



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Correspondence

Peripheral nerve blocks for above-the-knee amputation in a patient with COVID-19 pneumonia

ARTICLE INFO

To the Editor:

We read with interest the article by Kilicaslan et al. (2020) describing their use of peripheral nerve blocks in the care of a high-risk patient with COVID-19 undergoing below-the-knee amputation [1]. Current estimates suggest that more than 200 million patients worldwide suffer from peripheral arterial atherosclerotic occlusive disease and acute limb ischemia (ALI) is one of the most common emergencies that vascular specialists manage. Despite advances in pharmacologic and percutaneous endovascular therapies, ALI continues to be associated with significant morbidity, mortality, and limb loss rates [2]. We report a complex ALI presentation precipitated by COVID-19 in a physiologically frail patient and highlight the utility of peripheral nerve blocks for above-the-knee amputation.

An 88-year old male with a history of hypertension, chronic obstructive pulmonary disease, coronary artery disease, and chronic kidney disease presented to the emergency department with acute-onset of right lower extremity pain with worsening weakness and loss of sensation. He also reported a three-day history of fever, myalgias, and dyspnea with even minimal exertion. He was diagnosed with acute COVID-19 pneumonia and thrombotic occlusion of the right common iliac, superficial femoral, and popliteal arteries. Physical examination revealed an elderly, frail-appearing man with an oxygen saturation of 91% on 4 liters/minute of nasal cannula oxygen. Due to profound neuromotor deficits and the extent of arterial disease, an above-the-knee amputation was recommended and a therapeutic heparin infusion was initiated. The heparin infusion was continued until arrival to the operating room.

Ultrasound-guided single-injection sciatic, femoral, obturator, and lateral femoral cutaneous nerve blocks were performed using 0.25% ropivacaine with meticulous incremental aspiration. The patient was placed in the lateral decubitus position and the ultrasound probe was placed in the subgluteal region of the operative extremity. The sciatic nerve was identified between the ischial tuberosity and femur deep to the gluteus maximus muscle. Once this block was completed, he was placed in the supine position the remaining blocks were performed approximately at the level of, or slightly below, the inguinal crease. The femoral nerve was visualized lateral to the femoral artery and the lateral femoral cutaneous nerve was seen at its location in the plane between the lateral edge of the sartorius and the tensor fasciae latae muscle. For

the obturator nerve block, the adductor longus, brevis, and magnus muscles were identified in the medial thigh. Two interfascial injections were performed: one at the junction of the adductor longus, adductor brevis, and pectineus muscles and another between the adductor brevis and adductor magnus muscles.

The blocks were performed in a staggered, non-harried fashion to minimize the risk of local anesthetic systemic toxicity. Once the blocks were completed, a propofol infusion was started at 25 µg/kg/min for anxiolysis. He underwent a successful above-the-knee amputation with no additional sedative or analgesic agents. The propofol infusion was discontinued during surgical wound closure. At the conclusion of surgery, he was awake, conversant, pain- and nausea-free, and immediately transported to the COVID-19 ward.

The severe acute respiratory syndrome coronavirus 2019 (SARS-CoV-2 virus) has been associated with multiple coagulation defects including endothelial dysfunction, inflammation, cytokine release, hypercoagulability, and hypoxia which can synergistically coalesce to precipitate ALI [3,4]. Notably, among the subset of COVID-19 patients who experience ALI, major limb amputation and mortality rates are reported to be higher than those observed in patients without COVID-19 [3].

COVID-19 patients with ALI often have more complex cardiopulmonary sequelae of the viral infection which impacts their ability to undergo surgical interventions [3,4]. Because systemic anticoagulation precludes the use of neuraxial anesthesia in a patient population at high risk of respiratory complications, techniques such as peripheral nerve blocks should be considered as alternatives to general or neuraxial anesthesia. No prospective study data are available on the use of peripheral nerve blocks as a primary anesthetic for above-the-knee amputations and the existing literature consists solely of case reports and small case series. The prevalence of the use of this technique is currently unknown. In a retrospective study of 57 high-risk patients, Chandran et al. (2018) reported a 91% success rate for patients undergoing above-the-knee amputation under peripheral nerve blocks and sedation [5]. Not surprisingly, higher levels of sedation were required if only the femoral and sciatic nerves were blocked, rather than also blocking the obturator and lateral femoral cutaneous nerves.

The benefits of this technique in COVID-19 patients with ALI include avoidance of general anesthesia and concomitant airway manipulation, greater hemodynamic stability, excellent analgesia, and avoidance of

Abbreviations: ALI, Acute limb ischemia.

<https://doi.org/10.1016/j.jclinane.2021.110227>

Received 5 February 2021; Received in revised form 11 February 2021; Accepted 13 February 2021

Available online 1 March 2021

0952-8180/Published by Elsevier Inc.

opioids, which can result in hypoventilation and worsening hypoxia [1].

While additional research is needed to determine the safety, reliability, and efficacy of peripheral nerve blocks as a primary anesthetic for above-the-knee amputation, the high-risk nature of COVID-19 patients presenting with ALI merits consideration of this likely underutilized technique if neuraxial anesthesia is contraindicated.

The authors have no relevant competing interests to declare.

The patient's family provided written Health Insurance Portability and Accountability Act (HIPAA) authorization to publish this letter.

Conflicts of interest

The authors declare no conflicts of interest or competing interests.

Funding

The authors have no sources of funding to declare for this manuscript.

Acknowledgements

We thank Dr. Lauren V. Soberón and the University of Florida Department of Anesthesiology Communications and Publishing Services Office for their editorial assistance.

References

- [1] Kilicaslan A, Kekec AF, Eren AS, Uzun ST. Peripheral nerve blocks in a patient with suspected COVID-19 infection. *J Clin Anesth* 2020;65:109853.

- [2] Baril DT, Patel VI, Judelson DR, Goodney PP, McPhee JT, Hevelone ND, et al. Outcomes of lower extremity bypass performed for acute limb ischemia. *J Vasc Surg* 2013;58:949–56.
- [3] Etkin Y, Conway AM, Silpe J, Qato K, Carroccio A, Manvar-Singh P, et al. Acute arterial thromboembolism in patients with COVID-19 in the new York City area. *Ann Vasc Surg* 2021;70:290–4.
- [4] Giannis D, Ziogas IA, Gianni P. Coagulation disorders in coronavirus infected patients: COVID-19, SARS-CoV-1, MERS-CoV and lessons from the past. *J Clin Virol* 2020;127:104362.
- [5] Chandran R, Beh ZY, Tsai FC, Kuruppu SD, Lim JY. Peripheral nerve blocks for above knee amputation in high-risk patients. *J Anaesthesiol Clin Pharmacol* 2018; 34:458–64.

José R. Soberón Jr, MD^{a,b,*}, Salvatore T. Scali, MD^c,
Felipe Urdaneta, MD^a

^a Department of Anesthesiology, North Florida/Southern Georgia Veterans Health System and the University of Florida, Gainesville, FL, United States

^b Department of Anesthesiology, University of Central Florida, Orlando, FL, United States

^c Division of Vascular Surgery, North Florida/Southern Georgia Veterans Health System and the University of Florida College of Medicine, Gainesville, FL, United States

* Corresponding author at: Malcom Randall VA Medical Center, Department of Anesthesiology, ATTN: Dr. José Soberón, 1601 Archer Road, Gainesville, FL 32608.

E-mail address: jsoberon@anest.ufl.edu (J.R. Soberón).