

Research Article

Ultrasound-Guided Axillary Brachial Plexus Block in Patients with End-Stage Kidney Disease at Brazzaville University Teaching Hospital

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Abstract

Aim: to describe the anaesthetic management of patients with End-Stage Kidney Disease (ESKD) undergoing surgical procedures to create Arterio-Veinous Fistula (AVF) under ultrasound-guided Axillary Brachial Plexus Block (ABPB) in a campaign offering free AVF creation at Brazzaville University Teaching Hospital (CHUB). **Patients and methods:** The study was a descriptive, cross-sectional, single-centre study conducted from 1st to 18th July 2025 in the operating room at the CHUB. After obtaining their written consent, we had included patients with ESKD underwent AVF creation under ultrasound-guided ABPB in a free treatment programme. The variables socio-epidemiological, related to ESKD, related to haemodialysis, clinical, biological, therapeutic, related to ABPB and related to the AVF were studied Microsoft Excel 2021. **Results:** 40 patients were involved. The median age was 48 years [41-63 years]. The sex ratio was 3: 1, and 37.5% of patients had no source of income. ESKD had been diagnosed for a median of 6 months [3-12 months]. Haemodialysis (95%) was carried out using a femoral catheter (52.6%) and 80% of patients (n=32) had three sessions per week. Comorbidities (100%) were dominated by hypertension (97.5%). Long-term treatment (92.5%) combined an antihypertensive medication (97.3%) in a dual-therapy (41.7%) with amlodipine (69.2%). In anaesthesia consultation, an imbalance in arterial pressures (57.5%), a normal clinical examination (42.5%) and ASA 3 (100%) were predominant. The median duration of the ultrasound-guided ABPB was 11 minutes [10-12 minutes]. The procedure took between 11 and 15 minutes for 52.5% of patients. Bupivacaine 2 mg/ml (100%) was used with a median volume injected of 22 ml [20-25 ml] (range: 15-32 ml) and in 50% of cases, the volume injected was between 10 and 20 ml. The median time to onset of sensory block was 3 minutes [3-5 minutes] and in 87.5% of cases the time to onset was less than five minutes. Motor block was complete in all patients (100%). All ABPB procedures were 'successful' (100%). No intraoperative anaesthetic complications were recorded. The sensory block had a median duration of 250 minutes [217.5-280 minutes]. The AVFs were proximal (75%). The median duration of AVF surgery was 135 minutes [80-180 minutes] with 95% of success. All patients

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Received: 2 October 2026; **Accepted:** 13 October 2026; **Published:** 29 October 2026



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(100%) were transferred to POCU following surgery. *Conclusion:* Ultrasound-guided ABPB enabled the surgical creation of AVF in 40 patients with ESKD at the CHUB. The success rate for ABPB was 100% and that for AVF was 95%.

Keywords

End-Stage Kidney Disease, Ultrasound-guided Axillary Brachial Plexus Block, Arteriovenous Fistula, Brazzaville

1. Introduction

Chronic kidney disease (CKD) is defined as kidney damage or a glomerular filtration rate of less than 60 ml/min/1.73 m for at least three months, regardless of the cause [1]. Globally, the prevalence of CKD prevalence is estimated at around 850 million cases, with approximately 4 million people requiring renal replacement therapy (RRT) [2]. The prevalence of CKD in sub-Saharan Africa was 18.0% in 2025 [3]. By 2050, CKD is expected to become the fifth leading underlying cause of death worldwide [1]. In the Republic of Congo, CKD accounted for 52.1% of admissions to the department of nephrology and dialysis at the Brazzaville University Teaching Hospital (CHUB) in 2018 [4]. CKD progresses through five stages, ranging from mild impairment (stage 1) to end-stage kidney disease (ESKD) (stage 5), which requires either RRT or a transplant [5].

