International Journal of Medical Anesthesiology

E-ISSN: 2664-3774
P-ISSN: 2664-3766
www.anesthesiologypaper.com
IJMA 2024; 7(4): 175-181
Received: 12-09-2024
Accepted: 15-10-2024

Shrouk Mohamed El Sawaf
Anesthesiology, Surgical Intensive Care and Pain Medicine Department, Faculty of Medicine, Tanta University, Egypt

Omnia Ali Elmiseery
Anesthesiology, Surgical Intensive Care and Pain Medicine Department, Faculty of Medicine, Tanta University, Egypt

Mohamed Shebl Abdelghany
Anesthesiology, Surgical Intensive Care and Pain Medicine Department, Faculty of Medicine, Tanta University, Egypt

Ayman Abdelmaksoud Yousef
Anesthesiology, Surgical Intensive Care and Pain Medicine Department, Faculty of Medicine, Tanta University, Egypt

Corresponding Author:
Eman Ahmed Azzam
Department of Anesthesiology, Surgical Intensive, Care and Pain Management, Faculty of Medicine, Tanta University, Tanta, Egypt

Regional anaesthesia for arthroscopic shoulder surgery

Shrouk Mohamed El Sawaf, Omnia Ali Elmiseery, Mohamed Shebl Abdelghany and Ayman Abdelmaksoud Yousef

DOI: https://doi.org/10.33545/26643766.2024.v7.i4c.528

Abstract
The use of a local anesthetic technique as an element of combined pain management methods is advised. Studies on the efficacy of interscalene block for patients having shoulder surgeries, like rotator cuff repair, showed that interscalene block proved to be more effective. If an interscalene block cannot be performed, it is better to use an axillary nerve block, potentially along with a suprascapular nerve block, than to have no block or solely a suprascapular nerve block. A suprascapular nerve block has been found to decrease pain levels and/or reduce the need for opioid medication following surgery, although it does not appear to offer any significant pain relief benefits compared to an interscalene block.

Keywords: Regional anaesthesia, interscalene nerve block, anterior suprascapular nerve block, pericapsular nerve group block, arthroscopic shoulder surgery

Introduction
Arthroscopy of the shoulder is one of the most frequently carried out orthopaedic operations, with over 500,000 procedures annually and with technological advancements enabling more conditions to be treated through arthroscopy [1]. Postoperative pain is a frequent issue, and considering the rising problem of opioid abuse among patients with orthopaedic conditions, alternative pain management strategies have become more crucial [2]. Beyond the distress experienced by patients, severe postoperative pain is also linked to hospital discharge delays and unplanned rehospitalization. Proper pain management is crucial for improving patient recovery and outcomes, as well as for enabling shorter hospital admissions and reducing expenses linked to outpatient arthroscopic shoulder surgeries [3].
Regional anaesthesia can be employed on its own or in conjunction with general anaesthesia, as noted in reference. Regional anaesthesia can be used either as the only anaesthetic technique or alongside general anaesthesia [4].

Shoulder arthroscopy
Orthopaedic surgery frequently employs shoulder arthroscopy as one of its most widely performed procedures. Improvements in surgical and anaesthetic techniques have increased the occurrence of shoulder arthroscopy in large outpatient surgery centers, enabling early patient discharge, quicker post-operative recovery and a reduction in expenses associated with hospital stay [5].

Pain in arthroscopic surgery of the shoulder
Shoulder arthroscopy often leads to the development of pain, significantly affecting the outcome of the procedure. About one-fifth or roughly 20% of patients report the highest level of pain on the day after they leave the hospital. Pain levels shift throughout the days, generally being milder on the day of the surgery and the day that follows, as opposed to the days leading up to the procedure. The highest level of pain is experienced on days 2, 3, and 4 following surgery [6].
By the time day 30 arrives, the abrupt fluctuations in levels of pain intensity cease, leading to a stabilisation phase that persists through to the completion of the process. The intensity of pain experienced by patients during surgical procedures varies, and pain perception differs significantly from one individual to another.

