

# Evaluation of Percutaneous Tracheostomy Cases at An Tertiary Care Center Intensive Care Unit

## Üçüncü Basamak Yoğun Bakım Ünitesinde Perkutan Trakeostomi Olgularının Değerlendirilmesi

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### Abstract

Aim	Percutaneous tracheostomy is frequently performed in intensive care units, especially in patients requiring long-term mechanical ventilatory support. It has advantages such as providing safe airway, facilitating the aspiration of the airways and reducing the length of stay in the intensive care unit. In this study, we aimed to retrospectively evaluate the percutaneous tracheostomy cases that we opened with the seldinger method at a tertiary care center intensive care unit.
Materials and Methods	Our study was performed retrospectively. The records of 78 patients who underwent percutaneous tracheostomy between June 15, 2016 and August 30, 2018 were included. Patients with surgical and local infection at the intervention site, short neck and large thyroid tissue, cervical vertebra fracture or neck extension restriction, morbid obese and patients under 18 years of age were excluded from the study.
Results	78 patients were included in our study, the mean length of stay in the ICU was 39 days; mean duration of tracheostomy was 16.3 days. Most of the patients were admitted to intensive care unit due to serbrovascular and cardiovascular diseases. Hypotension was detected in four patients after tracheostomy, while wound infection and subcutaneous emphysema were found in one patient.
Conclusion	Percutaneous tracheostomy is an easy method that can be applied to bedside in a short time in patients who need mechanical ventilation for a long time. Intubation and prolonged mechanical ventilator is a useful method that is frequently used in intensive care patients because it reduces side effects, improves patient comfort and facilitates patient care. Complications can be minimized if appropriate patient selection is performed by an experienced physician.
Keywords	tracheostomy, ICU

### Özet

Amaç	Perkütan trakeostomi, işlemi yoğun bakım ünitelerinde, özellikle uzun süreli mekanik ventilatör desteği gerektiren hastalarda sıklıkla uygulanmaktadır. Güvenli havayolunun sağlanması, hava yollarının aspirasyonunun kolaylaştırılması ve yoğun bakım ünitesinde kalma süresinin azaltılması gibi avantajlara sahiptir. Çalışmamızda üçüncü basamak yoğun bakım ünitesinde seldinger yöntemiyle açtığımız perkütan trakeostomi olgularımızın retrospektif değerlendirilmesi amaçlandı.
Gereç ve Yöntem	Çalışmamız retrospektif olarak yapıldı. 15 Haziran 2016 - 30 Ağustos 2018 tarihleri arasında perkütan trakeostomi uygulanan 78 hastanın kayıtları incelendi. Girişim bölgesinde cerrahi işlem uygulanmış, lokal enfeksiyonu olan, kısa boyunlu ve büyük tiroid dokusuna sahip hastalar, morbid obez ve 18 yaşın altındaki hastalar çalışmaya alınmadı.
Bulgular	Çalışmamızda 78 hasta dahil edildi. YBÜ'de ortalama kalış süresi 39 gün; ortalama trakeostomi süresi 16.3 gün saptandı. Hastaların yoğun bakım ünitesine en sık serebrovasküler ve kardiyovasküler hastalıklar nedeniyle yatırıldığı görüldü. Dört hastada trakeostomi sonrası hipotansiyon saptanırken, bir hastada yara enfeksiyonu ve deri altı amfizemi tespit edildi.
Sonuç	Perkütan trakeostomi, uzun süre mekanik ventilasyona ihtiyaç duyan hastalarda kısa sürede ve yatak başında uygulanabilen kolay bir yöntemdir. Uzun süreli entübasyon ve mekanik ventilatör desteği gereken yoğun bakım hastalarında sıklıkla kullanılan, yan etkileri azaltan, hasta konforunu artıran ve hasta bakımını kolaylaştıran bir yöntemdir. Uygun hasta seçimi ve tecrübeli uzman hekim tarafından uygulanması ile komplikasyonlar en aza indirilebilir.
Anahtar kelimeler	: trakeostomi, YBÜ

## INTRODUCTION

Percutaneous tracheostomy is frequently performed in intensive care units, especially in patients requiring long-term mechanical ventilatory support. It has advantages such as providing safe airway, facilitating the aspiration of the airways and reducing the length of stay in the intensive care unit. It also reduces tracheal complications with prolonged endotracheal intubation. Tracheostomy is most commonly performed in patients with respiratory failure and mechanical ventilator support. Other indications include impaired consciousness, loss of airway protective reflexes, and traumas that endanger the safe airway<sup>1</sup>.

