
**BACKGROUND AND OBJECTIVE:** In the perivascular sheath of the brachial plexus, the volume of anaesthetic solution determines the quality of anaesthetic cover. Fibrous septa may divide the perivascular space into compartments, leading to inadequate diffusion of the anaesthetic solution. The aim of our study was to obtain good anaesthesia and less complications using high volume of low concentration anaesthetic solution, overcoming the obstacle of the septa with a double approach to the scalene sheath.

**METHODS:** Sixty patients scheduled for shoulder capsuloplasty received both Winnie interscalene brachial plexus block and Pippa proximal cranial needle approach. The patients were randomly assigned to two groups. A constant dose of local anaesthetic was administered to each group: Group I (30 patients) received high volume (60 mL of anaesthetic solution) and Group II (30 patients) received low volume of solution (30 mL of anaesthetic solution). Sensory and motor block in the upper limb and complications were evaluated.

**RESULTS:** In all the patients the quality of anaesthesia obtained at the surgical site was excellent. In Group I also the areas supplied by the medial cutaneous nerves of the arm and forearm, ulnar, median and radial nerves were blocked (P < 0.002). Complications were only observed in Group II and consisted of bradycardia and hypotension (66% of the patients) and phrenic nerve paresis (27% of the patients).

**CONCLUSIONS:** The lower concentration of the anaesthetic solution avoids complications while increased volume provides good analgesic cover. The combination of the Winnie interscalene plexus block and the Pippa proximal cranial needle approach should contribute to fill up the scalene sheath overcoming the septa obstacles.

From: www.nerveblocks.net
A supraomohyoidal plexus block designed to avoid complications.

Interscalene blocks of the brachial plexus are used for surgery of the shoulder and are frequently associated with complications such as temporary phrenic block, Horner syndrome or hematoma.

To minimize the risk of these complications, we developed an approach that avoids medially directed needle advancement and favors spread to lateral regions only: the supraomohyoidal block. We tested this procedure in 11 cadavers fixed by Thiel's method. The insertion site is at the lateral margin of the sternocleidomastoid muscle at the level of the cricoid cartilage. The needle is inserted in the axis of the plexus with an angle of approximately 35 degrees to the skin, and advanced in lateral and caudal direction. Distribution of solution was determined in ten cadavers after bilateral injection of colored solution (20 and 30 ml) and followed by dissection. In an eleventh cadaver, computerized tomography and 3D reconstruction after radio contrast injection was performed. In additional five cadavers we performed Winnie's technique with bilateral injection (20 and 30 ml). Concerning the supraomohyoidal block the injection mass reached the infraclavicular region surrounded all trunks of the brachial plexus in the supraclavicular region and the suprascapular nerve in all cases. The solution did not spread medially beyond the lateral margin of the anterior scalene muscle into the scalenovertebral triangle. Therefore, phrenic nerve, stellate ganglion, laryngeal nerve nor the vertebral artery were exposed to the injected solution. Distribution was comparable with the use of 20 and 30 ml of solution. Injections on five cadavers performing the interscalene block of Winnie resulted in an extended spread medially to the anterior scalene muscle. We conclude that our method may be a preferred approach due to its safety, because no structures out of interest were reached. Solution of 20 ml is suggested to be enough for a successful block.
Scalene regional anesthesia for shoulder surgery in a community setting: an assessment of risk.
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BACKGROUND: A retrospective review of shoulder procedures using scalene block anesthesia was performed.

METHODS: The records of all 218 patients who had undergone scalene block anesthesia over a three-year period at two facilities were retrospectively reviewed. All blocks were performed with use of a standard blunt-needle technique with the patient awake and with use of preoperative nerve stimulation to localize the brachial plexus.

RESULTS: Adjunctive general anesthesia was used for 179 (82%) of the 218 patients. Seventy-two patients (33%) required intravenous pain medication immediately on arrival in the recovery room, and twenty-eight blocks (13%) failed. One grand mal seizure, one episode of cardiovascular collapse, and four episodes of severe respiratory distress were noted. Two patients had temporary neurologic injuries that persisted at six weeks. The mean duration of the block was 9 +/- 4.6 hours. Two hundred (92%) of the 218 patients required parenteral narcotics despite the use of scalene block anesthesia.

