

Preliminary Results of Total Knee Arthroplasty in the Littoral of Cameroon, Sub-Saharan Africa

Olivier Kopong Fola^{1,2}, Martin Sopjio Tsemzang^{2,3}, Dominique Tamchom Djomo⁴, Frank Blaise Djoukeng², Forbang Ako⁵, Marcelin Ngowe Ngowe⁶

¹Department of Surgery and Sub-Specialties, Faculty of Medicine and Biomedical Sciences, University of Yaounde 1, Yaounde, Cameroon

²Department of Surgery, Technical Platform of Surgery and Resuscitation, Private Hospital, Douala, Cameroon

³Department of Surgery, University of Padua, Padua, Italy

⁴Department of Surgery, Faculty of Health Sciences, University of Buea, Buea, Cameroon

⁵Department of Radiology, Logbaba District Hospital, Douala, Cameroon

⁶Department of Surgery and Specialties, Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon

Email: dr.fola@yahoo.com

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Abstract

Background: The goal of total knee arthroplasty (TKA) is the restoration of normal knee joint function. Very few studies have been carried out on TKA in sub-Saharan Africa, despite increasing demand. We report preliminary experience with TKA in this context. **Methods:** We carried out a prospective study from January 2015 to December 2024 in one specialized private hospital in Douala, Cameroon. Patients who underwent total knee arthroplasties (TKAs) were registered in a predefined computerized database containing data on demographics, presenting symptoms, past medical history, radiological findings, preoperative evaluation, operative procedure, postoperative morbidity, and follow-up. **Results:** We studied the records of 41 TKAs performed on 32 patients (10 males and 22 females; mean age, 64 years). All of our patients had primary osteoarthritis (OA). Lequesne's index of severity for OA was on average 14. Preoperative HKA angle ranged from 18° varus to -17° valgus. According to classifications, Kellgren and Lawrence's grade 3 (63.4%), AHLBÄCK grade IV (53.1%), and IWANO stage III (62.5%) were mostly found. TKA was performed bilaterally in 9 patients (28.1%). The Knee Society Score was on average 45/100 preoperatively and 80/100 postoperatively. There were no postoperative complications except for one sudden death on postoperative day 7. The mechanical axis of the limbs was corrected in 100%. **Conclusion:** When well protocolled, total knee arthroplasty can be performed with good results, even in under-medicalized settings.

Keywords

Total Knee Arthroplasty, Preliminary Experience, Cameroon, Sub-Saharan Africa

1. Introduction

Also known as knee replacement, knee arthroplasty is a surgical procedure aiming to replace the weight-bearing surfaces of the knee joint. Total knee arthroplasty (TKA) is among the most consistently successful surgeries in all medicine [1] [2]. By resurfacing the bones that meet at the knee joint, total knee replacement surgery relieves knee pain and increases knee function. The primary indication for TKA is pain. Secondary factors are knee instability and decreasing range of motion (ROM) or contracture development. Core indications of TKA include end-stage OA of the knee joint with severe pain and functional disability failing non-operative treatment, systemic rheumatic conditions like rheumatoid arthritis, inflammatory arthritis with joint destruction, fracture of the distal femur and/or proximal tibia that cannot be stabilized by standard fracture management techniques, traumatic arthritis, osteonecrosis, severe coronal deformity ($>15^\circ$ varus/valgus), or flexion contracture not amenable to osteotomy [3]-[5].

The most common articular disease, and cause of chronic knee pain and disability, is arthritis [6]. The prevalence of OA increases with age, as well as the functional consequences, which are more considerable in the elderly population. In Cameroon, as in Africa in general, the knee is the most frequent location of OA [7] [8]. Current contraindications of TKA include symptomatic bacteremia, active knee joint or local tissue infection or sepsis, remote (extra-articular) active ongoing infection, uncontrolled metabolic syndrome or chronic diseases, neuropathic arthropathy, untreated immunodeficiency such as in severe malnutrition, severe cases of vascular dysfunction, and active deep venous thrombosis (DVT) or pulmonary embolism [9] [10].

