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Incidence, management and outcome of complications of total hip Arthroplasty in Yaounde

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Abstract

Background: The purpose of this study was to evaluate the complications of primary total hip arthroplasty (THA) in a low-income country, as well as their management and outcome.

Patients and Method: We conducted a retrospective cohort study on 130 consecutive primary total hip arthroplasty (THA) procedures performed across five institutions in Yaounde from January 2018 to December 2022. Patients were contacted for an ultimate evaluation, and all individuals who provided informed consent were included in this study. Our investigation focused on complications occurring perioperatively or during the follow-up period. All medical records were reviewed specifically for the management of complications and outcomes. Complications were defined as any problem requiring additional therapeutic intervention. A total of 105 patients were included in the analysis; the mean age at the time of surgery was 60 ± 16.2 years, with 53 (50.4%) being male.

Results: Major complications were observed in 15 patients, resulting in a prevalence of 14.28%. The main intraoperative complication was peri-prosthetic fracture, found in 9 (8.6%) cases. Early postoperative complications included surgical site infections (SSI) in 9 cases (8.6%), dislocations in 8 cases (7.6%), pulmonary embolism in 2 cases (1.9%). Late complications primarily included chronic prosthetic joint infections (PJI) in 4 (3.8%) cases, aseptic loosening in 4 (3.8%) cases, and peri-prosthetic fractures in 2 cases (1.9%). The mortality rate during the follow-up period was 3.8%. Periprosthetic fractures were treated with cerclage, tension band wiring, plate and abstention, resulting in bone healing in all cases. Hip dislocations were treated with open reduction in all cases; all attempts at close reduction were unsuccessful. SSIs were treated with surgical revision in 7 cases (of whom implant retention in 2 cases, implant exchange in 2 cases and implant sterilization in 3 cases). Four cases of relapse of infection were observed, leading to chronic PJI, which were treated with a Girdlestone procedure in 3 cases. All sciatic nerve palsies evolved favorably, with total recovery after the first postoperative year. The overall functional score (average PMA score) at the last follow-up was 13.2 ± 1.7 [range 8-17] and 84% of patients reported satisfaction or high satisfaction levels.

Conclusion: The prevalence of major complications related to hip arthroplasties in Yaounde, although still high compared to Western literature, has shown slight improvement compared to previous series in the same environment. Apart from PJIs, where therapeutic indications and outcomes need thorough improvement, the treatment of hip arthroplasty complications in Yaounde generally yields satisfactory results.

Keywords: Total hip arthroplasty, complications, outcome, low-income country

Introduction

Total Hip Arthroplasty (THA) is a highly successful surgery for managing hip pathology, yielding excellent short-term and long-term outcomes^[1,2]. THA is common, with more than 1 million procedures performed worldwide. Studies in the USA estimate an almost 200% increase in demand for THA based on current rates by 2030^[3]. The indications for surgery in the United Kingdom include hip osteoarthritis (93%), osteonecrosis (2%), femoral neck fracture (2%), developmental dysplasia of the hip (2%), and inflammatory arthritis (1%)^[1].

Despite excellent results, THA procedures can lead to complications, resulting in increased morbidity, mortality, and healthcare utilization^[4,5].

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Complications of THA can be devastating, raising questions about their outcomes and potentially necessitating partial or total implant exchanges (revisions) [6]. Postoperative complications after THA may include pain, prosthetic dislocation, fracture, infection, and abductor insufficiency [7, 8]. Despite advances in surgical techniques and implant design, the revision burden has remained unchanged over the past several decades. The most common cause for revision surgery in the USA is instability (22% of revision cases), followed by mechanical loosening (20%), infection (15%), implant failure (10%), osteolysis (7%), and periprosthetic fracture (6%) [9].

In developing countries, there is an increased risk of complications after total hip arthroplasty (THA). Several available studies have demonstrated a higher rate of complications following THA in the past decade, particularly in low-income countries in Africa [10-14]. Despite recent advances in human resources, infrastructure, equipment, and locally available implants, we have not found a recent study describing the prevalence, management, and outcomes of these complications in our setting.

Patients and Methods

After obtaining Institutional Review Board approval, we conducted a retrospective observational study on 130 consecutive primary total hip arthroplasty (THA) procedures performed across five institutions in Yaounde from January 2018 to December 2022 (spanning 5 years). Patients were contacted for an ultimate evaluation, and all individuals who provided informed consent were included in this study. Twenty-five patients were excluded due to unexploitable files, denial of consent, loss to follow-up, or death unrelated to THA. Among the remaining 105 patients, the mean age at the time of surgery was 60±16.2 years range:18-87, with 53 (50.4%) being male.