Studies have found that patients undergoing rotator cuff repair procedures often experience higher levels of pain, which can be up to 2.6 times more intense than for patients having glenohumeral instability procedures in the first 24 hours. By the second day, the distinctions between these two groups often diminish, yet opioid usage for rescue stays elevated for rotator cuff repair patients in the first week after surgery [7].

Factors influencing postoperative pain levels in patients include being female and having a history of anxiety or depression. Pre-existing psychosocial issues, including being jobless or having emotional disorders, are linked to higher post-operative pain levels [8].

Regional anaesthesia to management pain

By decreasing the length of procedures in the operating room, regional anaesthesia enables patients to leave the post-anaesthesia care unit sooner and lowers the incidence of postoperative complications like pain, sedation, nausea, and vomiting, as well as the necessity for an overnight hospital stay. Regional anaesthesia can be given independently as the only type of anaesthesia, or it may be used in conjunction with general anaesthesia [9].

The interscalene block (ISB)

The favored technique for shoulder surgery in this area is used because of its closeness to the targets, with injections given at the root level or early trunks, as recorded (number and citation retained). Delivering local anaesthesia in the interscalene groove, aligned with the cricoid cartilage, can efficiently obstruct the C5-C7 nerve roots and their related distal branches.

An interscalene block is especially well-suited for use in procedures such as shoulder arthroscopies and total shoulder arthroplasties (TSAs) [10].

Intracranial subdural hematoma may have some associated complications. Phrenic nerve palsy is the most common complication, resulting in diaphragmatic paralysis. Furthermore, although less frequent, complications comprised respiratory distress, arm paralysis, a raspy voice, Horner's syndrome, and injury to the brachial plexus nerve [10].

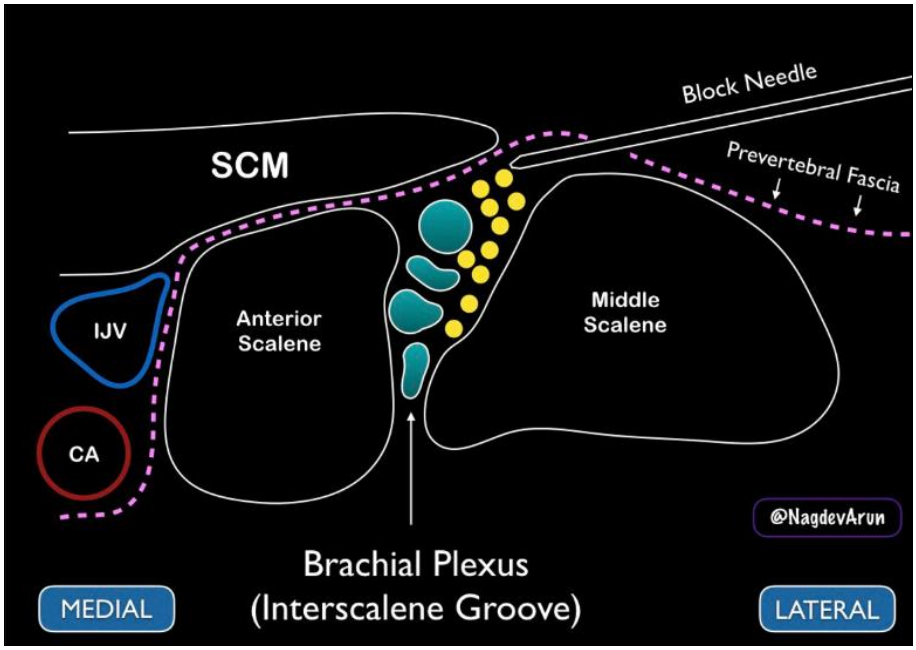

Fig 1: Positioned just beneath the sternocleidomastoid muscle (SCM), identify both the anterior and middle scalene muscles. The brachial plexus nerve roots will be located within the interscalene groove [11].

Supraclavicular block (SCB)

Shoulder surgery has been recommended to be effectively anaesthetized utilizing SCB. This procedure is typically performed through an incision above the collarbone, positioned further down from the phrenic nerve, which minimizes the risk of nerve injury. The suprascapular nerve also provides anatomical innervation to the shoulder within the supraclavicular fossa [12].

