Kaohsiung Veterans General Hospital

Research Program

Program Name：

Evaluation of the feasibility and safety of laryngoscopic microsurgery under non-intubation anesthesia

Expected Program Starting Date ~ End date：01/01/2021 ~12/31/2022

Principal Investigator：Yuan-Yi, Chia

Co-Investigator：Yu-Ting, Kuo

Sub-Investigator：Ting-Shou,Chang

CONTENT

A THESIS ABSTRACT

Key Words：

[KEY1]Laryngomicrosurgery	[KEY2] Nonintubation	[KEY3]spontaneous breathing
[KEY4] CO2 retention	[KEY5]	[KEY6]

Program Abstract:

Background

Laryngoscope microsurgery is a procedure putting laryngeal directoscope through the mouth under general anesthesia, so that the larynx and hypopharynx can be operated directly under the microscope. Surgery can remove benign lesions such as polyps, nodules, or cysts on the vocal cords to improve the function of sound and sound, or can perform biopsy on suspected malignant tumors of the larynx or hypopharynx, and determine the extent of tumor invasion, as a basis for future treatment.

Laryngoscope microsurgery is a safe procedure, General anesthesia for endotracheal intubation requires the use of muscle relaxants, which may lead to the risk of pulmonary complications after surgery and tracheal intubation may cause postoperative throat discomfort and pain. But there are still risks of surgery and anesthesia. Common side effects and complications: bleeding, pain, infection, oropharyngeal tissue damage. Uncommon serious complications: tooth loss, laceration, pain, temporomandibular joint injury, closed jaw and semi-dislocation, voice changes, upper airway obstruction, postoperative pulmonary edema, cervical spine injury.

Nonintubation anaesthesia for laryngomicrosurgery (LMS) provides both excellent visualization of the surgical field and complete examination on vocal cord. Recently, transnasal humidified rapid-insufflation ventilator exchange (THRIVE) has been reported effectively maintaining apneic oxygenation in patient with difficult airways. However, maintaining apneic oxygenation in patient may lead to CO2 retention and hypercapnia.

If nonintubation anaesthesia for laryngomicrosurgery can be performed with nerve block and intravenous anesthetic medicine, the cardiovascular risks may decrease because of avoiding CO2 retention by maintaining patient's spontaneous breathing function.The feasibility and safety of nonintubated LMS with spontaneous breathing was evaluated in this case series.

Method

We divide the patients who need laryngoscopy microsurgery into three groups. The first group is general anesthesia with endotracheal tube intubation, the second group is non-intubation with muscle relaxant administrated; the third group is non-intubation without muscle relaxant.

The three groups will perform arterial blood oxygen analysis (collecting PaO2, PaCO2, pH, HCO3-data) before intubation, before muscle relaxant administration and before SLNB, after the operation and 15 minutes after transferring to the recovery room, as well as the pressure of the surgeons and the degree of completion of the operation to analyze the difference between intubated general anesthesia and non-intubation anesthesia.

Results

Last year, we passed the in-hospital plan (2021/04/07) and have been included (Table 1). There are 15 males and 14 females, all of whom have completed the trial phase without complications. Group 1 earns 11 people, Group 2 earns 7 people, and Group 3 earns 11 people.

In the three groups of intraoperative blood oxygen changes (Table 2), without intubation and without muscle relaxants, the CO2 content in the body is less than that of muscle relaxants, and there is no possibility of PaCO2 ≥ 80mmHg. In the postoperative discomfort reaction (Table 3), 1 patient in group 1 and 3 had sore throat, and 1 patient in group 3 had difficulty breathing when he was interviewed in the recovery room. The side effects of postoperative nausea and vomiting (Table 4), each of the first group and the third group had nausea and vomiting. In the vital signs before, during and after the operation (Table 5), the heartbeat of the second group had an upward trend during the operation. In the surgical field of vision (Table 6), one in the first group affected the field of vision due to the appearance of congenital structures, one in the third group had an abnormal vocal cord structure that affected the field of vision, and the second group had no poor surgical field of vision. A questionnaire survey by the chief surgeon (Table 7) showed that the surgeons were satisfied with the surgical satisfaction of the three groups, but the pressure was higher when performing non-intubation and nerve block surgery.

