Suprascapular Nerve Block for Arthroscopic Shoulder Surgery: Meta-Analysis Approach for Measuring Patient Satisfaction

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ABSTRACT

A variety of peripheral nerve block methods are used in the clinic to enhance the effect of postoperative analgesia. In recent years, an increasing number of surgeons have considered the efficacy and safety of suprascapular nerve block (SSNB) combined with axillary nerve block (ANB) for controlling perioperative pain in shoulder arthroscopy. Shoulder pain is a frequent complaint that results in great functional disability in the affected shoulder as well as the decrease in patients' quality of life. Suprascapular nerve block is an effective therapeutic method and has been increasingly used by anesthesiologists both for regional anesthesia and postoperative analgesia of surgeries carried out. Compared with SSNB alone, SSNB + ANB has better advantages regarding patient satisfaction within 24 h after surgery.

Keywords: Suprascapular nerve block, SSNB, arthroscopic shoulder surgery, shoulder arthroscopy

INTRODUCTION

Suprascapular nerve block (SSNB) is a safe and effective method to treat pain in chronic diseases that affect the shoulder, like irrecoverable injury of rotator cuff, rheumatoid arthritis, calcific tendinitis, cancer, stroke sequels and adhesive capsulitis [1,2]. Shoulder pain is a frequent complaint among elderly patients, which leads to a great functional disability and decrease in their quality of life. The prevalence in general population is approximately 20% [3]. Anesthesiologists both for postoperative analgesia of surgeries carried out in this region, since pain, often severe, interferes with the rehabilitation process [4-6] have increasingly used this therapeutics. Other health care providers, like orthopedists, rheumatologists, neurologists and pain specialists also use this method for the desired analgesic effect in their patients [7,8]. It is important to point out that in the last two decades there has been an increase in regional anesthesia application in anesthetic practice with regard to peripheral nerve block. This technique included in this context, despite having low cost and easy reproducibility, is restricted by the lack of training of professionals in the area [9].

HISTORICAL ASPECTS

The procedure can be performed in ambulatory and was initially described by Wertheim and Rovenstein, in 1941. They applied it in patients with chronic shoulder pain, although diagnosis had not been made. They stated that it was necessary to apply it as a previous resource to manipulation of affected region and advised injection of 5 mL of procaine 2%, associated with 5 mL of an oily analgesic solution directly in the suprascapular incisure, site where suprascapular nerve passes under superior transverse scapular ligament. The effect duration was 4-6 weeks [10]. The article

only described the technique to carry out SSNB. Therefore, it was not a clinical trial in which possible complications of method could be detected [11].

SUPRAESCAPULAR NERVE ANATOMY

Suprascapular nerve is a mixed nerve, both motor and sensitive, originated in upper trunk of brachial plexus, C5 and C6 roots, receiving in over 50% contributions of fourth cervical root. It crosses the deep posterior triangle of neck, below omohyoid muscle and trapezium, entering the suprascapular incisure below the superior transverse scapular ligament (Figure 1). Suprascapular artery and vein run through above this ligament. The nerve provides two motor branches for supraspinatus muscle and sensitive branches to acromioclavicular and glenohumeral articulation. It continues its descending obliquus path bypassing the spinoglenoid incisure, under the inferior transverse scapular ligament present in 50% of people. It follows then towards the infraspinatus fossa, in which it provides three to four motor branches for infraspinatus muscle (Figure 2). The sensitive components innervate upper and posterior part of capsule of the shoulder in addition to the acromioclavicular articulation, coracoclavicular ligament and subacromial bursa. They provide 70% of shoulder articulation sensitivity, as the rest take place through axillary nerve branches [12]. These sensitive branches emerge from suprascapular nerve before and after passing below superior transverse scapular ligament [13]. Two to three of them pass through the scapular incisure and reach the base of coracoid process, where they perforate supraspinatus muscle, extending towards subacromial bursa [6]. To obtain the interruption of sensory impulses of the involved structures, it is important to know these anatomic details so that SSNB develops in a healthy way.

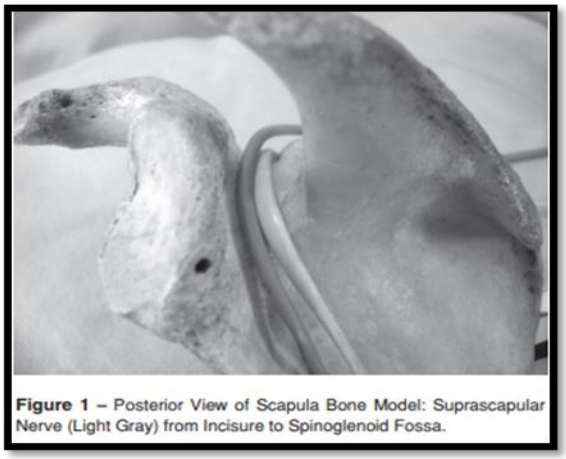

Figure 1 – Posterior View of Scapula Bone Model: Suprascapular Nerve (Light Gray) from Incisure to Spinoglenoid Fossa.

