DOI: 10.14744/ejmi.2017.09797
EJMI 2018;2(1):45-47

Case Report

Infraclavicular Block Application in Delayed Brachial Artery Laceration

Ali Bestemi Kepekci,[1] Derya Ozden Omaygenc,[2] Aziz Yarbil,[3] Ibrahim Halil Ozcan[4]

[1]Department of Anesthesiology and Reanimation, Yeni Yuzyil University, Academy of Health Services, Istanbul, Turkey
[2]Department of Anesthesiology and Reanimation, Yedikule Pulmonary Diseases and Thoracic Surgery Training and Research Hospital, Istanbul, Turkey
[3]Department of Anesthesiology and Reanimation, Kilis State Hospital, Kilis, Turkey
[4]Department of Anesthesiology and Reanimation, Private Academic Hospital, Gaziantep, Turkey

Abstract

The most significant indicator of mortality and medical conditions like circulatory collapse and limb loss in traumatic injuries to the peripheral arteries is the length of time until first medical contact. If intervention with a tourniquet cannot be administered immediately, the majority of patients will be in hypovolemic shock in the preoperative period. Application of a peripheral neural block rather than general anesthesia seems to be a better option for this hemodynamically unstable patient population. The aim of this report was to emphasize that an infraclavicular blockade facilitated by in-plane ultrasound is a rapid, effective, and easily applied method for upper limb surgery, and to present a case of an urgently operated brachial artery laceration.

Keywords: Anesthesia, conduction, nerve block, vascular system injuries

Morbidity and mortality rates are high in peripheral artery traumas that require urgent intervention. The interval between injury and first medical contact is of crucial importance for reducing these rates.[1]

This is the case of an experience of ultrasound-guided infraclavicular block in an emergency situation for a patient in hypovolemic shock due to brachial artery laceration who could not be instantly treated before admission.

Case Report

A 47-year-old male patient admitted to our emergency room with brachial artery laceration due to an occupational accident. Above elbow tourniquet had been applied immediately by paramedics before transfer. Regarding to patient's statement, the incident had occurred 10-12 hours before admission. There were several signs of hypovolemic shock and organ hypoperfusion like altered mental status, hypotension (70/40 mmHg), tachypnea, oliguria, mild hypoxia and tachycardia. Initial hemoglobin level was 6 g/dl. These findings raised the necessity of emergent surgical intervention and patient was rapidly transferred to operation room with fluid resuscitation and erythrocyte suspension (ES) replacement. Regional block seemed to be a better alternative than general anesthesia since hemodynamic status was apparently unstable. After hemodynamic monitorization, patient position was arranged. He lay at supine position. While loosening the arm at shoulder, forearm was flexed at 90° and placed on the body. Head of the patient was rotated to contralateral side. Ultrasound probe was placed 1 cm to the front of the intersection of

Address for correspondence: Ali Bestemi Kepekci, MD. Yeni Yuzyil Universitesi, Anesteziyoloji ve Reanimasyon Anabilim Dali, Istanbul, Turkey
Phone: +90 212 444 50 01 **E-mail:** alibestemi.kepekci@yeniyuzyil.edu.tr
Submitted Date: November 24, 2017 **Accepted Date:** December 14, 2017 **Available Online Date:** February 20, 2018

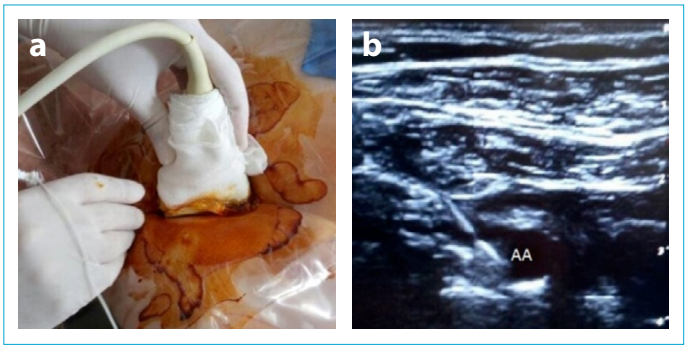

Figure 1. Patient positioning and infraclavicular block application **(a)**. Ultrasound guided puncture with in-plane method and periarterial local anesthetic administration **(b)**. AA, axillary artery.