Haemodialysis (HD) is the best-known and most commonly used method of RRT. To undergo this treatment, the patient must have optimal vascular access: an arteriovenous fistula (AVF), arteriovenous grafts or central venous catheters [6]. In 2021, the Republic of Congo had 93 patients with CKD undergoing HD, 43% of whom had an AVF [7]. Surgery to create a AVF can be carried out on an outpatient basis or as an inpatient procedure, depending on the complexity of the case, the patient's comorbidities and the type of anaesthesia used [6]. Patients with CKD are at high risk of perioperative complications (cardiovascular and haemorrhagic complications, fluid and electrolyte imbalances, acute kidney injury). Furthermore, CKD leads to pharmacokinetic and pharmacodynamic changes that affect the absorption, metabolism and clearance of drugs, thereby complicating anaesthetic management [5]. General anaesthesia (GA), regional anaesthesia (RA) and local anaesthetic (LA) infiltration are three anaesthetic techniques used for AVF surgery. GA carries significant cardiorespiratory risks, particularly in patients with CKD, in whom physiological disturbances induced by GA may outweigh its potential intraoperative benefits [8]. RA avoids all risks associated with GA in patients with CKD [5], and peripheral nerve blocks (PNBs) induce peripheral vasodilation, which may improve intraoperative blood flow [8]. Indeed, the axillary brachial plexus block (ABPB) has a significant vasodilatory effect which could facilitate the creation of AVF [9], not to mention its post-operative analgesic effect. In the Republic of Congo, ABPB accounted for 60% of PNBs of the brachial plexus at the CHUB in 2022 [10]. The aim of this

study was to describe the anaesthetic management of patients with ESKD undergoing surgical procedures to create AVFs under ultrasound-guided ABPB in a campaign offering free AVF creation at CHUB.

2. Patients and Methods

The study was a descriptive, cross-sectional, single-centre study conducted from 1st to 18th July 2025 in the operating room at the CHUB. Our study population consisted of patients with ESKD treated at the Centre of Chronic Kidney Disease Treatment (CTIR). After obtaining their written consent, we had included patients with ESKD underwent AVF creation under ultrasound-guided ABPB in a free treatment programme. Patients with CKD, aged 18 years or over, who were being and who consented to take part in the study were included. The AVF was created by the Cardiovascular and Thoracic Surgery Unit of the Department of Polyvalent Surgery at the CHUB. Patients under 18 years, patients who had not signed an informed consent form and patients who underwent GA following failure of ultrasound-guided ABPB were not included.

The CHUB is a Level III healthcare facility in the Republic of Congo with a current capacity of 876 beds spread across various departments. These include the operating room and the department of polyvalent surgery, which comprises a cardiovascular and thoracic surgery unit. The CHUB's operating room comprises nine rooms for elective surgery, two rooms for emergency surgery and two post-operative care units (POCUs): one for elective surgery and another for emergency surgery. The POCU for elective surgery is equipped with six beds, each fitted with four multi-parameter monitors: non-invasive blood pressure (NIBP), peripheral oxygen saturation (SpO₂), electrocardiograph (ECG), three ventilators, three electric suction units, a defibrillator, an ultrasound machine 'KONTRON IMAGIC AGILE®', an intubation tray, and an emergency tray with emergency drugs but without Intralipid.

Located within the grounds of the CHUB, the CTIR is the first public centre in Brazzaville dedicated exclusively to the outpatient and multidisciplinary management of CKD. It is headed by a nephrologist, assisted by four (4) other nephrologists and two (2) general practitioners. The healthcare team

also includes a paramedical team comprising 30 state-registered nurses, a technical engineer and a biomedical technician. The centre is equipped with 25 haemodialysis machines spread across two (2) treatment rooms - with 18 machines in one room and 6 in the other - as well as an emergency room, a biomedical analysis laboratory and a water treatment room. Patients with ESKD were selected by nephrologists and then referred for a consultation with a vascular surgeon. Following a clinical examination and a Doppler ultrasound scan of both upper limbs, the vascular surgeon referred the patient to the anaesthesiologist for a consultation. The anaesthesia consultation took place at least 12 hours before admission to the operating room.

