



Evaluation Of the Practice of Perinervous Blocks (B.P.N.) Echoguide by Paramedical Staff at the Somine Dolo Hospital in Mopti

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Abstract

Objective: To evaluate the practice of peri-nervous block ultrasounds by paramedical staff at the Sominé Dolo hospital in Mopti.

Materials and Methods: Descriptive study, a cross-sectional prospective survey from March 2023 to June 2023 (04 months), concerning all patients who have benefited from an ultrasound-guided nerve block performed by a paramedic at H.S.D. of MOPTI. Our data was collected on individual survey sheets and analyzed with the Epi info 7.2.5.0. Ink.

Results: Out of 756 patients, 210 patients benefited from ultrasound-guided BPN, a frequency of 27.77%. With a mean age of 30 years +/-15, the male sex was predominant at 77.51% (n = 162) for a sex ratio of 3:1. ASA was rated at 68.42% (n = 143) with a Glasgow score of 15/15 in 100% of patients. The majority of patients had no medical-surgical history, a frequency of 80%. Firearm injuries to the limbs were the most common indication of ultrasound-guided BNP with 60.28% (n = 126). The upper limbs were the most affected by BPN with 63% (n = 132), and axillary block was the most practiced BNP with a frequency of 46% (n = 61). No neurological or toxic complications have been reported. 09 cases of puncture pain were reported, Fentanyl and midazolam were the most used products for sedation, The average performance time was 05 minutes with a 95% success rate, 10 cases of partial blocks, and 3 failures for an average surgical hard of 92 min.

Conclusion: Training of anesthetists-resuscitators is essential, especially in Africa, particularly in Mali, which is facing a shortage of specialized medical staff.

Keywords: Ultrasound-Guided Peri Nervous Blocks; Sominé Dolo Hospital in Mopti; Paramedics

Introduction

At MALLI, medical assistants provide 33% of anesthesia-resuscitation practices, according to an article published at the University Hospital Center (CHU) Gabriel TOURE [1]. The practice of ultrasound-guided peri-nervous blocks (BPN) has become common practice in patients' anesthetic and/or analgesic management. Ultrasound is a useful aid for the realization of a peripheral

nerve block. Its use has resulted in a decrease in the incidence of vascular punctures, faster onset times, lower doses required, and higher success rates [2] especially as the onset time and quality of a regional anesthesia technique for limbs are improved by ultrasonographic identification of the nerve compared to older techniques [3]. Our study aimed to evaluate the practice of peri-nervous blocks (B.P.N.) guided by paramedical staff at the Sominé Dolo Hospital in Mopti.

Materials and Methods

After approval by the hospital ethics committee and written consent of patients, parents, or guardianship for patients under 18 years of age. Our study took place in the anesthesia and intensive care unit of the Somine Dolo hospital in Mopti, a 2nd reference hospital with a medical-surgical vocation and receives in particular war injuries (ballistic trauma) due to its geographical position in the north of the country or this vis jihadist attacks that the country has been facing since March 2012. Ultrasound-guided nerve blocks are nerve block techniques performed under ultrasound assistance, the latter allowing direct visualization of nerve structures (target) but also structures to avoid (vessels, pleura ...) while controlling the progression of the needle in real-time as well as the diffusion of the injectate around the target nerve occasionally reducing the installation time and complications related to the practice of nerve blocks. All patients had previously consented to the realization of a nerve block for their management. All blocks are performed under the supervision of an anaesthetist-resuscitator doctor (MAR) able to intervene at any time in case of complication and if necessary. This was a descriptive, cross-sectional study with a prospective survey from 01 March 2023 to 30 June 2023 (a study period of 04 months). The study involved all patients who benefited from an ultrasound-guided nerve block performed by a paramedic during their management, including patients who did not give their consent or had neurological lesions on the limb concerned by ultrasound-guided BNP. Our data was collected on individual survey sheets and analyzed with the Epi Info 7 software. A SonoSite FUJIFILM M-TURBO ultrasonic device equipped with an HFL38 linear probe with a frequency of 13-6MHz was used to locate the puncture space, an 'in-plane' or 'out-of-plane' technique was used depending on the patient's anatomy and practitioners' habits throughout the procedure to monitor the needle's progression and correct location (Image 1,2), Stimuplex Ultra 360, 20G type neurostimulation needles with a length of 0.9 x 100 mm and G 22 0.7 x 50 mm were used depending on the depth of the nerve and/or the anatomy of the patient. All axillary blocks were performed with the arm in the abduction of 120°, the shoulder in external rotation, and the forearm flexed at 90°, For the other blocks, the installation of patients was carried out according to the nature of the lesions and the convenience of the practitioner. Patients less than 10 years of age received premedication with 1 to 2 mg midazolam and 10 to 100 micrograms fentanyl (03 µg/kg/weight)