The history of TKA dates back to the mid to late 1800s. The earliest dates of implantation of artificial joints are variously reported as early as the mid-1880s to 1890 [11]. The evolution of TKA has been marked by four major eras: the era of experimentation between 1860 and 1970, the era of implant design and biomechanical standardization between 1970 and 2000, the rise of personalization and morphologic understanding between 1985 and 2020, and the modern era of perioperative and technological evolution starting in the early 2000s [12]. Themistocles Gluck is the pioneer of TKA. He designed the first modern type of total knee replacement and performed the very first knee replacement in May 1890 in Berlin. He presented a concept of surface replacement with the use of ivory components attached to the bone with cement made of colophony, pumice, and plaster of Paris [13]. He inserted a hinged ivory joint into the knee of a 17-year-old girl whose knee joint had been destroyed by tuberculosis. Unfortunately, neither the ivory nor the cement could withstand the constraints/forces applied to the knee, and infection became a major

problem. This design, which did not produce favorable results, was gradually replaced with metal implants in the 1930s. In the 1950s, modern hinged knee prostheses constraining out-of-plane movement emerged, allowing only flexion and extension, indicated for severe arthritis and ligamentous instability [12]. A new era of TKA began in the 1970s, with Gunston, who in 1971 designed a surface replacing prosthesis with a metal component articulating against a polyethylene component, and both components attached to the bone with bone cement made of polymethyl-methacrylate (PMMA). That was the first prosthesis considering the natural knee biomechanics [14]. Loosening of components, especially on the tibial side, was the major cause of high failure rates in knee arthroplasty. The 1980s were marked by the large popularity of modularity and mobile-bearing concepts, with metal-backed tibial components allowing polyethylene exchange and improving intraoperative flexibility. In the 1990s and 2000s, the standardization of implant geometries made it impossible to replicate natural anatomy, which subsequently led to the rise of the alignment philosophy. Nowadays, major advances in digital surgery are noticed, with Patient-Specific Instrumentation (PSI) utilizing preoperative 3D imaging (CT or MRI scans) to map out a patient's precise anatomy [15]. Robotic assistance facilitates the preparation of bone surfaces. These procedures require preoperative CT scans to plan the optimal component position based on sagittal, coronal, and rotational alignment. Robotic systems allow for 3D milling of the bone based on planning.

TKA has worldwide notoriety but is still performed frequently in high-income countries, and evidence supports that these procedures are cost-effective [16] [17]. The demand for TKA is increasing in Africa, but TKA remains relatively unaffordable for third-world settings, despite noticeable improvements in surgical techniques and equipment. In this context, very few studies have been conducted in sub-Saharan Africa [16]. In Cameroon, TKA represents a great challenge for surgeons because of the lack of appropriate infrastructure, surgical materials, supplies, and the absence of an adequate health coverage system for most of the population. To the best of our knowledge, very few studies have reported case series of total knee arthroplasties (TKAs) in Central Africa, such as in Cameroon. Hence, here we report a preliminary experience on TKA in a very resource-poor setting.

2. Materials and Methods

2.1. Patients

We carried out a 10-year prospective study from January 2015 to December 2024 in one private hospital in Douala, Cameroon. Patients who underwent TKAs were registered in a predefined computerized database containing data on demographics, presenting symptoms, past medical history, radiological findings, preoperative evaluation, operative procedures, postoperative morbidity, and follow-up. All patients were operated on by the same team.

2.2. Inclusion and Exclusion Criteria

We included in this study all patients with severe persistent pain, functional lim-

itation, radiographic evidence of structural joint damage, or failure of conservative treatment. Patients with active local or systemic infection, non-functional extensor mechanism, severe neurologic impairment, severe peripheral vascular disease, or uncontrolled medical comorbidities were excluded.

2.3. Preoperative Workup

Complete blood counts, renal function tests, serum electrolytes, HIV testing, coagulation profile, blood type, crossmatching, and cardiac function tests were performed depending on patients' clinical profiles. Patients were evaluated preoperatively using the Knee Society Score.

2.4. Procedure

Surgery was performed under combined spinal-epidural anesthesia, with morphine used as an adjuvant. Cefazolin was used for antibiotic prophylaxis (2 g intravenously), 30 minutes before surgery. Patients were positioned in the supine position, with the knee in flexion (**Figure 1**). We did not use a pneumatic tourniquet. The skin was prepared without hair removal. Chlorhexidine gluconate solutions were systematically used beginning the night before surgery. We used iodophor-in-alcohol solutions for scrub-and-paint. We did not use adherent plastic adhesive incision drapes. We used disposable non-woven drapes. We made an anterior midline incision beginning 6 cm proximal to the superior pole of the patella, extending over the patella midpoint, and ending at the medial border of the tibial tuberosity. Then, a medial arthrotomy was performed. Implant design varied in important ways to meet the needs of each patient. We selected the implant based on the patient's anatomy, degree of looseness of the knee, ROM, and planned sports activities.



Figure 1. Installation of the patient.

