



Frequent complications in adult patients related to percutaneous tracheotomy in the intensive care area of the Alfredo Noboa Montenegro Hospital in the period June - October 2021

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Abstract

Airway management is crucial for a patient's health, especially in the intensive care unit, to preserve airway patency. Tracheotomy has been performed for many centuries, and this is a surgical procedure that consists of an approach to the anterior wall of the trachea where an incision is made, and a cannula is placed to allow adequate airflow to the distal part of the trachea. The main objective is to determine the frequency of complications in adult patients related to the percutaneous tracheostomy technique and the benefit of respiratory therapy in the care unit area. It is a retrospective cohort study of 34 patients in whom percutaneous tracheostomy and open tracheostomy were performed to characterize the complications derived from this procedure and the benefit of respiratory therapy with bronchial hygiene techniques as a predictor of decannulation of tracheostomized patients. Patient characteristics, type of procedure, immediate complications, late complications, and types of bronchial hygiene techniques were observed. Clinical histories and a data collection questionnaire were used and recorded in the SPSS system to determine the complications of percutaneous tracheotomy and the benefit of respiratory therapy. The data obtained were organized in frequency distributions and presented in graphs, reporting that the percutaneous tracheotomy procedure was performed on 19 patients (56%) and 44% (15 patients) had an open or surgical tracheotomy, with an age range of 56% and 44% of the patients had an open or surgical tracheostomy. The age range ranged from 46 to 61 years, hemorrhage being an immediate complication that occurs frequently in the ICU and surgical site infection the most frequent late complication in the ICU, to analyze the effectiveness of bronchial hygiene techniques such as ETGOL, DA, TD, TEF, AFE, a total of 17 patients underwent respiratory therapy, of which 12 decannulated within the expected time of 8 to 15 days and without any respiratory complication, while 5 patients decannulated around 25 to 30 days, because there was no collaboration from the patient or because they performed the techniques incorrectly, of the 17 patients who performed respiratory physiotherapy with bronchial hygiene techniques as a predictor of decannulation, 59% corresponding to 10 patients tracheotomized with percutaneous technique and 41% tracheotomized with surgical technique corresponding to 7 patients noting that there are no significant differences in the clinical area, nor respiratory complications in any of the two techniques whose evolution was satisfactory for both techniques, resulting in the effectiveness of respiratory therapy with bronchial hygiene techniques mentioned above.

Keywords: tracheotomy, complications, respiratory therapy, percutaneous, surgical, decannulation, decannulation



1. Introduction

Adequate airway management is a crucial point in patients in critical care units (1) and emergency rooms worldwide in order to maintain adequate tissue oxygenation in the patient; due to this need, tracheostomy arises in medicine, a surgical procedure that consists of opening the trachea with subsequent placement of a cannula that communicates the airway with the outside in order to restore the respiratory cycle (2).

Any patient who undergoes a tracheostomy loses the ability to humidify and warm the inspired air. As a result, there is a greater risk of alterations in swallowing mechanics and cough reflex (linked to poor secretion management), which increases the risk of lower respiratory tract infections (3). In addition, it generates a decrease in dead space (between 60-70 ml) and loss of positive end-expiratory pressure (mediated by glottis activity), resulting in a lower residual functional capacity and an increased risk of atelectasis (4). Therefore, the pulmonologist frequently evaluates patients with tracheostomy, hence the importance of knowing the proper management.

The approach to the airway has been described since ancient times, as in the Eber and Rig-Veda papyrus of 1500 BC (5). In addition, there are references to the anterior opening of the trachea; in the 1st century B.C., Asclepiades of Prusa performed the first elective tracheostomy to overcome obstructive processes in the airway. Asclepiades of Prusa performed the first elective tracheostomy to overcome obstructive processes in the airway, and the surgical technique evolved over the centuries until 1921 when Chevalier described the surgical technique for open tracheostomy that is currently in force (6).

This is an era of technological advances where there is a need to innovate with less invasive procedures, which has led to the development of percutaneous tracheostomy, a procedure increasingly implemented by different health professionals (7). Among the indications for tracheostomy are respiratory failure, prolonged mechanical ventilation, airway obstruction due to foreign bodies, respiratory processes, and other conditions, neoplastic, severe maxillofacial trauma, and laryngeal trauma surgeries, among other causes (7). Although, currently, the number of patients who require tracheostomy has increased, reports made by several researchers, among which Cox and collaborators estimate that between 1993 and 2002, tracheostomy for prolonged mechanical ventilation increased by 200%(8), there are two positions, one of some physicians in favor of performing tracheostomy regardless of the surgical technique in an early manner in order to avoid laryngotracheal stenosis which may occur weeks or even months after extubation (8). The other position tries to maintain endotracheal intubation as long as possible; there are authors such as Stauffer who maintain that endotracheal intubation can remain up to 20 days without producing laryngotracheal sequelae; they are in favor of this position considering that in this procedure serious complications have been reported, some of them even condition the death of the patient (9).

