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Original Research Article

Peripheral Nerve Block Practice in a Country with Limited Resources: The Experience of Conakry University Hospital in Guinea

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Abstract: ***Objective*****:** To report on the experience of the anesthesia-intensive care unit of the Conakry University Hospital concerning the practice of ultrasound-guided peripheral nerve blocks (PBB). ***Methods*****:** This was a descriptive retrospective study carried out over a period of 24 months, from October 2022 to September 2024, in the operating room of the University Hospital of Conakry. We included all records of patients aged 18 years and older, who received ultrasound-guided BNP for scheduled or emergency surgery and gave informed consent to participate in the study. ***Results*****:** The frequency of peripheral blocks was 8.7%. The average age of the patients was 40 years, with a predominance of women (60%). The operating rooms were mainly performed for patients in the traumatology-orthopedics department (34.3%). The most frequent operative indication was fracture of the two bones of the forearm (26.2%). ASA Class I was the most represented (74.8%). The average duration of the blocks was 10 ± 1.8 minutes. Analgesic blocks predominated (63.1%), followed by anesthetic blocks (36.8%). TAP block (33.1%) and axillary block (27.5%) were the most common. Bupivacaine 0.25% was the most commonly used anesthetic (47.3%), followed by Xylocaine adrenalin (34.1%). ***Conclusion*****:** Although recent in Guinea, the practice of ultrasound-guided NPPs offers promising potential, particularly in traumatology-orthopedics. Their development requires increased investment in equipment and training to maximize their benefits.

Keywords: Peripheral Nerve Block, Ultrasound, Locoregional Anesthesia, Guinea, Traumatology-Orthopedics.

INTRODUCTION

Peripheral nerve blocks (PNBs) represent a major advancement in regional anaesthesia. They involve administering a local anaesthetic near a nerve or nerve plexus to temporarily block nerve transmission and provide targeted analgesia or anaesthesia (Hôpitaux Universitaires de Genève, 2024). The use of ultrasound guidance for these blocks has significantly improved their safety and effectiveness. Direct visualisation of anatomical structures and needle pathways reduces the risk of complications—such as nerve injuries or accidental intravascular injections—while increasing the precision and efficacy of the block (Hadzic, 2017). However, in low-resource countries, integrating this technology into clinical practice remains challenging, even though it has the potential to transform surgical and anaesthetic care.

In Guinea, where challenges include a shortage of qualified anaesthetists, limited access to essential medicines, and a lack of modern equipment, ultrasound-guided PNBs offer an effective alternative to general anaesthesia. They help reduce opioid requirements, optimise postoperative recovery, and improve patient safety, particularly among those with comorbidities that make general anaesthesia riskier (Fowler *et al*., 2016). However, these advantages contrast with practical obstacles such as the high cost of ultrasound devices, insufficient training of anaesthesia personnel, and the absence of standardised protocols in many healthcare facilities. Increasingly, anaesthesia departments in low-resource settings are acquiring ultrasound machines, not only for regional anaesthesia but also for multiple diagnostic and therapeutic procedures such as vascular access, echocardiography, lung ultrasound, transcranial Doppler, and emergency FAST ultrasound (Noble *et al*., 2007).

Furthermore, studies describing the use of ultrasound for regional anaesthesia remain scarce in low-resource countries. The objective of this study was to describe the experience of the Anaesthesia and Intensive

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Care Department of Conakry University Hospital in the practice of ultrasound-guided peripheral nerve blocks.

METHODS

This was a retrospective descriptive study conducted over a 24-month period, from October 2022 to September 2024, in the operating theatre of Conakry University Hospital.

Inclusion and Exclusion Criteria
Included:

- All records of patients aged 18 years or older who underwent an ultrasound-guided PNB for scheduled or emergency surgery.
- Patients who provided informed consent to participate.

Not Included:

- Minors or patients unable to give informed consent (e.g., coma, severe cognitive impairment).
- Patients who explicitly refused to participate.
- Patients who underwent non-ultrasound-guided regional anaesthesia.

Variables Studied

1. Sociodemographic variables: age, sex, ASA classification, frequency of blocks performed.
2. Technical variables: types of blocks performed, types of local anaesthetics used, volume administered, time required to perform the block.
3. Outcome variables : associated complications (failure, haematoma, infection), patient satisfaction.

Data Analysis

Statistical analysis was performed using SPSS 21.0.

- Qualitative data were expressed as frequencies and percentages.
- Quantitative data were expressed as means ± standard deviations.

Confidentiality and patient anonymity were ensured. Ethical approval from the Faculty of Health Sciences Ethics Committee of Conakry was not required, as this was a purely descriptive study. Data collected were used solely for scientific purposes.

RESULTS

The frequency of peripheral nerve blocks was 8.7%. The mean age of patients was 40 ± 43.2 years. Females represented 60% of cases (sex ratio = 1.49). ASA class I was the most frequent (74.8%) (Table I).