We used a fixed-bearing total knee non-constrained replacement system device consisting of a cobalt-chromium alloy (CoCr) femoral component, an ultra-high cross-linked polyethylene (UHMWPE) tibial insert, a cobalt-chromium alloy (CoCr) tibial tray with a titanium alloy keel extension, and an all-polyethylene patellar component. We used femur and tibia ancillaries size 3-6, with posterior stabilization. This device is indicated for cemented use, single-use only, and focuses on two main prin-

ciples (**Figure 2**): the first one is ligament isometry throughout the ROM by preserving the medial joint line, with a single-radius femoral design and medial referencing instrumentation. The second one is high rotational freedom on the tibial inserts and optimized sizing to allow patient-specific kinematics. TKAs were performed without resurfacing of the patella. The main steps were the follows:

- Preparation of bones, by removal of damaged cartilage surfaces at the ends of the femur and tibia, along with a small amount of underlying bone (**Figures 3-5**).
- Positioning of the metal implants, femoral and tibial components, using acrylic bone cement (**Figure 6**).
- Insertion of a spacer (**Figure 7**).

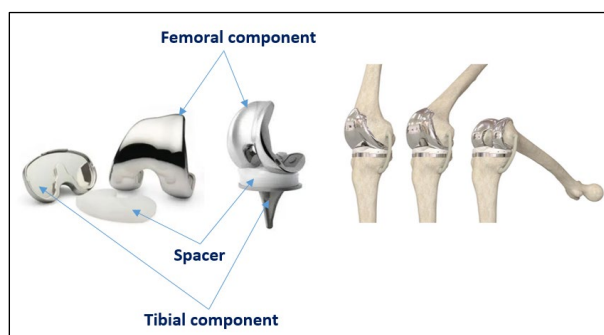


Figure 2. Device components, ensuring ligament isometry throughout the ROM, and rotational freedom on the tibial inserts.

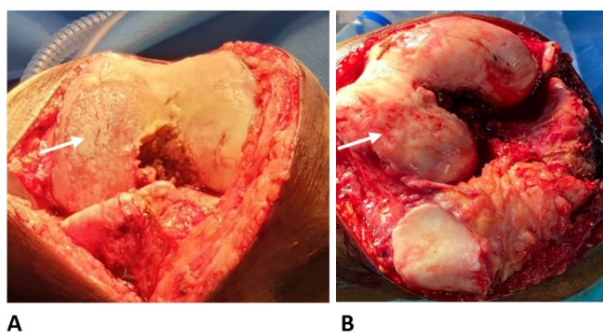


Figure 3. A. and B. Intraoperative picture showing erosion of the articular cartilage (white arrow), reflecting advanced degenerative arthropathy (the patella has been dislocated).

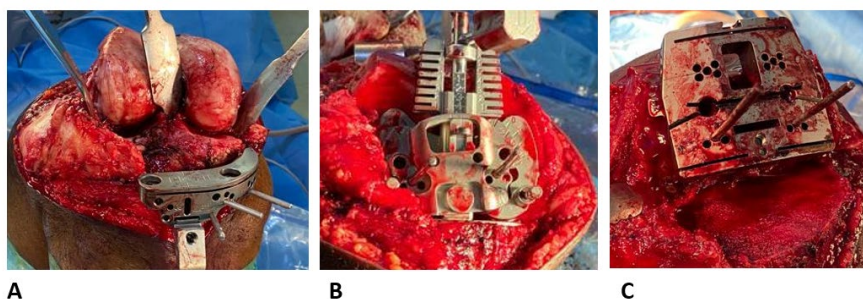


Figure 4. Preparation of bones; tibial cut ancillary (A), femoral cut ancillaries (B and C).

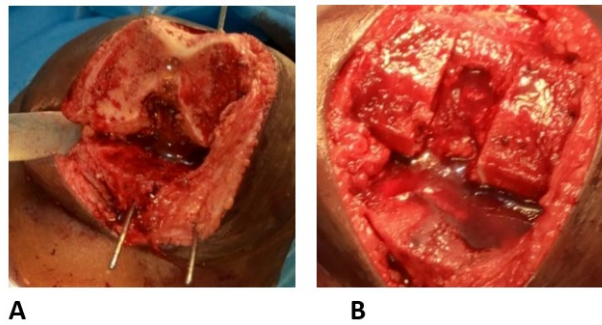
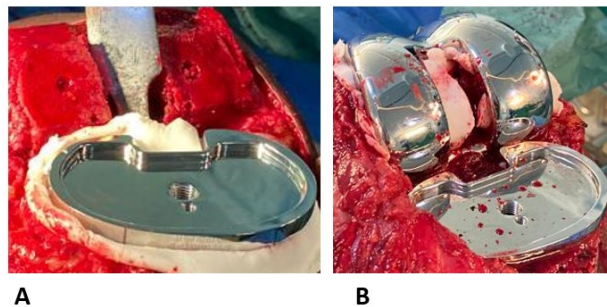


Figure 5. Preparation of bones (A and B). Tibial and femoral cartilages removed.