One of the factors to be assessed to determine the adequacy of tracheostomy removal is the integrity of the upper or extrathoracic airway (10,11).

The present research aims to determine the frequency of complications in adult patients related to percutaneous tracheotomy in adults and the benefit of using respiratory therapy in the Alfredo Noboa Montenegro Hospital care unit area. Therefore, the following problem is posed:

Research Problem: What are the common complications of percutaneous tracheostomy in adults, and the benefit of using respiratory therapy in the intensive care setting?



2. Objectives

2.1 General Objective

To determine the frequent complications in adult patients related to percutaneous tracheotomy and the use of respiratory therapy in the intensive care area of the Alfredo Noboa Montenegro Hospital.

2.2 Specific objectives

- To determine the sociodemographic characteristics of adult tracheostomized patients in the intensive care unit.
- To describe the intraoperative and postoperative percutaneous tracheostomy complications in adult intensive care unit patients.
- To determine the frequent complications in adult patients related to the percutaneous tracheotomy technique in the intensive care area.
- To analyze respiratory techniques for bronchial hygiene in tracheotomized patients.
- Effectiveness of Total Slow Exhalation with Open Glottis (ETGOL), Targeted Cough (TD) and Autogenous Drainage (AD), Forced Expiratory Technique (FET), Augmentation of Expiratory Flow Technique (AFE) to promote decannulation in tracheotomized patients in the Intensive Care Unit.

Methodology

3.1 Methodological design

3.1.1 Location

This work is developed at the Alfredo Noboa Montenegro Hospital in intensive care Service. The health facility is located in Ecuador, province of Bolivar, canton Guaranda, located on 15 de Mayo Street, Sierra region, urban area, with equipment and professionals specialized in adult care, has a modern physical and technological infrastructure.

3.1.2 Equipment and materials

The research used the medical records, data collection form, annex 1, which includes sociodemographic and observational questions; in the Microsoft Excel processor, the questions and results were recorded by age range and gender to determine the frequent complications, and the IBM SPSS statistical software was used.

3.1.3 Type of research

The design of the development project was a cross-sectional study and descriptive observational type with a quantitative approach because it uses direct observation. We will work with focus groups, in which there is no direct intervention by the author or the tutor on the study subjects (14).

3.1.4 Hypothesis testing

Ho. No complications were determined in percutaneous tracheostomy in adults.

Hi. Complications in percutaneous tracheostomy in adults were determined.

3.1.5 Population and sample



The population consisted of all patients treated in the Intensive Care Unit of Dr. Alfredo Noboa Montenegro Hospital, and the sample was obtained through non-probabilistic convenience sampling from August 5 to October 18, 2021, who required tracheostomy.

3.1.6 Techniques and instruments used

A data collection form was used for each individual included in the study, which was validated by applying it to each study subject.

3.1.7 Data processing and statistical analysis

The statistical processing of the information will be carried out with the SPSS 24, 0 statistical software. Pearson's correlation will be used to verify the hypothesis to find the relationship between the variables.

4. Results

With an age range from 41 to 63 years old, we analyzed with a range of 5 in grouped ages having as a result from 41 to 46 years old two patients, which equals 11%, from 46 to 51 5 patients, which equals 26%, from 51 to 56 a total of 5 patients which equals 26%, from 56 to 61 years old five patients which equal 26% and from 61 to 66 years old a total of 2 patients which equals 11%.

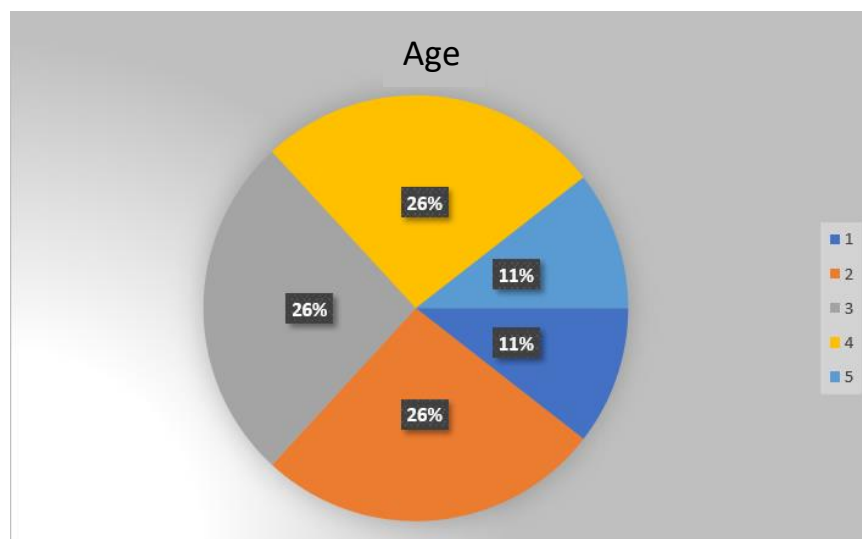


Figure 1. Age.
Source: Own elaboration

After the approval of the topic of the research project by the Teaching and Research Department of the Alfredo Noboa Montenegro Hospital in the city of Guaranda, the statistical department was asked for a database of patients, in which 34 patients were found to constitute the universe of the