and on-demand for other patients. Levobupivacaine 0.25% added to Xylocaine 1% iso volume was used at a dose of 0.8 ml/Kg/Weight. Continuous ECG (electrocardiogram), pulse oximetry, and intermittent blood pressure monitoring were performed on all patients during the procedure and surgery. Equipment for airway management, advanced cardiopulmonary resuscitation, and lipid emulsion were immediately available to manage complications.



Image 1: Interscalene block (BIS) with nerve roots surrounded by the solution Anesthetic (SCA: Anterior Scalene; SCM: Medium Scalene; TR: Nerve Root; ALR: Local anesthesia).

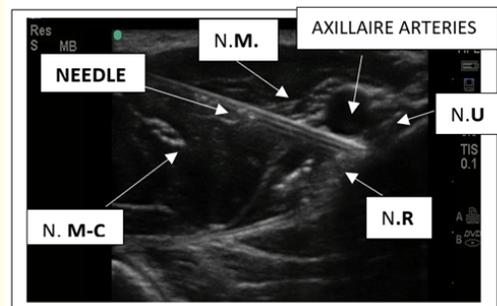


Image 2: Axillary block (N: Nerve; M: Median, U: Ulnar, M-C Musculocutaneous, R: Radial).

Results

During these four months, six hundred and fifty-six (656) patients were admitted to the operating room, among which, two hundred and ten (210) patients benefited from ultrasound-guided block performed by a paramedic, a frequency of 27.77%. Patients had a mean age of 30 years +/-15 (21; 41) with extremes of 08 and

90 years the age range]20-30] was the most representative (Table 1). The mean weight of patients was 68 kg (kilograms) +/-16,820 (59; 71) for extremes of 15 and 130 kg. Males were predominant at 77.51% (n = 162) compared to 22.49% (n = 47) for females with a sex ratio of 3:1 (Table 2). The ASA (American Society of Anesthesiologists) classification, the ASA system of classification of physical condition is a system for assessing the fitness of patients before surgery. In 1963, the American Society of Anesthesiologists (ASA) adopted the system of classifying physical condition into five categories; a sixth category was subsequently added [4] so the ASA was rated at I at 68.42%. of patients (n = 143) and all patients had a Glasgow at 15/15 (n = 210). The majority of patients had no medical-surgical history, a frequency of 80% (n = 159) however diabetes was the most common medical history with 6.58% (n = 13) followed by hypertension with 3.54% (n = 7). Firearm injuries (FNAs) at the limb level were the most common indication of ultrasound-guided NPP with 60.28% (n = 126) of cases followed by limb fractures (14%). Non-invasive blood pressure (NIP) was routinely measured in all patients with a mean systolic pressure of 125 mmHg (millimeter of mercury) for a diastolic mean of 79 mmHg. No patient had a neurological lesion before the ultrasound-guided BNP. The upper limbs were the most concerned by BPN with 63% (n = 132), the axillary block was the most practiced on the upper limbs with a frequency of 46% (n = 61) followed by the supraclavicular block with 20% (n = 27) while the block of the sciatic nerve in the popliteal hollow associated with the block of the trans arterial saphenous nerve was the most used blocks with a frequency of 81.82% (n = 45) followed by femoral nerve blocks 10.91% (n = 06) and the lower left limb was the most affected limb with 59.65% (n = 34) of cases. Unlike ultrasound, which was used in 99.52% of cases, the neurostimulator was used only once. No neurological or toxic complications were reported in our study so 09 cases of puncture pain were reported for an average volume of 10 ml of bupivacaine. Fentanyl and midazolam were the most commonly used products for patient comfort sedation, The average performance time was 05 minutes from the 03- and 30-min extremes with a 95% success rate, 10 partial blocks, and 3 failures (1%) for an average surgical hard of 92 min.

Discussions

This work was a cross-sectional study with prospective investigation from 01 March 2023 to 30 June 2023, i.e. a study period of

Table 1: Distribution of patients by age group.