The technique has not become the preferred method due to worries that the nerve branches closest to the origin arising from the upper roots of the brachial plexus may be overlooked, specifically the suprascapular nerve's origin at the proximal superior trunk. The block can be effective in achieving anaesthesia of the entire shoulder when performed above the clavicle, although this outcome may be influenced by local anaesthetic spreading into the interscalene groove [12].

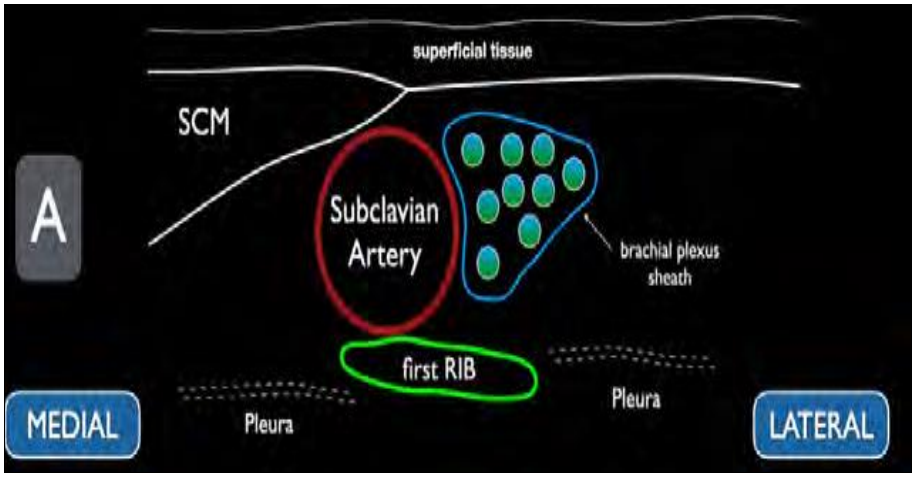

Fig 2: Schematic diagram of the supraclavicular brachial plexus block [13]

The suprascapular nerve block (SSB)

For pain management after shoulder arthroscopy surgery, the Single Shot Block is proposed as an alternative to the ISB. Approximately 70% of the shoulder joint is sensory innervated by the suprascapular nerve [14]. The surgical approach to the SSB can be undertaken from two different angles: one involves working from behind, located in the suprascapular fossa, and the other involves working from the front, located in the supraclavicular fossa. The anterior approach yields better analgesia results compared to the posterior approach, potentially because the early branching of articular nerves [15].

