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Clinical application of superior laryngeal nerve block combined with thyrocricocentesis tracheal surface anesthesia in emergency tracheal cannulation for cerebral trauma.

Dongnan Yu[12], Yi Zhu[2], Zhifang Yang[3], Jue Ma[2], Chunshui Lin[1*]

[1]Department of Anesthesiology, Nanfang Hospital, Southern Medical University, Guangzhou, Guangdong, PR China

[2]Department of Anesthesiology, Guangdong General Hospital, Guangzhou, Guangdong, PR China

[3]Department of Anesthesiaology, Zhongshan People's Hospital, Zhongshan, Guangdong, PR China

Abstract

Objective: To discuss the clinical application of superior laryngeal nerve block combined with thyrocricocentesis Tracheal Surface Anesthesia (TSA) in emergency tracheal cannulation for cerebral trauma.
Methods: A total of 62 patients who were treated with emergency tracheal cannulation for cerebral trauma in our hospital from Dec 2014-2016 were selected randomly as research subjects. They were divided into the control and test groups according to the method of achieving anesthesia. Variations in associated indexes after anesthesia were compared to evaluate the anesthetic effect.
Results: The test and control groups show no significant differences in Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP) and Heart Rate (HR) at different periods (P>0.05). In the test group, the SBP, DBP, and MAP significantly decrease, whereas the HR significantly increases 10 min after the anesthesia (P<0.05). In the control group, the SBP, DBP, and MAP decrease, whereas the HR increases. However, the difference is not statistically significant (P>0.05). The test group consumes significantly shorter time for tracheal cannulation after anesthesia and receives better oxyhemoglobin saturation compared with the control group (P<0.05).
Conclusions: Superior laryngeal nerve block combined with thyrocricocentesis TSA provides ideal and safe anesthesia to patients needing emergency tracheal cannulation for cerebral trauma.

Keywords: Superior laryngeal nerve block, Thyrocricocentesis, Cerebral trauma, Tracheal cannula.

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Introduction

Occurrences of traffic accidents causing cerebral trauma have increased with the development of communication and transportation [1]. Damages to brain tissues intensify hypoxemia caused by altered respiratory function. Therefore, patients with cerebral trauma should undergo tracheal cannulation as soon as possible to improve hypoxemia [2].

Aside from its unsatisfactory anesthetic effect, traditional anesthesia causes violent fluctuations in Heart Rate (HR) and blood pressure [3]. This paper discusses the clinical application of superior laryngeal nerve block combined with thyrocricocentesis Tracheal Surface Anesthesia (TSA) in emergency tracheal cannulation for cerebral trauma [4].

Data and Methods

Clinical data

A total of 62 patients (34 males and 28 females) who have been treated with emergency tracheal cannulation for cerebral trauma in our hospital from Dec 2014-2016 were selected randomly as research subjects. They were aged between 19 and 56 y (42.22 ± 6.25). These respondents were divided into the control and test groups according to the method of achieving anesthesia. The two groups have no significant difference in general data (P>0.05). Patients with other metal and nerve diseases were excluded from this study.

Experimental methods

All admitted patients were subjected to routine monitoring of vital signs, including respirations, pulse rate, and blood pressure. Foreign matter in the mouth was removed to ensure smoothness of the respiratory tract.

Control group: Patients were treated by spraying 2% lidocaine to the throat before tracheal cannulation.

Test group: Patients were first treated with superior laryngeal nerve block by locating the hyoid bone and then pushing it to the block side. Subsequently, 3 ml of 2% lidocaine was injected at the thyrohyoid and thyroid cartilage superior angle. Thyrocricocentesis was then performed and 3 ml of 2% lidocaine was injected vertically at the median of the cricothyroid membrane. Finally, tracheal cannulation was performed after achieving anesthesia.

Test indicators

The Systolic Blood Pressure (SBP), blood loss volume during the operation, HR, Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP), success of anesthesia, and adverse effects of the two groups were recorded and compared before the anesthesia (t1), 10 min after the anesthesia (t2), during the operation (t3), and at the end of the operation (t4). Tracheal cannulation conditions of the two groups were also compared.

Statistical analysis

Statistical data were compared, and the difference was tested using Chi-square and T-test. Statistically significant difference was considered at P<0.05.

Experimental Results

Comparison of changes in circulatory function

The test and control groups show no significant differences in the SBP, DBP, MAP, and HR at different periods (P>0.05). In the test group, the SBP, DBP, and MAP significantly decrease, whereas the HR significantly increases at t2 (P<0.05). In the control group, the SBP, DBP, and MAP decrease, whereas the HR increases at t2. However, the difference is not statistically significant (P>0.05) (Table 1).