Fixation of the prosthesis was achieved with cement in all our patients.

Figure 6. Positioning of the metal implants, tibial (A) and femoral (B) components, using acrylic bone cement.

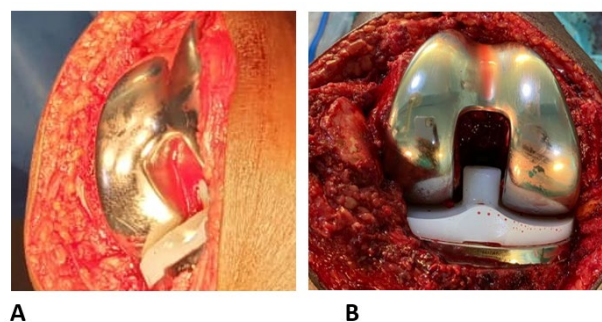


Figure 7. A. and B. Intraoperative view of knees, with prosthetic material in place. The femoral component is above the tibial component, with a spacer inserted between the two components (the patella has been dislocated).

Then, the stability of the implant and knee amplitudes was tested by classic maneuvers. We proceeded with an injection of a mixture of ropivacaine 200 mg (100 ml), ketorolac 30 mg (1 ml), and adrenaline 1 mg (1 ml), intracapsular and on the extensor apparatus. We introduced tranexamic acid 2.5 g (25 ml) intra-articularly, before the closure of the articular capsule, in order to reduce the postoperative bleeding risk. Closed suction drains were used in two cases with a high risk of postoperative bleeding.

2.5. Postoperative Management

All patients received standard postoperative care, including intravenous fluids, analgesics (intravenous paracetamol 1 g/8 h, intravenous tramadol 100 mg/8 h, and intravenous nefopam 20 mg/6~8 h; for 48 h, switched to oral paracetamol 1 g/6~8 h and oral tramadol 50 mg/6~8 h based on the pain Numeric Rating Scale), antibiotics (intravenous cefazolin 1 g/12 h for 48 hours), and 40 mg daily subcutaneous enoxaparin (switched to oral 10 mg daily rivaroxaban, by day three, for 45~60 days). This therapy was adapted to the deep venous thromboembolic disease risk. By day three, cefazolin was switched to oral cefuroxime 750 mg/8h for 7 days. We aggressively managed any postoperative pain. Cryotherapy was sometimes used locally around the skin incision in the early postoperative period as a painkiller. Physiotherapy was started early, by postoperative day one. Physiotherapy consisted of isometric contractions of the muscles of the thigh and the leg, passive then active mobilization of the knee, then progressively walking on a flat surface using a walker, then canes, and finally the ascent and descent of stairs.

Autonomy for walking was obtained on average after 3 weeks (2 - 4 weeks). Patients were able to walk by postoperative day one. When used, drains were removed by postoperative day 2. Patients were discharged on postoperative day 5. Skin sutures or staples were removed on postoperative day fourteen. After discharge, close follow-up was performed twice a week for two weeks, weekly for six weeks, and then monthly. Patients were evaluated postoperatively using a Pain Scale and Standard Range of Motion measurement. The study was approved by the ethics committee of the National Ethics Committee of Cameroon and conformed to the tenets of the Declaration of Helsinki. Written informed consent was obtained from patients whose images are enclosed. Data analysis was performed using Epi Info 7 (Center for Disease Control and Prevention, Atlanta, GA).

3. Results

We studied the records of 41 TKAs performed on 32 patients (10 males and 22 females, sex ratio, 0.4; mean age, 64 years; range: 48 - 92 years). Eighty-two percent of our patients were aged more than 60 years. OA was the indication for TKA in all our patients. All of our patients had primary OA. TKA was performed bilaterally in 9 patients (28.1%); simultaneously in a single procedure in 3 patients and in two operations staged 3 months apart in 6 patients. Twenty-four TKAs (58.5%) were performed on the right knee. Lequesne's index of severity for OA was on average 14 (range: 10 - 22). Two patients had a normal body mass index. Six patients were overweight and 24 patients (75%) were obese, with an average body mass index of 37 kg/m² (range: 32 - 45 kg/m²). Controlled Diabetes Mellitus was found in 4 patients (12.5%) and controlled hypertension in 11 patients (34.3%). Patients consulted on average 4 years after the beginning of symptoms (range: 2 - 7 years). All of our patients consulted at very advanced stages of OA (**Figures 8-9**). Patients were operated on average 4 months after the consultation (range: 3 - 6 months). According to Kellgren and Lawrence's (KL) grading system of OA, of

