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Research Article

Superior laryngeal nerve block as an adjuvant to General Anesthesia during endoscopic laryngeal surgeries
A randomized controlled trial

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KEYWORDS

Microlaryngosurgery;
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Postoperative cough and sore throat;
Intubation without muscle relaxant;
Pressor response to endotracheal intubation

Abstract *Background:* Direct rigid endoscopic laryngosurgery is a short procedure usually performed under general anesthesia. This is a double blinded randomized placebo-controlled trial, which was designed to evaluate the effect of bilateral block of the internal branch of superior laryngeal nerve (SLN) as an adjuvant to general anesthesia during endoscopic laryngeal surgery when smaller dose of muscle relaxant is used.

Method: Seventy-six patients required endoscopic laryngosurgery in whom general anesthesia was preceded by bilateral superior laryngeal nerve block either with 2% lidocaine (L-group) or with saline (C-group).

Results: The reaction to endotracheal tube insertion was better in L-group as less frequent cough occurred in L-group (one patient) compared to (8 patients) C-group (P value < 0.05). The maximum pressor response was observed immediately after intubation, at which the increase in MAP from baseline in C-group (24.4%) was significantly higher than in L-group (6.4%) ($P < 0.05$) and the increase in HR from baseline in C-group (29.5%) was significantly higher than in L-group (14.8%) ($P < 0.05$). The MAP and HR remain significantly higher in C-group than that of the L-group all through the intraoperative period. The incidence of severe cough was significantly higher in C-group just before extubation (bucking), 5 min and 30 min postextubation. Incidence and severity of postoperative sore throat was significantly higher in C-group in the first 4 h postoperatively.

Conclusion: During endoscopic laryngeal surgeries, using bilateral block of the internal branch of superior laryngeal nerve as an adjuvant to general anesthesia was associated with better intubation conditions, better intraoperative hemodynamic response to intubation and surgical procedure and better recovery profile in the form of improved postoperative cough and sore throat.

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1. Introduction

Direct rigid endoscopic laryngosurgery is a very common procedure performed to investigate and/or to treat lesions in the larynx with or without using operating microscope [1]. This procedure usually represents a challenge to the anesthesiologists, and is usually performed under general anesthesia in which adequate muscle relaxation and immobile vocal cords are crucial surgical needs because movement of the vocal cords, coughing, or bucking during endoscopy may cause injurious consequences. Another additional challenge in anesthetic management is the relative short operative time that necessitates rapid awakening and rapid return of muscle power and laryngeal reflexes [1]. Direct rigid endoscopic laryngosurgery is also associated with severe sympathetic stimulation that leads to tachycardia, hypertension, arrhythmias that may be dangerous in compromised elderly patients with coexisting cardiovascular morbidity [2,3]. In the postoperative period, edema and laryngospasm are the most important concerns [1], while cough and sore throat are frequent complaints annoying patients [1,4]. Topical anesthesia to laryngeal mucosa, administration of short acting opioids or beta adrenergic antagonist was described to attenuate the stress response during the intraoperative period [1,5]. While intravenous or topical lidocaine [6], and even lidocaine into the endotracheal tube cuff [7], and anti-inflammatory agents as steroids [8] were used to reduce postoperative sore throat, cough and hoarseness of voice.

The larynx is a potent reflexogenic region rich in sensory afferents that elicit various reflexes in response to mechanical stimulation [9]. The sensory innervation of the larynx is provided by the internal branch of the superior laryngeal nerve (SLN) which can be blocked bilaterally, and this block is commonly performed as a part of local nerve block of the upper airway during rigid direct laryngoscopy [1,10,11], or for awake fiberoptic bronchoscopy [12]. It was also reported that the block of internal branch of superior laryngeal nerve can attenuate hemodynamic response and catecholamine release associated with direct laryngoscopy in patients undergoing coronary artery bypass grafting [13].

This is a double blinded randomized placebo-controlled trial that is designed to evaluate the effect of bilateral block of the internal branch of superior laryngeal nerve (SLN) as an adjuvant to general anesthesia during endoscopic laryngeal surgery. The primary outcome is to assess the effect of combined bilateral SLN block with general anesthesia on the incidence and severity of postoperative sore throat, while the secondary outcome is the effect of this combination on the intubation condition when a smaller dose of muscle relaxant is used, the Intraoperative hemodynamic response to endotracheal intubation and surgical manipulation and the incidence and severity of postoperative cough and hoarseness of voice.

