

A New Application for Superior Laryngeal Nerve Block: Transesophageal Echocardiography

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The combination of topical anesthesia of the hypopharynx and superior laryngeal nerve block has been described for awake bronchoscopy, tracheal intubation, and esophagoscopy.¹⁻³ The use of transesophageal echocardiography (TEE) in awake patients is growing, especially for evaluation of mitral valve function. The management of patients for awake TEE with the combination of topical anesthesia and sedation was recently reported.⁴

We report our experience with a patient who would not tolerate awake TEE using only sedation and topical anesthesia. The addition of a superior laryngeal nerve block allowed the TEE to be completed without difficulty.

CASE REPORT

A 67-yr-old man presented for awake TEE to evaluate prosthetic mitral valve function. He had twice undergone mitral valve replacement but in the past 3 months he again developed progressive fatigue and dyspnea and TEE was planned to evaluate the possibility of recurrent paravalvular mitral regurgitation. His medications were warfarin, verapamil, digoxin, and furosemide. He had no allergies. He presented in mild respiratory distress with labored speech and a respiratory rate of 25-30 breaths per min, blood pressure of 95/60 mmHg, and an irregular pulse of 70 beats per min. Physical exam was also noted for marked jugular venous distension, decreased breath sounds bilaterally, distinct valve closure sounds without an audible murmur, and trace peripheral edema. Electrocardiogram demonstrated atrial fibrillation.

After administration of supplemental oxygen *via* nasal cannula, a baseline oxyhemoglobin saturation (SpO₂) was 95%. Topical anesthesia was applied to the hypopharynx with 4% xylocaine spray that the patient tolerated poorly because of excessive coughing. The patient was then asked to gargle and swallow 2% viscous xylocaine that was also difficult because of his dyspnea. The TEE probe was handled by either an echocardiologist or an anesthesiologist, both experienced in passing the probe. During each attempt to pass the probe, the patient was instructed to try to swallow. An initial attempt to pass the TEE probe was unsuccessful because of his as yet unobtunded gag reflex and topical anesthesia was reapplied. Intravenous sedation consisted of 2 mg of midazolam and 50 µg of fentanyl administered over 1 h. The second

attempt to pass the TEE probe through the mouth and hypopharynx was poorly tolerated. The patient coughed excessively, his respiratory rate increased, blood pressure decreased to 80/50 mmHg, ventricular response to atrial fibrillation increased to 85 beats per min, and SpO₂ decreased to 90%. When the probe was removed after the second attempt, hemodynamics, SpO₂, and ventilatory pattern returned to baseline.

Subsequently, a superior laryngeal nerve block was performed. Two milliliters of 2% xylocaine was injected bilaterally just below and medial to the greater cornu of the hyoid bone. No additional iv sedation was administered. The TEE probe was then passed without any difficulty, the patient tolerated a 40 min TEE without discomfort, with stable vital signs, and with SpO₂ 98-99%.

DISCUSSION

The superior laryngeal nerve (SLN) is a branch of the vagus nerve and is derived from the inferior ganglia (nodose ganglion) to run along the pharyngeal wall and medial to the carotid arteries. The SLN divides into an internal and external branch. The larger internal laryngeal branch is the focus of the SLN block.⁵

The origin of the internal branch is easily marked by two landmarks, the greater cornu of the hyoid bone and the thyroid cartilage. From its origin, the internal branch passes anterior to pierce the thyrohyoid membrane, just below the greater cornu of the hyoid bone. It is important to note that this internal branch has only sensory fibers.⁶ Hence, block of the internal branch of the SLN results in no laryngeal motor weakness. It supplies sensory fibers to the epiglottis, the piriform fossa, the base of the tongue, and the mucous membranes of the larynx superior to the true cords. The rest of the hypopharynx as well as the posterior third of the tongue receives its sensory innervation from the glossopharyngeal nerve. The smaller external branch passes inferior to the take off of the internal branch, in close proximity to the superior thyroid vessels. The external branch then crosses behind the thyroid gland to enter and supply the motor innervation to the cricothyroid muscle.⁷

SLN block was first described in the early 1900s as a way to ease the pain associated with laryngeal tuberculosis.¹ Early descriptions in the anesthesia literature during the 1950s included use for awake tracheal suctioning and awake endotracheal intubation.^{8,9} In 1966 Gaskill and Gillies reported their use of the SLN block in over 150 adults undergoing laryngoscopy, bronchoscopy, and esophagoscopy.¹ They concluded that compared with the

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sole use of topical agents in these patients, the addition of SLN block improved patient comfort, required less time, and reduced the total dose of local anesthetic.

SLN block is extremely safe. A review of published series of SLN blocks describes over 1,100 blocks with only one complication.^{1-3,10} One patient had a small hematoma in the neck that was easily controlled with manual pressure.³ The superior laryngeal artery, a branch of the superior thyroid artery, passes through the thyrohyoid membrane along with the internal branch of the SLN nerve. Aspiration prior to the injection of local anesthetic will prevent any inadvertent intravascular injection. As mentioned above, the internal branch of the SLN has no motor fibers. If the external branch is blocked along with the internal branch, ipsilateral cricothyroid muscle paralysis could result. The cricothyroid muscle is a vocal cord tensor and the patient may have a weak voice, loss of vocal range, or have no symptoms.⁷

TEE can often be safely performed with only the combination of topical anesthesia to the hypopharynx and sedation. This approach was not satisfactory for the patient described for two reasons. Adequate administration of topical anesthetic was difficult because of the patient's dyspnea, inability to fully cooperate, and heightened gag reflex. Also, the patient's medical condition deteriorated during the first two attempts to pass the TEE probe. The decline in SpO₂ and blood pressure was most likely from the adverse effect of the patient's sympathetic response to discomfort. The resultant increase in systemic vascular resistance may have increased the regurgitant flow through his mitral prosthesis. The administration of the SLN block allowed the TEE to be completed safely and with no patient discomfort.

In conclusion, this case demonstrates a new application for SLN block TEE. In awake patients, the block is easily performed, is associated with only rare minor complications, and has a high success rate. SLN block may prove to be a valuable addition to the anesthetic management of selected patients undergoing TEE while awake.

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Airway Fire during CO₂ Laser Surgery Using a Xomed Laser Endotracheal Tube

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The CO₂ laser offers significant advantages over conventional surgical techniques such as increased precision, an intrinsic hemostatic effect, and reduced postoperative

pain and edema. Due to the high-energy density of the laser and its proximity to combustible endotracheal tubes during airway surgery, it has been reported to cause airway fires secondary to tracheal tube combustion.¹⁻³ The need for an improved endotracheal tube that is resistant to the effects of the laser has led several manufacturers to design special laser endotracheal tubes. The efficacy of some of these tubes has been questioned in an *in vitro* comparison study.⁴ The following case report demonstrates the vulnerability of the Xomed® Laser Shield endotracheal tube during clinical use.

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