CASE REPORT

Ultrasound - Guided Bilateral Infraclavicular Blockade for Urgent Bilateral Upper Limbs Surgery

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Abstract
Before the advance in ultrasound guided nerve block, the bilateral brachial plexus block is considered a contraindication, due to the possible development of complications, such as toxicity from local anesthetics or bilateral diaphragmatic paralysis. However, with the real time visualization provided by the ultrasound scan, these complications have decreased and it became a safer procedure.

Keywords: Bilateral infraclavicular block; Ultrasound guided nerve block; Burn patient

Introduction
Ultrasound-guided nerve blocks were first described in anesthesiology literature in 1978, as La Grange et al. utilized a Doppler device while performing supraclavicular brachial plexus blocks [1]. In recent years, as the scope of emergency ultrasonography has grown and expertise has increased, many authors have described ultrasound-guided nerve blocks performed in the emergency department, done without the aid of nerve stimulator devices. In 2006, Blaivas and Lyon described four cases of successful shoulder anesthesia and dislocation reduction performed following ultrasound-guided inter scalene brachial plexus blocks [2]. Liebmann et al., in the same year, performed ultrasound-guided forearm nerve blocks (radial, median, and ulnar) on 11 patients, none of whom required rescue anesthesia during the subsequent procedures [3]. A peripheral nerve block, such as brachial plexus block, generally requires the use of relatively high doses of local anesthetics, under ultrasound guidance; the anatomic structures are identified which decreases the need for total anesthetic volume and complication rate when compared with blind technique [4].

Case report
A 45 years old male patient with 30% burn involving the face and both upper limbs since 2 days ago, admitted to intensive care for follow up and oxygen therapy after developing mild hoarseness of voice and compartment syndrome of both upper limbs, accordingly the case was schedule for urgent bilateral fasciotomy of both upper limbs (Figure 1).

The patient is heavy cigarettes smoker and controlled hypertensive on medication. On physical examination, vital signs were found to be within normal limits (heart rate of 80/ min, blood pressure of 130/90 mmHg, and SpO2 98% on 4L/ min Oxygen mask). Airway examination reveal limited mouth opening, mallampati classification II, limited neck extension due to pain, and recent onset change of voice for which he was admitted to ICU for close observation and possible intubation. His laboratory work was within normal limit. Due to compromise airway and the risk of intubation a decision was taken to give bilateral infraclavicular block following informed consent from the patient.

A18 G cannula was inserted in right saphenous vein, to provide sedation, 25 μg fentanyl and 3mg midazolam was given intravenously. The patient was placed in supine position with arms adducted and the head was turned to opposite side. The skin is prepared and draped to perform a lateral sagittal

Figure 1: Burn injury involving the face and both upper limbs.
infraclavicular blockade. The ultrasound probe (Sonosite linear probe, 10-18 MHz Washington, USA), placed as longitudinal plane of the probe is at crano-caudal direction. The axillary vessels and chords of brachial plexus were identified. Just below the clavicle the skin was anesthetized with 2 ml of 1% lidocaine. A 50 mm, 22 G nerve stimulation needle (Vygon, Ecouen, France) is introduced in the same plane with the probe. Under ultrasound guidance; medial, lateral, and posterior chords of the brachial plexus was injected with 15 ml of local anesthetic (2% lidocaine with 1: 200,000 epinephrine), respectively. Each chord is injected with 5 ml of local anesthetic. The same procedure is repeated for the other extremity, without inserting catheter for postoperative analgesia as a special catheter for peripheral nerve block is not available in the hospital. The surgical anesthesia was provided within 20 minutes after the injection of local anesthetic. No complication Such as local anesthetic toxicity was observed. The surgery lasted 2 hours and no additional analgesia or sedation was needed during surgery.

Discussion

In the past with nerve stimulator techniques, large doses of long acting local anesthetics were administered as a single bolus and the volume was an important determinant of the success of brachial plexus block. Recently, however, ultrasound-guided techniques allow for local anesthetic to be administered more accurately with lower doses of the initial medication bolus [5]. The maximum recommended dose of local anesthetic depends on the type of local anesthetic used, the site of local anesthetic injection, and patient-related factors (age, organ dysfunction, and pregnancy) that may alter the pharmacokinetics of the local anesthetic [6]. We used total volume of 30 ml of lidocaine 2% with epinephrine which calculates to a total of 600 mg of lidocaine. This is much lower than the 900 mg of lidocaine recommended by H. Palve et al., as the maximum dose for brachial plexus blocks [7]. The risk of pneumothorax in infraclavicular block with nerve stimulator technique around 0.2-0.5 %. Raj et al in 1973, described the lateral approach instead of medial approach to reduce the pneumothorax risk [8]. Ultra sound guided lateral sagittal infraclavicular block is performed just medial to Coracoid process in a longitudinal axis which make the anatomical structure more visible and reduce the risk of pneumothorax. In our case, we performed lateral sagittal infraclavicular block to avoid pneumothorax. However, the pneumothorax risk is still high even if it is performed under ultrasound guidance, if the needle and the probe are not kept in the same plane and if the anatomic structures are not identified clearly [4].

Another concern regarding bilateral infraclavicular plexus blockades is respiratory insufficiency due to phrenic nerve paralysis. Rodríguez 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 [9]. When blind technique is used, to obtain effective blockade high volume local anesthetic injection is performed. However, ultrasound guidance allows effective blockade with reduced local anesthetic volume. For example, O’Donnell et al performed successful axillary blockade with 4 ml of local anesthetic [10]. In our case, only 30 ml total volume was used divided bilaterally. In conclusion, advances in ultrasound guidance have helped reduce the complications associated with bilateral brachial plexus blocks. This technique may play a crucial role to avoid the risk of airway manipulation in the jeopardized airway when simultaneous bilateral procedures are necessary. Bilateral infraclavicular block with ultrasound guidance, constitute a safe alternative, with an adequate risk-benefit balance.

References