2. Methodology

This study was conducted in Anesthesia department, ENT operating theater, Cairo University hospitals through the period from May 2013 till May 2014 after being approved by the Departmental Research and Ethical Committee, and informed consents were obtained from 76 patients, aged 18–60 years old with ASA classes I and II. These patients were previously diagnosed by the ENT consultant as having vocal cord polyp, nodule, cyst or leukoplakia that needs removal through endoscopic laryngeal surgery. Patients with vocal cord mass, stridor, uncontrolled cardiovascular or respiratory disease, coagulation disorder, patients who received preoperative analgesics or beta-blockers, patients with hypersensitivity to the study drug, Mallampati classification III and IV and patients needed more than one attempt for endotracheal intubation were excluded from the study.

On arrival of patients to operating room, 18G canula was inserted and Ringer's solution was infused. Standard monitoring in the form of non-invasive blood pressure, electrocardiogram, pulse oximeter and capnogram was applied. All patients were premedicated with midazolam 0.02 mg/kg iv, Dexamethasone 0.2 mg/kg iv for edema prophylaxis, metoclopramide 10 mg slowly iv for emesis prophylaxis and H2 blocker in form of ranitidine 50 mg slowly iv. Baseline values of mean arterial blood pressure (MAP), oxygen saturation (PSO2) and heart rate (HR) were recorded. A computer generated random list was used and the random allocation numbers concealed in opaque closed envelopes were used to allocate the 76 patients to receive a bilateral superior laryngeal nerve block (2.5 ml per side) either with lidocaine 2% (in L-group; $n = 38$) or with isotonic saline (in C-group; $n = 38$).

2.1. Technique of local nerve block

The superior laryngeal nerve branches out of the vagus nerve just below the nodose ganglion, then it descends close to the pharynx, behind the internal carotid artery, and ends by dividing into two branches; the external branch that descends on the larynx, beneath the sternothyroid muscle then penetrates cricothyroid muscle to give it motor supply, while the internal branch passes 2–4 mm inferior to the great cornu of hyoid bone where it pierces the thyrohyoid membrane then ramifies to give sensory supply to base of tongue, epiglottis and mucosa of the larynx as far as inferiorly as the vocal cords [9,14].

The block was performed using 5 ml syringe that was filled with either normal saline or lidocaine 2% by a pharmacist who was not involved in data recording and each syringe was identified by a key number, so the anesthesiologist and the surgeon were both blinded to the injected preparation. Patient was positioned supine with head maximally extended; hyoid bone was identified by being mobile bone between the thumb and index finger. After proper antiseptic technique to the neck, 22-gauge needle over the prepared 5 ml syringe was introduced perpendicularly directed to the great cornu of the hyoid. After touching the bone, the needle withdrawn slightly then redirected caudally till it slipped over the bone and pierce the thyrohyoid membrane. In a space bounded by the thyrohyoid membrane laterally and the laryngeal mucosa medially located the ramifications of the internal branch SLN, aspiration was done to detect either air or blood, then 2.5 ml of prepared solution was injected. The same technique was repeated on the other side.

After local nerve block was accomplished, general anesthesia (GA) was induced intravenously by using fentanyl 2 μg/kg, propofol 2 mg/kg and rocuronium 0.3 mg/kg (it is nearly half the recommended intubation dose which is 0.45–0.6 mg/kg).