study after the application of inclusion and exclusion criteria, 19 patients were selected as a sample for the study by non-probabilistic sampling by convenience.

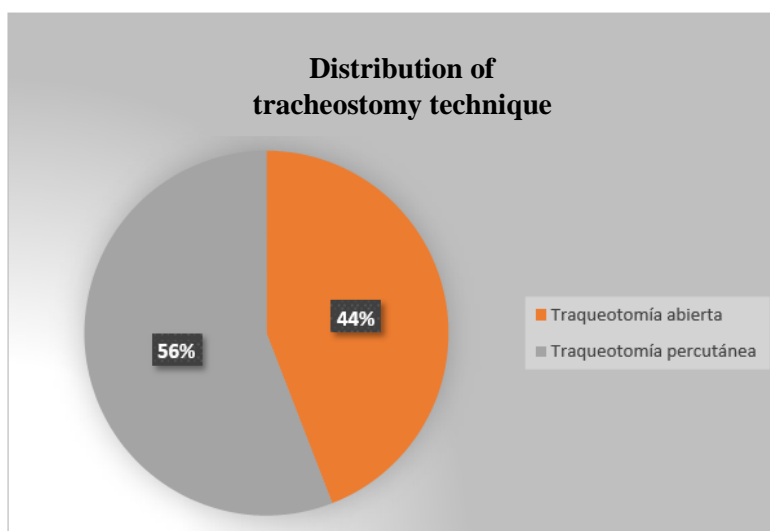


Figure 2. Distribution of tracheostomy technique.

Source: Own elaboration

Regarding the type of complication presented during the 24 hours, 11 complications were presented. In the case of percutaneous tracheotomy, the greatest immediate complication reported is hemorrhage which is equivalent to 46%, followed by premature obstruction of the cannula with 27%, occupying third place with 18%, and concluding with 9%, which is equivalent to 1 person, desaturation.

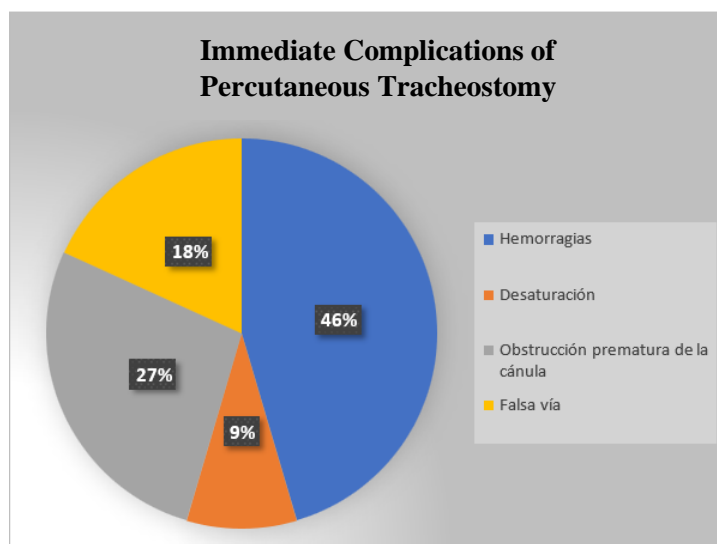


Figure 3. Immediate Complications of Percutaneous Tracheostomy
Source: Own elaboration

Evaluating the late complications, the results show 8 cases in patients who underwent a percutaneous tracheotomy. In the percutaneous group, the main adverse event was infection at the surgical site, with 5 cases (63%), followed by premature cannula obstruction, with 3 cases (37%).