Blocks were mainly performed in trauma-orthopaedic surgery (34.3%), followed by obstetrics-gynaecology (33.1%), oncologic surgery (16.6%), nephrology (8.7%), and neurosurgery (7.3%). The main surgical indications were forearm bone fractures (26.2%), caesarean section (20.8%), and arteriovenous fistula creation (8.6%).

Analgesic ultrasound-guided blocks predominated (63.1%), followed by anaesthetic ultrasound-guided blocks (36.8%). The axillary block was the most frequent (27.5%), after the TAP block (33.1%). The most commonly used local anaesthetic was 0.25% bupivacaine (47.3%), followed by adrenaline-containing lidocaine (34.1%).

The average duration required to perform ultrasound-guided PNBs was 10 ± 1.8 minutes. The success rate was 95%, while 5% failed. Finally, 84.5% of patients reported being very satisfied with the ultrasound-guided peripheral nerve blocks.

Table I: Distribution of patients by sociodemographic data

Variables	effective	%
Age groups (years)		
≤ 14	4	0,3
15-24	160	13,3
25-64	879	73,3
≥ 65	156	13,1
Sex		
Masculine	719	60
Feminine	480	40
ASA Class		
ASAI	899	74,8
ASAII	278	23,3
ASAIII	22	1,19

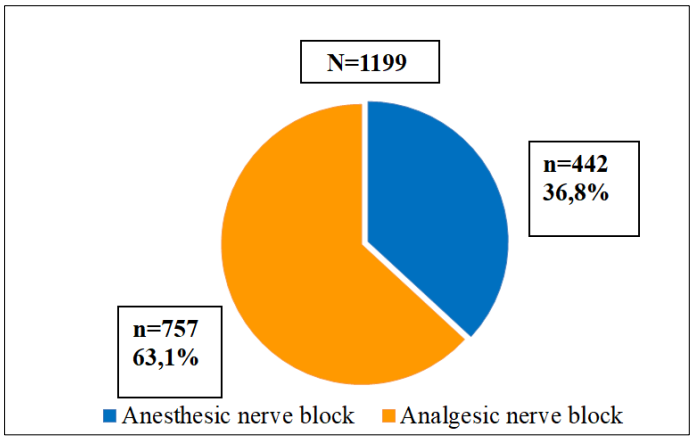

Figure 1: Type of peripheral nerve blocks made

Table II: Frequency of the different peripheral nerve block techniques performed

Block	Actual	(%)
Anesthetic Blocks		
Supraclavicular	104	8,6
Axillary	330	27,5
Interscalenic	8	0,6
Analgesic blocks		
Erector muscles of the spine	88	7,4
Quadratus lumbar	199	16,6
Supra-inguinal	73	6,1
Transversus Abdominal Plane	397	33,1

DISCUSSION

The results of this study highlight the characteristics, strengths, and challenges associated with the practice of ultrasound-guided peripheral nerve blocks (PNBs) in a low-resource country such as Guinea. Although this technique is widely recognized for its safety and patient comfort benefits (Hadzic, 2017), its implementation remains limited, as shown by our findings.

The frequency of ultrasound-guided PNBs in our context is relatively low compared to data from developed countries, where these techniques have become common practice (Neal *et al*., 2018). However, this frequency remains comparable to other studies conducted in African contexts. In Ethiopia, a study showed that only 10% of surgical procedures benefited from PNBs due to limited availability of ultrasound machines and insufficient training of anesthesiologists (Getahun *et al*., 2020). In Senegal, Diallo *et al*., (2019) reported similar usage, with PNBs often limited to simpler blocks such as axillary or ultrasound-guided TAP blocks. This low adoption rate can be explained by several factors, including limited availability of ultrasound machines, lack of training for healthcare professionals, and the absence of standardized protocols. However, this frequency indicates that the technique is being used in some centers, paving the way for its expansion with adequate support. This result also underscores the urgent need for investment in equipment and training to increase the use of ultrasound-guided PNBs in African countries.

Most patients who benefited from this technique were young adult females. This demographic profile may be linked to the local epidemiology of trauma and pathologies requiring surgical intervention. In other similar studies, variations in gender and age have also been observed, influenced by socioeconomic and cultural factors (Neal *et al*., 2018). One-third (1/3) of ultrasound-guided PNBs were performed in orthopedic surgery, with forearm fractures being the primary indication.

Our results emphasize the importance of PNBs in managing musculoskeletal trauma, which aligns with international practices where these blocks are particularly useful for fractures and orthopedic surgeries (Albrecht *et al*., 2016). These observations are consistent with other studies showing that PNBs are particularly beneficial for fractures and orthopedic procedures, reducing the need for general anesthesia (Firth & Ttendo, 2017).