CONCLUSION: Informed consent discussions regarding scalene block anesthesia should include information on the prevalence of complications and the efficacy of the technique.
Continuous brachial plexus block is the technique of choice for postoperative shoulder pain treatment. The localization of the plexus is usually obtained drawing landmarks on the skin and using the electrical nerve stimulator; these and other different modalities are applied in order to reach safely and precisely nerve roots to be blocked with an anaesthetic solution. The Author presents a new anatomical perspective to guide the localization of the brachial plexus. It is shown how it is possible to detect the pathway of the brachial plexus from the cutaneous surface, linking between each other various landmarks: a) the apex of the scalene triangle, at the cross of a line leaving from the cricoid process and directed posterior to the posterior border of the sternocleidomastoid muscle, b) the midline of the clavicle c)the deltoid-pectoral sulcus d) the midpoint between the coracoid process and the chest profile e) the pulsation of the artery in the axylla. Following the guide of the so formed anesthetic line, is possible to place the needle, with a direction from distal to proximal, in a tangential route towards the interscalenic groove, thus allowing to perform a block of the plexus in a simple and efficacious way.
Brachial plexus blockade is one of the most widespread technique in regional anaesthesia. Many Authors presented different approaches to the plexus, following different routes, over or under the clavicle related to near landmarks, paresthesia or electrical nerve stimulation. The Author presents an anatomical perspective to guide the localization of the brachial plexus, following an anaesthetic line created by linking together several landmarks, generally used in few number for single approach techniques, over or under the clavicle. The line leaves from the apex of the scalene triangle, through the middle point of the clavicle, the middle point between the coracoid process and the chest profile, and arrives to the pulsation of the axillary artery, when the arm is abducted at 45 degrees. This general view favours a better understanding of the placement of the brachial plexus, following the anatomical guide developed from the anaesthetic line; thus the placement of the needle, from distal to proximal, in a vertical or tangential route towards the nerve structures becomes clearer, showing the different entry point in a simple and efficacious way. The same technique may apply to the infraclavicular approach, favouring the vertical approach or a tangential one, when catheterisation is needed.
A technique is described which combines the advantages of interscalene (IS) and supraclavicular block (SCB) and avoids their disadvantages due to complications such as pneumothorax, high spinal and epidural block, cervical plexus block, puncture of a. subclavia and a. vertebralis. The technique has been applied on 110 patients with I-II degree of ASA functional status and indicated for surgical or physiotherapeutic treatment at the region of the shoulder and upper extremity. The IS approach is based on the reference points and site of insertion of the regional needle described by Winnie, as in the classical ISB. The caudally inserted canule into the inter-scalene space and a catheter through it provide supraclavicular distribution of the local anesthetic agent—1% Lidocaine and Adrenalin (1:200,000). The effectiveness, security and ability for control through the proposed technique of the brachial plexus anesthesia are investigated. The results we obtained prove an effective block in 93% of the patients together with a low incidence of complications, which determines the technique as a method of choice in the planned, urgent and outpatient surgery.

We performed the subclavian perivascular approach to the brachial plexus using contrast medium to confirm the location of the tip of the needle and the spread of the injected solution to obtain a high success rate and to minimize the risk of pneumothorax. Review of the cases led to the hypothesis that the solution injected inside the costal attachment of the middle scalene muscle spreads into the interscalene space. Because of the difference in the placement of the tip of the needle using our technique and the supraclavicular approach, including the subclavian perivascular approach, we termed our technique the supracostal approach. We conducted the present study to establish the supracostal approach by proving this hypothesis. A total of 173 blocks in 149 adult patients were studied. Eighty-four blocks in 74 patients were achieved by using the supracostal approach with contrast medium. The needle was inserted 1 cm lateral to the palpated subclavian artery and 1-2 cm above to the clavicle to touch a specific part of the first rib, which we believed to correspond to the inside of the costal attachment of the middle scalene muscle. After injecting the anesthetic solution with contrast medium, radiographs were obtained for each block, while computed tomographic (CT) studies were performed for five blocks. Five blocks in five patients were achieved by using the subclavian perivascular approach with contrast medium and both radiographs and CT studies. In addition, the anatomical difference between the two approaches was evaluated in five adult cadavers. Based on these studies, we determined the proper part of the first rib that corresponded to the inside of the costal attachment of the middle scalene muscle. Eighty-four blocks in the remaining 70 patients were performed with the supracostal approach without contrast medium. Of the 84 blocks with contrast medium, 80 (95%) produced successful blockade defined by sensory and motor examination. The radiological studies showed that, with the supracostal approach, the injected solution, which spread from the middle scalene muscle into the interscalene space, did not spread below the first rib. However, with the subclavian perivascular approach, the solution was confined within the perineural sheath and spread below the first rib to the axilla. The anatomical studies could explain this difference, revealing that the perineural space of the brachial plexus is not identical to the interscalene space. There was no failure in the 84 blocks performed with the supracostal approach without contrast medium after we determined the proper part of the first rib. We conclude that the supracostal approach to the brachial plexus is reliable, easy to perform, and associated with a low complication rate. IMPLICATIONS: A new fluoroscopically guided approach for brachial plexus block has been established on the basis of anatomical and radiological studies to be reliable, easy to perform, and associated with a low complication rate.
Subdural anesthesia as a complication of an interscalene brachial plexus block. Case report.

**BACKGROUND AND OBJECTIVES.** Interscalene brachial plexus block is performed in the groove between the anterior and middle scalene muscles at the level of C6, just over the transverse process. Injection occurs within 1-2 cm of the dural sleeve and could be misdirected into the epidural, subdural, or subarachnoid spaces. **METHODS.** Interscalene block was performed by elicitation of paresthesia with 40 mL 1.4% mepivacaine, 1/200,000 epinephrine. **RESULTS.** Initially, complete interscalene block was achieved that evolved into apnea, high motor, and sensory block; requiring induction of general anesthesia. **CONCLUSIONS.** The case represents a partial injection of local anesthetic intended for the interscalene brachial plexus into the subdural space. The diagnosis is based on the normal evolution of the block into full motor and sensory anesthesia of the ipsilateral brachial plexus that evolved into a patchy, sensory, and motor block involving many dermatomes outside the brachial plexus, with minimal sympathetic block, and evidence of a normal interscalene block on emergence from general anesthesia. Subdural injection must be considered when unusual motor and sensory block occurs after interscalene block, especially after a time interval too long for epidural or subarachnoid injection, or with minimal evidence of sympathetic block, after suspected high central block injection.