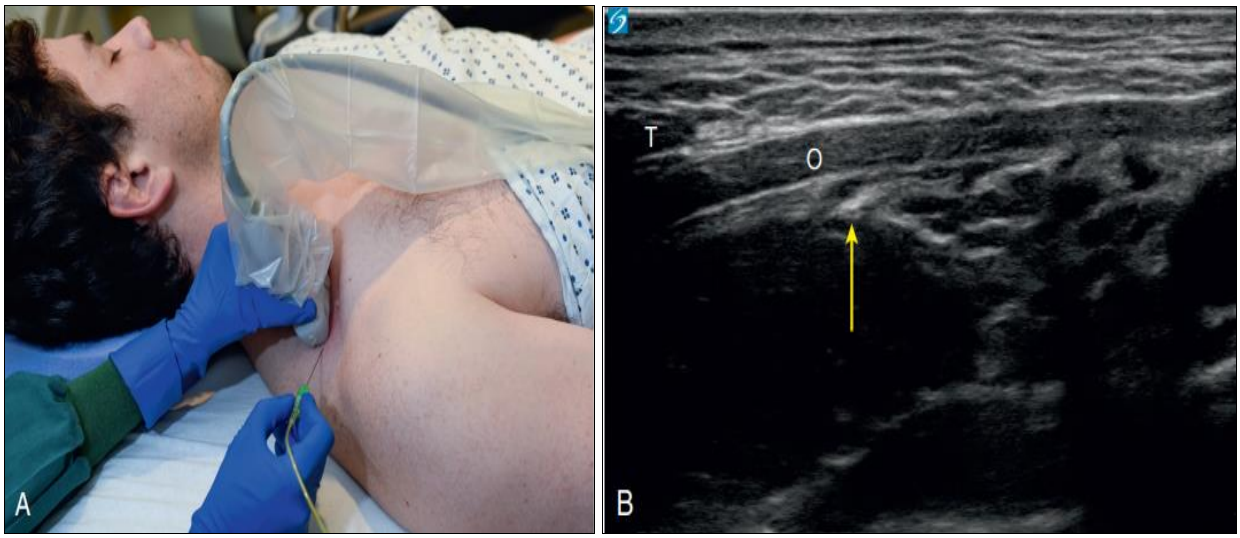

Fig 3: An external photograph is shown, illustrating the probe position required for imaging the suprascapular nerve (SSN) at its origin from the brachial plexus (A). The SSN block is visualized using a lateral to medial in-plane approach, with the ultrasound transducer positioned almost parallel to the clavicle. A sonogram corresponding to this is also displayed in Figure B. The superior shoulder nerve is primarily responsible for most of the sensory innervation to the shoulder joint. The yellow arrow indicates that the SSN is situated at a considerable depth. Below the omohyoid muscle lies its inferior belly, situated near the corner of the trapezius muscle [16].

Pericapsular nerve group block (PENG)

PENG block provides adequate anesthesia of the glenohumeral joint by blocking the articular branches alone. It's role as sole anesthetic technique for shoulder manipulation and reduction maneuvers is less explored [17].

The use of a block in this area did not lead to any motor block or pulmonary issues and failed to produce muscle relaxation, instead only blocking the upper third of the shoulder and humerus. Surgical anesthesia has certain restrictions, making it more appropriate for shoulder arthroscopy procedures. Further data is required, encompassing comparative studies with ISB plexus block, SCB. Infiltration at the local site, along with a block of the suprascapular and axillary nerves combined [18].

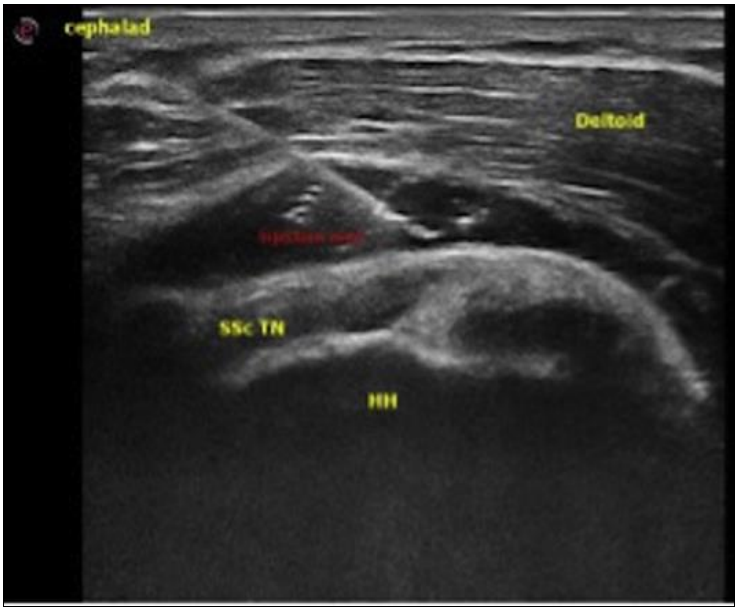

Fig 4: An injection of a local anesthetic is administered between the deltoid muscle and the subscapularis tendon. The humerus head is abbreviated as HH, while the subscapularis tendon is denoted as SSc Tn, and the deltoid muscle is referred to as the deltoid [18].

Upper trunk block

Because all of the terminal nerves feeding the shoulder branch off beyond the superior trunk, injections of local anaesthetics in the area of the superior trunk provide equal pain relief for the shoulder. The superior trunk is formed by the merging of the C5 and C6 nerve roots. The injection site is situated farther away from the phrenic nerve, which should potentially lower the likelihood of hemi diaphragmatic paresis. The superior trunk is seen below the junction of the C5 and C6 nerve roots, but above the point where the suprascapular nerve branches off [19].