Comparison of tracheal cannulation

As shown in Table 2, the test group consumes significantly shorter time for tracheal cannulation after anesthesia and receives better oxyhemoglobin saturation compared with the control group (P<0.05).

Table 1. *Comparison of changes in circulatory function between the two groups ($\bar{x} \pm s$).*

Indicator	Group	t1	t2	t3	t4
SBP (mmHg)	Test group	143.41 ± 8.31	141.31 ± 8.31	144.12 ± 9.35	144.2 ± 7.13
	Control group	143.74 ± 6.58	143.01 ± 10.44	145.14 ± 7.35	146.64 ± 8.35
DBP (mmHg)	Test group	79.99 ± 8.48	76.34 ± 7.88	80.49 ± 7.34	79.09 ± 7.48
	Control group	80.49 ± 6.42	79.34 ± 5.21	83.19 ± 4.34	80.59 ± 5.36
MAP (mmHg)	Test group	101.14 ± 6.37	98.81 ± 6.14	98.65 ± 5.36	100.33 ± 6.64
	Control group	102.39 ± 4.88	101.06 ± 5.37	102.04 ± 5.63	101.99 ± 4.78
HR (beats/min)	Test group	69.21 ± 4.25	66.41 ± 5.24	72.11 ± 5.13	70.13 ± 4.15
	Control group	70.19 ± 7.28	69.13 ± 5.34	71.42 ± 6.04	71.33 ± 5.23

Note: Compared with t1, P<0.05.

Table 2. *Comparison of tracheal cannulation between the two groups ($\bar{x} \pm s$).*

Group	Case	Intubation time (min)	Oxyhemoglobin saturation	
			Before	After
Control group	31	8.7 ± 2.4	68.6 ± 21.8	89.6 ± 8.8
Test group	31	5.3 ± 1.6*	70.3 ± 22.3	95.3 ± 6.6*

Note: Compared with the control group, *P<0.05.

Discussion

The consciousness of patients with cerebral trauma is often affected. Cerebral trauma damages the autonomous respiration of patients, thus causing hypoxia [5]. In addition, brain tissues, especially the pallium, are highly sensitive and weakly resistant to hypoxia. Any delayed improvement in hypoxia might cause disturbances to the metabolism and microcirculation of brain cells, ultimately resulting in encephaloedema [6]. Encephaloedema further negatively influences the respiratory function, thereby forming a vicious cycle. Timely tracheal cannulation can improve the respiratory state and hypoxemia of patients quickly and effectively [7]. However, traditional anesthesia is disadvantageous because it provides incomplete anesthesia and strong stimulus to patients.

Oral tracheal cannulation is often applied for emergency treatment of respiratory and cardiac arrest. However, because of dysphoria and poor tolerance, most patients demand for extubation when they recover their consciousness [8]. These patients could be given appropriate sedation or another mode of intubation to ensure timely extubation. Nasal tracheal cannulation is effective, convenient, and easy to perform. It is applicable to sober patients and does not influence oral care and eating, thus preventing malnutrition and electrolyte disturbance in long-term use. It is identified as a non-invasive method [9]. However, it can cause large airway dead space and sputum bolt obstruction. By contrast, tracheotomy causes small dead space, has few complications, and allows for easy sputum discharge, eating, and oral care, thereby increasing patient's tolerance to the procedure. It is the ideal way to cannulate the trachea and is applicable to patients who require long-term mechanical ventilation, are comatose, and have difficulty expectorating sputum [10]. In this experiment, 62 patients who needed emergency tracheal cannulation for cerebral trauma were selected, and two different methods for achieving anesthesia were used. The blood pressure and HR changes of patients before and after tracheal cannulation were compared. Results show that the HR of the two groups increases after tracheal cannulation. The HR of the control group increases more significantly than that of the test group ($P<0.05$). Blood pressure fluctuates to some extent after tracheal cannulation. However, it is more stable in the test group compared with the control group ($P<0.05$). The test group consumes a significantly shorter time for tracheal cannulation after anesthesia and receives better oxyhemoglobin saturation compared with the control group ($P<0.05$).

Conclusion

Superior laryngeal nerve block combined with thyrocricocentesis TSA is an ideal way to provide anesthesia in emergency tracheal cannulation for cerebral trauma. It can reduce HR and blood pressure fluctuations caused by tracheal cannulation, improve oxyhemoglobin saturation, and offer safe and effective anesthetic effect.

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*Correspondence to

Chunshui Lin

Department of Anesthesiology

Nanfang Hospital

Southern Medical University

Guangdong

PR China