Ultrasound-Guided Bilateral Infraclavicular Brachial Plexus Blockade for Bilateral Distal Radius Fracture Surgery: Case Report

Bilateral Radius Distal Uç Kırığı Cerrahisinde, Ultrason Eşliğinde Bilateral İnfarklavikuler Blok:Olgu Sunumu

Bilateral İnfraklavikuler Blok / Bilateral Infraclavicular Block

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Özet

Üst ektremite cerrahilerinde tek taraflı brakial pleksus blokları etkin analjezi ve anestezi sağlamaları nedeniyle sıklıkla kullanılmaktadır. Daha az sıklıkla da olsa bilateral ekstremite cerrahisi geçirecek hastalara; sistemik lokal anestezik toksistesi riski, pnömotoraks ve frenik sinir paralizisi gibi nedenlerle bilateral brakiyal pleksus bloğu nadiren uygulanır. Biz olgumuzda bilateral radius başı kırığı olan hastaya lokal aneztezik dozlarını azaltarak başarı bir şekilde uyguladığımız ultrason eşliğinde bilateral infraklavikuler bloğu paylaşmayı amaçladık. Biz olgumuza tek ekstremite için 15 ml lokal anestezik(10 ml 5% levobupivakain+ 5 ml 2% lidokain) toplam 30 ml ile ultrason eşliğinde bilateral lateral sagital infraklavikuler bloğu başarılı bir şekilde uyguladık ve herhangi bir komplikasyonla karşılaşmadık. Bilateral brakial pleksus blokları ultrason eşliğinde uygulansa da total olarak verilen lokal anestezik dozuna dikkat edilmeli, ultrason başarı oranını arttırmakla birlikte komplikasyonları tamamen ortadan kaldırmadığı sadece komplikasyon görülme sıklığını azalttığı hatırdan çıkartılmamalıdır.

Anahtar Kelimeler

Bilateral; İnfraklavikuler Blok; Ultrason

Abstract

Unilateral brachial plexus blockade causes efficient analgesia and anesthesia so it is frequently used in upper extremity surgery without major complications. However, bilateral brachial plexus blockade has some disadvantages such as systemic local anesthetic toxicity, pneumothorax and phrenic nerve paralysis. Thus bilateral brachial plexus blockade is seldom used in clinical practice. Here, we are presenting a case with bilateral radial head fracture that was operated under bilateral ultrasound guided infraclavicular blockade. The dosage of the local anesthesia was reduced and a total of 15 ml of local anesthetic (10 ml 5% levobupivacaine+ 5 ml 2 %lidocaine) for each extremity. The lateral sagittal infraclavicular blockade was successfully performed under ultrasound guidance without any complication. Total dosage local anesthetic should be carefully arranged during bilateral plexus blockades even if the blockade is performed under ultrasound guidance. It must be kept in mind that, although ultrasound guidance increases the success rate of the blockade it never eliminates risks of the complication.

Keywords

Bilateral; Infraclavicular Block; Ultrasound

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Introduction

Brachial plexus blockade is frequently used in upper extremity surgery as it causes effective analgesia and anesthesia. Orthopedic surgery is the major indication of the brachial plexus blockade which is generally performed unilaterally. Because of possible complications such as systemic local anesthetic toxicity, pneumothorax and phrenic nerve paralysis bilateral brachial plexus blockade is performed infrequently [1-3].

Introduction of Ultrasound(US) in anesthesia practice during the last 10 years enabled the differentiation of vascular structures from the blocked neural structures. Under US guidance, the anatomic structures are identified which decreases the need for total anesthetic volume and complication rate when compared with blind technique [3-5]. These advantages of US made it indispensable during both peripheral and upper extremity blockades. Infraclavicular blockade has a high success and low complication rate when performed under US guidance. As it is suitable for catheter insertion, the usage of infraclavicular blockade for upper extremity surgery is getting popular during the past years. Here, we are presenting a case with bilateral radius head fracture that is operated under bilateral UG guided infraclavicular blockade performed with low dose anesthetic.

