

Interscalene Block in the Modern Era: When Stuck, Go Back to the Roots!

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ABSTRACT

The traditional interscalene block has evolved over time to lower, lateral and posterior approaches, coinciding with the advent of Peripheral Nerve Stimulator and Ultrasonography. In limited infrastructure settings, such technology remains elusive and the classical paresthesia technique comes to the rescue. This approach is however very difficult to elicit in pediatric patients. It is here that the grassroot approach of a fascial “click” or “pop” emerges as the savior to administer a satisfactory block. We describe a case of a young boy with successful conduct of anaesthesia for K wire fixation of supracondylar fracture of humerus under lower interscalene block with loss of resistance technique. In light of recent research showing about 40-50% variation in the brachial plexus anatomy around the subclavian artery, use of technology in anaesthesia is the future. However, till such technology is made universally affordable, it is pertinent to remember the roots of interscalene block!

Introduction

The traditional interscalene block (ISB) by paresthesia technique, first described by Winnie in 1970, is a time-tested entity for surgeries of distal clavicle, shoulder and proximal humerus. As knowledge about the anatomy of the brachial plexus evolved, coinciding with the rapid rise in technological advances [peripheral nerve stimulator (PNS) and ultrasonography (USG)], ISB has also undergone certain innovations [lower interscalene block (LISB) [1], Boezaart and Pippa techniques [2]; posterior approaches] to expand the coverage of anaesthesia and analgesia, titrated to patient needs.

However, in middle to low-income countries with limited resources, PNS and USG affordability is a challenge. In such settings, paresthesia guided ISB becomes the technique of choice. But in the pediatric population, patient cooperation is a major limiting factor for eliciting paresthesia. It is here that the most basic phenomenon of a fascial “click” or “pop” of the

prevertebral fascia (Figure 1,2) while passing the needle in the interscalene groove [3] comes to the rescue, serving as a good endpoint for the deposition of local anaesthetic (LA), in a sedated patient.

The authors declare no conflicts of interest.

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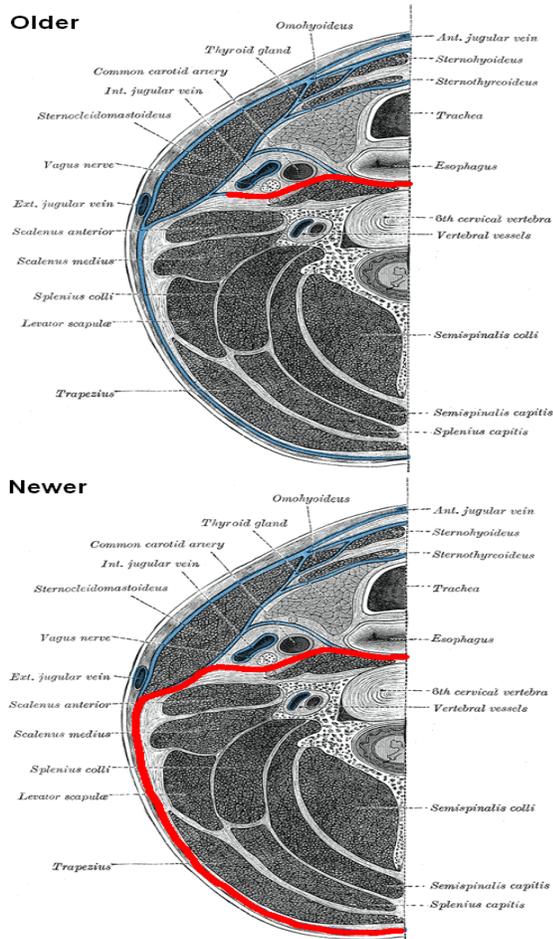


Figure 1- Cross section at C6 vertebral level showing comparison of older and newer versions of anatomical correlations of prevertebral fascia with vital landmarks in interscalene groove.

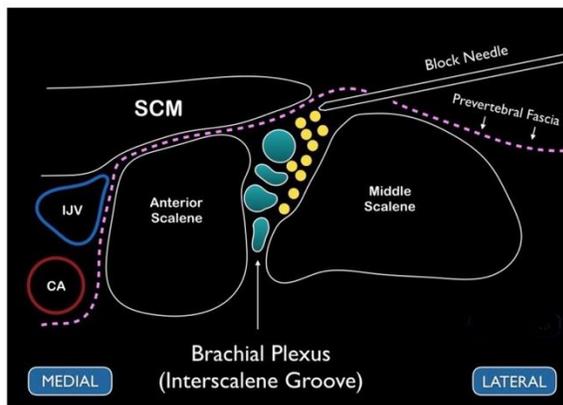


Figure 2- Needle piercing the prevertebral/interscalene fascia to lie in the interscalene groove for interscalene block.

