

Discussion on the Effect of Emergency Tracheal Intubation on Cardiopulmonary Resuscitation by Emergency Medical Staff

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Abstract: Objective: To study the positive effect of emergency tracheal intubation on cardiopulmonary resuscitation. Methods: 90 patients with cardiopulmonary arrest were randomly selected from the emergency department of our hospital from November 2017 to November 2019, and were randomly divided into the control group and the experimental group (n=45). The control group was given routine anesthesia combined with cardiopulmonary resuscitation, while the experimental group was given emergency tracheal intubation combined with cardiopulmonary resuscitation. The effect of cardiopulmonary resuscitation and operation time of the two groups were observed and discussed, and the results were recorded. Results: Under different intervention measures, the time from visiting a doctor to tracheal intubation in the experimental group was obviously shorter than that in the control group ($P < 0.05$). There is no significant difference in the time of intubation between the two groups ($P > 0.05$). In addition, the success probability of cardiopulmonary resuscitation and the discharge survival rate in the experimental group were higher than those in the control group ($P < 0.05$). The above-mentioned results with $p < 0.05$ indicated the statistically significant differences. Conclusion: In clinical practice, emergency tracheal intubation for patients with cardiopulmonary arrest by emergency medical staff can bring a higher success probability of cardiopulmonary resuscitation, buy valuable time for rescue operation, and obviously improve the prognosis of patients. Therefore, it is worthy of wider promotion and application.

Keywords: Emergency Tracheal Intubation; Emergency Department; Cardiopulmonary Resuscitation

Cardiopulmonary arrest is a common acute and critical illness in the emergency departments, which may cause damage to various important organs of patients and even induce death in severe cases. Such kinds of patients must be treated immediately^[1]. In the process of first aid, cardiopulmonary resuscitation (CPR) is a common intervention measure. However, in practice, the success probability of this measure will be affected by many objective factors. Whether tracheal intubation can be completed in time and smoothly is very important for the effect of cardiopulmonary resuscitation^[2]. With the help

of effective tracheal intubation, a safer breathing channel can be constructed to ensure patients to breathe smoothly. However, currently, in most primary hospitals it's the anesthesiologist who carries out tracheal intubation during cardiopulmonary resuscitation. As it usually takes an anesthesiologist 7 to 15 minutes to arrive at the emergency room, it can easily lead to delayed rescue^[3]. During cardiopulmonary resuscitation, if the medical staff in emergency department can give emergency tracheal intubation, better clinical results will be obtained.

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This article studies the effect of emergency tracheal intubation on cardiopulmonary resuscitation by emergency medical staff as follows.

1. Materials and methods

1.1 General materials

90 patients with cardiopulmonary arrest were randomly selected from the emergency department of our hospital from November 2017 to November 2019. The selection criteria are as follows: patients meeting the diagnostic criteria of clinical cardiopulmonary arrest; patients with no autonomous breathing, significant disturbance of consciousness, or no obvious pulsation of the aorta; patients with $SpO_2 < 80\%$, $PaCO_2 > 50$ mmHg and $pH < 7.13$; there is no significant change in oxygen inhalation through mask (or nasal catheter), and respiratory rate (RR) is less than 10 times or more than 30 times per minute, and the value of blood pressure is below 80/55 mmHg^[4]. Meanwhile, the exclusion criteria are as follows: patients with obvious airway stenosis or deformity; family members are unwilling to participate in research, etc.

By casting lots, the patients were randomly divided into two groups ($n=45$). The control group included 24 male patients and 21 female patients, all aged from 25 to 75 years old, with an average of 47.23 years old. The experimental group consisted of 23 male patients and 22 female patients, all aged from 24 to 76 years old, with an average of 48.08 years old. There is no obvious difference in general data between the two groups, thus the study can be carried out.

1.2 Methods

The control group was given routine anesthesia combined with cardiopulmonary resuscitation. The anesthesiologist arrived immediately after the patient was admitted to hospital and carried out intubation.

The experimental group was given emergency tracheal intubation combined with cardiopulmonary resuscitation. The specific operation is as follows. During tracheal intubation, keep the patient in supine position, extend the head slightly backward, keep high oxygen flow, and clean the secretions and foreign bodies in the respiratory tract. Take out the false teeth if the patient wears them. During the operation of tracheal

intubation, use a laryngoscope to slowly enter the mouth from the right corner, gently push the patient's tongue to the left to expose the uvula, and then slightly lift the epiglottis upward to expose the patient's glottis. After alignment, accurately and quickly insert the tracheal tube and withdraw the laryngoscope, and fix the catheter at the same time. During intubating, give effective cardiopulmonary resuscitation, keep a pressing frequency of 1000 times per minute, and always keep a pressing depth of more than 50 mm. Stop for 50 seconds to confirm whether the tracheal insertion is successful. If there are defibrillation indications, defibrillation shock should be given, with properly opening the venous access, and injecting adrenaline.

1.3 Clinical indicators

Observe and discuss the effect of cardiopulmonary resuscitation and the operation time of the two groups of patients, and make statistics on the results. The indicators are as follows:

Firstly, the index of the rescue efficiency is the length of time between the start of treatment and intubation and the time of intubation operation. Secondly, the curative effect of cardiopulmonary resuscitation includes the success probability of tracheal intubation and cardiopulmonary resuscitation, and the discharge survival rate of patients (the standard of successful tracheal intubation is that after intubation enters glottis and controls the breathing of patients, the heave of both sides of the chest are basically symmetrical; the respiratory sounds of the lungs are uniform and symmetrical; the number of continuous CO₂ waveforms is more than four. The standard of successful cardiopulmonary resuscitation includes that: the patient's complexion and lip color return to normal with obvious improvement from cyanosis; the pupils of the patient is almost reduced to normal condition, and there is autonomous activity of the eyeballs, which can normally respond to light again; the heartbeat is normal and there is atrial or sinus rhythm at the atrioventricular junction under the observation of ECG; the patient's blood pressure is above 90/60 mmHG, with $SpO_2 > 90\%$).