Ventilation was maintained using 100% of O2 via face mask for 3 min then endotracheal intubation was accomplished by using oral endotracheal tube (ETT) size 6 mm ID for females and size 6.5 mm ID for males, and the cuff, a high volume-low pressure cuff, was inflated gradually by 5 ml syringe till no air leak was detected by auscultation under controlled positive pressure ventilation "minimal occlusive cuff pressure". The intubation condition was assessed by using 3 variants, the first was the ease of laryngoscopy (excellent if easy: jaw relaxed, no resistance to blade insertion; good if fair: jaw not fully relaxed, slight resistance to blade insertion and poor if difficult: poor jaw relaxation, active resistance of the patient to laryngoscopy); the second variant was the vocal cord position (excellent if abducted, good if intermediate or moving and poor if closed) and the third was the reaction to tube insertion in the form of cough and diaphragmatic movement (excellent if non, good if one or two weak contractions or movements for less than five seconds and poor if more than two contractions or movements for more than five seconds) [15]. Lungs were mechanically ventilated to maintain the end-tidal CO2 ($_{ET}$CO2) 30–35 mmHg. Anesthesia was maintained with inspired isoflurane of 1.5–2 vol%. And intravenous infusion of Paracetamol preparation (perfalgan 1 gm) over 20 min was used for pain prophylaxis. Throughout the intra-operative period, mean arterial blood pressure (MAP), heart rate (HR) and oxygen saturation (SO2) were measured one minute after induction of GA, one minute after endotracheal intubation and then every 5 min till patient recovery. After termination of surgery and removal of surgical direct laryngoscope, isoflurane was discontinued, and the oropharynx was suctioned in a gentle way under direct vision using the Macintosh laryngoscope. The residual muscle relaxant was reversed with intravenous neostigmine 0.05 μ/kg with atropine 0.02 mg/kg then trachea was extubated once the patients showed eye opening and purposeful movement. Spontaneous ventilation time (which is the time span between emergence of spontaneous ventilation and extubation), extubation time (which is time span from discontinuation of isoflurane till removal of endotracheal tube) and duration of surgery (time span between the insertion of the surgical rigid direct laryngoscope till its removal) were recorded. Patients then were transferred to the postanesthesia care unit (PACU) where they were monitored with BP, PSO2, and ECG. O2 supplementation (5 L/min) was provided via face mask.

The postoperative sore throat (POST) was measured by using 4 grade scale (Table 1) at postoperative time interval 30 min, 2, 4 and 24 h. The incidence of POST was measured from patients who suffered from any degree of pain (grades 1–3). Cough was assessed just before extubation (bucking on the ETT) and after extubation at 5 min, 30 min, 2, 4 and 24 h by using graded 4 grade scale (Table 1). Grades 2 and 3 were considered as severe cough. The incidence of post-operative cough was measured from patients suffered from severe cough (grades 2 and 3). Postoperative hoarseness of voice was assessed 1 and 24 h postextubation. Postoperative hemodynamic variables and incidences of nausea and vomiting were also recorded. Post-operative swallowing reflex was assessed 2 h postoperatively by asking the patient to drink 20 ml of water, and if not depressed, patients were allowed to start oral fluid. Both anesthesiologist and surgeon in postoperative period were blinded to the intervention method.

Table 1 Scoring system for severity of cough [16], sore throat [17] and hoarseness [18].

Score
Cough severity
Grade 0 No cough
Grade 1 Light or single cough
Grade 2 More than one episode of unsustained (⩽5 s) coughing
Grade 3 Sustained (⩽5 s) and repetitive cough with head left
Sore throat severity
Grade 0 No sore throat
Grade 1 Mild (complained of sore throat only upon inquiry)
Grade 2 Moderate (complained of sore throat on his/her own)
Grade 3 Sever (sever pain associated with marked change in voice)
Hoarseness severity
Grade 0 None
Grade 1 Noted by the patient
Grade 2 Obvious to the observer
Grade 3 Aphonia

3. Statistical analysis

Microsoft Excel 2007 and the Statistical Package of Social Science software program (SPSS version 21, Chicago, IL, USA) were used for analysis. Seventy patients were required (35/group) to detect 30% drop in the incidence of post-operative sore throat with a power of 80% and alpha error of 5%. The number increased to 76 (38/group) for possible drop-outs. Continuous quantitative normally distributed data were expressed as means and standard deviations (SD). Quantitative discrete data were expressed as median and range. Qualitative nominal data e.g. incidence of complications were expressed as frequency or percentage. Normally distributed data were analyzed using Student's *t*-test and two-way ANOVA with repeated measures. Mann–Whitney *U*-test was used for non-parametric data. Chi square or Fisher's exact tests were used as appropriate to compare qualitative data. A *P*-value <0.05 was considered statistically significant.

4. Results

A total number of 76 patients were enrolled in the study. Only 73 patients completed the study as 3 patients (one from C-group and two from L-group) were excluded due to multiple intubation attempts (Fig. 1). Demographic data, number of smokers and duration of surgery were comparable in both groups. But spontaneous ventilation and extubation time were longer in L-group with *P* value <0.05 (Table 2).