The indications for THA included femoral head osteonecrosis (36.2%), neck fracture (30.5%), primary osteoarthritis (15.2%), secondary osteoarthritis (6.7%), hip dysplasia (4.8%), and rheumatoid arthritis (1.7%) (Table 1). Notably, none of the operations were performed under laminar flow conditions. The surgical procedures were carried out by orthopedic and trauma surgeons whose daily practice is predominantly focused on general orthopedics and traumatology. The cases were performed using the following approaches: direct anterior approach (Smith-Peterson) utilized in 1 case (0.9%); direct lateral approach (Hardinge) utilized in 67 cases (63.8%); posterolateral approach (Southern or Moore) utilized in 25 cases (23.8%); and an anterolateral approach (Watson-Jones) utilized in 12 cases (11.5%). The components used included 97 uncemented stems and 8 cemented stems, along with 85 uncemented acetabular components and 20 cemented acetabular components. The metal interface was paired with cross-linked polyethylene. Perioperative antibiotics were administered for at least 7 days in all cases, and low molecular weight heparin was used for at least 30 days.

Our investigation focused on complications occurring perioperatively or during the follow-up period. Complications were defined as any problem requiring additional therapeutic intervention [15]. Major complications were those necessitating a return to the operating room or resulting in permanent adverse outcomes, particularly periprosthetic fracture, nerve injury, dislocation, prosthetic joint infection and loosening. All mechanical complications, including instability/dislocation, periprosthetic femur or acetabular fracture,

aseptic loosening/failed osteo-integration, and prosthesis failure, were identified as major complications. Minor complications were those that responded to noninvasive and non-operative interventions without further problems [15]. This classification applied to both hip-specific complications and any systemic complications that occurred in the hospital or after discharge and were related to the surgery. Each potential complication was confirmed by two reviewers and classified based on its nature. Stems and cups were analyzed for radiographic signs of loosening according to the Gruen zoning system [16] and zones defined by DeLee and Charnley [17].

All medical records were further reviewed specifically for the management of complications and outcomes. At the final follow-up, functional evaluation was conducted using the Postel Merle D'Aubigné Scale (PMA), and patient satisfaction was assessed. Statistical analysis was performed using SPSS software version 26. Descriptive statistics were reported using mean (range) and frequency (percentage). Paired t-tests were used for the comparison of pre- and postoperative data. Two-sample t-tests were used to compare continuous variables, while Chi-squared or Fisher's test was used for categorical variables. Statistical significance was set at $p < 0.05$.

Results

Complications

Major complications were observed in 15 patients, resulting in a prevalence of 14.28%. The primary intraoperative complication was periprosthetic fracture, specifically involving the lesser trochanter or calcar fissure in 6 cases, fracture of the greater trochanter in 2 cases, and diaphyseal femur fracture in one case (Table 2). Early postoperative complications were predominantly characterized by surgical site infections in 9 cases (8.6%), dislocations in 8 cases (7.6%), pulmonary embolism in 2 cases, and neurapraxia of the common fibular nerve branch in 2 cases (Figure 1). Two patients died during the postoperative period—one due to septic shock and the other from pulmonary embolism.

Late complications were observed in 11 patients. These primarily included prosthetic joint infections in 4 (3.8%) cases (3 associated with septic loosening (figure 2)), aseptic loosening in 4 (3.8%) cases, and periprosthetic fractures in 2 cases (1.9%). Additionally, two cases of late mortality were recorded—one at 24 months (78 years old) and the other at 3 months (52 years old) postoperatively. These patients were seemingly in good health and had resumed their normal daily activities. The clinical presentation of sudden death with respiratory distress and rapid alteration of consciousness could suggest massive pulmonary embolism. Unfortunately, the rapid progression of events precluded diagnostic imaging, and a post-mortem autopsy could not be performed.