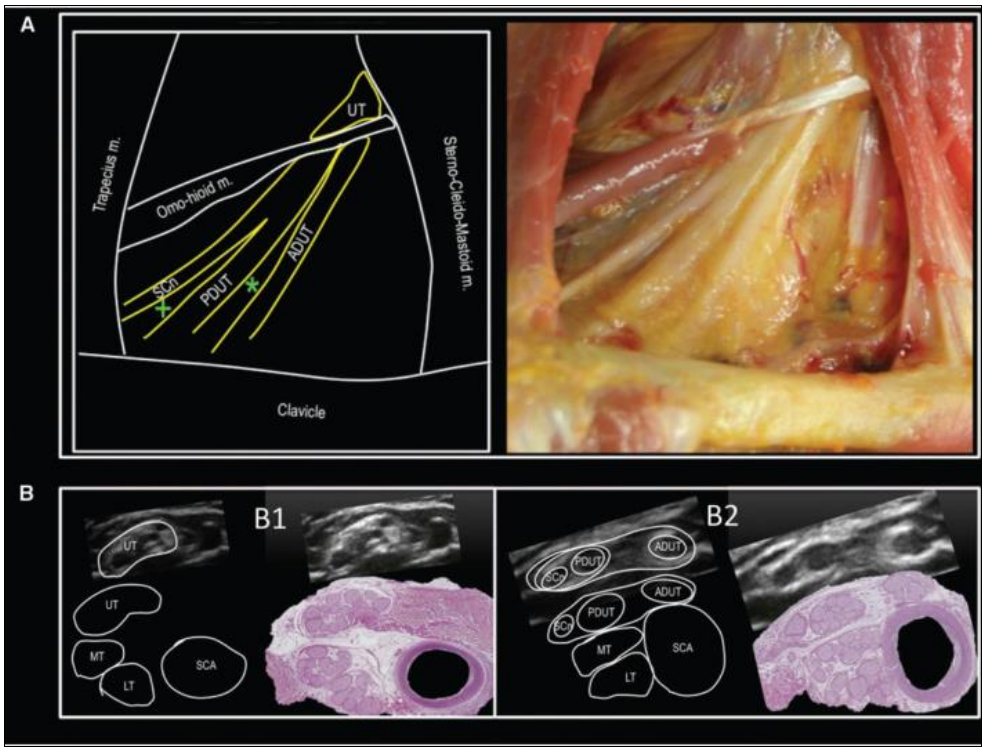

Fig 5: The subclavian artery is located in Utah. Subclavian Artery; UT. Main Trunk; MT. Medial trunk, also known as LT. Lower trunk; Adult Upper Limb and Trunk. Upper Trunk Anterior Division; PDUT. The posterior division of the upper trunk is also referred to as SCn. Suprascapular nerve [20]

Cervical plexus block

This is typically not used in isolation, but rather in conjunction with either supraclavicular or interscalene brachial plexus blocks. The main rationale for performing a superficial cervical plexus block is that, aside from the upper skin portions of the shoulder, which are managed by the supraclavicular nerves that originate from the superficial cervical plexus, the brachial plexus is in charge of all motor and most sensory functions of the shoulder (C3-C4) [21].

