

Our experiences of percutaneous tracheostomy in intensive care unit

Veysel G. Soylu¹, Ayşe Yılmaz²

¹Kastamonu University Faculty of Medicine, Intensive Care, Kastamonu, Türkiye

²Kastamonu University Faculty of Medicine, Anesthesiology and Reanimation, Kastamonu, Türkiye

ABSTRACT

Aim: We aimed to evaluate the indications for tracheostomy and early complications in patients who underwent percutaneous tracheostomy with the Griggs method in our clinic.

Material and Method: This study is retrospective and observational. Demographic data, hospitalization diagnoses, days of opening tracheostomy, days of intensive care hospitalization, indications for tracheostomy and early complications of tracheostomy were recorded and evaluated in a total of 78 patients between the ages of 23-93 who underwent percutaneous tracheostomy with the Griggs method between January 2021 and September 2022.

Results: A total of 78 patients were included in the study. Of the patients, 42 (54%) were female and 36 (46%) were male. In the patients included in the study, the earliest tracheostomy day was the 7th day of intubation and the latest tracheostomy day was the 32nd day of intubation. The mean day in terms of tracheostomy day was 23rd day of intubation. In terms of early complications, bleeding was observed in 5 (6.5%) patients, tracheoesophageal fistula in 1 (1.3%) patient, and pneumothorax in 1 (1.3%) patient. No complications were encountered in 71 (90.9%) patients.

Conclusion: Griggs technique, which is one of the percutaneous tracheostomy methods, can be safely applied in experienced hands in intensive care units.

Keywords: Intensive care; percutaneous tracheostomy, complication

INTRODUCTION

Tracheostomy is a surgical procedure that dates back to ancient times. It is the process of opening the tracheal ostium to the skin surface, which coincides with the skin in the anterior of the trachea (1). The first percutaneous tracheostomy method was performed in 1955. Over time, the percutaneous tracheostomy technique was developed and the seldinger method, which is now more widely used, and the percutaneous tracheostomy technique emerged (2). With this technique, Ciglia (sequential dilatation) and Griggs (forceps dilatation) methods are mostly used as percutaneous tracheostomy procedures in intensive care units (3,4).

Percutaneous tracheostomy is needed in intensive care units for different reasons. Vocal cord paralysis, infectious conditions, tracheal stenosis or dilatations may develop due to prolonged endotracheal intubation. In patients with prolonged endotracheal intubations, percutaneous tracheostomy is performed in order to reduce these complications, in addition to providing oral nutrition, reducing airway resistance, facilitating aspiration in the respiratory tract, and facilitating nursing care and patient mobilization(5). Despite these advantages, some complications may be encountered due to

the fact that tracheostomy is an invasive procedure (6). These complications are considered as early or late complications.

In this study, we aimed to evaluate the tracheostomy indications and early complications of patients who underwent percutaneous tracheostomy procedure with the Griggs method in our clinic.

MATERIAL AND METHOD

This study is a retrospective observational study conducted in the general intensive care unit of Kastamonu training and research hospital. Approval for our study was obtained from the ethics committee of Kastamonu training and research hospital with the protocol number 2022-KAEK-96. A total of 78 patients between the ages of 23 and 93 who underwent percutaneous tracheostomy procedure with the Griggs method between January 2021 and September 2022 were included in the study. Demographic data of the patients, hospitalization diagnoses, tracheostomy days, intensive care hospitalization days, tracheostomy indications and early complications of tracheostomy were recorded by examining the hospital information management system and patient files. Bleeding, pneumothorax, tracheoesophageal fistula, mortality, false

passage, and subcutaneous emphysema occurring in the first week after the tracheotomy procedure were considered as early complications.