the 41 knees operated on, 26 (63.4%) were classified as grade 3 and 15 (36.6%) as grade 4. The preoperative Hip-Knee-Ankle (HKA) angle ranged from 18° varus to -17° valgus (average 10° varus to -5° valgus). According to the AHLBÄCK classification, grade III was found in 8 patients (25%), grade IV in 17 patients (53.1%), and grade V in 7 patients (21.9%). Femoro-patellar loss of articular cartilage was evaluated by the IWANO classification: stage II was found in 7 patients (21.9%), stage III in 20 patients (62.5%), and stage IV in 5 patients (15.6%).



Figure 8. Severe joint space narrowing involving all knee compartments of both knees, associated with marked sclerosis of joint surfaces and bony spurs, in keeping with severe bilateral degenerative joint disease in a 52-year-old patient.



Figure 9. A. and B. Right knee AP and lateral view x-rays showing severe knee osteoarthritis with marked joint space narrowing, bony spurs, and sclerosis of the joint surfaces in a 50-year-old patient.

The medial femorotibial joint compartment was more affected (25 cases; 78.1%) and often more severe compared to the lateral. The Knee Society Score (function) was, on average, 45/100 (range: 15 - 60/100) preoperatively and 80/100 (range: 75 - 90/100) postoperatively. The mean surgical time was 55 minutes (range: 50 - 70 min) for unilateral TKA (UTKA) and 100 min (range: 90 - 120 min) for bilateral TKA (BiTKA). The mean intra-operative blood loss was 250 ml (range: 200 - 400 ml), and the average postoperative drainage volume was 125 ml (range: 80 - 150

ml) in single-side TKA. Closed suction drains were used in two patients (6.2%) with increased operative time in order to reduce the risk of postoperative intra-articular hematoma and thus infectious risk. Postoperative radiographs showed coronal and sagittal implant alignment, as well as fixation interface integrity (**Figures 10-12**). The mechanical axis of the limbs was corrected at 100%.

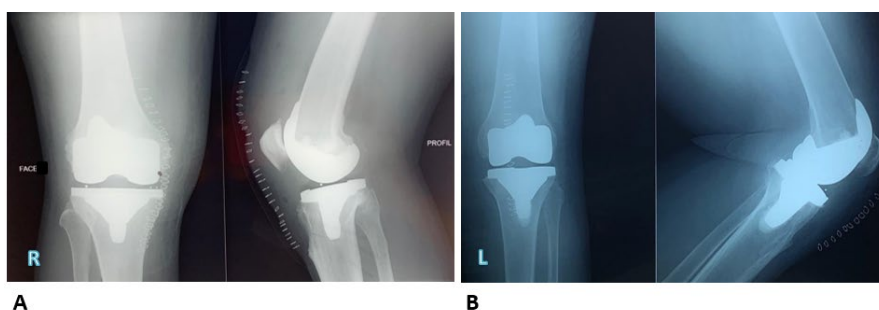


Figure 10. Postoperative radiograph of right and left total knee joint replacement with the symmetric reestablishment of joint space. The femoral and tibial components are perpendicular to the long femoral and tibial axes, respectively. There are no signs of infection, prosthesis loosening, failure, or fracture. Skin clips are shown.



Figure 11. Postoperative radiograph of bilateral total knee joint replacement with drains projecting in soft tissues and symmetric reestablishment of joint space. The femoral and tibial components are perpendicular to the long femoral and tibial axes, respectively. There are no signs of infection, prosthesis loosening, failure, or fracture.

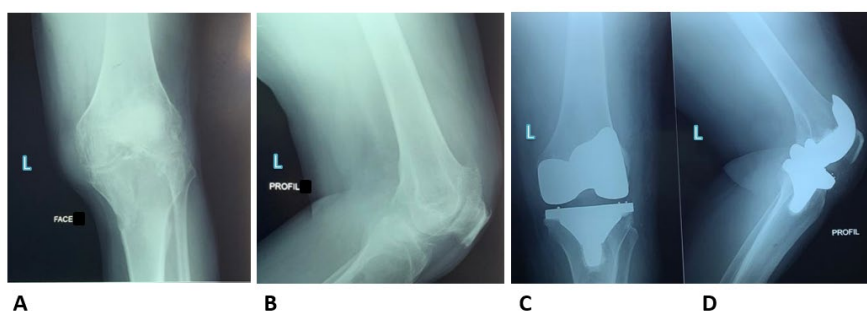


Figure 12. Severe degenerative joint disease of the left knee (A, B), successfully managed by TKA (C, D).

