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Association of Interscalenic Plexus Brachial Block and Serratus Anterior Plane Block May Be an Attractive Alternative for Axillary Surgery

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Abstract | **Case Report**

Introduction: General anesthesia is usually used for axillary surgery. However, development of regional anesthesia may make possible other alternative. Patient: Herein, we report the story of a 51 years old man admitted for excisional biopsy of an axillary lymphadenopathy the patient was in a high risk of perioperative cardiovascular and respiratory complications. Association of intersclaneic brachial plexus bloc and serrratus anterior plane block was proposed as anesthetic technique and surgery was completed without incidents. ***Conclusion:*** this Association seems to be an attractive alternative for general anesthesia in axillary surgery especially in high-risk patients.

Keywords: Axillary surgery, Regional anesthesia, Interscalene brachial plexus block, Serratus anterior plane block, High-risk patient, Ultrasound-guided.

INTRODUCTION

With the development of regional anesthesia around the world and the rise brought by the consistent use of ultrasounds, it has been proven that not only these techniques allow satisfactory pain management and good inflammatory reaction control but also they are associated to an improved outcome. This is particularly significant in high-risk patient in which general anesthesia is predictive of major complications. [1]

We report here the story of a high-risk patient undergoing an axillary surgery under association of interscalene plexus brachial block and serratus plane block.

Patient:

We report the story of a 51 years old skinny man (17 kg, BMI =17) admitted for progressive shortness of breath developed over the past 15 days. Computed tomography pulmonary angiography (CTPA) was realized and showed presence of a pulmonary embolism (PE) in association with right basal pneumonia and two pulmonary micronodules. This PE seemed to be paraneolpastic as in addition of pulmonary nodules in CTPA, extended examination found a suspect hard and fixed axillary lymphadenopathy. Thus, patient was scheduled for diagnostic excisional biopsy.

Patient breathing was laboured, and saturation under room air doesn't exceed 86 % and general anesthesia was at risk of perioperative cardio respiratory complications.

The need to have a rapid diagnosis made necessary developing safe strategy for patient anesthetic management. We conclude trying an association of interscalene brachial plexus block (ISBPB) and serratus anterion plane block (SAPB).

We explained all risks to the patient and his family and patient consent was obtained. After management of anticoagulation, patient was admitted to operation room. Oxygen was already administrated and standard monitoring received. The two blocks were realized in supine position. We use for procedures high frequency linear transducer (7mHz – 12mHz) of S6 sonoscape ultrasounds system and echogenic vygon echoplex+ needles (50mm – 22 G). To avoid intraneurlal injection, a neurostimulator braun stimuplex ® was connected to needles and intensity adjusted to 0,5 mA.

After skin desinfetion, first block realised was ISBPB. We have identified brachial plexus first in supra clavicular fossa (superficial and lateral to artery) and then we scanned cranially until interscalene space to identify roots needle was introduced in-plane medial to

lateral. The block was completed with injection of 15 ml of 0,25% bupivacaine.

For the SAPB, probe was placed in midaxillary line in 4th - 5th ribs level then we scanned posteriorly until apparition of latissimus dorsi muscle above serratus anterior muscle. The needle was introduced in-plane anterior to posterior. the injection was performed in the plane between latissimus dorsi and serratus anterior muscles. The block was completed with injection of 30 ml of bupivacaine 0,25% (Figure 1). Total dose received by the patient was less than toxic dose of bupivcaine (2mg/kg, being 120 mg for our patient).

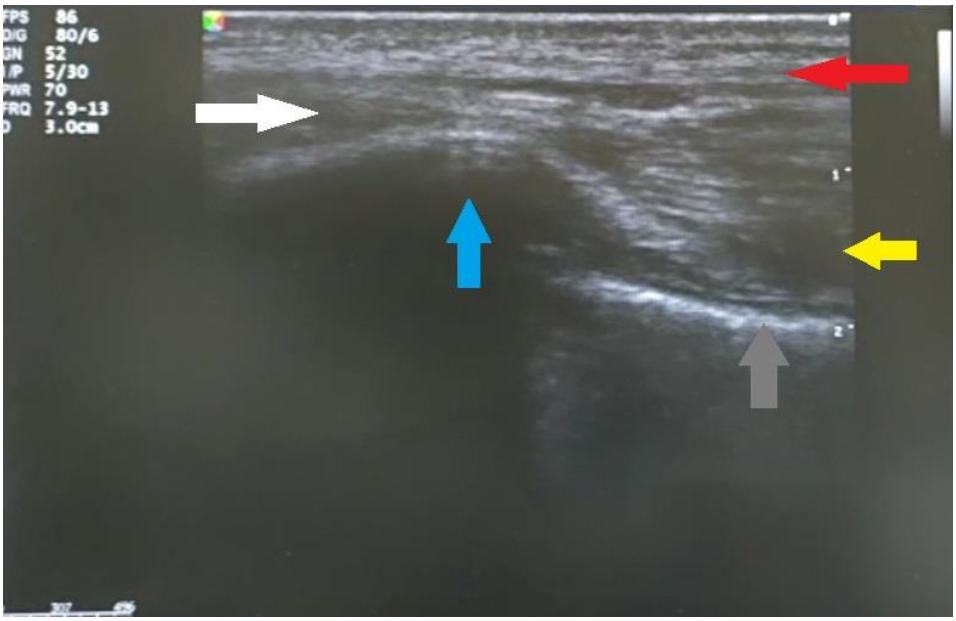

Figure 1: serratus anterior plane block (superficial technique)
Red Arrow: Latissimus Dorsi Muscle, **White Arrow:** Serratus Anterior Muscle, **Blue Arrow:** 4th rib, **Yellow Arrow:** Intercostal Muscles, **Grey Arrow:** Pleura

Evaluation of block after 15min has shown anesthesia of anterior lateral thoracic wall surgery was performed without incidents. We didn't have to use complementary sedation cytopathological examination confirms diagnosis of malignancy. It was about metestasis of lung cancer and patient was addressed to pneumo-oncology department.