Each group must collect 30 people, to compare the effects of intubation and non-intubation on the surgical field of vision and the changes in blood oxygen during the operation. At present, we have collected data on 29 patients. We anticipate that

needed 61 patient data. In order to achieve the accuracy and legibility of the number of statistical samples. And to explore the safety of laryngoscope microsurgery under non-intubation anesthesia.

B BACKGROUND AND PURPOSE

Importance and research status of this project at home and abroad, and indicate important documents。

Laryngoscope microsurgery (laryngomicrosurgery, LMS) is one of the most common otolaryngology procedures, mainly used to remove vocal cord polyps, nodules or cysts, laryngeal granuloma, or laryngeal papillomas, vocal cord plastic surgery, dipper-like Cartilage reduction, or fixation, etc. Traditional laryngoscope microsurgery requires general anesthesia for tracheal intubation, mainly because the endotracheal tube can provide a stable gas exchange airway. However, general anesthesia with endotracheal intubation requires the use of muscle relaxants, which may lead to the risk of postoperative pulmonary complications(1) and tracheal intubation may cause postoperative throat discomfort and pain (2,3)

Transnasal humidified rapid-insufflation ventilator exchange (THRIVE) is a physiological device that can provide heated 50-70L / min humidified oxygen. Cavity and provide a degree of continuous positive airway pressure.(4)

Since the development of the transnasal humidified rapid-insufflation ventilator exchange (THRIVE), because of the ability to provide an effective oxygen supply to patients without intubation anesthesia, many traditional intubation general anesthesia operations have to be performed without intubation (5) . The best way to use the nasal humidification rapid inflation exchange ventilation device is that the patient maintain self-breathing function and has a better gas exchange effect(6). If the patient is given a muscle relaxant or temporarily stopped breathing, it is difficult to completely avoid carbon dioxide retention and hypercapnia. (7,8)

Traditional laryngoscopy microsurgery requires endotracheal intubation anesthesia, which may lead to obstruction of the surgical field of vision and the inability to check the vocal cords completely. Transnasal humidified rapid-insufflation ventilator exchange (THRIVE) Optiflow can provide oxygenation to increase the success rate of laryngoscope microsurgery for non-intubation anesthesia patients (5), and Provide

excellent surgical vision and complete inspection of the vocal cords. Muscle relaxants are used during surgery to avoid reflexes such as coughing caused by vocal cords and throat irritation. The use of muscle relaxants during this time will cause the patient to apnea.

We assume that through 1% Lidocaine 1-1.5ml bilateral superior laryngeal nerve occlusion, intravenous injection of Lidocaine 1-1.5mg/kg and 10% Lidocaine spray for intratracheal spray(9-11) can reduce vocal cord and Irritation during laryngeal surgery and allows the operation to be performed without administrating muscle relaxants and maintain the function of self-breathing, which may avoid the apnea phase with Carbon dioxide retention and hypercapnia.

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C METHODS AND STUDY PROCEDURE

We expect to treat patients from 20 to 80 years of age who need to undergo laryngoscope microsurgery and are divided into three groups, the first group: the intubation general anesthesia group, and the second group, the third group two non-intubation Anesthesia group.

Patients in the intubation general anesthesia group will receive intravenous anesthesia using target-controlled infusion (TCI) propofol and remifentanil, and they will be given intravenous 0.2 mg glycopyrolate and 40 mg methylprednisolone and 5 mg midazolam. After losing consciousness, give cisatracurium 0.15mg/kg, and then perform endotracheal intubation (5.0-5.5, I.D. mm). After the endotracheal intubation is completed, it will be transferred to the respirator for positive pressure ventilation and maintained until the end of the operation.