	Frequency	Percent	Cum. Percent
>0 - 10	7	3,35%	3,35%
>10 - 20	37	17,70%	21,05%
>20 - 30	66	31,58%	52,63%
>30 - 40	43	20,57%	73,21%
>40 - 50	30	14,35%	87,56%
>50 - 60	15	7,18%	94,74%
>60 - 70	6	2,87%	97,61%
>70 - 80	3	1,44%	99,04%
>80 - 90	2	0,96%	100,00%
Total	209	100,00%	100,00%

Table 2: Distribution of patients by sex.

Sex	Frequency	Percent	Cum. Percent
1-Masculin	162	77,51%	77,51%
2-female	47	22,49%	100,00%
Total	209	100,00%	100,00%

Table 3: Distribution of patients according to ASA classification.

ASA	Frequency	Percent	Cum. Percent
1	143	68,42%	68,42%
2	38	18,18%	86,60%
3	28	13,40%	100,00%
Total	209	100,00%	100,00%

04 months on the evaluation of the practice of peri-nervous blocks by the paramedical staff of the Sominé Dolo hospital in Mopti. In our study a total of two hundred and ten (210) ultrasound-guided BNP was carried out, male patients, ASA I was in the majority with a sex ratio of 3/1, an average age of 30 years +/-15 things that go in pairs with our context of war surgery that the country has been facing since 2012 [4] which concerned especially young subjects ASA I these results are superposable to those of CISSE D., *et al.* [5] with an average age of patients of 27.48 years and a sex ratio of 13.5/1 but also the study of M.G. TITO., *et al.* [6] which finds an average age of 29 years as well as Mangane M., *et al.* with 28.4 years± 10.37 [7,8]. All patients had a Glasgow score of 15/15 (n = 210) while

Mangane M., *et al.* [7] found a Glasgow score of 15 in 98.5% (n = 129) this difference could be explained by the fact that his study concerned only epidemiological and evolutionary aspects of ballistic trauma. The limitations of the study were the non-training of all paramedics involved in the care of patients, and the short study period so these results are much lower than expected. Firearm injuries located on the limbs were the most frequent indication of ultrasound-guided BNP with 60.28% (n = 126) these results reflect our context of weapon conflicts whose taking of war wounds are carried out essentially in our hospital our results are comparable to those of many authors Mangane M., *et al.* [8], H S Saidi, *et al.* [9], Maman Sani, *et al.* [11] of Muazzam Nasrullah [9,12] whose lower limbs were the parts of the body most affected 30% (n = 86) difference which could be explained by the nature of his studies which concerned only gunshot wounds and nature Retrospective of his study. At the level of the lower limb, the axillary block was the most performed with a rate of 46% (n = 61) these figures are similar to those found by Kamissoko MS., *et al.* [13] with a rate of 84% (n = 52) during a study include two hundred and six (206) patients these results can be explained by the fact that the axillary block is the most used peripheral block [14] by its easy realization unlike the other block of the upper limb, the site of the lesions and its low complication rate, in addition, a case of cardiac arrest after plexin axillary anesthesia with ropivacaine in a dialyzed patient for chronic renal failure was reported by J-B Lascarrou, *et al.* [13]. All BPN were performed under ultrasound guidance associated with neurostimulators as sentinel only once. Ultrasound-guided BNP is not free of complications, in our series no complications have been reported however these complications should not be ignored, Atsushi Hashimoto, *et al.* [14] in a metanalysis we recency 115 case reports including most reports related to interscalene brachial plexus block when it was classified in the category of blocks, And most reports are related to neuropathy in terms of complications. There are only 3 reports of neuropathic complications in which ultrasound-guided PNB is performed this rightly highlights a reduction in common complications of BNP by ultrasound also emphasized by Warman, *et al.* [17]. An average amount of 10ml of an iso volume mixture of bupivacaine 0.25% and xylocaine 1% was used in our study, the use of a mixture of lidocaine with a long-acting local anesthetic is commonly used for blocking peripheral nerves [18], in our study the volume used corresponds to an average of 05ml/ nerves for the axillary nerve while O'Donnell [18,19] which performs an axillary block with 4 ml of Lidocaine 20 mg/ml-1 (i.e. 1 ml per nerve). This implies that it is not necessary to surround each

nerve to ensure the quality of the block. Indeed, 0.1 ml per mm² of nerve surface is necessary to perform a circumferential injection, i.e. 3.42 ml for the radial nerve, 2.75 ml for the median nerve, 2.58 ml for the ulnar nerve, and 2.3 ml for the musculocutaneous nerve [18,19] Sedation based on fentanyl and midazolam was used in most children for their comfort a similar technique was found in the study of P. Marhofer, *et al.* [20] in which most types of blocks are performed under sedation or general anesthesia.