Treatment of complications

Table 3 presents the treatment of observed complications. Fractures of the lesser trochanter/calcar fissures were treated with wire cerclage during the same surgical procedure in 4 cases therapeutic abstention was chosen in 2 cases; and weight-bearing was deferred for 45 days (figure 3). Greater trochanter fractures were managed using tension band wiring in both cases. Diaphyseal femur fractures were treated with plate fixation. Surgical site infections (SSI) were addressed surgically in 7 cases, debridement and implant retention (DAIR) in 2 cases, Debridement and implant exchange (DAIEx) in a single-stage in 1 case, Debridement and implant exchange (DAIEx) in two-stage in 1 case, Debridement and

implant sterilization (DAIS) and reimplantation in 3 cases. In the remaining 2 cases, SSIs were managed with daily bedside wound dressings. Antibiotic therapy was initiated empirically and adjusted based on bacterial culture results in all cases. As concerns hip dislocations, all attempts at closed reduction were unsuccessful, necessitating open reduction. As concerns late Prosthetic Joint Infections (PJI), it was treated with

prolonged suppressive antibiotic therapy in one case and a Girdlestone procedure performed in 3 cases. As concerns aseptic loosening, patients received symptomatic treatment with analgesics and crutches. Periprosthetic fractures were managed with plate fixation in one case and cerclage in the other, without exchange of the stem.

Table 1: Baseline and clinical characteristics of the patients

Variable	Catégories	Value (N=40)
Age moyen (années)		60±16.2 (18-87)
Gender	Male	53 (50.5%)
	Female	52 (49.5%)
Comorbidities	Cardiovascular disease	24 (22.8)
	Diabetes	11 (10.5%)
	Alcohol	12 (11.4%)
	Tobacco	4 (3.8%)
	Viral Hepatitis	7 (6.7%)
	HIV	4 (3.8%)
Indications for THA	Sickle cell disease	2 (1.9%)
	Avascular osteonecrosis	38 (36.2%)
	Femoral neck fracture	32 (30.5%)
	Primary osteoarthritis	16 (15.2%)
	secondary osteoarthritis	7 (6.7%)
	hip dysplasia	5 (4.8%)
Surgical approach Types of THA	others	7 (6.7%)
	Hardinge	67 (63.8%)
	Moore	25 (23.8%)
	Watson-Jones	12 (11.5%)
	Smith Peterson	1 (0.9%)
	Cementless THA	79 (75.1%)
	Hybrid THA	6 (5.7%)
Reverse Hybrid THA	18 (17.3%)	
Bipolar cemented THA	2 (1.9%)	

Table 2: Complications

Variable	Categories	Value (%) N=105
Peroperative Complications	Fracture lesser trochanter/calcar	6 (5.7%)
	Fracture greater trochanter	2 (1.9%)
	Fracture femoral shaft	1 (0.9%)
	Anesthetic complications	2 (1.9%)
Early Post Opérative Complications	Surgical site infection	9 (8.6%)
	Dislocation /instability	8 (7.6%)
	Pulmonary embolism	2 (1.9%)
	Death	2 (1.9%)
	Sciatic nerve palsy	2(1.9%)
Late Complications	Prosthetic joint infection	4 (3.8%)
	Aseptic loosening	4 (3.8%)
	Peri-prosthetic fracture	2 (1.9%)
	Implant breakage	1 (0.9%)
	Sciatic nerve neurapraxia	2 (1.9%)

Table 3: Management of complications

Variable	Categories	Value (%) N=105
Peroperative fractures (n=8)	Cerclage	4 (5.7%)
	Tension band wire	2 (1.9%)
	Screwed Plate	1 (0.9%)
	Therapeutic abstention	2(1.9%)
Sciatic nerve palsy (n=2)	Physiotherapy, vitamin B	2 (1.9%)
Surgical site infection (n=9)	DAIR	2 (1.9%)
	DAIEx in 1 stage	1 (0.9%)
	DAIEx in 2 stages	1 (0.9%)
	DAIS	3 (2.9%)
Dislocation/instability (n=8)	Daily wound dressing	2(1.9%)
	Surgical reposition	8 (7.6%)
Chronic PJI (n=4)	Girdlestone	3 (2.9%)
	Suppressive antibiotic treatment	1 (0.9%)
Aseptic loosening (n=4)	Crutches, analgesics	4 (3.8%)
Implant breakage (n=1)	Revision with implant exchange	1 (0.9%)



Fig 1: Postoperative dislocation and surgical site infection in the same patient. The patient was treated by debridement + implant sterilization, then repositioning. Unfortunately, the dislocation was incoercible due to the avulsion of greater trochanter and tear of gluteus medius muscle