Case Report

A 5-year-old ASA1 male child, weighing 20kg presented in the emergency department for K wire fixation of supracondylar fracture of the left humerus (Figure 3,4).



Figure 3- C arm image of Supracondylar fracture humerus



Figure 4- C arm image post K wire fixation of Supracondylar fracture humerus

Considering the age of the child and the surgical site, anaesthesia planned was intravenous (iv) sedation and supraclavicular block (SCB). After attachment of standard American Society of Anaesthesiologists (ASA) recommended monitors, the patient received premedication with inj. glycopyrrolate 80mcg, inj. midazolam 0.6mg and sedation with inj. ketamine 20mg. Then with the patient in supine position, the left shoulder was depressed with the head turned to the right side. The point of block needle insertion was just proximal to subclavian artery (SCA) pulsation in a posterolateral direction. We encountered persistent

subclavian artery puncture and non-localization of first rib despite standard troubleshooting measures. At this point, SCB was abandoned and LISB was attempted. Point of needle entry (PONE) was 2 finger breadths above the clavicle in the interscalene groove (modified Winnie's approach). After attaining the classical "pop" of the prevertebral fascia with 22G hypodermic needle, Inj. 2% Lignocaine + Adrenaline 4ml along with inj. Bupivacaine 0.5% 10ml was injected after repeated negative aspirations. Satisfactory backflow of LA in needle hub was seen post injection. Surgery was completed uneventfully in 1.5 hours. Block effect weaned off over 6 hours and patient was discharged after an uneventful hospital stay.

Discussion

Having a clear idea about the anatomical structures in the neck and brachial plexus is a prerequisite for performing a landmark guided brachial plexus block. This fact becomes more important when the patient is of paediatric age group in whom the anatomical ranges of the known landmarks viz size, width and depth have a lesser margin for error in a vital area like the neck. Moreover, it is not practical to expect the same level of cooperation or reliability of feedback in children, when contemplating a paraesthesia guided technique. In view of the abovesaid facts, the advent of USG is a boon for anaesthetists. It increases the precision of peripheral nerve blocks while also reducing the total administered volume of local anaesthetics, as the whole procedure is carried out 'under vision', thereby reducing the chances of local anaesthetic systemic toxicity (LAST). However, ground reality is that the correct placement of the ultrasound probe and proper identification of the target and vital structures is totally dependent on the accurate knowledge of surface anatomy. After all, the eyes cannot see what the mind doesn't know!

Recent research has shown that contrary to traditional teaching, anatomical variation may be present in as much as 40-50% of the population when it comes to relation of the brachial plexus with the subclavian artery and scaleni muscles [4-5]. This might have been the reason for the repeated subclavian arterial punctures and subsequent non localization of the first rib in our patient.

In such a situation of elusive SCB, LISB can be attempted at a site two thirds of the distance caudally from C6, after dividing the linear distance between the clavicle and C6 into three parts [6]. LISB provides adequate anaesthesia and analgesia to the whole upper limb which could be due to the relative proximity of the inferior trunks to the other components of brachial plexus as they become tightly bundled between the clavicle and first rib at this level [1]. This arrangement of the nerve roots at the lower interscalene level leads to a short effect

distance (from C5 to C8 nerve root) for the diffusion of local anaesthetics via the deep cervical fascia [7] (also known as the prevertebral or interscalene fascia) of the neck. In our case, due to the now dual disadvantage of blurred clinical anatomy and unavailable USG, the most basic phenomenon of loss of resistance when the block needle pierces the interscalene part of the prevertebral fascia, emerges as the saviour to salvage a successful nerve block.

Conclusion

Thus, moving ahead, there is no doubt that increased use of technology like PNS and USG would become the norm rather than exception in performing peripheral nerve blocks. Yet, the gross disparity in income in various regions of the world would prove a significant roadblock for universal use of the abovesaid technology. Till then, this case exemplifies that while adding new technological strings to the bow is always welcome, the "loss of resistance" or "fascial pop" technique would always remain the root of the so-called bow, in the anaesthetist's armamentarium. And as the saying goes, it is always a good idea to never forget our roots!

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