The postoperative pain was assessed using the Numeric Rating Scale (NRS). Patients reached standard functional abilities (walking at least 50 meters and climbing/descending stairs) at a mean length of 8 days without medication-related complications. The mean NRS during the time of stay was 1 (range: 0 - 2). In fact, the postoperative pain was graded as NRS 0 - 2 in 26 patients (81.2%). Cryotherapy was very helpful locally for pain induced by physiotherapy. After discharge, patients were comfortable regarding postoperative pain.

The ROM was assessed in the postoperative period. Full knee extension was achieved postoperatively in all patients. Between the fourth and the sixth week, knee flexion was on average 110° (100° - 120°). The gradual recovery of knee function was achieved with appropriate postoperative physiotherapy provided by outpatient and in-home rehabilitation services in each case. Psychological support was systematically offered to all our patients, from the preoperative period through the postoperative period, thus covering the entire follow-up period.

We reported a sudden death on postoperative day 7. It was the case of a 92-year-old obese (BMI 31.8 kg/m²) male patient, with a past history of controlled grade 3 hypertension, classified as ASA3, who underwent bilateral simultaneous TKA. It was a case of saddle pulmonary embolism confirmed post-mortem via autopsy. The specific mortality rate was thus 3.1%.

The average postoperative follow-up period of our patients was 5 years (1 - 11 years). Patients were carefully educated about living with their prostheses. In our follow-up period, there were no cases of periprosthetic joint infection, ligament instability, residual patellar pain, prosthesis loosening, failure, or fracture. TKAs considerably improved patients' quality of life.

4. Discussion

OA is the most common cause of chronic pain and disability in Cameroon as worldwide [18]. The longer life expectancy is, the higher the age-standardized prevalence and incidence rates of OA are. Countries with a high Socio-demographic Index (SDI) are facing a disproportionately high burden of knee OA. Countries in the High-SDI quintile report the highest age-standardized incidence rates, age-standardized prevalence rates, and disability-adjusted life years (DALYs) per 100,000 people [19]. Advanced OA, such as end stage OA, is a common indication for TKA. The medial femorotibial joint compartment is more commonly affected and often more severe compared to the lateral [20]. Osteoarthritis of the knee, which predominates in the internal femorotibial and femoropatellar compartments, with sometimes severe lesions, evokes a phenotype specific to Cameroon [7].

Obesity can contribute to the development and severity of symptomatic knee arthritis. High body mass index (BMI $\geq$ 25 kg/m²) is an attributable risk factor of OA [19]. A BMI of 45 to 50 or greater should be considered a contraindication to TKA, and patients should be counseled about the importance of weight loss as

treatment for their life-threatening condition [21]. Patients usually consult at advanced stages of OA, and sometimes with extremely severe handicaps (Lequesne index 12 - 22), because of the scarcity of rheumatologists and specialized care centers, some popular practices that consist of the care of joint pain by traditional massage therapists, and finally, the still high costs of hospital fees for many patients in low-income settings.

The goal of TKA is restoration of normal knee joint function. TKA is the most important gold standard treatment of advanced knee osteoarthritis is TKA [22]. We used non-constrained or unconstrained implants. There are three basic types of TKA: totally constrained, semi-constrained, and unconstrained. The degree of constraint incorporated into an artificial joint reflects the level of stability provided by the device. In a constrained joint, the femoral component is physically secured to the tibial component and requires no ligamentous or soft-tissue support. A semi-constrained TKA consists of two separate components that slide over one another, but the physical characteristics of the tibial component prevent excessive femoral slippage. An unconstrained TKA relies entirely on the body's ligaments and soft tissues to ensure joint stability. Semi-constrained and unconstrained TKA are the most commonly used. In general, unconstrained TKA have been found to provide the ROM and gait that most closely resemble normal function [23]. There is no consensus regarding the length of hospital stay, the rehabilitation protocol, preoperative threshold values for varus and valgus, or the management of cases involving an absent anterior cruciate ligament or an anterior osteotomy [24].