Conclusion

Anesthetic and/or analgesic ultrasound-guided perinervous blocks (nerve block techniques performed under ultrasound assistance), have become common practice in patient management thanks to ultrasound, which occupies a prominent place in this practice, not only makes it possible to directly visualize the nerve structures relevant to nerve blocks of the upper and lower limbs at all levels Such direct visualization improves the quality of nerve blocks but also avoids complications. Training of anaesthetists-resuscitators is essential, especially in Africa, which is facing a shortage of specialized medical staff.

Bibliography

1. Amadou Deh., *et al.* "Incidents and Accidents during Anesthesia in Scheduled and Emergency Surgery at the Gabriel Toure Hospital". *Scholars Journal of Applied Medical Sciences*.
2. Bigeleisen PE. "Nerve puncture and apparent intraneural injection during ultrasound-guided axillary block does not invariably result in neurologic injury". *Anesthesiology* 105.4 (2006): 779-783.
3. Marhofer P, *et al.* "Ultrasonographic guidance improves sensory block and onset time of three-in-one blocks". *Anesthesia and Analgesia* 85.4 (1997): 854-857.
4. Guerre du Mali. In: Wikipédia (2023).
5. Cissé D., *et al.* "Gunshot wounds of low urinary tract in period of security crisis at the Sominé Dolo Hospital of Mopti (Mali): Epidemiological and diagnostic aspects". *Progres En Urol J Assoc Francaise Urol Soc Francaise Urol* (2023): S1166-7087 (23)00129-X.
6. Tito MG., *et al.* *Public Health Action* 13.2 (2023): 30-35.

7. Yapo B, *et al.* Comité de lecture de (2022).
8. Hoffmann C, *et al.* "Épidémiologie des blessés de guerre français en Afghanistan : de la blessure à la réinsertion". In (2015).
9. Nasrullah M and Razzak JA. "Firearm injuries presenting to a tertiary care hospital of Karachi, Pakistan". *Journal of Injury and Violence Research* 1.1 (2009): 27-31.
10. Kamissoko M, *et al.* "Ultrasound-Guided Cervical Plexus Block for Thyroidectomy: About 05 Cases at Sominé Dolo Hospital in Mopti". *Acta Scientifical Medical Sciences* 7.3 (2023): 43-46.
11. Colin C. "Les blocs périphériques des membres chez l'adulte". *Annales Françaises d'Anesthésie et de Réanimation* 22.6 (2003): 567-581.
12. Lascarrou JB, *et al.* "Cardiac arrest after axillary plexic anaesthesia with ropivacaine in a chronic kidney failure dialysis patient". *Annales Françaises d'Anesthésie et de Réanimation* 27.6 (2008): 495-498.
13. Hashimoto A, *et al.* "Complications of peripheral nerve block". *Masui* 60.1 (2011): 111-119.
14. Warman P and Nicholls B. "Ultrasound-guided nerve blocks: efficacy and safety". *Best Practice and Research Clinical Anaesthesiology* 23.3 (2009): 313-326.
15. Cuvillon P, *et al.* "A Comparison of the Pharmacodynamics and Pharmacokinetics of Bupivacaine, Ropivacaine (with Epinephrine) and Their Equal Volume Mixtures with Lidocaine Used for Femoral and Sciatic Nerve Blocks: A Double-Blind Randomized Study". *Anesthesia and Analgesia* 108.2 (2009): 641.
16. O'Donnell BD and Iohom G. "An Estimation of the Minimum Effective Anesthetic Volume of 2% Lidocaine in Ultrasound-guided Axillary Brachial Plexus Block". *Anesthesiology* 111.1 (2009): 25-29.
17. Delbos A, *et al.* "Blocs nerveux périphériques: les solutions anesthésiques ont-elles changé depuis l'apparition de l'échographie?".
18. Harper GK, *et al.* "Minimum volume of local anaesthetic required to surround each of the constituent nerves of the axillary brachial plexus, using ultrasound guidance: a pilot study". *British Journal of Anaesthesia* 104.5 (2010): 633-636.
19. Marhofer P, *et al.* "Ultrasound guidance in regional anaesthesia". *British Journal of Anaesthesia* 94.1 (2005): 7-17.