Figure 1: Posterior View of Scapula Bone Model

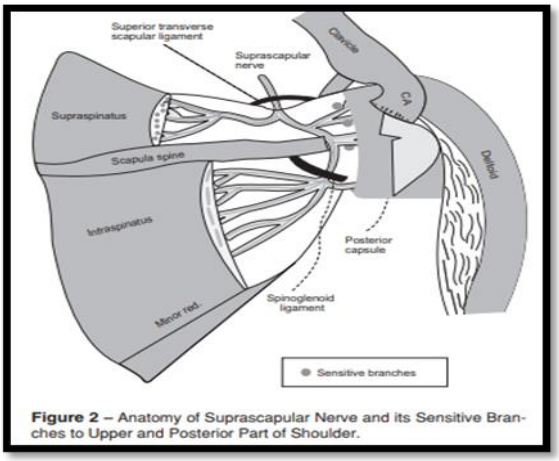

Figure 2 – Anatomy of Suprascapular Nerve and its Sensitive Branches to Upper and Posterior Part of Shoulder.

Figure 2 – Anatomy of Suprascapular Nerve

A variety of peripheral nerve block methods are used in the clinic to enhance the effect of postoperative analgesia [4, 9]. Although interscalene block (ISB) is one of the most commonly used analgesic methods [10], it can cause serious complications such as phrenic nerve paralysis, dyspnea, and Horner syndrome [11]. For arthroscopic shoulder surgery, suprascapular nerve block (SSNB) is the most commonly used regional nerve block [12]. Seventy percent of the sensory nerve fibers of the shoulder joint are innervated by the suprascapular nerve, with the supraspinatus and infraspinatus being directly innervated by the suprascapular nerve; the other 30% are innervated by the axillary, musculocutaneous and lateral thoracic nerves [13,14]. In recent years, an increasing number of surgeons have considered the efficacy and safety of SSNB combined with axillary nerve block (ANB) for controlling perioperative pain in

shoulder arthroscopy [12, 15].

The purpose of this study was to explore the patient satisfaction as per SSNB + ANB compared with ISB and SSNB as pain control after shoulder arthroscopic surgery.

METHOD

The protocol for this meta-analysis is registered with PROSPERO. PubMed, Cochrane Library, Embase and CNKI were searched for RCTs from inception to April 30, 2022. A meta-analysis was performed with Review Manager 5.3 to calculate the RR or WMD of related outcome indicators.

Search results and study characteristics

A total of 404 articles were retrieved, including 69 from PubMed, 133 from Cochrane Library, 83 from Embase and 119 from CNKI. Nine articles remained after duplicate studies were excluded and the full texts were read [16-24. Nine RCTs [16-24] from five countries were included in this meta-analysis, four of which were from South Korea. A total of 543 cases were included, including 266 cases in the SSNB + ANB group and 277 cases in the control group. General anesthesia (GA) was used in all of the included cases.

Patient satisfaction

SSNB + ANB Versus SSNB (Fig. 3). Two studies [19,22] compared patient satisfaction scores for SSNB + ANB and SSNB within 2 days of surgery. The results showed that the satisfaction score of SSNB + ANB at 12 h (WMD = 2.01, 95% CI = 0.25 to 3.78, P = 0.03, I 2 = 84%) and 24 h (WMD = 1.68, 95% CI = 0.11 to 3.24, P = 0.04, I 2 = 80%) postsurgery was higher than that of SSNB alone, and the difference was significant. However, there was no significant difference between the two interventions at 36 (WMD = 1.65, 95% CI = 0.21 to 3.51, P = 0.08, I 2 = 91%) and 48 (WMD = 1.14, 95% CI = − 0.13 to 2.41, P = 0.08, I 2 = 71%) hours.

SSNB + ANB Versus ISB (Fig. 4). A total of 3 studies [16,19,22] reported SSNB + ANB and ISB patient satisfaction scores at 24 h after surgery. No significant difference in patient satisfaction score at 24 h (WMD = 0.13, 95% CI = − 0.36 to 0.63, P = 0.60, I 2 = 28%) after the operation was found for SSNB + ANB compared with ISB.