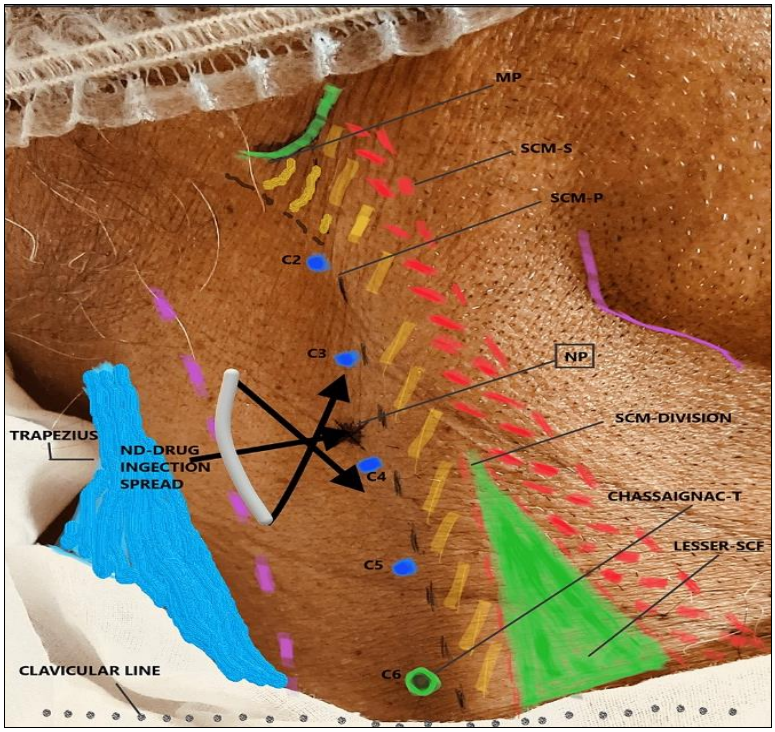

Fig 6 : Landmarks for the superficial cervical plexus block.MP: mastoid process; SCM: sternocleidomastoid muscle; SCM-S: SCM sternal border; SCM-P: SCM posterior border [21]

Costoclavicular brachial plexus block (CCB)

When anaesthesia is applied to the brachial plexus, the costoclavicular space—more especially, the level at which its cords are located—is targeted. According to a detailed anatomical investigation, the suprascapular nerve and all of the brachial plexus's trunks, cords, and branches were coloured when a dye was injected into the costoclavicular area [22]. Studies indicate that performing an intermediate cervical plexus block in conjunction with a costoclavicular brachial plexus block can provide effective surgical anesthesia for shoulder surgery, thereby minimizing the risk of hemidiaphragmatic paralysis. There is insufficient evidence from existing studies to substantiate that claim [23].

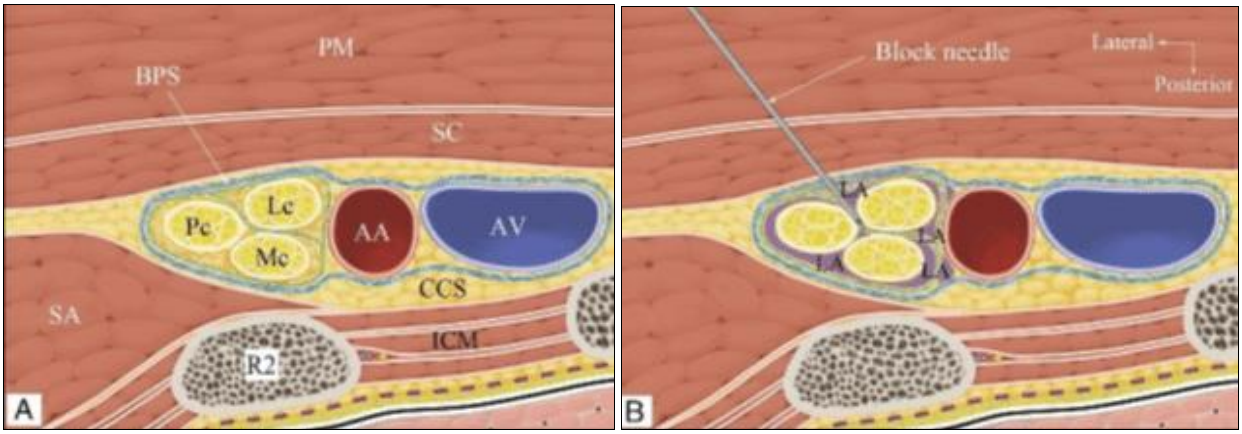

Fig 7: Schematic representation of costoclavicular space in (A); Costoclavicular brachial plexus block approach in (B) [21]

The axillary nerve block

This technique is often employed in conjunction with the suprascapular nerve block to offer a similar range of motion at the shoulder, comparable to that of the ISB, with a reduced risk of complications. The suprascapular and axillary nerves also transmit the main nerve supply that comes from the C5 and C6 nerve roots. These two peripheral nerves provide most of the sensory innervation of the shoulder [24]. Research has looked at the use of either an axillary approach or a posterior method for selective axillary nerve blocks. These methods can be challenging to use, and they might not always take into account all of the axillary nerve's branches, particularly the glenohumeral articular branch, which usually emerges proximally to the quadrangular region in a large majority of cases. As a consequence, their effectiveness varies [25].

