SAS Journal of Medicine
Abbreviated Key Title: SAS J Med
ISSN 2454-5112
Journal homepage: https://saspublishers.com

OPEN ACCESS

Anesthesiology

Ultrasound-Guided Nerve Blocks for Leg Amputation in High-risk Patients under Antithrombotic Therapy: A Report of Two Cases and Review of Literature

Ismail Aissa[1*], Aziz Benakrout[1], Mustapha Bensghir[1], Hicham Balkhi[1]

[1]Department of Anesthesiology and Intensive Care, Military Hospital Mohammed V, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University, Rabat, Morocco

DOI: https://doi.org/10.36347/sasjm.2024.v10i11.006 | **Received:** 07.10.2024 | **Accepted:** 12.11.2024 | **Published:** 14.11.2024

***Corresponding author:** Ismail Aissa
Department of Anesthesiology and Intensive Care, Military Hospital Mohammed V, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University, Rabat, Morocco

Abstract **Case Report**

Patients with complex comorbidities under antithrombotic therapy are a real challenge for anesthesiologists because of general and neuraxial anesthesia high risks. Perineural anesthesia allows high quality intraoperative conditions for fragile patients and provides excellent postoperative results. Ultrasound guided superficial nerve blocks were defined to be with low risk of bleeding and seems to be a safe anesthetic option for patients under antithrombotic therapy. Through two cases of leg amputation performed under ultrasound-guided femoral and sciatic nerve blocks we discuss the interest and the practicability of this anesthetic technique in such patients.

Keywords: Ultrasound-Guided Nerve Blocks, Leg Amputation, High-Risk Patients, Antithrombotic Therapy.

INTRODUCTION

Patients with severe commorbidities classified ASA (American Society of Anesthesiologists) IV under antithrombotic *therapy (ATT)* present a real challenge to anesthetists given a high risk of decompensation with a life-threatening prognosis in the perioperative period. Although lower limb surgery is most often performed under spinal anesthesia (SA), peripheral nerve blocks (PNB) is sometimes the only alternative, particularly for patients with a contraindication to SA and a high risk of general anesthesia (GA). The ultrasound guidance (US-PNB) has become increasingly common and several advantages compared to neurostimulation have been demonstrated in the literature [1-2], its contribution is major particularly in patients under ATT or with coagulopathy, in whom PNB exposes to real challenges given the risk of hemorrhage in the in case of vascular injury. Despite all its advantages, there is still a lack of investigations into the frequency and severity of bleeding complications secondary to this anesthetic practice in patients with primary or secondary blood dyscrasia. We report the case of two ASA IV patients with a potentially difficult airway management presenting a contraindication to perimedullary anesthesia (PMA) in whom a leg amputation was successfully performed under US guided femoral and sciatic peripheral nerve blocks (NB), and discuss the interest and feasibility of this anesthetic technique in *such* patients.

CASE REPORT

CASE NO. 1

A 82-year-old man (168 cm, 80 kg) admitted to the emergency department with sepsis due to infected necrosis of the right foot. Examination revealed several infected necrosis areas (figure 1a). Emergency leg amputation was indicated. The patient's history was very full: severe chronic obstructive pulmonary disease (COPD), arterial hypertension, ischemic heart disease (2 stents), recovered ischemic stroke, chronic renal failure on hemodialysis, osteoporosis. He was on insulin, aspirin 160 mg/day, clopidogrel 75 mg/day, carvedilol 6.25 mg/day, losartan 50 mg/day, furosemide 80 mg/day and simvastatin 20 mg/day. The patient was febrile at 38.7°, blood pressure (BP): 150/90 mmhg, heart rate (HR): 70 beats/min, *pulse oximetry* (SpO2): 90%. Head and neck were projected forward due to high dorsal angulation in hyperkyphosis. Hb: 7 g/dl, *WBC*: 18000/µl, platelets: 260000/µl, PT: 56%, aPTT: 38 seconds, CRP: 180 mg/l, procalcitonin: 5 µg/L, urea: 1.4 g/l, creatinine: 79 mg/l (GFR: 6 ml/min/1.73m2). Transthoracic

echocardiography: global hypokinesia with left ventricular dysfunction (EF: 35%).

