

Overview Of Tracheostomy Applications In Intensive Care Patients

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Abstract

In the process that the coronavirus disease has reached nirvana, an increasing number of patients need invasive mechanical ventilation and the need for tracheostomy to be opened due to prolonged mechanical ventilation. Although the exact time for tracheostomy is not specified in this group of patients, it is recommended to be opened after 14 days. It is not known whether percutaneous or surgical tracheostomy is superior to each other or whether they differ in terms of transmission risk. However, it is necessary to pay attention to some steps that will reduce the contamination during both processes. This study was conducted to indicate the points to be considered in tracheostomy applications in COVID-19 patients.

Method:-

The method of our study will be realized by reviewing the literature and collecting the critiques of the application.

Conclusion:-

In conclusion, during the COVID-19 pandemic, an increasing number of patients require tracheostomy due to invasive mechanical ventilation and prolonged mechanical ventilation. Although there is no clear timing of tracheostomy, it is recommended to be opened after 14 days.

I. INTRODUCTION

A new type of severe acute respiratory syndrome-coronavirus-2 [severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2)], which emerged in Wuhan city of Hubei province of China in December 2019 and spread to the whole world in a short time and turned into an epidemic. The number of infected people worldwide has reached 4,338,659 and the number of patients who lost their lives has reached 297,119 people (1,2). The number of people infected with this virus, which was detected for the first time in Turkey on March 11, 2020, increased to 146,457 and the number of patients who died to 4055 (3).

The picture of coronavirus disease-2019 [coronavirus disease-2019 (COVID-19)] caused by SARS-CoV-2 starts as an upper respiratory tract infection, and 80% of infected patients survive the picture asymptotically or with mild symptoms.

In 20% of the patients, the event progresses to viral pneumonia or even acute respiratory failure and hospitalization is required. It is known that the rate of patients requiring intensive care hospitalization is 5-6% of all cases. Patients are admitted to intensive care units with progressive acute respiratory distress syndrome (ARDS), hemodynamic instability and multiple organ failure.

In the majority of patients (70-80%) admitted to the intensive care unit, the need for invasive mechanical ventilation develops. It is known that 50-55% of patients requiring invasive mechanical ventilation support die in the first 7 days of intensive care hospitalization. It has been reported that 10% of the remaining patients require mechanical ventilation support for more than 14 days (4-7). Tracheostomy applications, which is our topic today, are also in question in patients who need this prolonged mechanical ventilation support.

Tracheostomy, which has a history of 3,000 years according to sources, has become a surgical procedure that can be applied not only for upper respiratory tract obstructions, but also for all respiratory failure patients who require prolonged invasive mechanical ventilation support. In patients who require tracheostomy, intubated and invasive mechanical ventilation, the timing varies between 3-21 days, but generally after 10-14 days, reducing dead space, clearing secretions, and upper respiratory tract complications (laryngeal and tracheal granulation tissue and/or stenosis) caused by the intubation tube. recommended to prevent its development. Tracheostomy provides a number of advantages and comfort to both the caregiver and the patient. With the increasing number of patients

in intensive care units, the aging population and the increasing prominence of organ-sparing surgeries in head and neck cancer surgery, intensive care patients constitute the patient group in which tracheostomy is most frequently performed in practice (8-12). Although sources show that tracheostomy is opened more and more by specialists in surgery other than otolaryngology (ENT), and especially internal medicine, using patented sets of certain disposable instruments, it is still opened by surgical dissection by a substantial proportion of the ENT team (13).

In this review article, the timing and method of tracheostomy applications in intensive care patients with COVID-19 and what should be done to prevent transmission during the procedure are discussed.

2. OVERVIEW OF TRACHEOSTOMY

2.1. Tracheostomy Timing

Tracheostomy is an application that is usually performed in intensive care units due to the need for a prolonged airway. Although it is opened most frequently due to respiratory failure, it may also be needed in cases such as consciousness disorders, loss of airway protective reflexes and trauma (14). While it makes the airway safer in some patients, it has advantages such as decreasing the need for sedation, oral feeding and increasing patient comfort in some patients (15). However, there are widely differing opinions regarding the timing and alleged benefits of tracheostomy in intensive care units. As there are those who accept the first 48 hours, the first five days, even 1-4 days for the definition of early tracheostomy; For the definition of late tracheostomy, we give the 10th day as the limit, and 13-16. There are also those who accept days, two weeks or the 21st day (16). Different approaches to these early-late tracheostomy timings can also cause problems among intensive care physicians. In many studies, the benefits of tracheostomy timing according to whether it is early or late have been evaluated, but no definite conclusions have been reached.