The overall intubation conditions show no statistically significant difference between both groups (Table 3), as there was no difference between both groups regarding the ease of laryngoscopy or the position of vocal cords, but the reaction to endotracheal tube insertion was better in L-group as less frequent cough occurred in L-group (one patient) compared to (8 patients) C-group (*P* value <0.05).

The baseline of MAP, HR and PSO2 was comparable in both groups. Both MAP and HR after intubation and throughout the intra-operative periods were significantly higher in C-group ($P < 0.05$) (Figs. 2 and 3). The maximum pressor response was observed immediately after intubation, at which

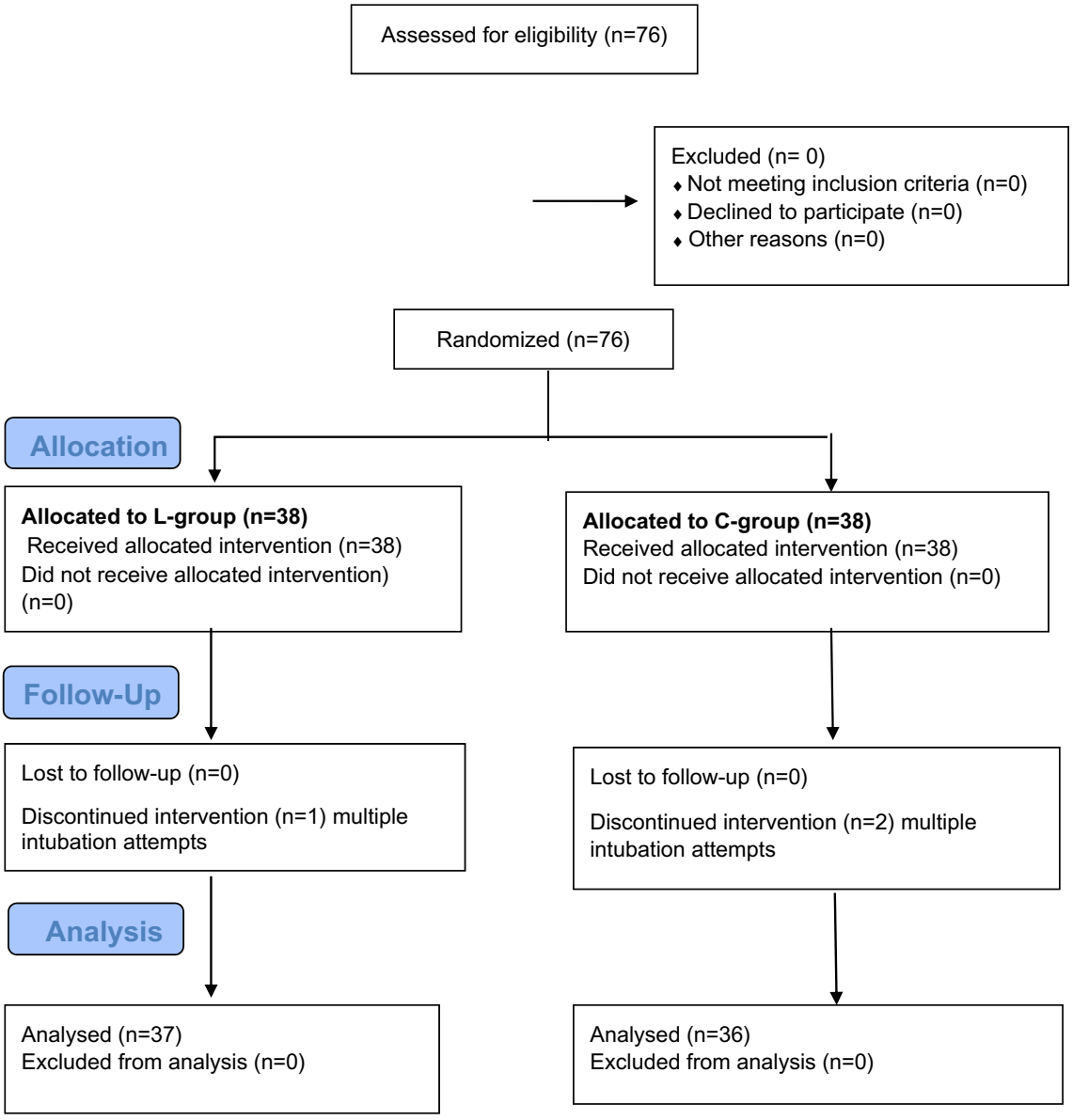

Figure 1 A flow diagram.