Fixation of the prosthesis was achieved with cement in all of our patients. Fixation of the prosthesis can be achieved with cement, may be cementless, or may be a hybrid of the two. Cementless implants were developed in the 1980s due to concerns that the cement might lose its effectiveness over time. The first generation of cementless implants was designed with porous, serrated, or grooved surfaces to promote bone growth around the implant [25]. The first generation of these prostheses failed at a higher rate than their cemented counterparts, and they have since been revised. Newer versions of cementless prostheses continue to carry an increased risk of aseptic loosening within five years, compared with their cemented counterparts [26].

Patellar resurfacing is optional during TKA. The two main complications associated with not performing patellar resurfacing are anterior knee pain and the possible need for secondary resurfacing. Level 1 evidence supports primary TKA with patellar resurfacing over no resurfacing, as resurfacing is associated with a reduced risk of anterior knee pain, revision surgery, and complications; however, passive ROM is similar between the groups with and without resurfacing [27]. TKAs without patellar resurfacing can give excellent results in the African context [28]. We performed TKAs without patellar resurfacing, with no case of postoperative anterior knee pain in our follow-up period.

TKAs are known to be painful surgical procedures. Multimodal analgesia yields excellent results. Morphine administered as part of a combined spinal-epidural

anesthesia ensured patient comfort for at least 24 hours after surgery, in combination with intra-articular administration of ropivacaine and ketorolac. Patients were then relieved with oral acetaminophen and tramadol. Intra-articular administration of ropivacaine is effective in reducing postoperative pain, thereby limiting the need for systemic analgesia. Intra-articular ketorolac and corticosteroid injections produce the same pain relief and functional improvement [29]. Very good control of pain with the perioperative anesthetic protocol and pain treatment protocol in use was obtained.

We did not use tourniquets. We introduced tranexamic acid (TXA) intra-articularly, before the closure of the articular capsule, in order to reduce the risk of postoperative bleeding. Over the past decade, it has been shown that the widespread use of TXA, an inexpensive antifibrinolytic agent, can significantly reduce postoperative blood loss [30]. The use of TXA has been shown to be superior to that of a tourniquet, as it was associated with less occult blood loss, less postoperative knee pain, a lower rate of postoperative knee swelling, lower levels of inflammatory biomarkers, better early knee function, and even greater early patient satisfaction [31].

The use of closed-suction drains after TKA does not appear to yield better outcomes than not using drains for most outcome measures; surgeons may therefore wish to reconsider the routine use of this empirical practice until new evidence becomes available [32]. We used drains in 2 cases of advanced OA in male patients with increased operative time. The main factors influencing perioperative blood loss, occult blood loss, and blood transfusion requirements during primary cemented total TKA are gender, duration of the procedure, and tourniquet time [33]. Prolonged surgery time is associated with increased intraoperative blood loss [34]. There is no rationale for the use of a drain after primary TKA. It has been observed that the drain hinders postoperative physiotherapy and nursing care, thereby delaying mobilization, which further prolongs the length of the hospital stay [35].

We did not register any case of prosthetic joint infection (PJI) during our follow-up period. Preventive measures implemented in the operating room aimed to reduce the staff/patient-derived bacterial load. Current guidelines for TKA most often recommend cefazolin or cefuroxime as first-line antibiotics [36]. Then, vancomycin or clindamycin is recommended for those with suspected or confirmed hypersensitivity to cefazolin and cefuroxime. Skin preparation of the surgical site is an essential component of the prevention of PJI, as it significantly reduces the bacterial load originating from the skin. Evidence regarding routine hair removal is inconclusive. Hair removal may actually increase the risk of surgical site infections (SSIs) following TKA [37]. Current evidence suggests the use of alcohol-based solutions for preoperative cleansing, with an emphasis on the use of chlorhexidine gluconate solutions starting the evening before surgery [38]. The use of iodophore-in-alcohol solutions is recommended over the traditional technique of scrubbing and then applying a layer of the product, in order to improve drape adhesion to the skin and ensure enhanced and longer-lasting antimicrobial activ-

ity [39]. Disposable non-woven drapes are superior to reusable woven cotton/linen drapes in resisting bacterial penetration. Finally, the use of adhesive plastic incision drapes to prevent postoperative surgical site infections is not considered necessary in orthopedic surgery [40]. Evidence suggests that the use of extended 7-day postoperative oral antibiotic prophylaxis results in a significant reduction in infection rates at one year among patients at high risk for infection [41].