During the study period, the CHUB Anaesthesia team comprised five anaesthesiologist and 24 anaesthesia nurses. Ultrasound-guided axillary blocks were performed in the Pre-Anaesthesia Unit by the anaesthesia technician coordinating day-time anaesthetic care in the operating theatre, assisted by the paramedical team. All patients underwent a pre-anaesthetic assessment at least one hour before the procedure. On admission to the POCU, a peripheral venous line was inserted in the upper limb opposite to the one affected by the AVF. Monitoring was systematic (NIBP, ECG, respiratory rate, SpO₂). Patients were positioned supine, with the affected upper limb abducted to approximately 90 degrees, the elbow flexed and the head resting on a pillow. After the surgeon had performed surgical hand washing, donned sterile gloves and positioned the patient, the ultrasound machine was switched on. The ultrasound probe, coated with ultrasound gel, was then placed inside a sterile glove. It was then positioned in the axillary fossa, at the base of the arm affected by AVF. ABPB procedures were performed using a 12-15 Hz linear probe, employing an in-plane technique, with a B. Braun Stimuplex® Ultra 0.7 × 80 mm 22G needle. ABPB procedures were performed via an anterior approach, using the perineural technique [11]. Following ultrasound localisation of the nerves, the needle was inserted laterally to the probe and guided under ultrasound until it reached the targeted nerve structures. Once each nerve had been individually identified, a negative aspiration test was mandatory before injecting an isobaric bupivacaine solution at 2 mg/ml around each nerve in turn: musculocutaneous, median, ulnar, radial and lateral cutaneous nerves of the arm, using a perineural approach. The volume administered was determined by the practitioner at the time of the procedure. No adjuvants were used.

The procedure time was defined as the time elapsed between the ultrasound localisation of the nerves, the ultrasound-guided advancement of the needle and the perineural injection of the LA. The onset time was defined as the time elapsed before the onset of sensory block in the distribution areas of all blocked nerves. The block was recorded as a 'success' if all these areas were anaesthetised, with the disappearance of thermal and pain sensation. The block was recorded as a 'failure' if, 30 minutes after the nerve block had been per-

formed, certain nerve areas still retained thermal and pain sensation. In the latter case, general anaesthesia was administered to ensure the surgical procedure could be carried out. Motor block was assessed for 30 minutes using voluntary motor response and was graded on a two-point scale: 'complete' motor block in the presence of total paralysis, or 'incomplete' motor block in the presence of paresis of the limb. The surgery was considered a 'success' if a 'thrill' was detected on the AVF at the end of the procedure. The absence of a 'thrill' was defined as surgical failure. All patients received 1.5 g of cefuroxime administered by intravenous infusion at least 30 minutes before the start of surgery.

Data were collected using a standardised paper-based questionnaire. The main sources of information were the CTIR registers, face-to-face interviews with patients, anaesthesia records, operating room registers, and medical records from the Polyvalent surgery department.

The variables studied were socio-epidemiological (age, sex, comorbidities and source of income), related to ESKD (type, duration of the condition), related to haemodialysis (weekly frequency, catheter location), clinical (body mass index "BMI", blood pressure control, American Society of Anesthesiologists "ASA" classification), biological (complete blood count and prothrombin level), therapeutic (long-term treatments), related to ABPB (volume of local anaesthetic injected, duration of procedure, time to onset of sensory block, duration of sensory block, incidents, complications, outcome) and related to the AVF (type of AVF, location, presence of a thrill, duration of surgery). Microsoft Excel 2021 was used to create the database, perform statistical analysis of the data and produce the graphs. Quantitative variables were expressed as mean ± standard deviation or as median (quartiles), and qualitative variables were expressed as percentages. Patient anonymity and data confidentiality were maintained.

3. Results

The study involved 40 patients.

The median age was 48 years [41-63 years] (range: 15 to 73 years). The age group of 45-64 years accounted for 40% of patients (n=16) and 22.5% of patients (n=9) were aged at least 65 years. The sex ratio was 3: 1, and 37.5% of patients had no source of income.