Figure 1: Infected foot of patient 1 (a) and patient 2 (b)

We decided to perform the surgery under US-PNB (femoral block via the inguinal route and sciatic block via the popliteal route). After initial conditioning, the patient was lightly sedated with 25µg of fentanil and 1mg of midazolam. A high-frequency linear probe (8-12 MHz) placed on a SonoScape® ultrasound machine (S9, Shenzhen, China) was used. The femoral nerve was approached first at inguinal level. A 50 mm 22G short-bevel needle was advanced in plane close to the nerve target (Figure 2a). Once correct positioning had been confirmed by imaging, 15 ml of local anesthetic (LA) (50/50 mixture of 2% lidocaine and 0.5% bipivacaine) was slowly injected with intermittent aspiration (Figure 2b). Knee and thigh were slightly flexed, the sciatic nerve was sought at the popliteal level (Figure 2c). The needle was advanced in the plane close to the nerve target, and 15 ml of the same LA mixture was injected (Figure 2d). Sensory block was assessed by pinprick test and motor block by bromage scale. The leg was successfully amputated in 50 minutes. The patient maintained a perfectly stable haemodynamic and respiratory profile. Bleeding was estimated at 200ml. No additional analgesia was required intraoperatively. The patient was subsequently transferred to ICU for postoperative monitoring. No haematomas were observed at the puncture sites. The first need for analgesics was expressed 10 hours postoperatively, and the neurological examination of the femoral and sciatic nerves territories was within normal limits. After 24 hours, the patient was transferred to nephrology and discharged after 7 days.

CASE NO. 2

A 76-year-old man (182 cm, 85kg) admitted for sepsis of infected diabetic foot. Examination revealed extensive necrosis with multiple infected foot ulcers (figure 1b), indicating emergency leg amputation. The patient was being monitored for old multicomplicated diabetes, arterial hypertension, ischaemic heart disease, Parkinson's disease, pulmonary embolism 3 months previously. He was taking insulin, aspirin 75 mg/day, acenocoumarol 3 mg/day, captopril 50 mg/day, propanolol 80 mg/day, furosemide 20 mg/day, levodopa and atorvastatin. Patient was febrile, BP: 160/90 mmhg, HR: 62 beats/min, SpO2: 91%, diffuse snoring in both lung fields. Hb: 10.2 g/dl, WBC: 16000/µl, platelets: 180000/µl, PT: 32%, aPTT: 34 seconds, CRP: 160 mg/L, procalcitonin: 3 µg/L. Chest X-ray revealed a bronchial syndrome with a basal right alveolar focus. Transthoracic echocardiography showed concentric left ventricular hypertrophy with septal hypokinesia (EF 45%).

The same anaesthetic technique described above was chosen for the surgical procedure. After antibiotic therapy-rehydration-insulin therapy-vitamin K and FFP-transfusion, the patient was lightly sedated. US-PNB was performed using the same technique described in the first case. No intraoperative incidents were noted. Bleeding was 250 ml. In the postoperative period no

haematomas were noted at the puncture sites, the first need for analgesics was expressed after 12 hours, and the neurological examination of of the femoral and sciatic nerves territories was without anomalies. The patient was discharged after 10 days.