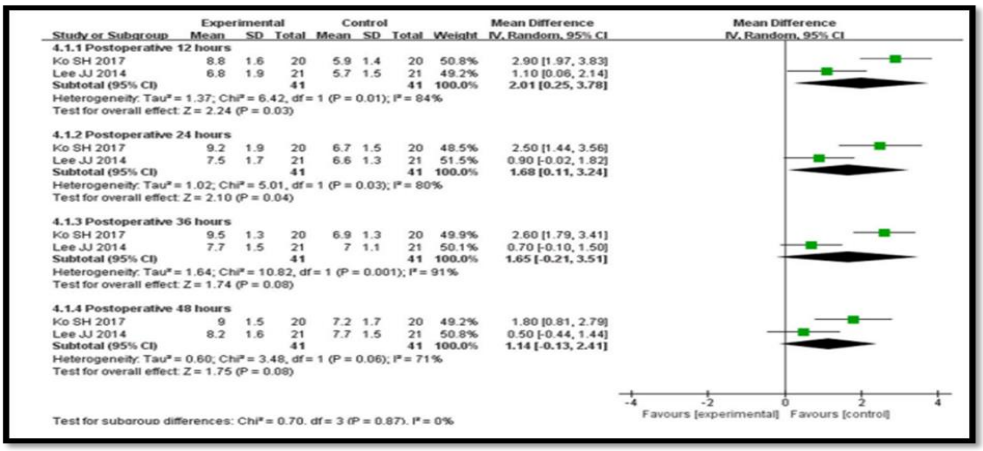

Figure 3: Forest plot of patient satisfaction (SSNB + ANB versus SSNB).

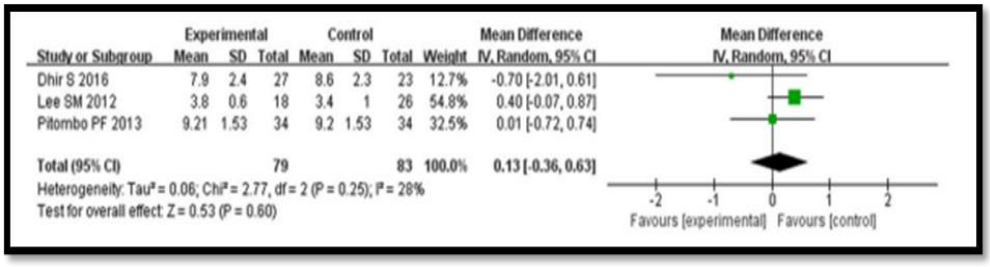

Figure 4: Forest plot of patient satisfaction (SSNB + ANB versus ISB).

DISCUSSION

ISB has always been considered the gold standard for local nerve block in shoulder arthroscopic surgery [25], but there are also serious complications, such as dyspnea, hoarseness and Horner syndrome. Ultrasound and chest X-ray examinations are useful for identifying the occurrence of diaphragmatic paralysis with different nerve blocks (such as ISB) and distinguishing asymptomatic diaphragmatic paralysis, which is also an aspect that requires attention in future research, rather than relying solely on the occurrence of dyspnea. The suprascapular nerve is a mixed nerve, which is anatomically far from the phrenic nerve, while the axillary nerve is a branch of the posterior bundle of the brachial plexus, distributed in the deltoid, teres minor and lateral arm skin, and close to the phrenic nerve [21]; therefore, SSNB + ANB may cause diaphragmatic palsy. Studies have shown that the analgesic effect of SSNB is not as good as that of ISB, even though it can reduce the incidence of dyspnea, fatigue and other adverse reactions [26]. The advantage of SSNB + ANB is that it can reduce or avoid the hand numbness and weakness caused by ISB. Because SSNB + ANB and ISB may cause diaphragmatic paralysis, future studies can study the use of different local anesthetics, doses and concentrations to reduce the occurrence of adverse reactions such as diaphragmatic paralysis. In addition, our results show that compared with SSNB alone, SSNB + ANB yields a better analgesic effect and higher patient satisfaction.

CONCLUSIONS

This meta-analysis showed that compared with SSNB alone, SSNB + ANB had better advantages in pain relief and patient satisfaction within 24 h after surgery. Overall, SSNB + ANB did not show a better clinical effect in postoperative pain relief or patient satisfaction than ISB, but SSNB + ANB did have better advantages in reducing the incidence of dyspnea. Future research exploring the clinical efficacy of SSNB + ANB is warranted.

Conflict of Interest: None

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