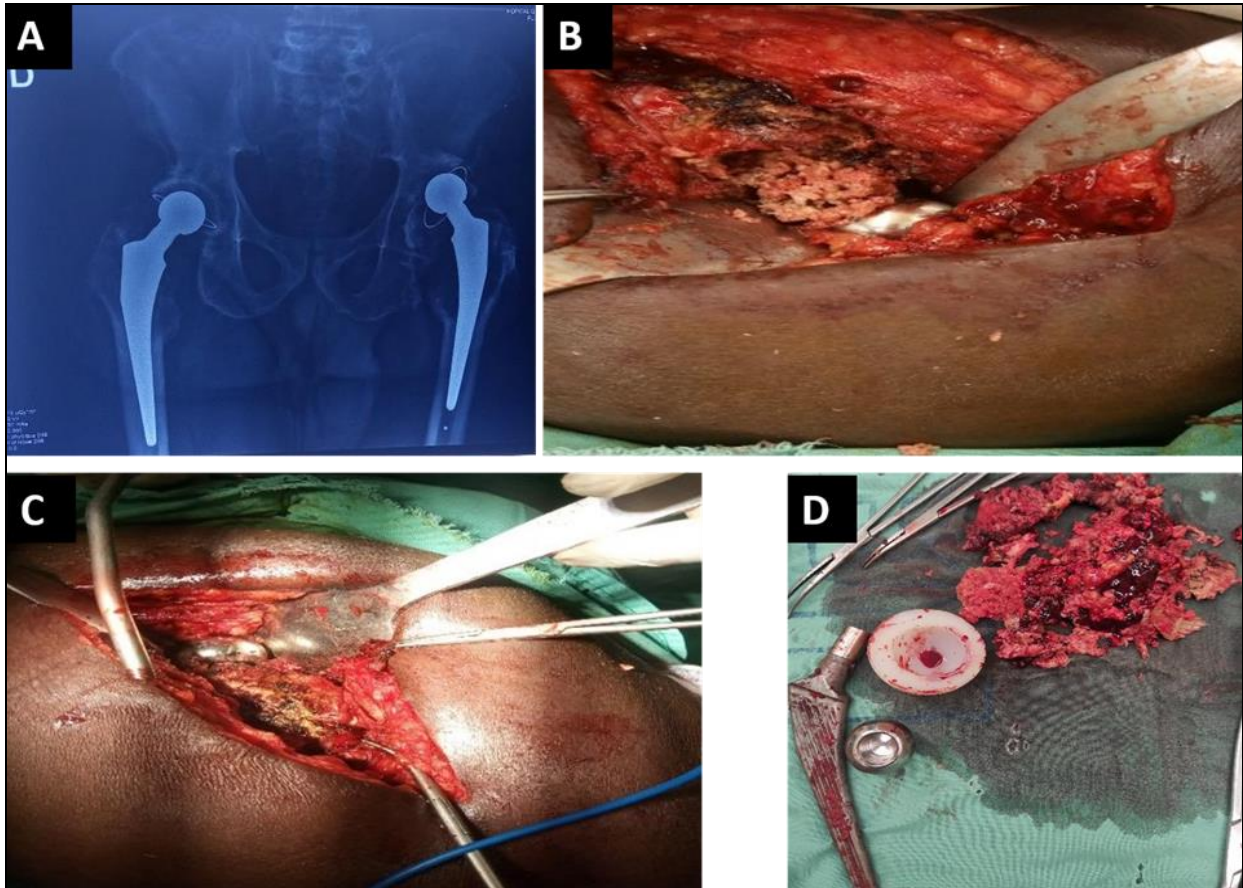


Fig 2: Septic loosening of a hybrid reverse THA. A, anteroposterior radiographs. B, C, D: peroperative image during revision (Girdlestone)