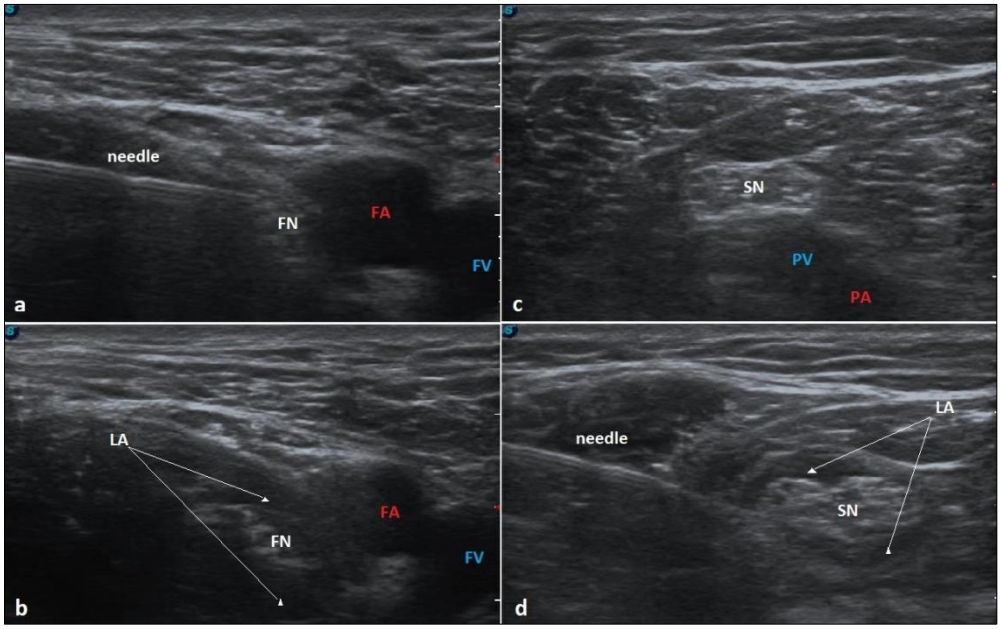

Figure 2: (a) Ultrasound image of the femoral nerve in the inguinal region before injection of local anaesthetics. (b) Ultrasound image after femoral nerve block: diffusion of local anaesthetics around the femoral nerve. (c) Ultrasound image of the sciatic nerve in the popliteal region before injection of local anaesthetics. (d) Ultrasound image after sciatic nerve block: diffusion of local anaesthetics around the sciatic nerve. FN = femoral nerve, FA = femoral artery, FV = femoral vein, SN = sciatic nerve, PA = popliteal artery, PV = popliteal vein, LA = local anaesthetics.

DISCUSSION

Several factors made GA a high-risk procedure in our patients, and airway management appeared potentially difficult: the first patient had been treated for severe COPD, with a vicious spinal attitude that prevented strict dorsal decubitus, and the second patient had a pulmonary infection. In addition, the haemodynamic effects secondary to anaesthetic drugs and mechanical ventilation in patients with serious co-morbidities.

The literature shows a reduced incidence of postoperative respiratory and cardiovascular complications, shorter hospital stays and lower blood transfusion requirements in favour of PMA compared with GA for lower limb amputations [3]. However, the risk of perimedullary haematoma (PMH) led us to abandon this anaesthetic technique. The risk associated with antiplatelet therapy (APT) in this context has not been precisely quantified. While aspirin alone does not appear to represent any additional risk of developing PMH during an PMA [4, 5], *the* clopidogrel conversely carry a greater risk. As for vitamin K antagonists (VKA) PMA remains an absolute contraindication [4, 5]. The first patient who was on a dual antiplatelet therapy (clopidogrel + aspirin) and the second patient who was on aspirin + acenocoumarol, were clearly at high risk of developing PMH in the use of PMA.

All these arguments led us to choise US-PNB. Compared with GA or SA, PNB offers better intraoperative haemodynamic stability [6], and also provides excellent postoperative results in patients with heavy commorbidities, with a reduced risk of confusion and deep vein thrombosis [7]. Recommendations in this context are not based on randomised studies but rather on expert opinions based on case reports, clinical series, pharmacology, haematology and risk factors for surgical bleeding [5]. Any haematoma at the puncture site carries the risk of surgical revision for evacuation, transfusion and nerve compression [8]. Depending on the risk of haemorrhage PNB have been divided into two groups: PNB with a low risk of haemorrhage (such as femoral, axillary and popliteal fossa sciatic NB) and PNB with a high risk of haemorrhage (such as infraclavicular, parasacral sciatic, and lumbar plexus NB) [5-8]. The first (subject of our choice) are superficial NB; in case of a vascular injury the haemorrhagic zone is accessible to external compression, so the bleeding is easy to control. These NB can be performed under antithrombotic conditions [9]. However, in case of bleeding during NB defined as being at high risk of haemorrhage, the bleeding zone cannot be compressed and the consequences of bleeding may be serious; for these NB, if ATT is being used, the guidelines concerning PMA will be applied in the same way [5-8].

Learned societies suggest that these PNB should be carried out under US and by an experienced operator [8]. Indeed US guidance was of great help in ensuring the success of the PNB avoiding possible haemorrhagic complications in our patients, real-time visualisation allows avoiding vascular structures effectively and confirms the good diffusion of LA. In addition, compression of the veins by the ultrasound probe reduces the risk of vascular puncture and intravascular LA injections. The literature shows that ultrasound guidance is superior to neurostimulation guidance in PN-ALR, with a significantly lower rate of vascular puncture (2% versus 10%) [10].