Ultrasound-guided PNBs can be divided into two main techniques: analgesic-focused PNBs, generally used for peri- and postoperative pain management, and anesthetic-focused PNBs, under which surgical procedures can be performed. In our study, analgesic blocks (63.1%) predominated over anesthetic blocks (36.8%), highlighting the value of this technique for postoperative pain control in contexts where analgesic

options, such as opioids, are limited. This observation aligns with the literature, which demonstrates that ultrasound-guided blocks significantly reduce postoperative pain and analgesic consumption (Albrecht *et al*., 2016).

Regarding the types of ultrasound-guided PNBs, the TAP block (33.1%) and axillary block (27.5%) were the most frequently performed. This reflects a pragmatic use of ultrasound-guided PNBs in this context, with axillary blocks being particularly suited for upper limb procedures, while TAP blocks provide excellent analgesia for abdominal surgeries (Albrecht *et al*., 2016). The choice of these blocks may also be related to their relative technical simplicity and the availability of local expertise to perform them.

Local anesthetics (LAs) play a crucial role in the implementation of ultrasound-guided PNBs, as they induce anesthesia or analgesia when injected near nerves. Our study found that 0.25% bupivacaine (47.3%) was the most commonly used, reflecting a preference for a long-acting anesthetic, particularly suitable for analgesic blocks. In Cameroon, Tchiegang *et al*., (2020) also reported predominant use of bupivacaine due to its prolonged duration of action and relatively affordable cost. Adrenalized lidocaine, on the other hand, is a less expensive alternative but with a shorter duration of action. These choices reflect the necessary balance between efficacy, availability, and cost of local anesthetics in low-resource settings (Walker & Wilson, 2015).

The average duration for performing ultrasound-guided PNBs was 10 minutes, which is encouraging and indicates good technical mastery by trained practitioners. This performance is comparable to data reported in environments where ultrasound-guided techniques are more common (Mwangi *et al*., 2013). This result is similar to that reported in Kenya, where the average time for axillary and TAP blocks is 6 to 10 minutes in centers with basic equipment (Mwangi *et al*., 2013). However, a 5% failure rate, which is acceptable in a context where the use of ultrasound-guided PNBs is still in the adoption phase, highlights the need for continuous training to improve practitioners' skills, particularly in complex anatomical conditions or emergency situations.

Patient satisfaction is an important indicator to consider for improving the quality of ultrasound-guided PNBs. Our results showed a high patient satisfaction rate (84.5%), which highlights the perceived benefits of ultrasound-guided PNBs, particularly in terms of comfort and postoperative pain reduction. In several African studies, patients who underwent PNBs reported similar satisfaction levels, often linked to better pain management and rapid recovery after surgery (Koudouvo *et al*., 2021).

This satisfaction could be a significant driver for further promoting the use of PNBs in Guinean hospitals. This result aligns with studies demonstrating that patients receiving ultrasound-guided blocks report high satisfaction levels due to the increased efficacy and safety of this technique (Tchiegang *et al*., 2020).

Despite these promising results, several challenges must be addressed to maximize the use of ultrasound-guided PNBs in Guinea. Limited access to ultrasound machines and the shortage of trained professionals remain major obstacles (Walker & Wilson, 2015). Initiatives aimed at integrating low-cost portable ultrasound machines and providing structured training programs could significantly improve PNB practices in this context (Walker & Wilson, 2015). Future prospects also include standardizing protocols for the most common indications and collaborating with international partners to strengthen local capacities. These efforts could not only increase the frequency of ultrasound-guided PNBs but also make them an essential practice for anesthesia and analgesia in resource-limited environments.

CONCLUSION

The practice of ultrasound-guided peripheral nerve blocks in Guinea, although recent, shows promising potential for improving the quality of anesthetic care in a low-resource country. Despite its low frequency, this technique has proven particularly useful in departments such as trauma and orthopedics, where it effectively meets the needs for analgesia and anesthesia while reducing complications associated with other methods. The results obtained, including high patient satisfaction and a low failure rate, demonstrate the efficacy and safety of this approach when performed by trained and motivated teams.

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- The conception and design of the study, or acquisition of data, or analysis and interpretation of data.
- Drafting the article or revising it critically for important intellectual content.
- Final approval of the version to be submitted.
- Sound scientific research practice

The Authors Further Confirm That:

- The manuscript, including related data, figures and tables has not been previously published and is not under consideration elsewhere
- No data have been fabricated or manipulated to support our conclusions

- This submission does not represent a part of single study that has been split up into several parts to increase the quantity of submissions and submitted to various journals or to one journal over time (e.g. "salami-publishing").

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The Authors Declare no Conflict of Interest

"The author/s declare that this submission is in accordance with the principles laid down by the Responsible Research Publication Position Statements as developed at the 2nd World Conference on Research Integrity in Singapore, 2010."

"All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

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