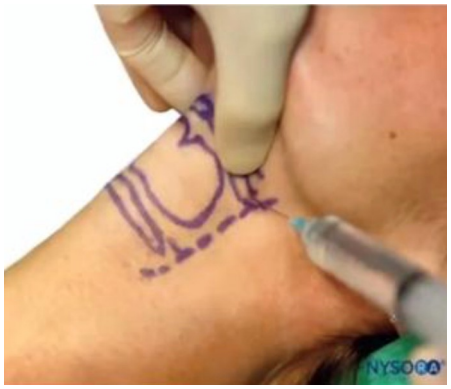
Patients undergoing non-intubation anesthesia for laryngoscope microsurgery will use transnasal humidified rapid-insufflation ventilator exchange (THRIVE) and target-controlled infusion (TCI) intravenous anesthesia with propofol and remifentanil. The laryngoscopy microsurgery operation will be divided into two groups: the group administrate muscle relaxants, and the group maintain spontaneous breathing without administrating muscle relaxants.

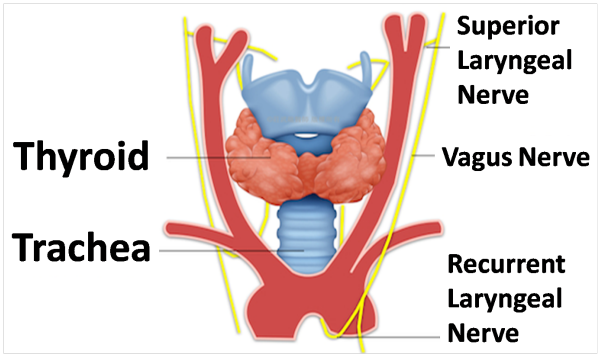
After installing the monitor, Optiflow 100% 20L/min oxygen was used to pre-oxygenation through the nasal device for five minutes, and the patient was given intravenous injection of 0.2 mg glycopyrolate and 40 mg methylprednisolone and 5 mg midazolam.

The second group: the group using muscle relaxants will first give a low dose of cisatracurium about 1.5-3mg, and after the effect of Propofol TCI loses consciousness,0.6mg/kg Rocuronium or 0.1mg/kg Cisatracurium will be administrated. When the patient stops breathing, Optiflow is adjusted to 50L/min and maintained until the end of the operation, the patient resumed spontaneous breathing. The patient's head will strengthen and ensure that the airway is stable, and the laryngeal

microscope will erect and reveal the location of the lesion to facilitate surgery. Low-dose muscle relaxant succinylcholine will be given continuously to maintain muscle relaxation until the end of the operation.

The third group: the group without the muscle relaxant will first touch the rear of the hyoid bone to the greater cornu about 0.5-1cm below the inner side of the greater hornu, that is, the internal branch of superior laryngeal n(chart I). Injection through the thyrohyoid membrane 1% Lidocaine 1-2ml for bilateral Superior laryngeal nerve block, and intravenous injection of Lidocaine 1-1.5mg/kg, Propofol TCI occurs.





(chart I)

The patient loses consciousness after setting up the laryngoscope, and 10% Lidocaine spray is used for intratracheal spray. After the effect is produced, the operation can be performed. Optiflow is adjusted to 50 L/min and maintain until the end of the operation.

After the operation, Propofol TCI and remifentanil TCI are stopped to wake up the patient, and Optiflow is adjusted to 15-20L/min. Patients who are given muscle relaxants will be given 1 mg of Atropine and 2.5 mg of neostigmine after spontaneous breathing is restored. After the patient resumes complete spontaneous breathing, Optiflow is stopped, the patient will be put on an oxygen mask, and transferred to a postanaesthesia care unit PACU for postoperative observation. After leaving the PACU, the patient will be transferred to the general ward to observe for one night.

Target-controlled infusion (TCI) injection of propofol will be set to Schneider model, Ce-targeted: 2.0-4.0 ug/ml, remifentanil 2–6 ng/ml. GE Entropy EasyFit Sensor was used to monitor intraoperative State Entropy (SE), Response Entropy (RE) and

Surgical plethysmographic index (SPI), and as a reference for adjusting TCI propofol and remifentanil.