Table 2 Demographic data in both groups.

	L-Group	C-Group
	$n = 36$	$n = 37$
Age (y)	39 ± 11	41 ± 8
Weight (kg)	80 ± 6	76 ± 10
Gender (M/F)	21/15	24/13
Smoking (%)	17 (47.2%)	20 (54%)
Duration of surgery (min)	22 ± 4	24 ± 3
Spontaneous ventilation time (min)	9 ± 4*	3 ± 2*
Extubation time (min)	18 ± 6*	9 ± 2*

Data expressed as mean ± SD.
* Denotes significance relative to the other group with p value < 0.05.

the increase in MAP from baseline in C-group (24.4%) was significantly higher than in L-group (6.4%) ($P < 0.05$) and the increase in HR from baseline in C-group (29.5%) was significantly higher than in L-group (14.8%) ($P < 0.05$). After endotracheal intubation, the MAP and HR remain significantly higher in C-group than that of the L-group in which both MAP and HR maintained closer to baseline values unlike C-group in which values of both HR and MAP did not return to the baseline readings. There was no difference between both groups regarding the oxygen saturation throughout the procedure.

The incidence of severe cough was significantly higher in C-group just before extubation (bucking), 5 min and 30 min post-textubation (Table 4). The severity grades of cough were significantly lower in L-group just before extubation and all through the first 2 h postoperatively (Fig. 4A and B). Spontaneous resolution of cough was noticed in both groups.

Incidence (Table 5) and severity (Fig. 5) of postoperative sore throat (POST) was significantly higher in C-group in the first 4 h postoperative. Gradual resolution of POST was noticed when the patents start their oral fluid intake.

Table 3 Intubation conditions.

Intubation condition	L-Group	C-Group
	$n = 36$	$n = 37$
Ease of laryngoscopy		
Excellent	35 (97.2%)	36 (97.3)
Good	1 (2.8%)	1 (2.7%)
Poor	0	0
Vocal cord position		
Excellent	33 (91.6%)	32 (86.4%)
Good	3 (8.4%)	5 (13.5%)
Poor	0	0
Reaction to ET insertion		
Excellent	35 (97.2%)	29 (78.4%)
Good	1 (2.8%)*	7 (18.9%)*
Poor	–	1 (2.7%)*
Total score		
Excellent	33 (92%)	29 (81.1%)
Good	3 (8%)	7 (16.2%)
Poor	0	1 (2.7%)

ET = endotracheal tube. Data expressed as number of patients (%).
* Denotes significant relative to the other group with $p < 0.05$.

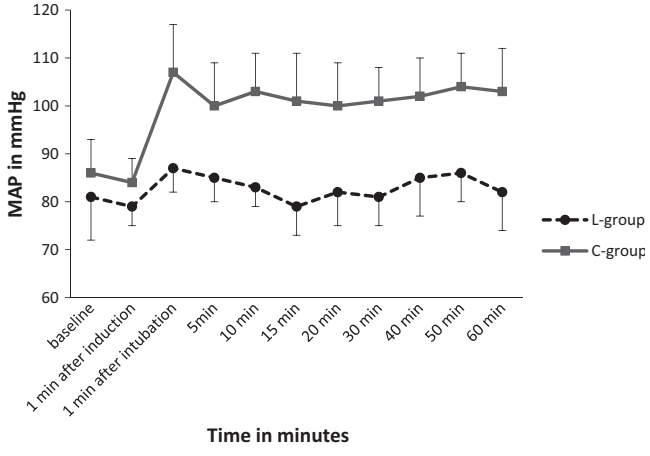

Figure 2 Intraoperative MAP in both groups.

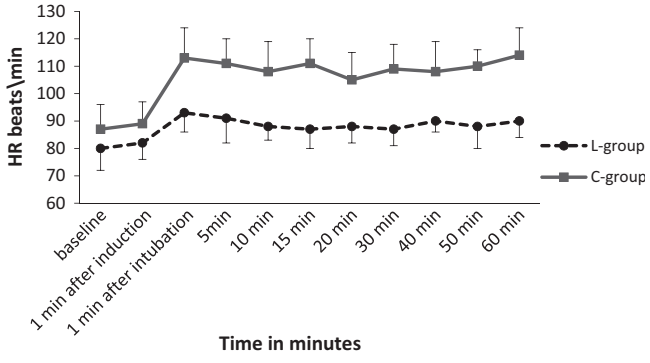

Figure 3 Intraoperative HR in both groups.

