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Efficacy of Anatomical Landmark Guided Suprascapular Nerve Block in Arthroscopic Shoulder Surgeries for Post-Operative Pain Management

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ABSTRACT

In an effort to reduce the use of opioids after rotator cuff repair surgery, cryotherapy, intralesional anaesthesia, nerve block, continuous nerve block with catheters and multimodal analgesia have all been proposed as pain relief methods. The purpose of this study was to evaluate the efficacy of suprascapular nerve block as a post-operative analgesic during shoulder arthroscopies. The present investigation is a retrospective observational study carried out at the affiliated medical college and hospital. The study encompassed all individuals who underwent arthroscopic shoulder interventions conducted by a solitary surgeon. Patients were divided at random into two groups of fifty individuals each. Patients in Group I (n = 50) were administered SSNB in accordance with the anatomical landmark method outlined by Dangoisse. SSNB was administered to patients in Group II (n = 50) via the USG procedure. The efficacy of SSNB was assessed using the following parameters pain, range of motion and disability. The VAS scale was employed to quantify pain, with a range of 0-10 cm. Shoulder periarthritis accounted for the largest patient populations in both categories, followed by rotator cuff injury, post-cerebrovascular accident sequela, impingement syndrome and shoulder arthritis. When compared to the baseline value the reduction in VAS in both groups was found to be statistically significant ($p<0.001$) immediately following the block, after one week and after four weeks. A statistically significant improvement was observed across the entire spectrum of shoulder movements ($p<0.05$). The findings of the present study indicate that by utilising ultrasound guidance, a reduced volume of injectate and steroid can be administered for SSN blocks. In addition, the implementation of ultrasound guidance yields a marginal enhancement in the reduction of discomfort. Further extensive prospective trials are required in order to validate the efficacy of ultrasound guidance in the treatment of persistent shoulder pain.

INTRODUCTION

Orthopaedic patients who require joint decompression or arthroplasty are as diverse in appearance as healthy, robust athletes who have sustained sports injuries and require stabilisation procedures, to frail, elderly rheumatic patients who present for shoulder surgery. Recent surgical developments have led in the creation of limited access arthroscopic techniques, which has resulted in faster recovery times[1,2].

However, many anesthetists still find it difficult to manage severe postoperative pain. Arthroscopic rotator cuff surgery is a minimally invasive treatment that is presently predominantly performed as an outpatient procedure. Nevertheless, moderate to severe postoperative distress is associated with arthroscopic rotator cuff repair, making pain management an essential component in ensuring the success of outpatient procedures[3,4].

Cryotherapy, intralesionalanaesthesia, nerve block, continuous nerve block with catheters and multimodal analgesia have all been presented as ways to relieve pain following rotator cuff repair surgery that reduce opioid use. ISB has demonstrated efficacy as a viable analgesic substitute during arthroscopic shoulder surgery, attaining success rates that span from 87-100%. Nevertheless, it is associated with potentially hazardous adverse effects and is contraindicated in patients with severe chronic obstructive pulmonary disease on account of the diaphragmatic paralysis it induces, which is virtually inevitable[5,6].

Recent interest has been heightened in the use of suprascapular nerve block (SSNB) as an analgesic after shoulder surgery, despite the fact that Wertheim and Rovenstine first described it in 1941. In addition to innervating the infraspinatus and supraspinatus muscles the suprascapular nerve supplies 70% of the sensory input to the glenohumeral joint[7].

An SSNB is an effective method of treatment for shoulder issues. Successful applications of this substance include the treatment of acute and chronic shoulder pain, as well as the diagnosis of suprascapular neuropathy. Research has demonstrated the therapeutic efficacy of SSNB in addressing prevalent conditions characterised by chronic shoulder pain, including lesions of the rotator cuff, adhesivecapsulitis, calcifying tendinitis, shoulderarthritis, rheumatoid arthritis and stroke sequelae[8,9]. In contrast to the interscalene block, this particular block is less difficult to execute, results in a less severe motor block, and demands a reduced volume of injectate, thereby mitigating the potential for systemic toxicity. However, no evidence exists to compare the effectiveness of SSNB guided by anatomical landmarks and SSNB administered as a post-operative analgesic following surgery. The purpose of this study was to evaluate the efficacy of suprascapular nerve block as a post-operative analgesic during shoulder arthroscopies.