During the operation, a pulse oximeter will be used to monitor and record the patient's oxygen saturation. The patient's gender, height, weight, BMI, age, past medical history, ASA classification, type of laryngoscopic surgery, operation time, lesion location, blood loss, and anesthesia records will be kept.

All three groups of patients will use radial artery catheters. In addition, the three groups performed arterial blood gas analysis (including: PaO2, PaCO2, pH, HCO3-) at the following times to understand the difference of pCO2 in different groups and as a secondary result.

The first period to measure those variables is before each set of surgery are follows:

The first group is before tracheal intubation.

The second group was before the administration of muscle relaxants.

The third group is before applying superior laryngeal nerve block bilateraly.

The second period to measure those variables is the end of the operation.

The third period to measure those variables is 15 minutes after entering the recovery room.

All the anesthesia time, operation start time and operation end time of the three groups will be recorded, and the relationship between them will be discussed.

After the operation, the surgeon and the patient will be asked to do a questionnaire survey in order to understand whether the non-intubation anesthesia laryngoscope microsurgery of the self-breathing causes obstruction or other difficulties for the operator, as well as the patient's postoperative recovery, surgical satisfaction and operation After scoring. Finally, the surgeon's score on the degree of surgical completion was taken as the primary outcome.

Conditions for participating in this research project:

- Subjects are between 20-80 years old.
- Patients undergoing laryngoscope microsurgery.

•Anesthesiologists rated ASA as between I and III.

If those who are included have any of the following conditions, you will not be able to participate in this research project:

•Having drug dependence and drinking habits.

•Abnormal heart, liver and kidney function.

•Allergic reactions to narcotic drugs.

•Emergency surgery.

•pregnancy.

•Refuse to participate.

This study will explore the following assumptions:

Ho1: The intraoperative field of vision of the nonintubation group is clearer than that of the intubation group.

Ho2: Non-intubation and no muscle relaxation has less carbon dioxide retention and less hypercapnia.

Ho3: There is less sore throat in the nonintubation group than in the intubation group.

Ho4: Non-intubation and no muscle relaxation may lead to less postoperative pulmonary complications.

Ho5: In the non-intubation group, no muscle relaxants are more suitable for long-term surgery than those with muscle relaxants.

Statistical analysis (the statistical analysis tool will use IBM SPSS version 20):

1、The sample characteristic data will be expressed as average, SD, and median, and the category variables will be displayed in the form of count and percentage.

2、The 95% confidence interval will show the original data and the change from the baseline.

3、The difference between the three groups was analyzed using one-way ANOVA to analyze the comparison between the intubation and non-intubation groups for drug administration, the presence or absence of complications, the severity and

the degree of completion of the operation.

4、The differences between the groups will be evaluated by chi-square test or Fisher's exact test.

5、Unless otherwise stated, all statistical tests will be two-way and evaluated at a significance level of 0.05.

Sample size calculation：

The main purpose of the study will focus on the completion of surgery and the occurrence of complications. In order to obtain the total number of participants in the study, a sample size will be calculated to detect a difference in incidence reduction of 25%. A statistical power of 80%, a 5% alpha and up to 10% possible sample loss. Therefore, each group will require 30 patients (90 in total). Considering the number of patients undergoing laryngoscope microsurgery each year, we estimate that there may be a total of 45 patients within a year. After meeting the inclusion criteria and obtaining patient consent, 45 patients will be included in the treatment plan in the first year, and the remaining sample size will be completed next year.

Primary outcome(2nd year)：

1、Less carbon dioxide retention and less hypercapnia.

2、Reduce postoperative lung complications.