Table 4 Incidence of severe cough (grades 2 and 3).

	L-group	C-group
	$n = 36$	$n = 37$
Just before extubation (bucking)	13 (22.2%)*	33 (86.4%)*
Post-extubation		
5 min	7 (19.4%)*	28 (75.7%)*
30 min	2 (5%)*	22 (54.1%)*
2 h	0 (0%)	3 (8.1%)
4 h	0 (0%)	1 (2.7%)
24 h	0 (0%)	0 (0%)

Data expressed as number (%of total).
* Denotes significant relative to the other group with $p < 0.05$.

No difference was noticed between both groups regarding the postoperative severity of hoarseness. No postoperative chocking or aspiration was detected in both groups when the patients were asked to swallow 20 ml of water 2 h postoperatively. No postoperative laryngospasm or nausea and vomiting were recorded. The postoperative hemodynamics variable including HR and MAP was comparable between both groups. Both groups were comparable regarding the intraoperative and postoperative oxygen saturation. Mean oxygen saturation was 97.1% in L-group versus 97.4 in C-group on room air just before discharge from recovery room.

5. Discussion

The main findings in this study are that using bilateral superior laryngeal nerve block as an adjuvant to general anesthesia during endoscopic laryngeal surgeries was associated with better intubation conditions, better intraoperative hemodynamic response to intubation and surgical procedure and better recovery profile in the form of improved postoperative cough and sore throat.

In this study, patients received bilateral SLN block showed significantly lower incidence and severity of postoperative sore throat and lower incidence and severity of cough just before extubation (bucking) and over the 1st 2 h postoperatively. The incidence of postoperative sore throat, cough and hoarseness ranges from 6.6% to 90% [19,20]. The postoperative sore throat and cough are precipitated by factors that are claimed to cause irritation to the laryngotracheal mucosa such as the endotracheal tube diameter and cuff design, rough intubation maneuver, cough/bucking on the tube and surgical manipulations on the larynx and vocal cord [21–23]. Several methods have been tried to minimize such irritation and to increase the tolerance of the mucosa to the ETT and/or surgical manipulations and they fortunately succeeded in reducing postoperative sore throat, cough and hoarseness. The use of ETT with high volume low pressure cuff tends to decrease the POST [24]. Topical anesthesia of the laryngotracheal mucosa using lidocaine has been tried using either spray or gel lidocaine preparations [6,16,25] and even inflation of the endotracheal tube cuff with lidocaine [7] and enhancing the lidocaine diffusion throughout the ETT cuff to the surrounding mucosa by using alkalinized preparations [26], all significantly reduced POST and cough. Using steroid preparations as ant-inflammatory either topical application of gel form [8], or inhaler form [18,27] was also tried and was effective.

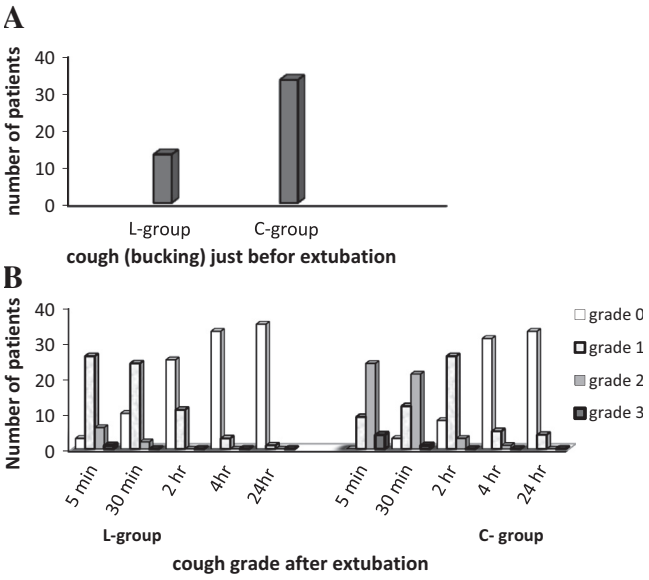

Figure 4 Cough grading: (A) just before extubation, and (B) over 24 h after extubation.