ESKD had been diagnosed for a median of 6 months [3-12 months] (range: 1 and 72 months) and, in 95% of patients (n = 38), it had been diagnosed less than 24 months previously. Hypertensive nephropathy was present in 95% of patients (n = 38). Haemodialysis was underway in 38 patients (95%), and 2 patients (5%) were due to commence haemodialysis sessions once their AVF had matured. Of the 38 patients already on haemodialysis, 20 (52.6%) had a femoral catheter and 18 (47.4%) had a jugular catheter. The average weekly frequency of haemodialysis was 2.9±0.4 sessions per week, and 80% of patients (n=32) had three sessions per week.

All patients (100%) had a comorbidity associated with

ESKD. Hypertension affected 97.5% of patients ($n=39$), with a median duration of diagnosis of 48 months [24-60 months] (range: 1 to 528 months). Diabetes mellitus was present in 32.5% of patients ($n=13$), with a median duration of diagnosis of 144 months [57-183 months] (range: 12 to 468 months). [Table 1](#) presents epidemiological characteristics, those related to ESKD, and patients' comorbidities.

Long-term treatment was being administered to 37 patients (92.5%): 36 patients (97.3%) were taking antihypertensive medication, six patients (16.2%) were taking medication for diabetes mellitus, and one patient (2.7%) was on anticoagulant therapy. Antihypertensive treatment consisted of monotherapy in 8 patients (22.2%), dual-therapy in 15 patients (41.7%), triple-drug therapy in 11 patients (30.6%) and quadruple-therapy in two patients (5.5%). Amlodipine was prescribed to 69.2% of hypertensive patients ($n=27$). The antihypertensive treatments for the patients are shown in [Table 2](#). Insulin was prescribed to three diabetic patients (3/6) and oral antidiabetic agents to the other three diabetic patients (3/6).

At the anaesthesia consultation, 5% of patients ($n=2$) had a BMI <18 kg/m², 70% ($n=28$) had a BMI between 18 and 24.5 kg/m² and 25% ($n=10$) had a BMI between 25 and 29.9 kg/m². An imbalance in arterial pressures was found in 57.5% of patients ($n=23$), and the clinical examination was unremarkable in 42.5% of patients ($n=17$). The mean haemoglobin level was 9.5 ± 1.4 g/dL (range: 6.7-12.1 g/dL), and 85% of patients ($n=34$) had a haemoglobin level below 11 g/dL. Four patients (10.2%) had a platelet count below 150 G/L. The prothrombin time was below 70% in one patient (2.5 per cent). All patients were classified as ASA 3 (100%).

An ultrasound-guided ABPB was performed on all patients. There were 30 left-sided ABPB (90%) and 10 right-sided (10%). The median duration of the ABPB was 11 minutes [10-12 minutes] (range: 6 to 14 minutes). In 52.5% of cases (21 patients), the procedure took between 11 and 15 minutes. For all ABPBs, the local anaesthetic (LA) used was bupivacaine 2 mg/ml. The median volume of LA injected was 22 ml [20-25 ml] (range: 15-32 ml). In 50% of cases (20 patients), the volume injected was between 10 and 20 ml. The median time to onset of sensory block was 3 minutes [3-5 minutes] (range: 2 and 30 minutes) and in 87.5% of cases (35 patients) the time to onset was less than five minutes. Motor block was complete in all patients (100%). All ABPB procedures were 'successful' (100%). Three patients (7.5%) underwent a vascular puncture without intravascular injection of the LA. No intraoperative anaesthetic complications were recorded. The sensory block had a median duration of 250 minutes [217.5-280 minutes] (range: 150-360 minutes). In 72.5% of cases, the duration of the sensory block was between 201 and 300 minutes. [Table 3](#) presents the characteristics of the ABPB procedures performed.