Statistics from 10/20/2020 to 5/11/2021：

Table I-i.Baseline demographics

Variable	G1(n=11)		G2(n=7)		G3(n=11)		p-value
	Mean	SD	Mean	SD	Mean	SD	
Age	52.0	13.9	46.9	8.4	51.7	14.2	0.66
BMI	26.4	5.5	24.5	3.5	25.1	2.5	0.78

Table I-ii.Baseline demographics

Variable	G1(n=11)		G2(n=7)		G3(n=11)		p-value
	n	(%)	n	(%)	n	(%)	
Sex							
male	7.0	63.6	3.0	42.9	5.0	45.5	0.60
female	4.0	36.4	4.0	57.1	6.0	54.5	
ASA							
ASA I	3.0	27.3	3.0	42.9	9.0	81.8	0.04
ASA II	8.0	72.7	4.0	57.1	1.0	9.1	
ASA III	0.0	0.0	0.0	0.0	1.0	9.1	
Medical history							
HTN	3.0	27.3	0.0	0.0	4.0	36.4	0.20
CVA	1.0	9.1	0.0	0.0	0.0	0.0	0.43
CVD	1.0	9.1	0.0	0.0	3.0	27.3	0.22
DM	1.0	9.1	0.0	0.0	2.0	18.2	0.46
Endocrine	1.0	9.1	2.0	28.6	1.0	9.1	0.43
Genitourinary	0.0	0.0	1.0	14.3	0.0	0.0	0.20
HPL	1.0	9.1	1.0	14.3	0.0	0.0	0.47
Neurologic	0.0	0.0	1.0	14.3	1.0	9.1	0.47
Hepatitis B	1.0	9.1	1.0	14.3	0.0	0.0	0.47

Table I-ii. During the acceptance period, group 3 included 1 ASA3 case, and the remaining groups have not yet encountered ASA3 cases.

Table II. Arterial blood oxygen changes during surgery

Variable	G1(n=11)		G2(n=7)		G3(n=11)		p-value
	Mean	SD	Mean	SD	Mean	SD	
Before surgery							
pH_1	7.4	0.0	7.3	0.0	7.4	0.0	0.34
PaCO2_1	49.5	2.5	53.6	9.5	51.3	6.5	0.58
PaO2_1	321.2	79.6	451.9	108.6	377.5	196.6	0.14
SO2_1	99.7	0.8	99.9	0.0	99.8	0.4	0.50
HCO3-_1	28.3	1.7	28.6	3.3	28.8	1.6	0.67
In surgery							
pH_2	7.3	0.0	7.2	0.1	7.3	0.0	0.00
PaCO2_2	54.4	7.6	86.4	21.7	55.5	10.8	0.00
PaO2_2	186.9	64.0	321.8	128.2	341.9	136.9	0.02
SO2_2	99.3	1.1	99.6	0.5	99.7	0.5	0.48
HCO3-_2	27.7	1.9	31.8	4.1	29.1	2.7	0.06
After surgery							
pH_3	7.4	0.0	7.4	0.1	7.4	0.0	0.07
PaCO2_3	43.6	4.0	45.1	9.0	43.3	5.7	0.78
PaO2_3	123.3	63.1	110.8	16.1	116.3	29.6	0.77
SO2_3	98.0	1.5	98.2	1.0	98.3	1.4	0.81
HCO3-_3	25.8	1.7	26.3	2.9	27.0	2.5	0.55

TableII. During the operation, the PaCO2 value of the second group was >80mmHg.

Table III.Discomfort after surgery

Variable	G1(n=11)		G2(n=7)		G3(n=11)		p-value
	n	(%)	n	(%)	n	(%)	
Sore throat	3.0	27.3	0.0	0.0	4.0	36.4	0.20
Hoarseness	6.0	54.5	6.0	85.7	7.0	63.6	0.39
Difficulty breathing	0.0	0.0	0.0	0.0	1.0	9.1	0.43

TableIII. One case in group 3 reported dyspnea in the recovery room. In most cases of laryngoscope surgery, the voice is required to be silenced after the operation, so the case cannot make a sound.