Percutaneous dilatational tracheostomy (PDT) technique is preferred more frequently in intensive care units because of its shorter application time and less complication rate. Percutaneous tracheostomy contraindications are controversial. In this study, we aimed to retrospectively evaluate the percutaneous tracheostomy cases that we opened with the seldinger method at a tertiary care center intensive care unit.

## Materials And Methods

Our study was performed retrospectively. The records of 78 patients who underwent percutaneous tracheostomy between June 15, 2016 and August 30, 2018 were included. Patients with surgical and local infection at the intervention site, short neck and large thyroid tissue, cervical vertebra fracture or neck extension restriction, morbid obese and patients under 18 years of age were excluded from the study.

In our intensive care unit, fentanyl 2µg kg-1, midazolam 0.2 mg kg-1, rocuronium 0.6 mg kg-1 intravenously are administered as percutaneous tracheostomy protocol for analgesia and sedation.

After sedation and muscle relaxation were provided to the patients, they were brought to the head extension with a pillow placed under the shoulders and 100% O<sub>2</sub> support

is obtained. After the second and third intervals of the tracheal cartilage are palpated, a 14 G needle is inserted into the tracheal lumen. After inserting the guide wire into the tracheal lumen, the needle is retracted and dilated with dilator. After enlarging the skin, subcutaneous and trachea with forceps, the appropriate number of tracheostomy tubes are inserted into the trachea.

Finally, after the cuff of the tracheostomy cannula is inflated and the location of the cannula is confirmed, the endotracheal tube is removed. After physical examination, chest x-ray is taken in bed.

Coagulation values, platelet count, trachea and neck structure of the patients included in our study were within normal range. If the patients have any enteral nutrition, they are terminated at least 6 hours before the procedure. Age, gender, primary diagnoses requiring mechanical ventilation, APACHE II score, duration of intubation, length of stay in intensive care unit, duration of total mechanical ventilation, discharge status (healthy, sequelae, mechanical ventilator), postoperative complications (bleeding, subcutaneous emphysema), pneumothorax incorrect passage, hypotension, hypoxia and mortality) intervention times were recorded.

Systolic, diastolic blood pressures, heart rate, and peripheral oxygen saturation values were recorded during the procedure. Hemorrhage in administration site, redness in the application site, the pulmonary X-ray findings were evaluated with patient information system, files and observation notes.

## Results

A total of 78 patients were included in the study. The mean length of stay in the ICU was 39 days. The mean duration of tracheostomy was 16.3 days. Demographic data of the patients are shown in Table-1. Serbrovascular, cardiovascular diseases and pneumonia were the most frequent indications for intensive care unit admission. Indications for

intensive care unit admission are shown in Table-2. Hypotension was detected in four patients after tracheostomy, while wound infection and subcutaneous emphysema were found in one patient. Complications of tracheostomy procedure are shown in Table-3.

Gender (Female/Male)	34/44
Mean of age (year)	71,21
Mean of ICU duration (Day)	39
Mean of tracheostomy opening duration (Day)	16,3
APACHE II	18,96
Prognosis(Dismissed/Ex)	26/52

Cerebrovascular disease	22; 28,2
Cardiac failure	14; 17,9
Pneumoniae	16; 20,5
Metabolic Disorder	6; 7,7
Septicemia	12; 15,3
Other	8; 10,2

Hypotension	4; 5,1
Minor Bleeding	2; 2,5
Major Bleeding	0
Wound infection	1; 1,2
Subcutaneous amphysema	1; 1,2
Pneumothorax	0

### Discussion

Tracheostomy was first performed by the Egyptians. It is among the oldest known surgical procedures. Although it was used for emergency opening of the airways in the first days of application, it has many indications and it is applied with different methods. Tracheostomy reduces dead space volume and airway resistance. It provides a safe airway and increases patient comfort. In addition, laryngeal damage, vocal cord paralysis, glottic and subglottic stenosis, infection and tracheal stenosis, dilatation, such as dilatation provides the reduction in late-period disadvantages.