MATERIALS AND METHODS

The present investigation is a retrospective observational study carried out at the affiliated medical college and hospital. The study encompassed all individuals who underwent arthroscopic shoulder interventions conducted by a solitary surgeon. Patients who had open surgical procedures or other concurrent surgical procedures, were below the age of 18, or were older than 70 were precluded from the study.

Exclusion criteria for the trial included patients who had established contraindications for block interventions, a medical history of adverse reactions to bupivacaine and steroids, uncontrolled diabetes mellitus, or who declined SSNB. Patients were divided at random into two groups of fifty individuals each. Patients in Group I (n = 50) were administered SSNB in accordance with the anatomical landmark method outlined by Dangoisse. SSNB was administered to patients in Group II (n = 50) via the USG procedure. Both groups were administered an equivalent amount of medication. Group I participants underwent skin preparation and local anaesthesia prior to the insertion of a 21-gauge, 38 mm needle through the epidermis, positioned 2 cm cephalad to the midpoint of the scapular spine. By aligning the needle in a parallel trajectory with the scapula blade, it was able to establish bone contact with the suprascapular fossa floor.

After performing a negative blood aspiration, a progressive infusion of 5 mL of 0.25% bupivacaine and 40 mg methylprednisolone was initiated. Patients in Group II received SSNB while being monitored with SonoSiteMTurbo ultrasound apparatus that was equipped with a linear probe ranging from 6-13 MHz. The ultrasound probe was positioned in the coronal plane over the suprascapular fossa with a slight anterior tilt while the patient was seated with the arm by their side. By scanning the suprascapular fossa from medial to lateral, the SSN and artery in the floor of the fossa between the spinoglenoid notch and the suprascapular notch were identified. Following local infiltration with a local anaesthetic solution, a 23-gauge Quincke spinal needle was used to penetrate the skin in a mediolateral trajectory at an angle of 30-45 degrees to the vertical under the supervision of ultrasonography. A gentle administration of 5 mL of 0.25% bupivacaine and 1 mL (40 mg) methylprednisolone was performed in the vicinity of the nerve after identification.

The efficacy of SSNB was assessed using the following parameters pain, range of motion, and disability. The VAS scale was employed to quantify pain, with a range of 0-10 cm. The participants were instructed on the utilisation of the VAS scale, which

quantifies pain from zero (indicating no pain) to ten (indicating the most excruciating anguish). Prior to pain evaluation, patients were directed to perform a range of motion on the affected limb. The Shoulder Pain and Disability Index (SPADI), a self-administered survey comprising two dimensions-pain and functional activities was utilised to assess disability.

Comparing normally distributed continuous variables between groups was performed using the Student's ttest; however, within Group I (LMG) and Group II (USG) the paired t-test was employed.

RESULTS

Every single patient's data was analysed. Shoulder periarthritis accounted for the greatest number of patients in both cohorts, followed by rotator cuff injury, post-cerebrovascular accident sequela impingement syndrome and shoulder arthritis. The patient distribution in the two groups was comparable with respect to age, gender, duration of pain and diagnosis (p>0.05).

In Group I the VAS for pain decreased from 7.75±2.61 at baseline to 3.23±1.08 immediately following block administration, it then decreased to 3.23±1.94 after one week and 3.15±1.05 after four weeks. In Group II the VAS decreased from 7.03±2.11 at baseline to 3.87±2.41 immediately following the block. It then decreased to 3.79±2.36 after one week and to 2.95±2.14 after four weeks. Group I and Group II achieved mean SPADI scores of 77.77±21.80 and 76.18±24.58, respectively, at the outset. After one week, those scores increased to 45.35±9.12 and 36.90±25.41 and after four weeks, they reached 39.96±6.20 and 35.48±0.08, respectively. When compared to the baseline value, the reduction in VAS in both groups was found to be statistically significant (p<0.001) immediately following the block, after one week and after four weeks.