Table IV.Side effects after surgery

Variable	G1(n=11)		G2(n=7)		G3(n=11)		p-value
	n	(%)	n	(%)	n	(%)	
nausea	0.0	0.0	0.0	0.0	1.0	9.1	0.43
Vomiting	1.0	9.1	0.0	0.0	1.0	9.1	0.71
Nausea and vomiting	0.0	0.0	0.0	0.0	1.0	9.1	0.43

Table IV. One patient in group 1 had the side effect of vomiting.

In group 3, 1 case had nausea and vomiting.

Table V.Three stages of vital signs

Variable	G1(n=11)		G2(n=7)		G3(n=11)		p-value
	Mean	SD	Mean	SD	Mean	SD	
Before surgery							
BT	36.0	0.5	36.3	0.4	36.2	0.5	0.61
SpO2	98.8	1.3	98.1	1.5	97.7	2.1	0.46
NBPs	136.5	11.2	121.7	7.5	124.0	18.5	0.04
NBPd	83.8	9.7	83.3	9.1	71.6	14.5	0.06
PR	69.8	7.5	71.4	16.0	72.3	10.2	0.46
RR	14.7	2.9	15.6	4.0	15.8	2.6	0.79
In surgery							
SpO2	98.4	1.0	98.1	1.8	97.9	2.2	0.96
NBPs	128.7	19.7	133.3	16.2	123.8	16.4	0.45
NBPd	80.2	11.4	72.9	9.2	71.4	10.2	0.15
HR	83.8	15.1	90.4	9.6	88.4	13.3	0.54
After surgery							
BT	36.2	0.5	36.0	0.1	36.0	0.4	0.26
SpO2	98.9	1.4	98.9	1.1	98.3	2.3	0.85
NBPs	138.5	26.5	117.0	13.4	124.4	6.4	0.20
NBPd	85.5	16.8	77.3	14.8	78.0	8.5	0.26
PR	83.5	6.6	81.1	12.6	89.1	13.2	0.46
RR	15.4	3.0	16.1	4.0	15.8	2.8	0.63
PAR Score	8.8	1.7	7.1	2.1	7.8	2.1	0.15

Table V. The heartbeat of group 2 tends to rise during the operation

Table VI. Operation status

Variable	G1(n=11)		G2(n=7)		G3(n=11)		p-value
	Mean	SD	Mean	SD	Mean	SD	
OP time	77.4	35.8	37.3	8.1	39.7	21.4	0.00
	n	(%)	n	(%)	n	(%)	
LMS Procedures							
Vocal polyp	1.0	9.1	1.0	14.3	3.0	27.3	0.14
Vocal cyst	4.0	36.4	2.0	28.6	0.0	0.0	
Vocal atrophy	1.0	9.1	2.0	28.6	0.0	0.0	
Vocal paralysis	0.0	0.0	0.0	0.0	0.0	0.0	
Laryngeal tumor	1.0	9.1	0.0	0.0	0.0	0.0	
Other	4.0	36.4	2.0	28.6	8.0	72.7	
Lesion site							
Ant.	3.0	27.3	0.0	0.0	0.0	0.0	0.16
Middle	4.0	36.4	3.0	42.9	5.0	45.5	
Post.	1.0	9.1	0.0	0.0	2.0	18.2	
Mixed	1.0	9.1	0.0	0.0	0.0	0.0	
Ant & Middle	2.0	18.2	1.0	14.3	0.0	0.0	
other	0.0	0.0	3.0	42.9	4.0	36.4	
Surgery completion							
Complete	11.0	100.0	7.0	100.0	11.0	100.0	N/A
Partially complete	0.0	0.0	0.0	0.0	0.0	0.0	
Incomplete	0.0	0.0	0.0	0.0	0.0	0.0	
Vision							
Good	10.0	0.9	7.0	100.0	10.0	0.9	0.71
Poor	1.0	0.1	0.0	0.0	1.0	0.1	
Poor Visualization							
none	10.0	90.9	7.0	100.0	10.0	90.9	0.51
Difficulty with vocal cord injection	0.0	0.0	0.0	0.0	1.0	9.1	
Other	1.0	9.1	0.0	0.0	0.0	0.0	
The Cormack-Lehane (CL) glottis view classification							
I	9.0	81.8	6.0	85.7	9.0	81.8	0.97
IIa	2.0	18.2	1.0	14.3	2.0	18.2	
IIb	0.0	0.0	0.0	0.0	0.0	0.0	
III	0.0	0.0	0.0	0.0	0.0	0.0	
IV	0.0	0.0	0.0	0.0	0.0	0.0	
Laryngeal compress							
Not applied	1.0	9.1	0.0	0.0	0.0	0.0	0.43
Applied	10.0	90.9	7.0	100.0	11.0	100.0	
N/A：Not suitable for any statistics.							