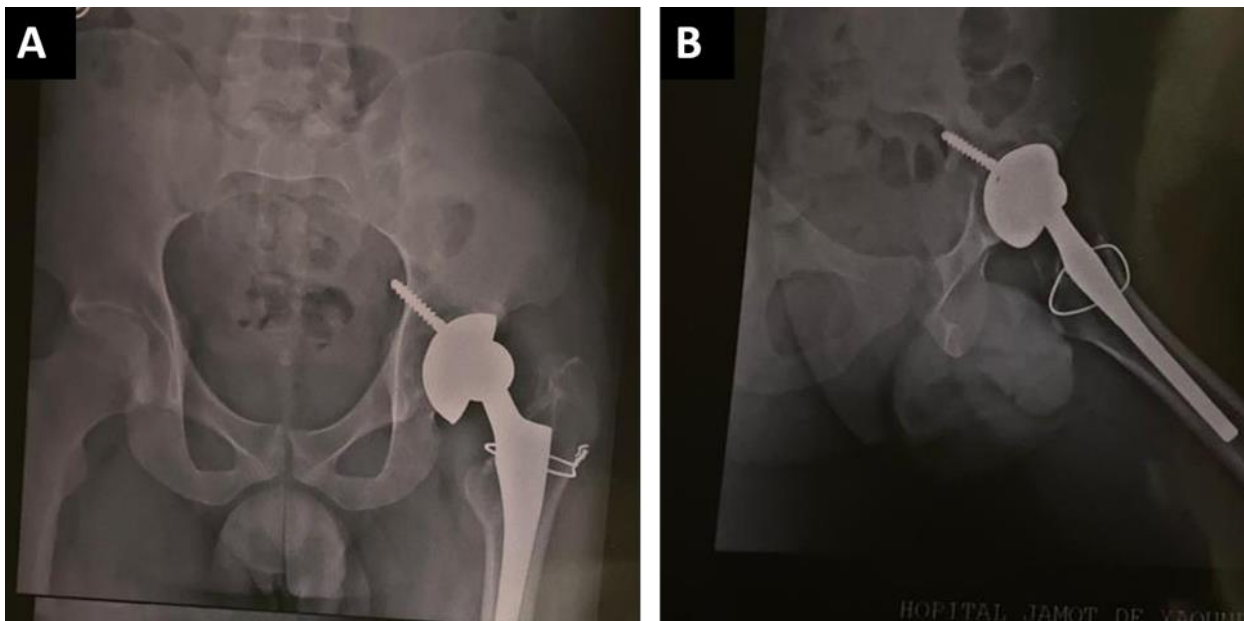


Fig 3: Cerclage for a preoperative trochanteric fracture

Outcome

All intraoperative fractures healed without complications. Among 9 cases of SSIs no relapse of infection was observed in 5 cases. In 4 cases, delayed or late relapse of infection occurred, leading to the 4 cases of late PJI. These chronic PJIs occurred in patients who were treated with daily bedside wound dressings and DAIR. Of these 4 patients with chronic PJI, the 3 treated with Girdlestone's intervention no longer exhibit signs of infection, while the patient on antibiotic suppressive treatment still has a persistent fistula. Among patients who experienced dislocations, 5 did not have any further episodes during follow-up. In the remaining 3 cases, recurrent dislocation occurred due to implant malposition in 2 cases. Another case involved failure of the gluteus medius muscle due to a comminuted fracture of the greater trochanter with avulsion of the gluteus medius (figure 1). The latter lives with his dislocated prosthesis to this day. The two other recurrent dislocations were treated by surgical revision with complete exchange of the prosthesis, for dual mobility, and no longer had any episodes of dislocation. All sciatic nerve palsies evolved favorably, with total recovery after the first postoperative year. The overall functional score (average PMA score) at the last follow-up was 13.2 ± 1.7 range 8-17 and 84% of patients reported satisfaction or high satisfaction levels.

Discussion

This study aimed to determine the prevalence of complications in total hip arthroplasties in Yaounde, describe their management, and present the outcomes. It found that major complications were observed in 15% of patients, with PJI (8.6%), periprosthetic fractures (8.6%), and dislocations (7.6%) being the dominant issues. Periprosthetic fractures were treated using osteosynthesis with wire cerclage, tension band wire fixation, or plate fixation, resulting in successful bone healing in all cases. Surgically treated infections, involving implant exchange, implant sterilization, or prosthesis explantation, showed favorable outcomes. However, cases managed with bedside dressings and suppressive antibiotic therapy persisted. Dislocations were all managed through open reduction after failed attempts at closed reduction. In 3 out of 8 cases, recurrent dislocations necessitated implant replacement with a double-mobility prosthesis, effectively resolving the issue.

The prevalence of major complications (requiring surgical intervention) in this series was 14.3%. Manga *et al.* found 15.65% complications in a series of 115 THAs performed at a single hospital institution in Yaounde over a period of more than 20 years [18].