In general, early tracheostomy (within the first 7-10 days of invasive mechanical ventilation support) is recommended for ICU patients who have undergone translaryngeal intubation and are on invasive mechanical ventilation support. In the literature, it has been reported that early tracheostomy reduces the damage caused by prolonged intubation in the upper airway, helps the patient to speak and eat, facilitates nursing care, provides a

safer airway for the patient's mobilization, helps the patient to wean from mechanical ventilation earlier, reduces the rate of infection, and shortens the length of intensive care stay. and there are studies showing that it reduces mortality (17,18). However, when it comes to COVID-19 patients, it is important to clarify 2 issues before early tracheostomy is opened. The first is the expected survival rate due to the high mortality rate (50-55%) observed in these patients, and the second is the risk of infecting healthcare workers with this procedure.

2.2 Tracheostomy Method

With the development and widespread use of percutaneous tracheostomy techniques in the 1980s, these techniques have become the most frequently preferred tracheostomy applications in intensive care units today. Dilatational tracheostomy techniques are frequently used in percutaneous tracheostomy; It is named as multiple row dilatation, single dilatation, forceps dilatation, balloon dilatation or controlled rotational dilatation. Various commercial kits available for each method (Ciaglia Blue Rhino kit-Cook Critical Care, Bloomington, IN, USA; PercuTwist-Rüsch™, Kern, Germany; Griggs Portex®-Smiths Medical, Minneapolis, MN, USA, etc.) exists. Although these techniques have advantages and disadvantages over each other in terms of complications, procedure time, safety and cost, it is still not clear which method is the best method in routine use.^{22,23}

When it comes to COVID-19 patients, some of the guidelines suggest that the procedure should be performed surgically based on the experience gained during SARS, while others suggest that it can be opened with the percutaneous technique, but single dilatation methods should be preferred to reduce the entry and exit of the trachea and thus the formation of aerosols. However, the patient is obese (BMI >30 kg/m²); If there is a short and thick neck, a history of previous neck surgery and a large goiter, it is recommended to perform the procedure with open surgery. Another problem in percutaneous tracheostomy is that the procedure is usually performed with bronchoscopy. Bronchoscopy is known to increase aerosol formation. However, in this process, it has been reported that the risk of transmission can be reduced by different methods such as using a closed aspiration system during bronchoscopy, using disposable bronchoscopes, advancing the bronchoscope from the side of the endotracheal tube rather than through the endotracheal tube, or guiding the tracheostomy

procedure by ultrasonography instead of bronchoscopy. 24

It is the creation of an opening in the trachea surgically or for other reasons (such as trauma), while tracheotomy is the name of the operation in which an opening is surgically created in the trachea. In practice, both are used synonymously. Tracheostomy is opened in two ways. These are surgical and percutaneous type (19).

2.2.1. Indications of tracheostomy

Upper airway obstruction (vocal cord paralysis; secondary to trauma 'bleeding, edema, unstable jaw fractures, direct trauma to the larynx, cervical vertebra injuries'; burns 'such as smoke, gases, corrosive substances'; foreign bodies; congenital malformations; infections 'croup, epiglottitis, Ludwig's angina, deep neck infections'; tumors; secondary to surgeries; obstructive sleep apnea), conditions in which tracheal secretions cannot be cleared (mental state disorders, neuromuscular diseases), prolonged or chronic ventilator requirement, difficult intubation (19).

In addition, the indications for tracheostomy defined by the American academy of otolaryngology and head and neck surgery are shown in table-1 (20).

2.2.2 Contraindications for tracheostomy

There are no contraindications in emergency situations. However, in elective surgical tracheostomy (CT), the patient's medical condition should be stable and there should be no bleeding or coagulation disorders (1). In percutaneous tracheostomy (PT), emergency conditions, pediatric patients, positive end-expiratory pressure (PEEP) > 8 cmH₂O, high oxygen demand (FiO₂ > 50%), high airway pressures (> 45 cmH₂O), conditions that complicate the procedure (short neck, neck mass, infection, unstable cervical vertebra, limitation in neck extension, previous surgeries, trauma, burns, malignancies, laryngeal and subcricoid stenosis, enlarged thyroid, morbidly obese patients) and coagulopathy are contraindications(21-22).

2.3 Tracheostomy Procedure

When talking about the tracheostomy procedure in COVID-19 patients, it is useful to mention separately what to do before, during and after the procedure, and what to consider (23).