DISCUSSION

Axillary masses are diversified, and are uncommon alterations when detected as an isolated finding. they may be associated with bening ou malignant diseases.[2] in all cases and especially when malignancy is suspected having the right diagnosis become an obligation. This urgent requirement may sometimes interfere with anesthetic risk in some patients.

General anesthesia is the main technique usually used in axillary surgery; but in our patients with pulmonary embolism and pneumonia, major cardio respiratory complications are expected. We had to find another anesthetic technique to minimize risks. regional anesthesia fulfills this role.

The first idea was to accomplish surgery under ISBPB as sole anesthetic technique. However, many limitations were identified. first and foremost, all brachial plexus blocks described until today don't ensure anesthesia of axilla skin. This territory innervation comes under intercostobrachial nerve, which is the cutaneous branch of the second intercostal nerve. This nerve pierces the serratus anterior muscle to go through axilla to join medial side of arm. In addition to this, sensitive innervation of antero lateral chest wall is not entirely ensured by brachial plexus.

Addition of another block covering the anterior lateral chest wall was necessary. And the best choice appeared to be the serratus anterior plane block (SAPB). This technique is recent, described the first time by Blanco and al. In 2013. [3] the block was described under two techniques. it consists in an injection either in the plane between the latissimus dorsi muscle and serratus anterior muscle in the superficial technique or between the deep face of serratus anterior muscle and ribs in the deep technique. authors have realised the block with a mixture of levobupivacaine 0,125 % (0,4ml / kg) and gadolinium. Analgesia obtained was about 750 min to 840 min and block seemed to be promising.

this block is a fascial block. This is the main limitation found by authors, which means that the quality of blockade depends essentially of the spread of the local anesthetics. To highlight this feature, Blanco and al. have realised magnetic resonance imaging (MRI) after

completing blocks. They found a distribution of local anesthetics covering the major part of axillary groove with a more anteriorly spreading in the deep technique, and a more descending distribution in the superficial technique. in our case we have use the superficial technique and we had the same distribution as mentioned by Blanco and al.

These observations will be taken again in a cadaveric study published in 2018. [4] The study consisted in realization of SAPB with methylene blue and then evaluation of spreading of local anesthetic. The main result of the study was that the spread of local anesthetic depends of injected volume regardless of the used technique. Moreover, the addition of a second injection in 3^{rd} – 4^{th} ribs level invreases the distribution area. in our case we have injected 30 ml of 0,25 % bupivacaine whit one injection as described the first time in 4^{th} – 5^{th} ribs level.

We firstly thought that we were the first to report the use of this technique in axillary surgery until we found this report published by luo and al. [5] authors have used association of ISBPB ans SAPB for resection of a huge axillary mass (92 x 65 cm). Authors report the need of complementary sedation 15 min after surgery. in our case no sedation has been needed. we think that the volume used in the block was the main cause. in fact, they use only 15 ml of 0,5 % ropivacaine. also, the injection has been performed in 5^{th} – 6^{th} ribs level which may not cover all the axillary area.

Association of these two blocks has been reported also in a randomized trial published by demir and al. [6] They compared the effects of the association in arthroscopic surgery of shoulder classically performed under ISBPB alone. They found that adding SAPB to ISBPB increases the quality of surgical anesthesia and reduces the need for intraoperative sedoanalgesia for arthroscopic shoulder surgery. they have performed SAPB using 30 ml of a mixture of 2% lidocaine and 0,5% bupivacaine in equal parts.

Realizing a ISSPB in a patient with a compromised respiratory function was the main questionnable point in our paper. Compromised respiratory function is commonly known as contre indication to ISBPB. Diaphragmatic palsy, reduction of functional pulmonary measurements are confirmed after block. However, general anesthesia was also dangerous for our patient for many reasons. respiratory and hemodynamic consequences of mechanical ventilation were predictable. atelectasis, hypoxemia, decreased end tidal CO2, tachycardia, right heart failure, shock are the most common findings in patients with pulmonary embolism receiving general anesthesia [7]. Hemodynamic complications were an added risk in our patient.

We had a deep discussion to evaluate benefits and risks. we chose ISBPB to spare hemodynamic complications. and to try to prevent respiratory function worsening, we have used a low dose of local anesthetics without evidence of efficacy in literature.

Shwenk and all. Have published in a case report, a long defense speech of perioperative management of ISBPB in patient with lung disease. [8] they reported a case of A 89 years old women 89-year-old female smoker with prior left lung lower lobectomy and mild to moderate lung disease who presented for right shoulder arthroplasty. after explaining risks to patient, she insisted for regional anesthesia. patient received 30 ml of ropivacaine 0.25 % and a cathether was inserted for post operative analgesia. surgery was uneventful and post-operative analgesia satisfying. there was no complications. in this paper authors, insisted in a benefit / risk assessment and a close respiratory monitoring.

Supraclavicular block was not suitable in our opinion .it results in an anesthesia below the shoulder, and for axillary surgery moving the upper arm was required. thus, anesthesia of shoulder was necessary.

In conclusion, the association of ISBPB and SAPB seems to be an attractive alternative technique, especially in high-risk patient. further investigation are required to clearly define indications of this technique.

Conflict of interest: Authors declare that they do not have any conflict of interest

Written consent: This case report is published with the written consent of the patient

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