The SPADI improved significantly (p<0.001) in both groups one week and four weeks after SSNB [Table 1]. A comprehensive range of shoulder movements (including flexion, extension, abduction, internal rotation, and external rotation) improved significantly (p<0.05) in both groups compared to their initial values immediately after the SSNB. This improvement persisted for one week and four weeks after the procedure.

DISCUSSIONS

In shoulder surgery, anaesthetic techniques have evolved in tandem with the procedure. The implementation of progressively intricate yet minimally invasive procedures involving the unstable shoulder has necessitated the advancement of anaesthetic methods that permit adequate pain management throughout the intraoperative and postoperative phases[10,11].

An SSNB is an effective method of treatment for shoulder issues. Successful applications of this substance include the treatment of acute and chronic shoulder pain, as well as the diagnosis of suprascapular neuropathy. Research has demonstrated the efficacy of SSNB in managing prevalent shoulder distress caused by disorders including rotator cuff lesions, adhesive capsulitis, calcifying tendinitis, shoulder arthritis, rheumatoid arthritis, and stroke sequelae. Numerous modifications have been implemented to the surface landmark approach since its inception by Wertheim and Rovenstien in 1941. The surface landmark technique that is most frequently implemented is the one introduced by Dangoisse. Utilising image guiding modalities, including computed tomography (CT), fluoroscopy, and ultrasound, surface landmark approaches can achieve greater precision. The utilization of ultrasound guidance provides the advantage of minimizing radiation exposure to both the patient and personnel. Additionally, this technique enables real-time visualization of drug infiltration around the recess site and suprascapular nerve (SSN)[12,13].

Kamal *et al*.[14] compared the effectiveness of SSNB guided by landmarks versus ultrasonographic guidance in 50 patients with persistent shoulder pain. Patients were arbitrarily divided into two categories. Dangoisse anatomic landmark approach was implemented during the landmark-guided injection procedure. A combination of 5 mL 0.25% bupivacaine and 40 mg methylprednisolone was preferred by both groups.

CT-guided SSNB was compared to anatomic landmark SSNB in patients with degenerative joint RC disease, as described by Shanahan et al.[15]. An evaluation was conducted on the patients one, four, and twelve weeks after the injection. Both approaches yielded comparable levels of pain relief, patient satisfaction, and enhancements in shoulder mobility and functionality over the course of 12 weeks. Both landmark-guided and CT-guided SSNBs result in substantial reductions in pain and disability and both are safe, according to the study. We also found no complications resulting from nerve block in either group during this investigation.

Table 1: Comparison of visual analog scale and shoulder pain and disability index

	VAS		SPADI	
	GROUP 1	GROUP II	GROUP I	GROUP II
Before block	7.75±2.61	7.03±2.11	77.77±21.80	76.18±24.58
Immediately after block	3.23±1.08	3.87±2.41		
1 week after block	3.23±1.94	3.79±2.36	45.3±9.12	36.90±25.41
4 week after block	3.15±1.05	2.95±2.14	39.96±6.20	35.48±10.08

It has been demonstrated that SSNB is a safe and effective treatment for shoulder pain associated with chronic disorders. However, local injections used for analgesic purposes should be administered with imaging. On the other hand, our findings suggest that anatomic site-based SSNB techniques for treating shoulder discomfort may be beneficial and should be utilised in the absence of US devices.

CONCLUSION

The current study reveals that employing ultrasound guidance, it is possible to use less injectate volume and steroid for SSN blocks. Furthermore, the use of ultrasound guiding results in a minor increase in pain alleviation. Larger prospective trials are needed to confirm the effectiveness of ultrasound guidance in persistent shoulder discomfort.

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