2.3.1 During the procedure

During the procedure, the patient should be given deep anesthesia and muscle relaxants. Make sure that the patient does not strain or cough. During surgical tracheostomy, the endotracheal tube should be lowered to the level of the area where the tracheostomy will be opened, and the ventilator should be turned off during the incision into the trachea. After the incision, the intubation tube is pulled up to the level of the arytenoid cartilage. The tracheostomy cannula connected to the mechanical ventilation circuit is inserted into the trachea, the cuff is inflated, fixed, and then the mechanical ventilator is started to ventilate the patient. It is recommended not to use cautery or ultrasonographic dissection device during the tracheostomy procedure, as they increase aerosol formation. The patient's intubation tube is carefully removed and disposed of properly. During the procedure, it is recommended to cover the patient's face with a transparent nylon cover and to throw it away by wrapping it while removing the endotracheal tube. The procedure is terminated after the patient's hemodynamics and ventilation parameters are checked. At this stage, it is recommended not to listen to the ventilation of the lungs with a stethoscope, but to monitor it with "end tidal" carbon dioxide monitoring, preferably with a capnogram. The location of the tracheostomy can be confirmed by direct radiography. The team whose work is finished must take off their protective equipment in accordance with the rules.

2.3.2 After the procedure

The care of the patient with tracheostomy should be done by an experienced nurse team. Closed aspiration system should be used for aspiration of secretions. The cuff pressure of the tube should be checked every eight hours. While positioning the patient, it must be fixed by a staff member so that the tracheostomy cannula does not come out and there is no air leakage around it. The dressing around the tracheostomy should not be changed unless it becomes dirty or wet. The first cannula change should be made after an average of 7-10 days (in some publications it is called 14 days), all protective equipment should be worn during this process and mechanical ventilation should be stopped for a short time. The next change should be made at the earliest 1 month later. If it is desired to perform spontaneous breathing trials by deflating the cuff, it is recommended that this should be done after the patient's PCR test for the virus is negative and the effective treatment of the complications caused by the virus is finished.

Broderick et al. They recommended the “5T” rule for safe surgical tracheostomy in COVID-19 patients (24):

1.T (Theatre set-up); preparation of the operating room, gathering of the team and entering inside by wearing appropriate protective equipment.

2.T (Team briefing); meeting of the team, who is inside until the patient comes to the operating room, explanation of the procedures to be done, distribution of tasks, material control etc. process that involves

3.T (Transfer of patient); the patient is transported to the operating room and taken to the operating table by providing appropriate conditions and taking the necessary protective measures.

4.T (Tracheostomy procedure); It is the opening of the tracheostomy with the team inside. Meanwhile, in order to reduce contamination as much as possible, the things that the anesthesiologist and surgeon will do and pay attention to are different.

5.T (Team doffing and de-brief); At the end of the procedure, the points that the patient and the team should pay attention to when leaving the operating room (the patient should be sent to the patient's place at the earliest 20 minutes after the endotracheal tube is removed and the team should start removing their protective equipment, etc.) are mentioned.

CONCLUSION and DISCUSSION

In conclusion, during the COVID-19 pandemic, an increasing number of patients require tracheostomy due to invasive mechanical ventilation and prolonged mechanical ventilation. Although there is no clear timing of tracheostomy, it is recommended to be opened after 14 days. It is not known whether percutaneous or surgical tracheostomy is superior to each other or whether they differ in terms of transmission risk. Each team should make a choice according to its own experience, possibilities and preparedness, and if this choice will be open surgery, it should be planned in advance with the stakeholders (anesthesia, surgical team and those who will take part in the transplant) outside the intensive care unit. In addition, it is necessary to pay attention to some steps that will reduce the transmission both during both procedures and during the care of patients with tracheostomy.

It is obvious that school success is also affected among young people who are treated with tracheos-

teomy operation. Tracheostomy is performed on young patients in order to ensure their respiration, especially after various health problems experienced by students who have a normal education process in school life. After the intensive care period of many young people, many issues such as difficulty in speaking, getting used to the situation of not even speaking out are very difficult to coincide with, especially in the period when they tend to be liked in their social environment. After the operation, it is very difficult for the young people to not even hear their own voices. It is obvious that the difficulty in speaking and the inability to hear the voice of many students who have experienced this situation deeply affect them psychologically. For many students, it seems that all of their social friendships have suddenly changed, their approach has changed and school psychology has been negatively affected.

When the literature is examined, it is seen that the tracheostomy opening process affects the daily life activities of young patients, with physiological problems such as respiratory problems, difficulty in swallowing, inability to taste and smell, constipation due to not being able to push, loss of appetite, insomnia, deterioration in physical appearance, fear, introversion and difficulty in establishing social relationships. and shows that he is progressing with psychological problems. In studies on quality of life after laryngectomy, it has been determined that patients encounter problems such as decreased quality of life, loss of physical and social functions, changes in family roles, loss of appetite, fatigue, respiratory problems and financial difficulties in the postoperative period.

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