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Case Report

PENG Block: A Proposal for Shoulder Dislocation in Emergency Room

Guadalupe Zaragoza-Lemus^{1*}, Maritza María Elena Hermosillo Franco², Marisol Limón Muñoz¹, Arely Seir Torres Maldonado¹, and Juana Rebeca Núñez Mendoza¹

¹Department of Anesthesiology, Instituto Nacional de Rehabilitación, México ²Department of Anesthesiology, ISSSTE Tláhuac, México

Abstract

Shoulder dislocation is often associated with intense pain and requires urgent pain therapy and reduction. Anterior shoulder dislocations are the most common types of joint dislocation, nearly all of them are treated with closed reduction. We report the case of an elderly man with shoulder dislocation who was presented to anesthesia department for closed reduction under a novel and effective blockade of the group of pericapsular nerve (PENG) of the shoulder.

INTRODUCTION

Anterior shoulder dislocations are the most common types of joint dislocation, the majority are treated with closed reduction. Reduction methods could be grouped into their principle mode of action: traction-countertraction, leverage and scapular manipulation, they are usually associated with moderate to intense pain, and require urgent pain therapy and anesthesia for reduction [1]. A lot of anesthetic techniques have been reported for releasing pain and improving the joint reduction, both interscalene block (ISB) and intravenous analgesia, or general anesthesia, are well stablished applied procedures [2]. However, the hemidiaphragmatic paralysis and the use of ambulatory opioids remain problematic [3,4].

The suprascapular block (SSNB) has shown to be effective when compared to ISB in postoperative analgesia, even for the management of chronic pain, showing a very low incidence of adverse effects, only 1% [5]. However, SSNB is not the only nerve responsible for the sensory and motor innervation of this joint. The axillary nerve completes the innervation of the shoulder joint [6]. Current anatomical studies [7-9), have highlighted that shoulder joint receive innervation from articular branches of the suprascapular, axillary, subscapular, and lateral pectoral nerves. The use of ultrasound-guidance (US-G) to locate neurovascular structures allows real-time visualization of selective anatomy and the best practice for regional anesthesia in high-risk patients, as in this case. We present a patient with anterior shoulder dislocation with background of recurrent right glenohumeral dislocation that should be managed outpatient. Therefore, the aim of the present report was to assess the use of the, so called, Pericapsular

*Corresponding author

Guadalupe Zaragoza-Lemus. Anesthesiology Department, Instituto Nacional de Rehabilitación. Calzada México-Xochimilco 289, Tlalpan, CP 14389, México City, México, Email: zararegional@hotmail.com

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or PENG block, related to 1) effectiveness 2) diaphragm-sparing 3) no side effects 4) ambulatory patients.

CASE PRESENTATION

A 60-year-old male patient was admitted to the emergency department (ED) with a diagnosis of anterior shoulder dislocation of 20 days of evolution. He went to the emergency room to be assessed with unbearable 10 VAS for pain, where 3 closed unsuccessful reduction attempts were made, so the anesthesiology department was consulted to perform closed reduction under anesthesia. His physical examination showed: BMI 32 m2; Mallampaty III, thyromental distance 6 cm, with a mouth opening >3.5 cm, partial odontectomy, with missing upper incisor. There was remarkable evidence of contracture of the pectoralis major, deltoids and the glenohumeral head was palpable in the pectoralis major below the acromioclavicular joint, flexion and extension of his arm was impossible. Due to the inherent characteristics of recurrent anterior right glenohumeral dislocation, closed reduction traction-countertraction could not be delayed. Laboratory findings were: Hb 16.4 Hto 43% Platelets 324, Gluc 96 Tp 12.4 Ttp 32 INR 0.96. X-rays are shown in Figure 1, Reconstructed CT is shown in Figure 2 and Post-Reduction, Figure 3.

He was catalogued as ASA Physical Status II-U. The preoperative anesthetic concerns were: 1) a potentially difficult airway 2) obesity 3) non viability or difficulty to reduce the shoulder joint 4) safely discharged from ED two hours post-treatment.

After obtaining the informed anesthetic consent, the patient was placed under standard monitoring: EKG, Spo2 and non-

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Figure 1 X-rays with dislocation of the glenohumeral joint, Walch classification Grade II type B. Before PENG block.



Figure 2 CT: tomography of the right shoulder showing loss of articular congruence of the glenohumeral joint in the anteroinferior direction. With avulsion of the anteroinferior aspect of the right glenoid.