Griggs Method Procedure

Enteral nutrition of the patients was stopped 6 hours before the procedure. All patients underwent electrocardiography, pulse oximetry, and invasive/non-invasive arterial blood pressure monitoring. During the intervention, the FiO₂ was increased to 100% and pressure or volume controlled ventilation was applied. Intravenous sedation was applied to the patients before the procedure. After the patient was placed in the supine position, a support was placed under the shoulder and the head was extended. The procedure was performed by experienced specialist physicians under appropriate sterile conditions. Just before the procedure, the endotracheal tube cuff was lowered and pulled just below the vocal cords, and the tube cuff was inflated again. "Percutaneous tracheostomy kit" (Portex) was used for the procedure. By palpating 1-2 or 2-3 intervals of the tracheal cartilage, the tracheostomy procedure was completed using the forceps dilatation technique using the method described by Griggs et al. A tracheostomy tube with a size of 7.0-8.5 was placed in the trachea. The tracheostomy tube cuff was inflated and tracheal aspiration was performed, and the position of the tracheotomy tube was confirmed by listening to bilateral breath sounds, and the patient was connected to the mechanical ventilator. All patients were evaluated with a control chest X-ray after the procedure.

Statistical Analysis

Statistical analysis was performed in the IBM SPSS 20.0 statistical package program while evaluating the findings obtained in the study. Data were indicated as number (n) and percentage (%).

RESULTS

A total of 78 patients were included in the study. Of the patients, 42 (54%) were female and 36 (46%) were male. The mean age of the patients was 69 years and the mean hospital stay in the intensive care unit was 36 days. The earliest tracheostomy day was 7th day of intubation and the latest tracheostomy opening day was 32nd day of intubation in the patients included in the study. The mean day in terms of tracheostomy day was 23rd day of intubation. Tracheostomy was performed in 54 (69%) patients due to prolonged weaning, 19 (24.2%) patients due to secretion control, 4 (5.5%) patients due to inability to protect the airway, and 1 (1.3%) patient due to airway obstruction (Table 1).

Of the 78 patients included in the study, 33 (42.3%) patients were due to respiratory reasons (higher rate of pneumonia), 30 (38.5%) patients were due to neurological reasons (higher rate due to acute ischemic stroke), 8 (10.2%) patients were due to cardiac reasons and 7 (9%) patients were other diagnostic reasons admitted to the intensive care unit.

Based on these diagnoses, tracheotomy was applied to the patient admitted to the intensive care unit with the diagnosis of root of the tongue ca, because of airway obstruction, to the patients who were admitted to the intensive care unit for neurological reasons, for the inability to protect the airway and secretion control, and for the patients admitted to the intensive care unit for respiratory reasons due to prolonged weaning (Table 2).

In terms of early complications, bleeding was observed in 5 (6.5%) patients, tracheoesophageal fistula in 1 (1.3%) patient, and pneumothorax in 1 (1.3%) patient. No complications were encountered in 71 (90.9%) patients (Table 2).

Table 1: Demographic data, tracheostomy procedure day and indications

	n: 78 Mean(%)
Age Range (years)	23-93
The average age(year)	69
Gender	
Male	36 (46%)
Female	42 (54%)
Intensive care hospitalization day range (days)	18-73
Intensive care average hospitalization day (day)	36
Tracheostomy day interval (days)	7-32
Tracheostomy Average day (day)	23
Tracheostomy Indication	
Prolonged weaning	54 (69%)
Inability to protect the airway	4 (5.5%)
Secretion control	19 (24.2%)
Airway obstruction	1 (1.3%)
Tracheostomy tube no	
Tube no. 7	12 (15%)
Tube no 7.5	26 (33%)
Tube no 8	28 (37%)
Tube no. 8,5	12 (15%)

Table 2: Intensive Care admission diagnoses and early complications

	N: 78 (%)
Respiratory Causes	33 (42.3%)
Chronic obstructive pulmonary disease	11 (14.5%)
Pneumonia	20 (25.5%)
Lung malignancies	2 (2.6%)
Neurological Causes	30 (38.5%)
Acute ischemic stroke	16 (20.4%)
Intracerebral hemorrhage	8 (10.2%)
Motor neuron disease	4 (5.1%)
Status epilepticus	2 (2.6%)
Cardiac causes	8 (10.2%)
Acute coronary syndrome	4 (5.1%)
Heart failure	4 (5.1%)
Others	7 (9%)
Cervical trauma	3 (3.8%)
Tongue root ca	1 (1.3%)
Post surgery	3 (3.8%)
Early complications	
No	71 (90.9%)
Bleeding	5 (6.5%)
Tracheoesophageal fistula	1 (1.3%)
Pneumothorax	1 (1.3%)

DISCUSSION

In this study with our tracheostomy experiment, the mean day of tracheotomy was 23rd day. Prolonged weaning was the most common indication for tracheostomy with a rate of 69%. Among those who underwent tracheostomy procedure, the most common reason for admission to the intensive care unit was the patients admitted to the intensive care unit due to respiratory problems with a rate of 42.3%. The most common early complication was bleeding with a rate of 6.5%.