Table 5 Incidence of postoperative sore throat (POST).

	L-group	C-group
	$n = 36$	$n = 37$
30 min	55.5%*	91.8%*
2 h	52.8%*	94.5%*
4 h	21.7%*	60.9%*
24 h	9.1%	15.4%

Data expressed as %.
* Denotes significance relative to the other group with p value < 0.05.

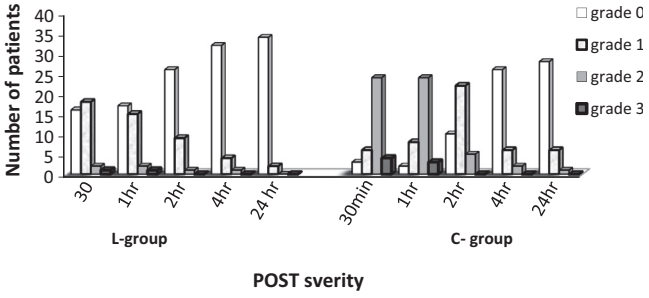

Figure 5 POST severity grading.

The precise mechanism of suppressing the postoperative cough and sore throat by intravenous or topical lidocaine is not exactly clear. Some attribute this effect to the primary site of action i.e., intravenous lidocaine is centrally mediated and topical lidocaine is peripherally mediated [16]. Another theory suggests the inhibition of the sensory C fibers in the airway, which reduces the amount of neuropeptide released leading to neuroplasticity in the airway and brainstem as a possible mechanism [18,28]. Despite the successful use of either intravenous and topical lidocaine in reducing the postoperative cough and sore throat, the plasma lidocaine level necessary to effectively suppress coughing is fairly high (3 pg./mL) [29] and can prolong the emergence from anesthesia due to the sedative effect of lidocaine [30]; in addition, topical application of lidocaine preparations to the mucosa might itself be initially irritating and produce coughing in some patients [31].

The blockage of internal branch of the SLN has been frequently used during awake intubation [11,12] and laryngoscopic examination [14,32], as adjuvant to general anesthesia to facilitate intubation without using muscle relaxant [33] and during TEE examination in awake patients [34]. The lower incidence and severity of POST and cough found in our study may be attributed to increased tolerance of the laryngeal mucosa to the ETT. This tolerance is denoted by prolongation of spontaneous ventilation time, time of extubation and less cough reflex during intubation and just before suction and extubation. Despite SLN block does not produce anesthesia to the tracheal mucosa, the irritation of the tracheal mucosa in our study was minimized by using a high volume low pressure cuff and the minimal occlusive pressure to inflate such cuff; in addition the surgical manipulation of the vocal cords in our study, renders the laryngeal mucosa more liable to irritation by both surgical and intubation trauma [35]. In agreement with our finding, a study compared upper airway nerve block (combined superior laryngeal and glossopharyngeal nerve block) with general anesthesia during direct laryngoscopy biopsy for laryngeal carcinoma, and authors revealed that patients who received upper airway nerve block had significant analgesia over the first 12 h postoperative with less postoperative cough and sore throat [11]. Another study assessed the effect of bilateral SLN block on cough reflex after inhalation of a chemo-irritant substance, and the authors concluded that the bilateral anesthesia of the internal branch of superior laryngeal nerve abolishes the laryngeal cough reflex [36]. Also in another study, SLN block was described to abolish the cough reflex associated with awake TEE examination [34]. In contrary to our finding, a study used preoperative 60 mg of topical lidocaine applied to laryngeal surface of epiglottis and vocal folds in patients underwent laryngeal microsurgery, revealed no effect on the postoperative laryngospasm and cough reflex [37].

In this study, general anesthesia was preceded by bilateral SLN block and the endotracheal intubation was facilitated by using neuromuscular blocking agent rocuronium in a small dose of 0.3 mg/kg. This technique provided overall excellent intubation conditions and shorter clinical duration of the muscle relaxant with early administration of reversal agent in both groups. Less frequent cough was observed during intubation in patients who received SLN block.