The AVFs were proximal (brachio basilic or brachiocephalic) in 30 patients (75%) and distal (radio cerebral) in 10 patients (25%). AVFs were created on the left upper limb in 90% of patients (36 patients) and on the right upper limb in

10% of patients (4 patients). AVFs were successfully created in 38 patients (95%), and we recorded one failure in 2 patients (5%). The median duration of surgery was 135 minutes [80-180 minutes] (range: 50 to 300 minutes). It lasted less than 60 minutes in one patient (2.5%), between 60 and 120 minutes in 18 patients (45%), and more than 120 minutes in 21 patients (52.5%). All patients (100%) were transferred to POCU following surgery. After 2 hours of monitoring in POCU, they were admitted in the Department of polyvalent surgery.

4. Discussion

This was a cross-sectional, single-centre, descriptive study. As a single-centre study, it does not provide information on the practice of ABPB in other hospitals in Brazzaville. We did not carry out any post-operative follow-up to detect nerve damage, which clinical manifestations may occur sometime after surgery. We did not assess the cost of anaesthetic care, even though the 'free campaign' scheme covers the full cost of treatment usually borne by patients and their families in our country, which lacks a public health insurance system. Despite its limitations, our study has the merit of providing national and sub-regional data on ABPB in a group of patients at very high anaesthetic risk in a developing country.

During the 18-day free period of the campaign, 40 patients underwent an ABPB. This is an exceptional situation, as throughout the whole of 2022, 40 brachial plexus blocks - including 24 ABPB procedures - were performed at the CHUB by Elombila *et al* [10]. The authors attributed this low total number of brachial plexus blocks in 2022 partly to difficulties in accessing nerve block needles in Brazzaville. Indeed, the Republic of Congo does not have a health insurance system. Usually, all anaesthetic products and consumables are paid for by the patients. The fact that treatment was provided free of charge during this campaign would partly explain why as many ABPBs were performed in 18 days as there were brachial plexus blocks carried out at the CHUB over a 12-month period in 2022.

We report a median age of 48 years, with 75 per cent of patients aged between 25 and 64. Between 2018 and 2020, Eteni *et al* reported a median age of 54 years, with 78.9% of patients aged between 31 and 65, among Congolese patients with CKD who had been on dialysis for at least three months across the whole country [7]. A meta-analysis of dialysis outcomes in patients with CKD in sub-Saharan Africa found a mean age ranging from 35.6 to 58.2 years among adults on dialysis [12]. In France, patients with CKD on haemodialysis (HD) are older, with a median age of 77 years [13]. We report a profile of male adults amongst our patients with CKD on haemodialysis, consistent with national and continental data on CKD but in contrast to French data, which instead indicate a profile of older patients in their population of those with chronic kidney disease on haemodialysis. Unlike in developed countries, the young age of the Congolese population - mirroring that of populations across the African continent - and

the absence of a health insurance system ensuring the management of CKD risk factors could explain the early onset of HD in our series.

We report a predominance of men (75%). Eyen *et al* [7] in the Republic of Congo (67.8% men) and Ashuntantang *et al* [12] in a meta-analysis of sub-Saharan Africa (62% of men) also report a predominance of men in access to haemodialysis. A male predominance is reported worldwide. Although women are more likely to develop CKD than men, men predominate at the ESKD. Women commence dialysis slightly later than men. The reasons for this are unclear. Women generally have lower muscle mass, a lower protein intake and greater loss of body mass than men, particularly after the menopause; this could result in a lower creatinine level for the same glomerular filtration rate, leading to a later start to dialysis and higher mortality [14].