Case Report

A patient with bilateral radius head fracture due to falling injury is consulted for surgical treatment. The patient was 26-year old, 172 cm in height and 80 kg in weight. He was ASA I and did not accept general anesthesia so application of US guided bilateral infraclavicular blockade was decided. Following informed consent, an iv line was provided with a 18 G angiocath from a right ankle vein. In order to provide sedation, 50 µg fentanyl was given intravenously. The patient was placed in supine position with arms adducted and the head was turned to opposite side. The skin is preped and draped. In order to perform a lateral sagittal infraclavicular blockade (LSIB), the US probe (Sonosite linear probe, 10-18 MHz Washington, USA) was placed as longitudinal plane of the probe is at cranio-caudal direction. The axillar vessels and chords of brachial plexus were identified. Just below the clavicle is anesthetized with 2 ml of 5% prilocaine. A 50 mm, 22 G nerve stimulation needle (Vygon, Ecouen, France) is introduced in the same plane with the probe. Under US guidance; medial, lateral and posterior chords of the brachial plexus is injected with 15 ml of local anesthetic (10 ml 5% levobupivacaine+ 5 ml 2% lidocaine), respectively. Each chord is injected with 5 ml of local anesthetic. The same procedure is repeated for the other extremity. The surgical anesthesia was provided 20 minutes after the injection of local anesthetic. No complication such as phrenic nerve paralysis and local anesthetic toxicity was observed. The surgery is lasted in 4 hours and no additional analgesia or sedation was needed during surgery. The VAS score was 5 at 12 hours postoperatively and 75 mg diclofenac was given intramuscularly. The patient was discharged at 7 days postoperatively.

Discussion

Brachial plexus blockades are frequently performed because they cause surgical anesthesia, long lasting postoperative analgesia, reduce the hospitalization time and increase the patient comfort. Depending on the surgical site and the experience of the physician, interscalene, supraclavicular, infraclavicular or axillary blockade can be performed. The increased success rate under US guidance makes these four plexus blockades suitable for forearm and hand surgeries. However, axillary and infraclavicular blockades are the preferred for forearm and hand surgeries. Of these two blockade techniques infraclavicular block has several advantages such as blocking nerves at more proximal level, enabling catheter placement, blockade of all chords from one injection site and high success rate. In the literature, there are case series instead of clinical studies reporting bilateral brachial plexus blockade [1-3]. The possible causes there are not many patients requiring bilateral upper extremity surgery, need for multiple approaches and avoidance from the possible complications.

There are three main problems regarding bilateral infraclavicular plexus blockades. The first is respiratory insufficiency due to phrenic nerve paralysis. The second one is pneumothorax and the third one is systemic toxicity of local anesthetic due overdose. The cause of phrenic nerve paralysis is displacement of the local anesthetic cranially causing motor blockade. The cranial displacement of the local anesthetic is directly related to the injected volume. Rodriguez et al investigated the effect of infraclavicular blockade with large volume local anesthetic on respiratory functions. They performed 20 cases of unilateral infraclavicular block with 40 ml of 1,5%mepivacaine and did not observe a negative effect on respiratory functions [6]. When blind technique is used, in order to obtain effective blockade high volume local anesthetic injection is performed. However, US guidance enabled effective blockade with reduced local anesthetic volume. As an example, O'Donnell et al performed successful axillary blockade with 4 ml of local anesthetic [7]. In our case, we used 15 ml of local anesthetic for each extremity and reduced the phrenic nerve paralysis risk. Similarly total dose of 30 ml reduced the systemic anesthetic toxicity risk. Pneaumothorax may develop in 0,2-0,5 % of the infraclavicular block patients. In 1973, in order to reduce the pneumothorax risk, Raj et al described the lateral approach instead of medial approach [8]. US guided lateral sagittal infraclavicular blockade is performed just medial to chorocoid process in a longitudinal axis. By this way, the anatomic structures become visible and risk of pneumothorax is reduced when compared to techniques with neurostimulation alone. In our case, we performed lateral sagittal infraclavicular blockade in order to avoid pneumothorax. However, even if it is performed under US guidance, if the needle and the probe is not kept in the same plane, if the needle is directed medially and if the anatomic structures are not identified clearly the pneumothorax risk is still high.

Conclusion, if bilateral brachial plexus blockade is needed, it must be performed under US guidance and infraclavicular blockade should be preferred that it has high success and low complication rate. However, even it is performed under US guidance total dosage of the local anesthetic has utmost importance. It must be kept in mind that US guidance reduces the complication rate, but not eliminates the complications related to infraclavicular blockade.

Competing interests

The authors declare that they have no competing interests.

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