

Acceptance of Transverse Sweep vs Backtracking Method for Ultrasound-guided Interscalene Block in Awake Patients

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ABSTRACT

Background: Ultrasound-guided interscalene block is widely practiced for upper extremity surgery. There are two methods of identifying the brachial plexus by interscalene method—transverse sweep and backtracking. These methods are also used to scan stellate ganglion and do interventional procedure for Complex Regional Pain Syndrome 1 (CRPS1) and Complex Regional Pain Syndrome 2 (CRPS2). The aim of this study was to compare the two methods in an awake patient, the level of patient's comfort, acceptance, and presence of any symptoms like coughing, choking, vomiting, dyspnea, and pain.

Materials and methods: In total, 100 patients undergoing upper extremity surgery requiring interscalene block were scanned with SonoSite Edge, high-frequency linear probe (6–13 Hz) by both the transverse and backtracking methods. All patients were subjected to both the methods of scanning, and the level of patient's comfort was compared. We categorized the comfort level into three levels—comfortable, mild discomfort, and significant discomfort. We measured pain with the help of unidirectional verbal rating scale as no pain, mild, moderate, and severe. Also, we recorded the associated symptoms including choking sensation, nausea, vomiting, cough, and dyspnea.

Results: Even though the number of events was smaller in number in the transverse sweep method, the backtracking method scored over the transverse method. The transverse method caused some percentage of nausea (4%), choking (12%), dyspnea (6%), and mild pain (12%) and was statistically worse than the backtracking method. Although the comfort levels were not comparable statistically, due to lack of sufficient subgroups, transverse sweep patients had discomfort ranging from mild to significant compared with the comfortable feeling reported by all, when the backtracking method was used.

Conclusion: The acceptance of the backtracking method was better than the transverse sweep method while scanning for ultrasound-guided block in awake patients.

Keywords: Backtracking, Interscalene block, Pain, Transverse sweep.

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INTRODUCTION

From compressing nerves, paresthesia, transarterial injection, peripheral nerve stimulator to ultrasound, we have come a long way in regional anesthesia.¹ Regional anesthesia is an established method for anesthesia and analgesia. It provides numerous advantages over general anesthesia like avoidance of airway manipulation, respiratory depression, inadequate reversal, reduced postoperative nausea and vomiting (PONV), good postoperative analgesia, improved cardiac and pulmonary function, decreased intensive care unit and hospital stay, decreased infection rates, and neuroendocrine stress responses.²

After simple descriptions of ultrasound-guided block techniques in mid-1990s, it rapidly became evident that this technique is here to stay. The last two decades have seen a steady rise of the use of ultrasound for regional anesthesia and pain management.

Ultrasound-guided brachial plexus block is routinely performed in awake patients. Regional techniques provide not only excellent analgesia but also the absence of systemic sedation makes it easier to monitor the mental status of patients with head injuries.¹ Interscalene block is used most commonly for procedures like shoulder arthroscopy, shoulder surgery, proximal humerus fractures, and clavicle fractures. The transverse method is also used for stellate ganglion block in chronic pain management. We wanted to analyze the comfort level and any pain of patients using two different methods, transverse sweep and backtracking methods. This study provides valuable information that is not available in the literature.

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Whether regional anesthesia should be performed in awake or sedated patients is in itself a topic of discussion. Performing ultrasound-guided block in awake patients offers certain definite benefits like ability to identify early symptoms of local anesthetic systemic toxicity (LAST) and paraesthesia and avoid sedation related side effects like respiratory depression, nausea, and vomiting. Given the interindividual variability to sedative/hypnotic for sedation, it is impossible to provide dosage guidelines or drug recommendations that clearly draw a line between "light" and "heavy" sedation.³ Hence, we perform nerve blocks in awake patients except those who refuse to give consent in awake state, anxious, and apprehensive patients.

MATERIALS AND METHODS

After obtaining approval from ethics committee, we included 100 patients undergoing elective and emergency surgery randomly for the study. Inclusion criteria were either sex, age group between 18 years and 80 years of age, American Society of Anesthesiologists (ASA) grade I or II. Exclusion criteria were hemodynamically unstable, apprehensive, and uncooperative patients.

After arrival in the preoperative holding area, IV line was secured. Electrocardiography, SpO₂, and non-invasive blood pressure (NIBP) were monitored, and the vital parameters were noted. SonoSite Edge ultrasound machine with high-frequency linear probe of 6–13 MHz frequency was used for the study. The entire study was performed by a single anesthesiologist.