We report a median time to diagnosis of CKD of 6 months. Hypertension (97.5%) and diabetes (32.5%) were the most common comorbidities in our series. At the CHUB, between 2016 and 2018, 61.9% (n=252) of patients with CKD admitted to the Nephrology Department had been diagnosed less than 6 months previously, and 67.6% had hypertension [4]. In Dakar, hypertensive nephropathy is the leading cause of CKD, followed by diabetic nephropathy [15]. At the Point G University Hospital in Bamako, 75.6% of patients with CKD had hypertension [16]. A recent meta-analysis by Yirga *et al* showed that the combined overall prevalence of CKD among people with hypertension was 29% in sub-Saharan Africa, and that patients with both hypertension and diabetes were approximately three times more likely to develop CKD than non-diabetic patients [17]. Haemodialysis patients in the Republic of Congo are at high cardiovascular risk despite their young age; this is consistent with reports from other sub-Saharan African countries [4, 15, 16].

The American Society of Anaesthesiologists (ASA) classifies patients on chronic dialysis as 'high risk' from the outset, placing them in ASA category 3, which corresponds to a high risk of perioperative complications [18]. Patients with CKD are at high risk of perioperative complications, including cardiovascular events, haemorrhagic complications, fluid and electrolyte imbalances, and acute kidney injury (AKI). This increased risk is multifactorial and results from pathophysiological changes as well as pharmacokinetic and pharmacodynamic alterations that occur during CKD, which complicates anaesthetic management [5]. All our patients were classified as ASA 3 (100%). The choice of a peripheral nerve block was justified because GA is highly risky in patients on ESKD, whilst regional anaesthesia appears to be safe in patients on dialysis [18]. Furthermore, ABPB has a marked vasodilatory effect which could facilitate the creation of AVF [9], not to mention its post-operative analgesic effect.

All ABPB procedures were ultrasound-guided (100%) in our series. Ultrasound reduces the time taken to set up the procedure by ensuring that the LA is administered as close as possible to the nerve [19]. African studies over the last ten years

have increasingly reported the use of ultrasound guidance in brachial plexus blocks [10, 20-22]. This represents a real step forward in our sub-Saharan African practices.

The ABPB was performed in a median time of 11 minutes. Leye *et al* reported a procedure duration of 13.7 minutes in Dakar in 2015 [20]. Matsanga *et al* reported a shorter average procedure duration of 5.5 minutes in the ultrasound-guided ABPB group in Libreville in 2018 [22]. When comparing ABPB procedures using the perivascular and perineural approaches, Vastrad *et al* [23] reported a prolonged duration for both the ultrasound localisation of the nerves and the ultrasound-guided advancement of the needle, accounting for an overall ABPB procedure time of 15.7 minutes using the perineural approach, which is similar to that in our series. Like Vastrad *et al* in 2019 [23], we did indeed include the time taken for ultrasound-guided nerve localisation and the time taken for ultrasound-guided needle advancement prior to perineural injection when quantifying the procedure duration.

The onset time and duration of the sensory block during a peripheral nerve block depend mainly on the LA used and the volume of LA injected [24]. However, ultrasound reduces the onset time by ensuring that the LA is administered as close as possible to the nerve [19].

In our series, all RA procedures were performed using bupivacaine 2 mg/ml. Bupivacaine is the unique intermediate-acting LA available in the Republic of Congo. Although bupivacaine is the most cardiotoxic LA, ESKD, one of the classic circumstances in which the free fraction of many acidic drugs increases, does not appear to influence the protein binding of LA themselves, in the absence of metabolic acidosis [24]. A concentration of 2 mg/ml of isobaric bupivacaine was chosen because it is recommended to use the lowest concentrations that provide sufficient sensory block for surgery in patients with CKD [25]. Indeed, RA using bupivacaine 2 mg/ml has proved sufficient for long-duration surgical procedures [26]. The pharmacodynamics of LA also vary from patient to patient, with certain high-risk groups being predisposed to increased toxicity at a given concentration of LA in the blood or tissues; for example, patients with moderate-to-severe renal impairment, who are at high risk of local anaesthetics systemic toxicity syndrome (LAST) [27].

The median volume of LA injected was 22 ml. Elombila *et al* in Brazzaville [10], Matsanga *et al* in Libreville [22] and Leye *et al* in Dakar [20] reported similar volumes of various LA used to perform ultrasound-guided ABPB in patients with normal renal function. Indeed, ESKD does not interfere with the protein binding of LA, except in cases of metabolic acidosis [24].