invasive blood pressure (NIBP). No sedation was given. A Hartman solution was initiated and continuously administered in the opposite arm. The procedures were performed using a 6-10 MHz 38-mm linear US probe (M-Turbo; SonoSite Inc, Bothell, WA®) First, in transversal plane, the brachial plexus was identified as a compact neural cluster located on the first rib and lateral to the subclavian artery, the needle tip (Stimuplex; B. Braun Medical Inc, Bethlehem, PA®) was advanced in lateral to medial direction in the deeper postero-lateral area from plexus in approach like Aliste et al technique(10), a "mini volume" of 5 mL of local anesthetic (LA) Ropivacaine 0.375% was injected. A redirection was made to perform the Subomohyoid Anterior Suprascapular block described by Abdhalla, et al [5], in a plane approach with 5 mL and same LA was injected. Acromioclavicular approach (Figure 4), was achieved with probe in transversal approach, visualizing the clavicle and acromion, 5 ml of LA was then administered in out-plane approach (Figure 5). The last approach was at the glenohumeral joint with the arm in extension and an external rotation towards the thoracic wall, then, linear ultrasound probe was placed longitudinally in plane of the needle tip pierce, the subscapular muscle was placed deep into it between deeper subscapular muscle fascia and deltoid muscle fascia, humeral head process was used as reference (Figure 6) 15 mL of LA was deposited in this location accordingly to Fajardo's group technique [11]. Evaluated 30 minutes later, 12 points before start according with the proposal of Aliste et al [12]. The absence of hemidiaphragmatic paresis was corroborated by USG. The reduction maneuvers were made by an orthopedic specialist with the traction-countertraction technique, and it successfully got to his place in the first attempt. The patient was discharged two hours after the resolution of his problem. Anteroposterior X-rays of the right shoulder after reduction showed partial congruence of the glenohumeral joint (Figure 3) and went without pain while waiting days for surgery. Telephone assessment revealed 23 hours analgesia.

DISCUSSION

The USG-guided shoulder pain control has originated vast scientific research to anesthetize all skin, muscles, tendons, bursae, synovium, joint surfaces, capsules, bone tissue and nociceptive territories of this complex major joint. Despite



Figure 3 Partial Reduction post maneuvers by orthopedic colleagues after Peng Block.



Figure 4 SSNB in plane approach with 5 mL of AL in anterior via, SA subclavian artery, BP brachial plexus, OHM omohyoid muscle, SSN suprascapular nerve.



Figure 5 Acromicoclavicular Joint, out plane approach 5 mL Hihg Nociceptors Zone: SSM subscapularis muscle.



Figure 6 In plane approach deltoides muscle (deltoides M), SSM subscapularis muscle 15 mL of LA.

the recently published anatomic studies, there is still lack of consensus about this issue. Neuroanatomic understanding of the glenohumeral joint (GHJ) and surrounding shoulder structures is improving. The innervation of the shoulder is complex and cannot be reduced to the articular branch alone for the above, neither just one block. The concept of Shoulder Blockade with motor sparing includes various modalities for controlling pain after shoulder procedures that combine interfascial, infiltratives, peri articular and peripheral branch nerve block. However, until now, they have not been validated or well defined in randomized controlled trials. Other studies have combined: suprascapular and axillary nerve block (SSAX), or, Suprascapular Nerve blocks SOS [13], with Axillary nerve (AN) block, or, Anterior approach [14,15] plus Colateral block [16], or, triple puncture with SNNB plus AN plus Peck I [17] or Pecs II [18]. Also, the combination of Infraclavicular-suprascapular blocks (ICB-SSB) has been unsuccessfully evaluated [19]. Even more, Czuczman M et al [20]., have used the erector spinae block versus shoulder periarticular anesthetic infiltration but it is still in validation process. Likewise, Continuous Subacromial Infusion [21], PENG, Periarticular or Pericapsular Block have been used [22], with variants as shoulder anterior capsular block (SHAC) in interfascial plane including the superior, middle and inferior subscapular and the musculocutaneous nerves [23], or Multimodal Nerve Injection called "3NB", which includes three approaches SSN+AN+lateral pectoral nerve (NLP) this last to blind [24]. Local Infiltration Analgesia with a catheter for 24 hours [25], or, pericapsular block based in permeable spaces between the three glenohumeral ligaments as potential gateways [26], or Pericapsular Instillation [27], some of them are in process of validation. Following validation of every technique and patient selection, clinical trials should prioritize categorical data.

Thus, anatomic and clinical reports led us to perform a supraclavicular block to reinforce the coverage of the proximal exit of the AN from the brachial plexus. A SSNB was placed anteriorly despite having a 41% failure, this nerve gives 70% of the innervation to the shoulder (Figure 4), a periarticular block was placed on the acromioclavicular joint to search for the free portion of the head long of the biceps tendon (Figure 5), considering that this site is highly rich in nociceptors(9). Finally, we tried to block both the axillary, lateral pectoral and subscapularis nerves via the myotendinous junction of the anterior subscapularis muscle with the humeral head (Figure 6), allowing the spread of the transfusion through the anterior, inferior and posterodorsal walls of the articular capsule, the subacromial bursa and the bicipital groove, as well as into the articular space [11]. Current nascent literature suggests several safe and potentially effective approaches, like in this case. Then, we proposed another: the PENG block combined, as an alternative to the interscalene block. Even though we have had adequate analgesia in this patient, further studies are needed to evaluate clinical efficacy, analgesia effects, and also optimal volume of the block. Despite multiple punctures are undesirable, it is worth motor block sparing, mini volume and no lateral effects of ISB in high-risk patients.

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