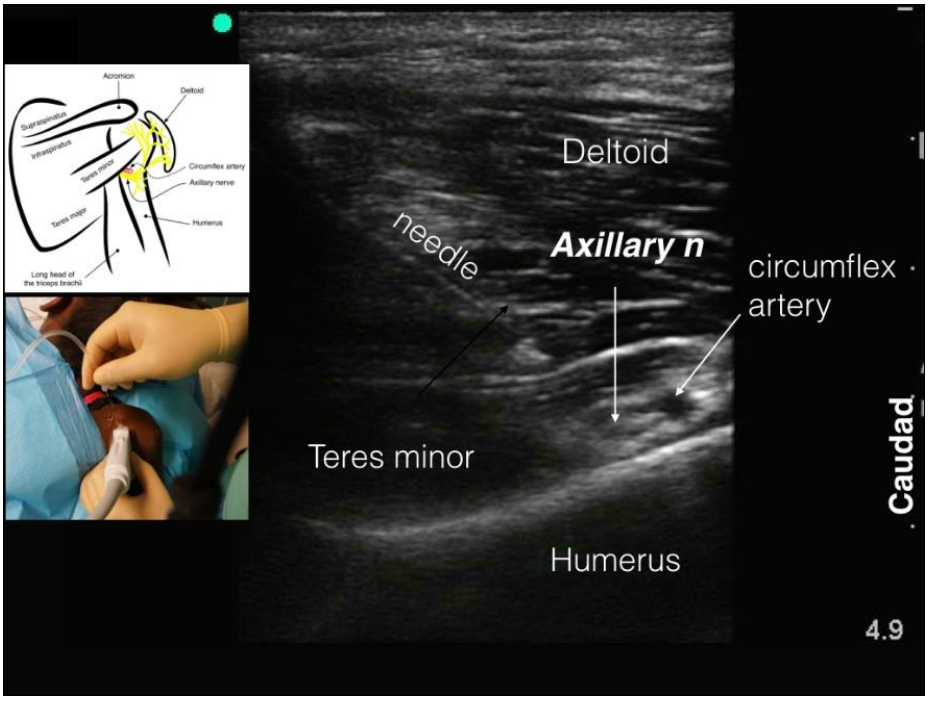

Fig 8: Ultrasound guided axillary nerve block [24]