CONCLUSION

PNB provides excellent intraoperative conditions in patients with severe commorbidities who are candidates for leg amputation, and offers very good post-operative results. However, there is still a lack of research into the frequency and severity of haemorrhagic complications secondary to this anaesthetic practice in patients on antithrombotic drugs. Recommendations in this context are not based on randomised studies but rather on expert opinion. Inguinal femoral NB and sciatic NB in the popliteal fossa belong to the group of superficial NB defined as having a low risk of haemorrhage, remain accessible to compression in the event of bleeding, and can therefore be performed under antithrombotic drugs if the benefit/risk ratio is favourable. In experienced hands, the advantages of the US route can make this anaesthetic technique a safe option for patients on antithrombotic therapy.

REFERENCES

1. Domingo-Triadó, V., Selfa, S., Martínez, F., Sánchez-Contreras, D., Reche, M., Tecles, J., … & Moro, B. (2007). Ultrasound guidance for lateral midfemoral sciatic nerve block: a prospective, comparative, randomized study. *Anesthesia and analgesia*, *104*(5), 1270-4.
2. Abrahams, M. S., Aziz, M. F., Fu, R. F., Horn, J. L. (2009). Ultrasound guidance compared with electrical neurostimulation for peripheral nerve block: a systematic review and meta-analysis of randomized controlled trials. *British Journal of Anaesthesia*, *102*(3), 408-17.
3. Chery, J., Semaan, E., Darji, S., Briggs, W. T., Yarmush, J., D'Ayala, M. (2014). Impact of regional versus general anesthesia on the clinical outcomes of patients undergoing major lower extremity amputation. *Annals of Vascular Surgery*, *28*(5), 1149-56.
4. Gogarten, W., Vandermeulen, E., Van Aken, H., Kozek, S., Llau, J. V., Samama, C. M. (2010). Regional anaesthesia and antithrombotic agents: recommendations of the European Society of Anaesthesiology. *European Society of Anaesthesiology*, *27*(12), 999-1015.
5. Horlocker, T. T., Vandermeuelen, E., Kopp, S. L., Gogarten, W., Leffert, L. R., & Benzon, H. T. (2018). R*egional anesthesia* in the *patient receiving antithrombotic* or *thrombolytic therapy: American Society* of *Regional Anesthesia* and *Pain Medicine Evidence-Based Guidelines* (*Fourth Edition*). *Regional Anesthesia and Pain Medicine*, *43*(3), 263-309.
6. Robertshaw, H. J., & Hall, G.M. (2006). Diabetes mellitus: anaesthetic management. *Anaesthesia*, *61*(12), 1187-90.
7. Parker, M. J., Handoll, H. H., & Griffiths, R. (2004). Anaesthesia for hip fracture surgery in adults. *The Cochrane Database of Systematic Reviews*, *18*(4), CD000521.
8. Godier, A., Fontana, P., Motte, S., Steib, A., Bonhomme, F., Schlumberger, S., & Collet, J. P. (2018). Management of antiplatelet therapy in patients undergoing elective invasive procedures. Proposals from the French Working Group on perioperative haemostasis (GIHP) and the French Study Group on thrombosis and haemostasis (GFHT). In collaboration with the French Society for Anaesthesia and Intensive Care Medicine (SFAR). *Anaesthesia, Critical Care & Pain Medecine*, *37*(4), 379-89.
9. Narouze, S., Benzon, H. T, Provenzano, D. A., Buvanendran, A., De Andres, J., Deer, T.R., & Huntoon, M. A. (2015). Interventional spine and pain procedures in patients on antiplatelet and anticoagulant medications: guidelines from the American Society of Regional Anesthesia and Pain Medicine, the European Society of Regional Anaesthesia and Pain Therapy, the American Academy of Pain Medicine, the International Neuromodulation Society, the North American Neuromodulation Society, and the World Institute of Pain. *Regional Anesthesia and Pain Medecine*, *40*(3), 182-212.
10. Munirama, S., & McLeod, G. (2015). A systematic review and meta-analysis of ultrasound versus electrical stimulation for peripheral nerve location and blockade. *Anaesthesia*, *70*(9), 1084-91.