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Regional Anesthesia for Arthroscopic Shoulder Surgery: Comparison between Interscalene Brachial Plexus Block and Combined Suprascapular Nerve and Axillary Nerve Blocks

Thesis

Submitted for the Partial Fulfillment of the M.D. Degree in Anesthesiology

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List of Abbreviations

Abb.	Full term
ACLS	Advanced Cardiac Life Support
AN	Axillary nerve
ANB	Axillary nerve block
COX	Cyclooxygenase
DPQ	Dartmouth pain Questionnaire
GSN	Greater scapular notch
IA	Intraarticular
IBPB	Interscalene brachial plexus block
ISB	Interscalene block
LA	Local anesthetic
MPQ	Mc Gill pain Questionnaire
NMDA	N-methyl-D-aspartic acid
NSAID	non steroidal anti-inflammatory drugs
PACU	Postanesthesia care unit
PCA	Patient controlled analgesia
PONV	Postoperative nausea and vomiting
SD	Standard deviation
SSN	Suprascapular nerve
SSNB	Suprascapular nerve block
VAS	Visual analogue scale
VRS	Verbal rating scale
WHYPQ	West Haven-Yale pain Questionnaire

INTRODUCTION

Anesthetic options for shoulder surgery include general anesthesia, regional anesthesia with or without sedation, and a combination of regional and general anesthesia. In the latter case, the addition of regional anesthesia will result in reduced general anesthetic requirements and postoperative analgesia of varying duration.

Arthroscopic shoulder surgery has a 45% incidence of severe intraoperative and postoperative pain that is often significant enough to interfere with initial recovery and rehabilitation ***(Checcucci et al., 2008).***

The regional block was found to be safe and effective, with a high degree of patient acceptance. It provided excellent intraoperative analgesia and muscle relaxation. Postoperatively, regional anesthesia resulted in fewer side effects, fewer hospital admissions, and a shorter hospital stay when compared to general anesthesia ***(Rasche and Nath, 2004).***

The use of regional anesthesia, in the form of interscalene brachial plexus blockade, is gaining popularity because of the numerous benefits that have been attributed to this type of anesthesia, because shoulder surgery frequently results in severe postoperative pain, the preemptive and intense intraoperative analgesia provided by interscalene blockade, but it is associated with some side effects and complications ***(Lenters et al., 2007).***

There may however, be an alternative approach using specific blockade of the two major peripheral nerves supplying the shoulder joint, the suprascapular and axillary (circumflex) nerves ***(Checcucci et al., 2008).***

Aim of the Work

The aim of this study is to compare between interscalene block and combined suprascapular nerve and axillary nerve blocks in arthroscopic shoulder surgery as regard intraoperative anesthesia and postoperative analgesia.

ANATOMICAL CONSIDERATIONS

Brachial Plexus Anatomy

Upper extremity regional anesthesia requires a thorough knowledge of brachial plexus anatomy to facilitate the technical aspects of block placement and optimize the patient-specific block selection.

The brachial plexus is defined as that network of nerves supplying the upper extremity and formed by the union of the ventral primary rami of cervical nerve (C5-C8), including a greater part of the first thoracic nerve (T1). Variable contributions may also come from the fourth cervical (C4) and second thoracic (T2) nerves ***(Wedel and Horlocker, 2010).***

The ventral rami are the roots of the brachial plexus and are variable in their mode of junction. The C5 and C6 rami unite near the medial border of the middle scalene muscle to form the superior trunk of the plexus, the C7 ramus becomes the middle trunk, and the C8 and T1 contributions unite to form the inferior trunk. The interscalene groove is defined as the palpable surface anatomy between the anterior and middle scalene muscles and allows clinicians easy and reliable access to the roots and trunks of the brachial plexus ***(Williams et al., 1989)***.

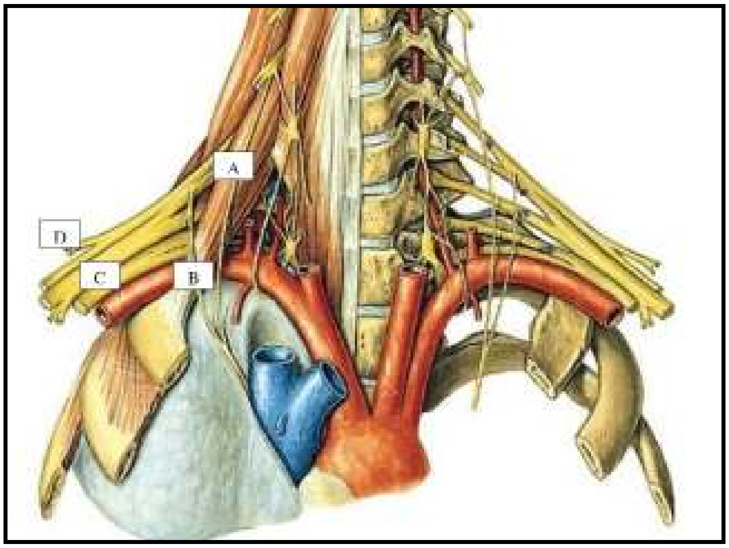

Fig. (1): Anatomy of the brachial plexus. A: Phrenic nerve, B: Accessory phrenic nerve, C: Trunks of the Brachial plexus, D: Suprascapular nerve ***(Urban und Schwarzenberg, 1997).***

