. In addition, de Vries and colleagues⁵ found a higher rate of periprosthetic fracture in the lateral approach compared to the posterior approach. Similarly, in our study, the lateral approach to the hip, was associated with a relatively higher periprosthetic fracture rate (9% for lateral approach vs 2.4% for posterior approach) in patients who underwent hemiarthroplasties. Our study, however, did not find a difference in the dislocation rate between the lateral and the posterior approaches to the hip. Of their cohort of patients, de Vries and co-workers⁵ reported that 5% required re-admission within 3 months post primary THA and 2% needed additional surgery. The indications for re-admission after THA were dislocation, deep infection, fractures and pain. Similarly, in our study, 6.4% (5 of 78) of the patients who underwent hip or knee arthroplasty required re-admission in the first 8 weeks after surgery and the indications for readmission were periprosthetic fracture, dislocation and infection.

The revision rate for THA in this study, was 6.7% (2 out of 30 THAs) and no case of the infection in hip arthroplasty was recorded by 2 years. The revision rate for hemiarthroplasty was 2.3% (1 out of 44) and that of TKA was 2 out of 11 patients. Prosthetic hip dislocation rate for THAs was 4% (1 of 25 THAs). The indications for revision in our study, were periprosthetic fracture, dislocation and infection. Conversely, Robertson and others¹⁴ reported that in Sweden, component loosening and infection were the most common indication for revision arthroplasty.

Ibrahim and others² reported that 90% of patients who undergo hip or knee replacement attain pain relief and/or improvement in function and that joint replacement has a mortality risk of 1% making it one of the safest routine surgeries. Also, Gerellick and others¹⁵ in their study observed that for patients undergoing total joint arthroplasty, relief of pain, restoration of function and improved quality of life are the outcomes most highly rated by patients. Similarly, in our series 92.4% (61 of 66) of patients studied had excellent outcome and 89.4% (59 of 66) were very satisfied with the procedure and reported improved function.

The average modified Harris hip score of the THA and hip hemiarthroplasty patients we studied was 92 (range: 54 to 100). These findings are similar to those of Graham and others²³ who in their study concluded that

with modern components, total joint arthroplasty outcomes are superior. Similarly, study by Lubega and others {4} in Malawi, found a mean Harris hip score of 85 (79 to 91).

In this study, a dissatisfaction rate for THA was 4.5% (1 of 22 THA patients) was observed and this involved a patient with chronic kidney disease who was on dialysis. These findings are similar to those found by many other studies. It has been reported that the factors that predict poor function after TKA are depression, pre-operative pain and comorbidities^{9,10}. Also, Mannion and others²⁰ reported a fair outcome in 10.6% and a poor outcome in 1.9% and reported that the dissatisfaction associated with the outcome of TKA occurs when patients experience post-operative complications, failure of the operation to meet pre-operative expectations and patients with less severe radiographic osteoarthritis.^{7,8} A study in Sweden, by Robertsson and co-workers¹⁴, on patient satisfaction with outcome after TKA reported a dissatisfaction rate of 19%.

Conclusion

In this study, we found that women have a higher hip or knee replacement rate (67.9%) than men (32.1) and the rate of hip or knee replacement increases with age for both men and women. Osteonecrosis of the femoral head is the most common indication for total hip replacement in patients younger than 60 years. Sickle cell disease (66.7%) and corticosteroid abuse (33.3%) are most commonly associated with hip replacement in patients under the age of 40 years. Periprosthetic fractures are the most (5.7%) commonly encountered complication in this study. The most common indications for readmission and for revision after a hip replacement were periprosthetic fracture, dislocation and infection. The dissatisfaction associated with the outcome of a hip or a knee replacement is associated with the development of post-operative complications. Arthroplasty of the knee or hip is safe at the study site. It provides excellent outcome in most (92.4%, 61 of 66) patients and has low complication and high patient satisfaction (89.4%, 59 of 66) rates.

Limitations

We enrolled 25 total hip replacement, 42 hip hemiarthroplasty and 11 total knee replacement patients over a 3-year period. Our conclusions would have been stronger and the power of the study higher, if a larger sample size had been studied. The cause of death in patients who died at home during the follow-up period, if it had been known would have improved the quality of our study. In addition, measurement of body mass indices of patients who underwent total knee replacement would have enabled the association

between obesity and patient reported outcomes after total knee arthroplasty to be determined.

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