1.4 Statistical methods

According to the data types of this study, the statistical software SPSS20.0 is selected to process the

data. The data related to probability are expressed in the form of (number of cases, percentage), and chi-square test is carried out. The data involving variables are expressed in the form of ($\bar{x} \pm s$), and *t* test is carried out^[5]. In this article, it can be considered that there are statistical differences when $p < 0.05$.

2. Results

2.1 Analysis of rescue efficiency of two groups of patients

The time from treatment to tracheal intubation in experimental group was significantly shorter than that in

control group ($P < 0.05$). There was no significant difference in the time of intubation between the two groups ($P > 0.05$). The specific data is in **Table 1**.

2.2 Analysis of the efficacy of cardiopulmonary resuscitation in two groups of patients

The success probability of cardiopulmonary resuscitation and the discharge survival rate in the experimental group were higher than those in the control group ($P < 0.05$). The above results with $p < 0.05$ all indicate the statistically significant differences. The specific data is in **Table 2**.

Group	Intubation time (minutes)	Operation time (minutes)
Control group	3.15±0.84	1.89±0.28
Experimental group	1.69±0.51	2.02±0.36
T value	9.966	1.912
P value	0.000	0.059

Table 1. Analysis of rescue efficiency of two groups of patients ($\bar{x} \pm s$)

Group	Successful probability of intubation	Success probability of cardiopulmonary resuscitation	Discharge survival rate
Control group	42 (93.33%)	13 (28.89%)	8 (17.78%)
Experimental group	43 (95.56%)	24 (53.33%)	17 (37.78%)
T value	0.212	5.553	4.486
P value	0.645	0.018	0.034

Table 2. Analysis of the efficacy of cardiopulmonary resuscitation in two groups (n,%)

3. Discussion

Under the influence of different interventions, the time from treatment to tracheal intubation in the experimental group was significantly shorter than that in the control group, while there was no significant difference in the time of intubation between the two groups. In addition, the success probability of cardiopulmonary resuscitation and the discharge survival rate in the experimental group were higher than those in the control group. This research result shows that emergency tracheal intubation for patients with cardiopulmonary arrest performed by emergency medical staff can obtain a higher probability of successful cardiopulmonary resuscitation. The research results have also been proved in Wu Jiyou's works^[6], which shows its correctness.

There has been an obvious increase in clinical cases of cardiopulmonary arrest in recent years. The causes of this disease are complicated, such as electric shock, drowning, severe cardiovascular and cerebrovascular diseases and severe trauma. Following the sudden stop of the heart beating, the internal effective blood drainage of the patient stops at the same time, resulting in the symptoms of hypoxemia in all tissues and organs of human body. After cardiopulmonary arrest occurs, the patient's condition often rapidly goes worse. If effective intervention is not given in time, especially effective cardiopulmonary resuscitation, there will be irreversible damage to the important organs of the patient^[7]. Relevant studies have proved that over 5 minutes of hypoxemia in brain tissue can lead to serious damage. Therefore, it can be concluded that relieving hypoxemia as soon as

possible will play a very positive role in improving the prognosis of patients.

At present, the most effective intervention for cardiopulmonary arrest is cardiopulmonary resuscitation. Active tracheal intubation is the guarantee of the effective implementation of cardiopulmonary resuscitation. Tracheal intubation can clean the patient's airway well, and build a smoother artificial airway, so as to win the rescue time and appropriately improve the success rate of cardiopulmonary resuscitation. In cardiopulmonary resuscitation, it is easy to carry out effective cardiac compression and electric shock operation, but the most critical operation is to construct artificial airway by tracheal intubation, which requires mature intubation technology of medical staff. In the past clinical experience, most of the operations were done by anesthesiologists, most of whom have rich clinical experience and mature operation technology. They can ensure the success rate of intubation. However, as far as the actual situation is concerned, it takes an anesthesiologist some time to arrive at the emergency department, which wastes the rescue time and increases the risk that the patient's rescue may lag behind. Therefore, it is very necessary for the medical staff in the emergency department to carry out emergency tracheal intubation. It can gain precious time for the operation of opening airway and mechanical ventilation in the first aid of cardiopulmonary resuscitation. In addition, it can relieve the symptoms of hypoxemia and acidosis of patients as soon as possible^[8]. During the operation of tracheal intubation, the medical staff must pay attention to the following conditions: whether the patient wears false teeth, whether there is tonsil enlargement and loose teeth. These conditions may lead to the failure of tracheal intubation. In practice, it is necessary to ensure that the glottis are fully exposed, which is conducive to the rapid completion of intubation. Blind intubation must be avoided to prevent unnecessary injury to the patient.

4. Conclusion

To sum up, for the clinical first aid of patients with cardiopulmonary arrest, a higher success probability of

cardiopulmonary resuscitation can be obtained through emergency tracheal intubation by emergency medical staff. It can gain precious time for rescue operation, significantly improve the prognosis of patients, enable patients to return to their normal life as soon as possible, and strengthen their quality of life at the same time. Emergency tracheal intubation by emergency medical staff is worthy of more extensive promotion and in-depth research in clinical practice.

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