the coracoid process and clavicula on the sagittal plane. In-plane method was used to monitor the needle throughout the procedure. Following the antisepsis of the area, 2 ml 2% lidocaine infiltration was used for local anesthesia. 20 ml 0.25% levobupivacaine and 1% lidocaine mixture was administered around the axillary artery between 3 and 11 to provide "U" shaped distribution (Fig. 1a and b). 22 Gx80 mm stimulator needle (Pajunkneedle, Germany) was used for application. Intermittent negative aspiration was performed to exclude the risk of vascular puncture.

Block was applied in 115 seconds and peak of blockage was reached roughly at 10th minute. No complication occurred during the procedure. The operation lasted about one and a half hour. The hemodynamic status improved after ES, fresh frozen plasma and 2 liters of isotonic fluid replacement. No additional analgesic was required at perioperative and early postoperative (12 hours) period. Oral and written informed concent was received from patient for the publication.

Discussion

Vascular traumas constitute 1-3% of all traumas.[2] Injuries of peripheral arterial and nervous system particularly require urgent intervention. Delayed or incomplete treatment of vascular injuries may end up with limb loss and even death.[3] Although success in extremity surgery has reached 86% thanks to advancements in vascular repair procedures, early intervention is still the cornerstone of therapeutic approach by means of preventing distal ischemia and blood loss. The first 6 hours is vital for reconstruction.[4, 5] Unfortunately, it was not the instance in our case and time to intervention was far more than desired latency. Moreover, hypovolemic shock had already been established. Thus, it was of critical importance to select the proper and time saving anesthetic method which would avoid further hemodynamic deprivation. At this point, regional anesthesia has a significant superiority over general anesthesia. Furthermore, regional anesthesia had been stated not to have deleterious effects on endocrine and metabolic response to acute surgical stress even in major vascular procedures.[6, 7] In accordance with these facts, we preferred to use peripheral blockage for our critically ill patient.

Brachial plexus can be blocked via interscalene, supraclavicular, infraclavicular and axillary approaches. The approach of choice depends on the relevant problematic area, the experience of the operator and the patient's anatomy. Lateral sagittal infraclavicular block-which was defined in 2004 by Klaastad et al.[8] is commonly used for upper extremity interventions regarding to its high success rate and low risk of complications. Infraclavicular approach is appropriate for hand, wrist, elbow and distal arm surgery. It provides significant advantages in comparison with other methods like low risk of pneumothorax and compatibility with catheterization.[9] We used infraclavicular approach in our case.

Technical ease and rapid application is another advantage of infraclavicular approach in brachial plexus blockage. Gürkan et al. depicted that time required to complete blockage at infraclavicular approach is significantly shorter than supraclavicular one. They also stated that statistical significance did not reflect clinical benefit. The peak of blockage for infraclavicular approach was achieved at 12.5±4.8 minutes. At this study 20 ml of 0.5% levobupivacaine plus 10 ml of 2% lidocaine solution was used for local anesthesia.[10] Özgür et al. had a supraclavicular block experience with ultrasound on 14 cases operated for upper extremity peripheral artery lacerations; in which 20 ml of 0.5% bupivacaine plus 20 ml of 2% lidocaine solution was used. Full blockage was applied in 7.8±5.1 minutes and peak of blockage was achieved at 10.1±4 minutes.[11] In addition to comparability of durations about blockage application and reaching to peak level with previous reports, in our case we had the advantage of achieving a satisfactory blockage with less volume of a more diluted solution.

The use of ultrasound for peripheral neural blocks yielded to utilization of lower doses of anesthetic mixtures and higher success rates. Thereby, its popularity increased in recent years. It was put forth by Casati et al.[12] that carrying out the procedure with ultrasound had increased patient's comfort and thus the acceptability of the procedure. Li et al.[13] demonstrated that brachial plexus blockage with ultrasound had increased the level of sympathetic blockage and blood flow especially in the ulnar artery in comparison with neuro-stimulator method. We appreciate the superiority of ultrasound guided intervention in peripheral blockage and principally use this method for facilitation of this procedure in our clinic.