Table VI. Among the three groups of operation time, the operation time of the first

group was longer than that of the other two groups.

Table VII.Surgeon's Feedback

Variable	G1(n=11)		G2(n=7)		G3(n=11)		p-value
	n	(%)	n	(%)	n	(%)	
Satisfaction							
Satisfied	11.0	100.0	7.0	100.0	10.0	90.9	0.43
Partially satisfied	0.0	0.0	0.0	0.0	1.0	9.1	
Unsatisfied	0.0	0.0	0.0	0.0	0.0	0.0	
	Mean	SD	Mean	SD	Mean	SD	
Stress index	1.0	0.0	1.9	1.2	2.0	0.8	0.01

Table VII. The surgeon was satisfied with the surgical satisfaction of the three groups, but the stress intensity was higher when performing non-intubation and nerve block surgery.

Table VIII. Dunnett T3 Post-hoc tests of during the operation

variable			M.D (I-J)	SE	p-value
pH_2	G1	G2	.135961*	.024404	.001
		G3	-.013455	.017469	.825
	G2	G1	-.135961*	.024404	.001
		G3	-.149416*	.024411	.000
	G3	G1	.013455	.017469	.825
		G2	.149416*	.024411	.000
PaCO2_2	G1	G2	-32.0468*	8.5162	.020
		G3	-1.1636	3.9766	.987
	G2	G1	32.0468*	8.5162	.020
		G3	30.8831*	8.8281	.023
	G3	G1	1.1636	3.9766	.987
		G2	-30.8831*	8.8281	.023
PaO2_2	G1	G2	-134.9130	52.1401	.087
		G3	-155.0273*	45.5545	.012
	G2	G1	134.9130	52.1401	.087
		G3	-20.1143	63.6399	.984
	G3	G1	155.0273*	45.5545	.012
		G2	20.1143	63.6399	.984
*. The M.D is significant at the 0.05 level.					

Table VIII. Found the following situation：

1. In the non-intubated and muscle relaxant group (G2), the pH value during the operation was lower than the non-intubated and nerve-blocking group (G3), and lower than the normal value (7.35-7.45) .
2. During the operation, the PaCO2 of the non-intubated and muscle relaxant group (G2) was significantly higher than intubated group and also higher than the non-intubated and nerve-blocking group.
3. 3. The PaO2 value of the intubation group (G1) during the operation was lower than that of the non-intubation group.

KSVGH20-C9-09 CASE REPORT

No:	Consent Signed(MM/DD/YYYY):	Operation Date:
Patient status：_____		
Reason for quiting：		

Gender:	Age:	Weight(kg):	Height (cm):	BMI:	ASA:
BASELINE MEDICAL/SURGICAL HISTORY：					
Time to enter the room：	Before inductiob BT:____ SpO_2:____ BP:___/___ PR:___ RR:___				

Study Group		Operation time	
Induction time		Anesthesia time	

Endo size & pressure		Propofol dose		Rocuronium dose	
		Fentanyl dose		Cisatracurium dose	

GAS	Before(:) G1: intubation； G2: cis and scc ； G3: SLNB	OP end(:)	POR(:)
pH			
$PaCO_2$			
PaO_2			
SO_2%			
$HCO3^-$			

PACU

Time to post anesthesia recovery room :