Supine position was given with head tilted to the opposite side of the block. Soft pillows were placed under the shoulders of the patients. The transverse sweep method was performed by placing the probe initially near the midline at the level of cricoid cartilage and scanned laterally to identify the carotid artery and internal jugular vein. Stellate ganglion and vertebral artery were visualized. The sternocleidomastoid muscle overlies these structures. By moving the probe laterally, the anterior scalene muscle is visible below the lateral edge of the sternocleidomastoid. A groove containing the hypo-echoic nerve structures can usually be identified but may require fine adjustments of the probe in a rotational or tilting motion.⁴ Later, patients were questioned and symptoms were recorded. Then, the same patients were subjected to the backtracking method when the patient was ready (range: 5–15 minutes), which was performed by placing the probe above and along the direction of clavicle and sweeping it up until brachial plexus is visible,⁴ typically a “traffic signal” and “seagull” kind of appearance. Moving further medially, carotid artery, internal jugular vein, stellate ganglion, and vertebral artery could be visualized. Patients were again questioned on comfort level and abnormal symptoms. Later, the interscalene block was performed in the awake patient.

STATISTICAL ANALYSIS

Descriptive along with inferential statistical analyses were performed. As the two groups were dependent, McNemar’s test was used for inferences from statistics. As the level of comfort was collected in three levels (comfortable, mild discomfort, and significant discomfort), in the *post hoc* analysis, only the proportion of patients who felt comfortable (grade I) was used for comparison. Statistical significance was set at $p < 0.05$.

RESULTS

The average age in this study was 35 years with ages ranging from 16 years to 65 years. There were 32 females and 68 males, where 33 belonged to urban and 67 to rural localities.

Four patients felt nausea when the transverse sweep method was used compared with none in the backtracking method Table 1. Similarly, 6 patients experienced difficulty in breathing and 12 patients suffered choking while the transverse sweep method was used, and no one had such experiences during the backtracking method. Twelve patients had mild pain in the neck in the transverse sweep method. All the patients were comfortable and pain free with the backtracking method, while only 41% felt comfortable with the

Table 1: Number of people who felt various symptoms and level of comfort when the two methods to identify brachial plexus were used

Variable	Backtracking (n)	Transverse sweep (n)	p value
Nausea	0	4	0.125
Vomiting	0	0	–
Cough	0	0	–
Dyspnea	0	6	0.0313
Choking	0	12	0.0005
Pain	0	12	0.0005
Level of comfort	100	41	<0.0001

transverse sweep method. Except for nausea’s result, remaining all were statistically significant. Both methods did not show any symptoms of vomiting or coughing in any of the patients.

DISCUSSION

Ultrasound-guided interscalene block by any of the methods is the norm in our hospital. Awake regional anesthesia is maximally followed to avoid the major complications. Interscalene block by transverse and backtracking methods is performed. However, no study comparing the two methods in an awake patient is done. So, we put forth this study to evaluate the same with respect to the comfort level of the patient.

Larynx is situated at the cranial end of the trachea. It extends from the third to the sixth cervical vertebra. The framework of the larynx is formed by cartilages. These cartilages are linked by ligaments and membranes. Thyroid and cricoid epiglottis are the unpaired cartilages. Arytenoid, corniculate, and cuneiform are the paired cartilages. The larynx is intimately involved in swallowing, breathing, coughing, and phonation. These functions are dependent on normal movements of the vocal cords. These movements are controlled by muscles which are innervated by the recurrent laryngeal branch of the vagus nerve.

The larynx is supplied by the branches of vagus nerve, i.e., superior and recurrent laryngeal nerves. The jugular ganglion contains cell bodies of parasympathetic and sensory fibers that run in the vagus. The vagal supply to the pharyngeal plexus and the superior laryngeal nerve arise from nodose ganglion.⁵

The external laryngeal nerve provides motor supply to the cricothyroid muscle, while the internal laryngeal nerve pierces the thyrohyoid membrane above the entrance of the superior laryngeal artery and divides into sensori and secretomotor branches.⁵ Sensory innervation below the vocal cords and to the upper trachea is supplied by the recurrent laryngeal nerves.⁶

Sensory and motor innervation of this region is by the branches of the vagus nerve. Thus, any sensory stimulation will give rise to coughing, difficulty in breathing, swallowing, phonation, nausea, and vomiting as the larynx is intimately related with these functions.

Thus, we compared the transverse sweep method which had the possibility of the above symptoms with the backtracking method which avoids any stimulation of the larynx.

In our study, though the number of patients suffering symptoms was less, both clinically and statistically, the results suggest that backtracking is superior to transverse sweep as we generally avoid stimulating the nerves that cause discomfort, pain, and symptoms like choking, nausea, and breathlessness.

CONCLUSION

Based on the results from this study, we would like to conclude that backtracking (traceback) method is well tolerated by patients than transverse sweep (medial to lateral). These patients were more comfortable with less pain in the backtracking method, thus giving a conducive environment to perform a successful block.

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