Conclusion

Regional anesthesia methods have recently come to the forefront since they provide effective analgesia at both peri- and post-operative period and enable early mobilization. Regarding its favorable properties like technical ease, rapid application and long-lasting analgesic effect, peripheral blockage via infraclavicular approach might be a feasible anesthetic method that can be used in upper extremity arterial injuries.

Disclosures

Ethics Committee Approval: The study was approved by the Local Ethics Committee.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship contributions: Concept – A.B.K., D.O.O., A.Y., I.H.O.; Design – A.B.K., D.O.O., A.Y., I.H.O.; Supervision – A.B.K., D.O.O., A.Y., I.H.O.; Materials – A.B.K., D.O.O., A.Y., I.H.O.; Data collection &/or processing – A.B.K., D.O.O., A.Y., I.H.O.; Analysis and/or interpretation – A.B.K., D.O.O., A.Y., I.H.O.; Literature search – A.B.K., D.O.O., A.Y., I.H.O.; Writing – A.B.K., D.O.O., A.Y., I.H.O.; Critical review – A.B.K., D.O.O., A.Y., I.H.O.

References

1. de Silva W, Ubayasiri RA, Weerasinghe CW, Wijeyaratne SM. Challenges in the management of extremity vascular injuries: A wartime experience from a tertiary centre in Sri Lanka. World J Emerg Surg 2011;6:24.
2. Kauvar D, Kraiss L. Vascular trauma: Extremity. In: Cronenwett JL, Johnston KW, editors. Rutherford's Vascular Surgery. 8th ed. Philadelphia: Elsevier Saunders; 2014. p. 2485–501.
3. Moskovitz B, Levin DR. Gunshot wound of the thigh presenting as a massive hemorrhage to the scrotum. Isr J Med Sci 1988;24:684–5.
4. Rich NM, Baugh JH, Hughes CW. Acute arterial injuries in Vietnam: 1,000 cases. J Trauma 1970;10:359–69.
5. Shah DM, Naraynsingh V, Leather RP, Corson JD, Karmody AM. Advances in the management of acute popliteal vascular blunt injuries. J Trauma 1985;25:793–7.
6. Smeets HJ, Kievit J, Dulfer FT, van Kleef JW. Endocrine-metabolic response to abdominal aortic surgery: a randomized trial of general anesthesia versus general plus epidural anesthesia. World J Surg 1993;17:601–6.
7. Hadzic A, Arliss J, Kerimoglu B, Karaca PE, Yufa M, Claudio RE, et al. A comparison of infraclavicular nerve block versus general anesthesia for hand and wrist day-case surgeries. Anesthesiology 2004;101:127–32.
8. Klaastad Ø, Smith HJ, Smedby O, Winther-Larssen EH, Brodal P, Breivik H, et al. A novel infraclavicular brachial plexus block: the lateral and sagittal technique, developed by magnetic resonance imaging studies. Anesth Analg 2004;98:252–6.
9. Şahin Ş. Santral ve periferik sinir blokları el kitabı. İstanbul: Logos Yayıncılık; 2004. p. 112–7.
10. Gürkan Y, Hoşten T, Tekin M, Acar S, Solak M, Toker K. Comparison of ultrasound-guided supraclavicular and infraclavicular approaches for brachial plexus blockade. Agri 2012;24:159–64.
11. Özgür M, Hasde Aİ, Köseoğlu A. Ultrasound Guided Supraclavicular Block For Upper Extremity Perıpheral Artery Lacerations; A Fast, Easy And Safe Anaesthetic Management. J Contemp Med 2015; 5:31–5.
12. Casati A, Danelli G, Baciarello M, Corradi M, Leone S, Di Cianni S, et al. A prospective, randomized comparison between ultrasound and nerve stimulation guidance for multiple injection axillary brachial plexus block. Anesthesiology 2007;106:992–6.
13. Li T, Ye XH, Nan Y, Shi T, Ye QG, Ma JF, et al. Comparison of ultrasound and nerve stimulation techniques for brachial plexus block for regional hemodynamic changes of upper extremity. Zhonghua Yi Xue Za Zhi 2013;93:187–90.