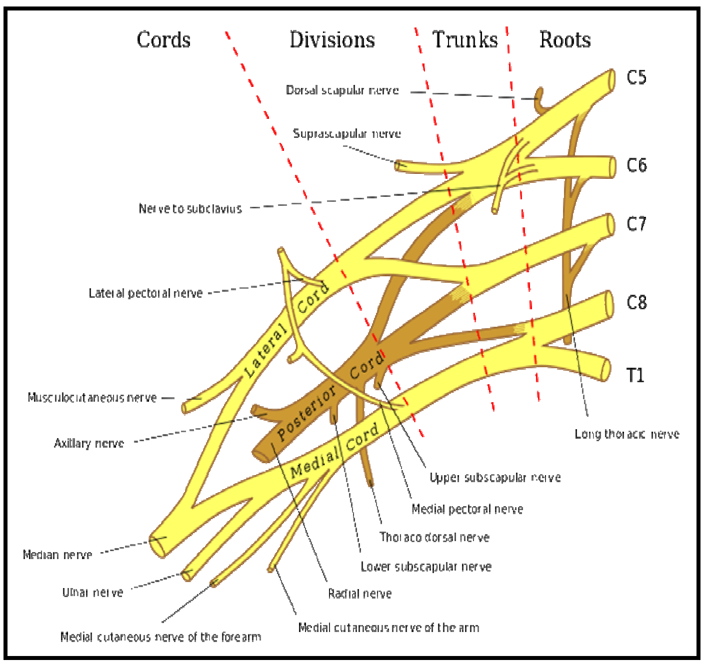

Fig. (2): Roots, trunks, divisions, cords and branches of the brachial Plexus ***(Wedel and Horlocker, 2010).***

The 3 trunks undergo primary anatomic separation into anterior (flexor) and posterior (extensor) divisions at the lateral border of the first rib. Divisions undergo yet another stage of reorganization into cords. The anterior divisions of the superior and middle trunks form the lateral cord of the plexus, the posterior divisions of all 3 trunks form the posterior cord, and the anterior division of the inferior trunk forms the medial cord. The 3 cords divide and give rise to the terminal branches of the plexus, with each cord possessing 2 major terminal branches and a variable number of minor intermediary branches ***(Williams et al., 1989).***

The lateral cord contributes the musculocutaneous nerve and the lateral root of the median nerve. The posterior cord generally supplies the dorsal aspect of the upper extremity via the radial and axillary nerves. The medial cord contributes the ulnar nerve and the medial root of the median nerve. Important intermediary branches of the medial cord include the medial antebrachial cutaneous nerve of the forearm and the medial cutaneous nerve of the arm, which joins with the intercostobrachial nerve to innervate the skin over the ulnar aspect of the arm (***Joseph et al., 2002).***

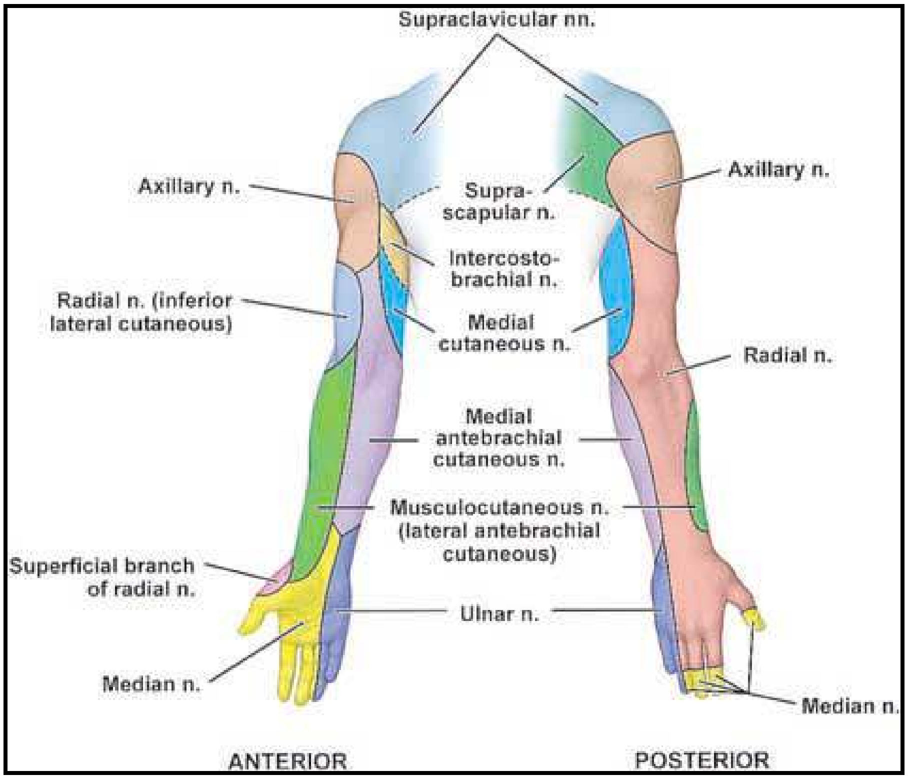

Fig. (3): Cutaneous innervations of the upper extremity
(Wedel and Horlocker, 2010).

In addition to the neural plexus, several vascular structures have clinical importance as anatomic landmarks or structures to avoid. The vertebral artery travels cephalad and enters a bony canal formed by the transverse processes at the C6 level. As the cervical roots of the brachial plexus leave the transverse processes, they course immediately posterior to the vertebral artery which offers an interposed portal for potential intravascular injection ***(Brown, 1999)***.