BT:____ SpO_2:____BP:____/____ PR: ____RR:____

Time	oxygen	respiration	circulation	consciousness	activity

i:oxygen saturation
2: able to maintain oxygen saturation >92% on room air;
1: needed oxygen inhalation to maintain oxygen saturation >90%;
0: oxygen saturation <90% even with oxygen supplement
ii:respiration
2: able to breathe deeply and cough freely;
1: dyspnea or limited breathing;
0: apneic
iii:circulation
2: blood pressure ±20% of preanesthetic level;
1: blood pressure from ±20% to 49% of preanesthetic level;
0: blood pressure ±50% of preanesthetic level
iv:consciousness
2: fully awake;
1: arousable on calling;
0: not responding
v:activity
2: able to move 4 extremities voluntarily or on command;
1: able to move 2 extremities voluntarily or on command;
0: unable to move extremities voluntarily or on command

KSVGH20-C9-09 QUESTIONNAIRE (No._____)

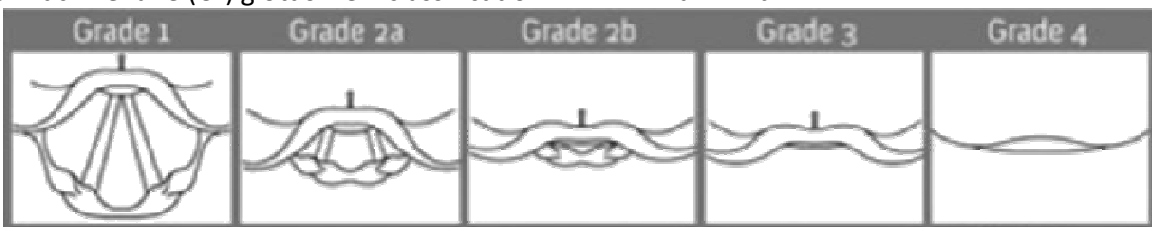
Surgical records

	Ant.	Middle	Post.	Mixed
Lesion site				

	Vocal polyp	Vocal cyst	Vocal atrophy	Vocal paralysis	Laryngeal tumor Bx
LMS Procedures					

Surgery completion	□ Complete	□ Partially complete	□ Incomplete
Satisfaction	□ Satisfied	□ Partially satisfied	□ Unsatisfied
Vision	□ Good	□ Poor	
Poor Visualization	□ Inability to suppress gag reflex □ Inability to achieve anesthesia □ Had to change approach □ Others:	□ Copious secretions □ Difficulty with vocal cord injection	

The Cormack-Lehane (CL) glottis view classification □I □IIa □IIb □III □IV



Laryngeal compress： □Not applied □Applied

Stress index □1 □2 □3 □4 □5

Other：

Postoperative evaluation

I. Evaluation (Score：none=1,minor=2,moderate=3,severe=4)，**time**：

1. Sore throat：_____
2. Hoarseness：_____
3. Swallowing difficulty：_____
4. Breathing difficulty：_____

II. **Ward recording (24hr postoperative event)**：

Score	**Nausea( )**	**Vomiting( )**	**Nausea/vomiting( )**
0	none	none	none
1	minor	minor	minor
2	moderate	moderate	moderate
3	severe	severe	severe

D EXPECTED WORK ITEMS AND SPECIFIC RESULTS

Projects expected to be completed in the second year

1. Improve the success rate of laryngoscopic microsurgery for patients with non-intubated anesthesia.
2. Provide excellent surgical field of vision and complete examination of vocal cords.
3. Bilateral superior laryngeal nerve block surgery replaces muscle relaxants to keep patients breathing spontaneously and avoid carbon dioxide retention and hypercapnia.

Contribution to clinical or academic

Non-intubation anesthesia laryngoscope microsurgery without muscle relaxants can be used for more patients who need laryngoscope microsurgery but have higher cardiovascular and cerebrovascular risks. Surgeons can use more operation time to reduce stress and complete the operation without interruption.