The most common indication for tracheostomy in intensive care patients is associated with prolonged mechanical ventilation as a result of respiratory or neuromuscular

diseases. (7) In the study of Gucyetmez et al., the most common indications for opening a tracheostomy are the need for prolonged mechanical ventilation and prolonged coma. (8) Yeşiler and In a similar study conducted by his friends, it was stated that the most common indication for tracheotomy opening was 85% prolonged need for mechanical ventilation and prolonged coma.(9) Our study is compatible with this and similar studies in the literature.The number of patients who underwent tracheotomy procedure due to the need for prolonged mechanical ventilation comprised 69% of the patients included in the study.

There are many studies in the literature regarding the timing of tracheotomy in intensive care patients. Although there is no definite and clear information about the timing, the time of tracheotomy can be decided by the patient's doctor regarding the diagnosis and clinical condition of the patient. In general, early tracheotomy is recommended for patients who are followed up in the intensive care unit due to neurological reasons for whom extubation cannot be performed in the short term.(9)

The mean time of tracheostomy was reported as 13.23 ± 6.29 days in the study conducted by Çiçek et al., and 8.65 ± 5.97 days in the study conducted by Kırca et al. (10,11). In our study, the opening time for tracheotomy ranged from 7 to 32 days, and the mean day was 23 days. In our study, the rate of patients who were followed up for neurological reasons and who underwent tracheotomy was 38.5%. Therefore, we think that the reason for the delayed tracheotomy time is that our patients are followed up in the intensive care unit for less neurological reasons.

Tracheotomy with percutaneous dilatation is the most preferred method for tracheotomy in suitable patients in intensive care units. (12) Tracheostomy with percutaneous dilatation and tracheostomy is the most widely used method in our country. We opened tracheostomy with the method.

There are many studies in the literature on early and late complications in the percutaneous tracheotomy procedure. The importance of experience in terms of complication development in percutaneous tracheostomy procedure is stated in the literature. (13). In some studies, it has been reported that early and late complications are less common in percutaneous tracheostomy compared to surgical tracheostomy (14). The most common complications are; bleeding that does not require transfusion or surgery, subcutaneous emphysema, placement of the cannula outside the trachea, injury to the posterior tracheal wall, short-term hypoxia and stoma infection(15). The most serious complication is perioperative mortality. In the study by Kearney et al., the perioperative mortality rate was reported as 0.6% (16). There was no perioperative mortality in our study. Pneumothorax, which is one of the early complications, is seen between 0-3% in the griggs technique(15), pneumothorax was found in 1 patient (1.3%) in our study and it was similar to the literature.

Bleeding due to percutaneous tracheotomy has been reported in many studies in the literature (17). In general, it is described as 50-100 ml bleeding from the stoma. Minor bleeding can be managed with a pressure dressing, while major bleeding may require ligation. In the study where Erden et al. shared tracheotomy cases that they had opened with the Griggs technique, they stated that they encountered bleeding complications with a rate of 3.5%(18). In the study performed by Çakmak et al., they reported that they encountered major

bleeding at a rate of 5.1% and minor bleeding at a rate of 6.8%(19). In our study, however, there was no major bleeding complication, and minor bleeding complications occurred at a rate of 6.5%.

Although tracheoesophageal fistula is rare in the early period due to percutaneous tracheotomy procedure, destegul et al. reported a case of tracheoesophageal fistula in one patient (20). In our study, a complication of tracheoesophageal fistula was seen in 1 patient (1.3%).

CONCLUSION

Percutaneous tracheotomy, which is performed at the bedside in a shorter time and without the need to transfer the patient to the operating room, has a low complication rate. Griggs technique, which is one of the percutaneous tracheotomy methods, can be safely applied in intensive care units in experienced hands.

ETHICAL DECLARATIONS

Ethics Committee Approval: Approval for our study was obtained from the ethics committee of Kastamonu training and research hospital with the protocol number 2022-KAEK-96.

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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