We registered a sudden death on postoperative day 7. It was the case of a 92-year-old obese (BMI 31.8 kg/m²) male patient, with a past history of controlled grade 3 hypertension, who underwent bilateral simultaneous TKA (BSiTKA). The cause of death was a saddle pulmonary embolism. It has been shown that BSiTKA increases both mortality and complications, including pulmonary complications [42]. Compared with UTKA, BSiTKA is generally associated with a higher risk of complications and a longer hospital stay, while functional outcomes, joint ROM, and health-related quality of life appear to be comparable between the two groups [43]. Postoperative medical complications following TKA are associated with a significantly increased risk of recurrence of these complications after staged arthroplasty of the contralateral knee [44]. In general, in selected patients (ASA classes 1 and 2), bilateral TKA performed in a single procedure does not result in serious complications [45]. Bilateral total knee arthroplasty may not be the safest option, but it offers potential benefits, including a reduction in length of stay, rehabilitation time, and costs. Relative contraindications to TKA include morbid obesity (BMI greater than 40) and age less than 50 years. Patients with relative contraindications should exhaust all nonsurgical treatment options. Significantly higher rates of wound complications, infections, thromboembolism, and implant failure have been reported in obese patients [46]. Patients with a high BMI, older patients, women, and those with cardiopulmonary disease should be carefully screened before undergoing BSiTKA. It has been demonstrated that oral rivaroxaban at a dose of 10 mg once daily for 10 to 14 days is significantly more effective than subcutaneous enoxaparin at a dose of 30 mg every 12 hours for the prevention of venous thromboembolism following total knee arthroplasty. Rivaroxaban should hence be considered as a more effective alternative for thromboprophylaxis in orthopedic surgery [47]. This could reignite the debate over adjusting anticoagulant doses in the context of major orthopedic surgery, particularly in elderly patients with a history of cardiovascular disease.

TKAs considerably improved patients' comfort and knee function. After TKA, at the very least 100° - 110° of knee flexion is needed to perform basic normal activities of daily living such as sitting, walking, and stair climbing. The mechanical axis of the limbs was corrected at 100%. Mechanical alignment is an anatomical alignment technique first introduced in the 1980s by Hungerford and Krackow as a compromise aimed at improving the longevity of early TKA designs. It involves achieving an oblique joint line (2° to 3° valgus) relative to the mechanical axis of the limb. At the time, it was believed that this technique allowed for better load distribution on the tibial component and improved the biomechanics

of the patella [48]. The kinematic alignment technique involves a ‘true knee re-surfacing’ (fully anatomical positioning of total knee replacement prostheses). This is a customized technique, known as ‘ligament-preserving’, which aims to restore the limb’s alignment and stability, as well as its original joint line—as they were before the onset of arthritis—which vary considerably from one individual to another [49]. One of the key factors in ensuring good outcomes for patients following knee surgery, such as TKA, is achieving proper knee alignment. One of the fundamental principles of total knee arthroplasty (TKA) is that postoperative limb alignment—or an HKA angle within $0^\circ \pm 3^\circ$ —promotes the longevity of the implant [48]. Good education of operated patients reduces the risk of accidents and incidents. Modern TKA devices generally last 15 to 25 years; recent long-term studies show that approximately 82% to 90% of implants remain functional after 20 years [50].

TKA represents a financial challenge in low-income settings. Patients were operated on an average of 4 months after the consultation (3 - 6 months), the time needed to be financially prepared. The prostheses are not manufactured in Cameroon and are still imported from overseas, increasing the procedure fees. The overall cost is on average 8300 US dollars (6600 - 10,000 US dollars) for unilateral TKA and on average 13,200 US dollars (11,750 - 14,700 US dollars) for bilateral TKA. This surgical procedure is very expensive in a low-income country like ours, where the minimum wage is 70 US dollars. Efforts must be made by the government to match supply and demand. Moreover, the fear of surgery, of possible bodily injuries or scars, is common in the African traditional mentality. Thus, many patients eligible for surgery do not consult or refuse to be operated on. The changes in body image induced by surgery require psychological support for patients [51].

5. Conclusion

Typical total knee replacement surgery is feasible in low-income settings. With well-established protocols, scientific rigor, and a multidisciplinary approach, TKAs can be performed with good results, even in an under-medicalized context. There is a real need to empower regional hospitals or to develop specialized centers in TKAs, as well as to train qualified personnel, including specialized surgical teams, prosthetists, physiotherapists, and psychologists. Early diagnosis and management of knee OA would prevent progression to surgical treatment, which is still not very accessible in Cameroon.

Author Contributions

The patients were admitted and operated under the care of Martin Tsemzang Sopjio and Olivier Fola Kopong, who conceived the study. Dominique Djomo Tamchom, Frank Blaise Djoukeng, and Forbang Ako collected data. From there, the paper was written. Marcelin Ngowe Ngowe reviewed the paper and gave the final approval.

Conflicts of Interest

The authors declare no conflict of interest.

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