These results are also similar to those reported in a Moroccan series (17.4% complications) [10]. However, in an older series in Yaounde, Farikou *et al.* identified 10 major complications out of 34 operated hips, corresponding to a 31% complication rate [11]. In Bobo-Dioulasso in 2014, Soulama *et al.* reported a 24% complication rate for THA [12]. Padonou *et al.* in Benin (2022) found a 15.9% complication rate [14]. These complication rates remain significantly higher compared to those observed in developed countries. Feishchman *et al.* in the United States reported 1.79% mechanical complications (periprosthetic fractures, dislocations/instabilities, aseptic loosening) in a series of 16,186 THAs [19]. Sugimine *et al.*, in a series of 213 THAs, noted complications in 23 (10.8%) cases, with 4.3% of patients requiring surgical revision for major complications at an average follow-up of 5 years [20]. Among a series of 42 hips operated on obese patients (BMI >

50 kg/m²), Aroy *et al.* found 11 cases of major complications (26.2%) [15]. The high prevalence of complications may be related to our working environment, including equipment and infrastructure that may not always meet the standards required for prosthetic surgery. Additionally, due to the absence of universal health coverage and the poverty of the population, there is a low patient recruitment rate, which prolongs the learning curve for surgeons. Indeed, to date, no orthopedic surgeon in our environment predominantly practices joint prosthetic surgery. Our practice consists of 90% general traumatology, and hip arthroplasties are performed occasionally, which does not allow for the formation of experienced and skilled teams. In developed countries, hip arthroplasties are carried out by surgeons specialized in hip procedures, who have completed their learning curve and performed more THAs per year than our entire series over 5 years. Nevertheless, we observe that the prevalence of major complications in hip arthroplasties in our environment, while still high compared to western literature, has slightly improved compared to previous series in Yaounde [11, 18]. This improvement could be attributed to progressive advancements in technical facilities, learning curve progression, and an increase in the number of orthopedic surgeons.

The management of complications of hip prosthesis remains a challenge in our environment. Surgical revisions for complications related to arthroplasties are technically more difficult and have even higher complication rates. In this series, the therapeutic indications for managing complications mostly adhered to recommendations. Dislocations and instabilities often require surgical revision, either for an open reduction, repositioning of implants, or implant replacement. In our series, no closed reduction was successful. Fortunately, the advent of dual-mobility prostheses has allowed correction of recurrent dislocations after the failure of an initial bloody reduction, which aligns with the medical literature. Ayouba *et al.* in Togo found only one case of dislocation in a series of 147 dual mobility THA [13]. Therapeutic indications for infections need further improvement based on recommendations for treating joint prosthesis infections [21, 22]. Notably, all patients who were treated with bedside dressing and suppressive antibiotic therapy had unfavorable outcomes, with deceptive calm followed by a distant resurgence of prosthetic infection. It is crucial to recognize that prosthesis joint infections absolutely require early and tailored surgical revision, as per guidelines. Managing periprosthetic fractures posed no significant difficulty in our series, primarily involving Vancouver type A and B1 fractures that did not necessitate stem exchange [23, 24].

The observed results were favorable, and all patients achieved consolidation. Regarding aseptic loosening, it required surgical revision, which unfortunately was not performed due to financial constraints. Indeed, financial considerations play a significant role in the decision-making process for prosthesis revisions in resource-limited countries, often more so than the clinical indication for revision [25]. Some patients who have made considerable financial efforts to undergo hip arthroplasty, which can cost up to 60 times the minimum wage in Cameroon, may find themselves lacking resources to manage complications that fall solely on their shoulders. Therefore, it remains crucial to continue working toward reducing the complication rates associated with hip arthroplasties in our environment.

This study has several limitations its retrospective nature, the small sample size, non-standardized procedures, and involvement of multiple practitioners. Nevertheless, it

provides a clear and objective understanding of hip prosthesis complications in our environment and their management.

Conclusion

The prevalence of major complications related to hip arthroplasties in Yaounde, although still high compared to Western literature, has shown slight improvement compared to previous series in the same environment. Major complications are observed in 15% of patients, with infections of joint prostheses (8.6%), periprosthetic fractures (8.6%) and dislocations (7.6%) being the dominant issues. Apart from PJI, where therapeutic indications and outcomes need improvement, the treatment of hip arthroplasty complications in Yaounde generally yields satisfactory results. However, it is essential to continue working on preventing these complications, which increase morbidity, mortality, and the already substantial cost of surgery borne solely by the patient.

Author Contributions

All the authors contributed to the conduct of this work, and all the authors read and approved the final version of the manuscript.

Conflicts of Interest

The authors do not declare any conflict of interest.

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