Conflict of Interest
Not available

Financial Support
Not available

References

1. Barber FA. Editorial Commentary: Open or Arthroscopic Surgery? Practice Makes Perfect… We Do Best What We Do Most Often. Elsevier; 2020. p. 872-874.
2. Alaia MJ. Editorial commentary: Uncle Sam wants YOU!(to stop the opioid crisis). Elsevier; 2020. p. 832-833.
3. Hurley ET, Maye AB, Thompson K, Anil U, Resad S, Virk M, *et al*. Pain Control After Shoulder Arthroscopy: A Systematic Review of Randomized Controlled Trials With a Network Meta-analysis. Am J Sports Med 2021;49:2262-2271.
4. Hewson D, Oldman M, Bedforth N. Regional anaesthesia for shoulder surgery. BJA education. 2019;19:98-104.
5. de Soto PCM, Cáceres AG, Aznar IDR, Moreno MM, Heredia JD. Perioperative pain management in arthroscopic surgery of the shoulder. Rev Esp Artrosc Cir Articul En. 2022;29:87-97.
6. Elkassabany NM, Wang A, Ochroch J, Mattera M, Liu J, Kuntz A. Improved quality of recovery from ambulatory shoulder surgery after implementation of a multimodal perioperative pain management protocol. Pain Med. 2019;20:1012-1019.
7. Calvo E, Torres MD, Morcillo D, Leal V. Rotator cuff repair is more painful than other arthroscopic shoulder procedures. Arch Orthop Trauma Surg. 2019;139:669-674.
8. Elkassabany NM, Wang A, Ochroch J, Mattera M, Liu J, Kuntz A. Improved quality of recovery from ambulatory shoulder surgery after implementation of a multimodal perioperative pain management protocol. Pain Medicine. 2019;20:1012-1019.
9. Lobo C, Gomes NS. Regional Blocks and Opioid. Massive and Irreparable Rotator Cuff Tears: From Basic Science to Advanced Treatments; 2020. p. 267.
10. Mojica JJ, Ocker A, Barrata J, Schwenk ES. Anesthesia for the patient undergoing shoulder surgery. Clin Sports Med. 2022;41:219-31.
11. Abdallah FW, Halpern SH, Aoyama K, Brull R. Will the real benefits of single-shot interscalene block please stand up? A systematic review and meta-analysis. Anesth Analg. 2015;120:1114-1129.
12. Guo C, Ma J, Ma X, Lu B, Wang Y, Tian A, *et al*. Supraclavicular block versus interscalene brachial plexus block for shoulder surgery: A meta-analysis of clinical control trials. Int J Surg 2017;45:85-91.
13. Ayala A, Ashworth H, Nagdev A. How To: The Ultrasound-Guided Supraclavicular Brachial Plexus Block. ACEP Now. 2023;42:4.
14. Kumara A, Gogia AR, Bajaj J, Agarwal N. Clinical evaluation of post-operative analgesia comparing suprascapular nerve block and interscalene brachial plexus block in patients undergoing shoulder arthroscopic surgery. J Orthop Trauma. 2016;7:34-39.
15. White L, Reardon D, Davis K, Velli G, Bright M. Anterior suprascapular nerve block versus interscalene brachial plexus block for arthroscopic shoulder surgery: a systematic review and meta-analysis of randomized controlled trials. J Anaesth. 2022;36:17-25.
16. Gray A. Suprascapular nerve block (anterior approach above the clavicle). Gray, AT Atlas of Ultrasound-Guided Regional Anesthesia 3rd ed Philadelphia, Elsevier2019. p. 89-92.
17. Ramadurai R, Bhoi D, Nagarajappa A, Amar P. Pericapsular nerve group block (PENG) at neutral position for shoulder manipulation: A feasible approach for a new indication. J Clin Anesth. 2021;75:1105.
18. Küpeli İ, Kara MY. Anesthesia or analgesia? New block for shoulder surgery: pericapsular nerve group block. Braz J Anesthesiol. 2022;72:669-672.
19. Kang R, Jeong JS, Chin KJ, Yoo JC, Lee JH, Choi SJ, *et al*. Superior trunk block provides noninferior analgesia compared with interscalene brachial plexus block in arthroscopic shoulder surgery. Anesthesiology.

2019;131:1316-1326.
20. Aguirre O, Tobos L, Reina MA, Sala-Blanch X. Upper trunk block: description of a supraclavicular approach of upper trunk at the points of its division. Br J Anaesth. 2016;117:823-824.
21. Rameshi S, Janardhaniyengar SM, Kantharaju S. Comparison of ultrasound guided costoclavicular brachial plexus block versus supraclavicular brachial plexus block for forearm and hand surgeries for surgical anaesthesia: a prospective randomised clinical study. Indian J Clin Anaesth. 2021;8:96-101.
22. Han JU, Yang C, Song J-H, Park J, Choo H, Lee T. Combined Intermediate Cervical Plexus and Costoclavicular Block for Arthroscopic Shoulder Surgery: A Prospective Feasibility Study. J Pers Med. 2023;13:1080.
23. De T, Layera Ramos S, Bravo Advis D, Cristi Sánchez I, Bermúdez L, Aliste Muñoz J. Diaphragm-sparing nerve blocks for shoulder surgery, revisited; 2020.
24. Sun C, Zhang X, Ji X, Yu P, Cai X, Yang H. Suprascapular nerve block and axillary nerve block versus interscalene nerve block for arthroscopic shoulder surgery: A meta-analysis of randomized controlled trials. Medicine. 2021;100:61.
25. Galluccio F, Fajardo Perez M, Yamak Altinpulluk E, Hou J-D, Lin J-A. Evaluation of interfascial plane and pericapsular nerve blocks to the shoulder joint: a preliminary analysis of shoulder anterior capsular block. Pain and Therapy. 2021;10:1741-1754.

How to Cite This Article
Sawaf SME, Elmiseery OA, Abdelghany MS, Yousef AA. Regional anaesthesia for arthroscopic shoulder surgery. International Journal of Medical Anesthesiology. 2024;7(4):175-181.