Respiratory tract aspiration and nursing care are easier. It may enable the patient to return to speech earlier<sup>2</sup>.

Tracheostomy can be performed by surgical and percutaneous methods. Percutaneous tracheostomy has been increasingly used in intensive care patients because it is less invasive, does not require operating room conditions, and less tissue trauma.

In a study comparing surgical and percutaneous techniques, the procedure time was shorter and the procedure-related bleeding was less<sup>3</sup>.

Percutaneous tracheostomy was first reported in 1957 by Shelden et al. There have been different applications in the process. In 1990, Griggs et al. developed the technique of Howard guide wire dilating forceps (GWDF, Griggs) using the tool they modified from Howard Kelly forceps<sup>4</sup>.

Although contraindicated percutaneous tracheostomy is controversial, it is not recommended for anatomical causes and coagulation disorders. Children, due to the small and mobile airway, emergency opening of the airway, obesity, short neck or thyroid-induced anatomical defect, where the procedure can not be palpated, coagulation defects are among the cases where PDT is contraindicated.

In addition, it is reported that the complication rate increases in cases where the trainee is inexperienced and in patients who have undergone tracheostomy previously<sup>5,6</sup>. There are various opinions on when to perform tracheostomy in the ICU. According to many studies, percutaneous tracheostomy is an easy method that can be performed in a short time and has a lower rate of early and late complications. According to these studies, the most influential factor in complication rates is the practitioner's experience<sup>7</sup>.

Today, tracheostomy should be opened between the 2nd and 10th day of mechanical ventilation<sup>8</sup>.

In a prospective study of intensive care patients, patients receiving prolonged mechanical ventilation were evaluated and the patients were divided into early (3rd day) and late (15th day) tracheostomy groups. In the early tracheostomy group, the time to leave mechanical ventilator and exit from intensive care unit was shorter than the other group; The incidence of ventilator-associated pneumonia was lower.

The study showed that the need for sedation was lower in the group that had an early tracheotomy <sup>9</sup>.

In a retrospective study, tracheostomies opened up to ten days were grouped as early group and those opened after 10 days were grouped as late group. In early tracheostomy group, mortality rates were found to be low at 90 days and at the end of the first year <sup>10</sup>.

In another study, the early tracheostomy group was grouped as tracheostomy for 6-8 days and the late tracheostomy group was grouped for 13-15 days. In the early tracheostomy group, the duration of ventilator stay and intensive care unit stay were short compared to the other group. however, no significant difference was found in the length of hospital stay and mortality rates<sup>11</sup>.

Percutaneous tracheostomy procedure of the patients included in our study was performed by experienced anesthesiologists. In our study, mean opening time of tracheostomy was found to be 16.3 days.

Although bleeding, infection, emphysema, trachea and esophageal injuries are the most commonly reported complications of percutaneous tracheostomy, failure to provide airway and cardiac arrest due to this are reported as the most important and mortal complications.

No peroperative complication was observed in the patients included in our study. Minor bleeding was observed in two (2.5%) patients. Culture specimens are taken in case

of redness and discharge at the stoma site in patients who underwent tracheostomy in our intensive care unit. One patient had Methicillin sensitive S.aureus (MSSA) in culture and was sensitive to glycopeptides.

Percutaneous tracheostomy is an easy method that can be applied to bedside in a short time in patients who need mechanical ventilation for a long time. Intubation and prolonged mechanical ventilator is a useful method that is frequently used in intensive care patients because it reduces side effects, improves patient comfort and facilitates patient care. Complications can be minimized if appropriate patient selection is performed by an experienced physician.

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