The median onset time was 3 minutes. The majority of studies in French-speaking sub-Saharan Africa concerned ABPB in patients with normal renal function [10] and used a mixture of LA [20, 22]. Although ultrasound guidance shortens the time taken to administer nerve blocks [19], this very short onset time with bupivacaine 2 mg/ml could be explained by chronic metabolic acidosis, the primary cause of which is

CKD [28]. Indeed, CKD is one of the classic conditions associated with an increase in the free fraction of many acidic drugs, particularly in cases of metabolic acidosis [24]. This could also explain why the duration of sensory block in our study (250 minutes) was comparable to that reported by Elombila *et al* (275 minutes) [10], even though the bupivacaine concentration in our study was 50% lower. Indeed, in CKD, chronic metabolic acidosis increases the free fraction of drugs such as LA [24]. Furthermore, CKD alters the distribution, metabolism and excretion of all anaesthetic agents [5].

We report a venous puncture detected by the aspiration test in 3 patients (7.5%). In a previous study conducted in the operating room at the CHUB, Elombila *et al* [10] reported a vascular puncture without haematoma detected by the aspiration test in one patient (2.9%). Matsanga *et al* [22] reported paraesthesia and an arterial puncture in the ultrasound-guided ABPB group in Libreville. In Dakar, Leye *et al* [20] reported a vascular puncture without haematoma in two patients (3.27%). Furthermore, all our ABPB procedures were successful, representing a 100% success rate, which is higher than that reported by Elombila *et al* [10], Leye *et al* [20], Donamou *et al* [21] and Matsanga *et al* [22]. This low complication rate, combined with a high success rate in our African studies, encourages the wider adoption of peripheral nerve blocks in sub-Saharan Africa. However, the small sample sizes in these studies do not allow us to draw definitive conclusions regarding the proven safety of this practice under our clinical conditions.

5. Conclusion

Ultrasound-guided ABPB enabled the surgical creation of AVF in 40 patients with ESKD at the CHUB. The majority of patients had hypertension, were already on haemodialysis, and were being treated with a calcium channel blocker. All patients were ASA 3. The success rate for ABPB was 100% and 95% for AVF surgery. The duration of the surgery was 135 minutes and that of the sensory block was 250 minutes. To perform a thoracic limb surgery under ultrasound-guided ABPB in patients with high anaesthetic risk in a developing country represents a major advance for patients with ESKD in the Republic of Congo and in Sub-Saharan Africa.

Abbreviations

ABPB	Axillary Brachial Plexus Block
AKI	Acute Kidney Injury
ASA	American Society of Anesthesiologists
AVF	Arteriovenous Fistula
BMI	Body Mass Index
CHUB	Brazzaville University Teaching Hospital
CKD	Chronic Kidney Disease

CTIR	Centre of Chronic Kidney Disease Treatment
ECG	Electrocardiograph
ESKD	End-Stage Kidney Disease
GA	General Anaesthesia
HD	Haemodialysis
LA	Local Anaesthetic
LAST	Local Anaesthetics Systemic Toxicity Syndrome
NIBP	Non-invasive Blood Pressure
PNBs	Peripheral Nerve Blocks
POCU	Post-operative Care Unit
RA	Regional Anaesthesia
RRT	Renal Replacement Therapy
SpO ₂	Peripheral Oxygen Saturation

Acknowledgments

The authors of this manuscript wish to express their sincere gratitude to the entire medical and paramedical staff of the operating room, the department of anaesthesia and critical care, the centre of chronic kidney disease treatment and the cardiovascular and thoracic surgery unit of the department of polyvalent surgery at the Brazzaville University Teaching Hospital, for their dedication and commitment to the effective care of patients. Their personal commitment to improving perioperative patient care was a major asset in the development and completion of this manuscript.

Author Contributions

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Conflicts of Interest

The authors declare no conflicts of interest.

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