Several years ago, many studies described alternative methods to achieve endotracheal intubation without using muscle relaxant especially when muscle relaxant is not desirable as in short procedures and in day case surgeries or if contraindicated [38–40]. In contrary, other studies reported that in absence of muscle relaxant, excellent intubation conditions did not exceed 60% even with high opioid doses [41,42], and other studies reported that vocal cord sequelae and post-operative hoarseness of voice occur more frequently in patients for whom tracheal intubation is attempted without neuromuscular blocking agents [43,44].

With especial emphasis on endoscopic laryngeal surgeries, the operative time is short and they are performed mainly as

day-case surgeries; the ideal anesthetic technique should provide immobile vocal cords with clear field and free of secretions with rapid recovery of the vocal cord mobility and airway reflexes [1,45]; in addition, laryngeal damage may be the result of the intraoperative surgical manipulation of the larynx independently of the intubation conditions [43]. So in our study, the facilitation of intubation with a small dose of rocuronium was our technique of choice. This dose of rocuronium was proved to be effective in several previous studies. Schlaich et al. who reported poor intubation conditions in 40% when remifentanil/propofol was used without muscle relaxants and adding reduced doses of rocuronium to this regimen improved the intubation conditions significantly with marked shortening in its duration of action [46]. Also Siddik-Sayyid SM et al. reported that rocuronium 0.3 mg/kg administered before induction using lidocaine–remifentanil–propofol provides intubating conditions comparable to those achieved with succinylcholine 1.5 mg/kg [47]. The use of neuromuscular blocking agent in both groups of our study provided similar overall intubation conditions; however, it should be noted that the less frequent cough during intubation occurred in patients received SLN block, a finding that may be attributed to the use of muscle relaxant as well as the increased tolerance of the laryngeal mucosa to the ETT and is in agreement with the studies reported the ability of SLN block to suppress the cough reflex [11,34,36].

The last observation in our study is the intraoperative HR and MAP. The results revealed that bilateral SLN block produces effective attenuation in HR and MAP response to endotracheal intubation and surgical manipulation. The hemodynamic responses to direct laryngoscopy and endotracheal intubation and their potential hazards have been well studied [2,48]. The heart rate and arterial blood pressure can be ranked according to the site of stimulation in a descending order as: larynx, trachea and carina and bronchus [37]. Several techniques were described to attenuate such response as topical anesthesia to laryngeal mucosa or parenteral lidocaine, beta adrenergic antagonists or opioids [4,5]. In agreement with our finding, in a previous study, preoperative topical lidocaine 10% was applied to laryngeal surface of epiglottis and vocal folds in 54 patients underwent laryngeal microsurgery, concluded that this technique can attenuate the airway–circulatory reflex in response to intubation, surgical manipulation and extubation [49]. Another study applied on 30 patients underwent coronary artery bypass grafting, and bilateral SLN block was performed prior to general anesthesia, and the study revealed that this was effective in inhibiting circulatory response to laryngoscopy and endotracheal intubation in patients with ischemic heart diseases [13].

Finally, the possibility of pulmonary aspiration of gastric contents after tracheal extubation may be a concern especially when SLN is blocked. In our study, no postoperative nausea and vomiting were recorded and no suppression of the swallowing reflex was detected, but it should be noted that in our study, several precautions were taken such as preoperative fasting for at least 8 h, premedication with antiemetic and H2 blocker, and the use of dexamethasone with its known anti emetic properties, extubation while patients are fully awake and keeping them in semi-upright position and finally, no oral intake was allowed till 2 h postoperatively when the swallowing reflex was assessed. We consider it enough time for the effect of lidocaine to be elapsed.

Some limitation may be mentioned in this study; first, plasma level of Lidocaine was not measured, this is due to the small dose of lidocaine (100 mg) used for the nerve block. Second, we did not assess the effect of this block with other types of laryngeal lesions especially lesions accompanied with some degree of stridor or in patient with preexisting cardiovascular disease. Third, recently, peripheral nerve block is better to be performed guided by ultrasound, but in our study, unavailability and lack of experience were the obstacles.

6. Conclusion

During endoscopic laryngeal surgeries, combining the bilateral block of the internal branch of superior laryngeal nerve as an adjuvant to general anesthesia was associated with better intubation conditions, better intraoperative hemodynamic response to intubation and surgical procedure and better recovery profile in the form of improved postoperative cough and sore throat.

Conflict of interest

No conflict of interest in this study.

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