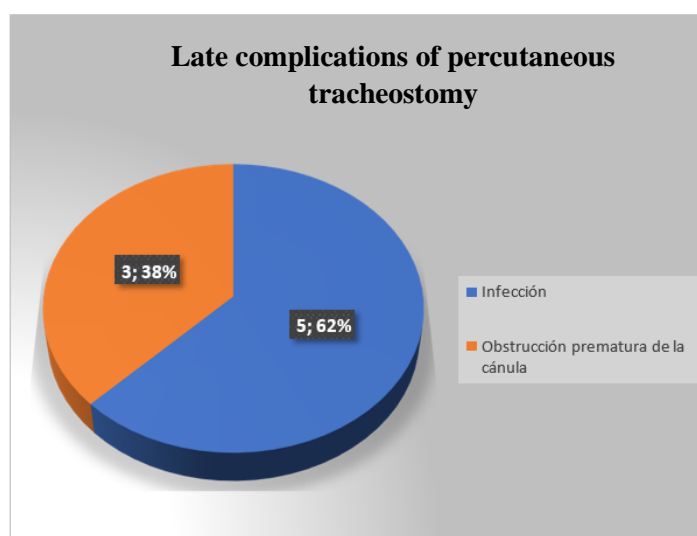


Figure 4. Late complications of percutaneous tracheostomy.
Source: Own elaboration



Of the 34 patients included in the study, there were 6 deaths; performing this analysis with a total of 28 patients, 17 received respiratory therapy applying bronchial hygiene techniques and 11 were sedated and received physical therapy mobility of lower limbs and upper limbs.

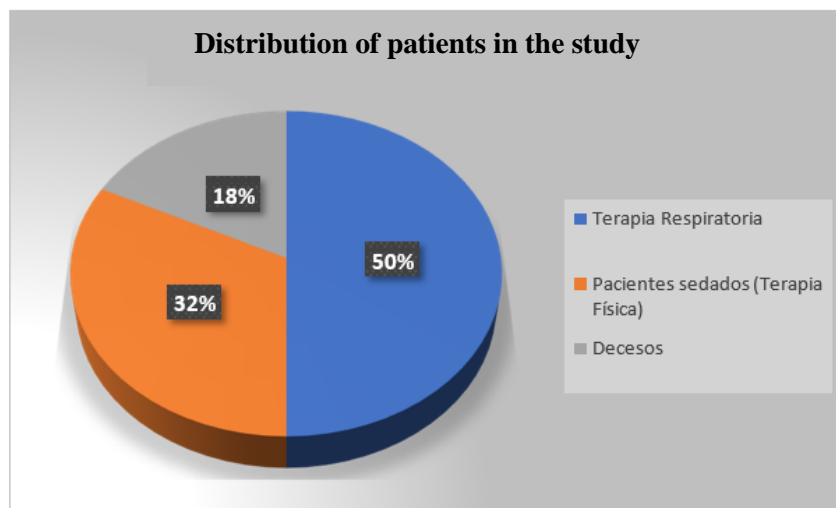


Figure 5. Distribution of patients in the study

Source: Own elaboration

Of the 17 patients who underwent respiratory physiotherapy with Bronchial Hygiene techniques, 71% (11 patients) decannulated in a period of 8 to 15 days, 29% (5 patients) did not decannulate in this period (8 to 15 days) due to lack of collaboration on the part of the patient and incorrect execution of the technique.

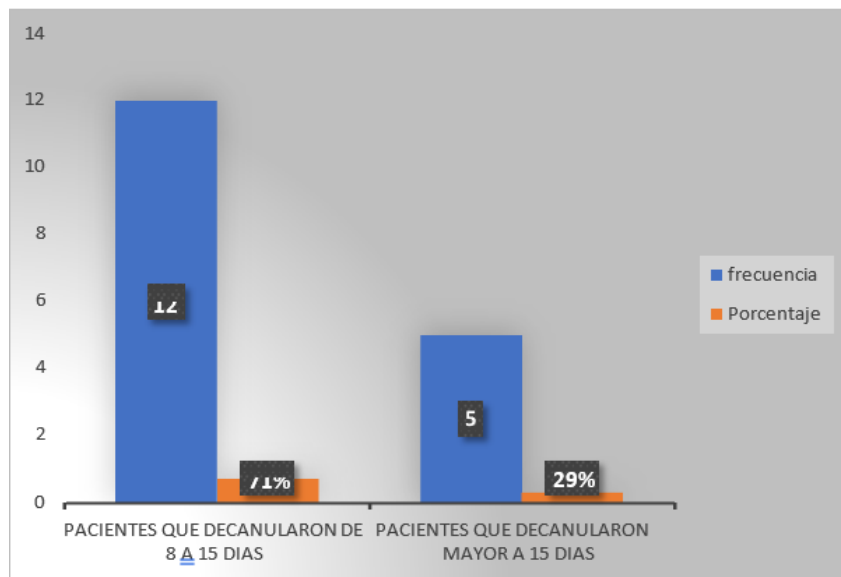


Figure 6. Number of respiratory therapy patients decannulated, and days
Source: Own elaboration

Of the 17 patients who underwent respiratory physiotherapy with Bronchial Hygiene techniques, 59%, corresponding to 10 patients, were tracheotomized with the Percutaneous technique and 41%, corresponding to 7 patients, were tracheotomized with the surgical technique.

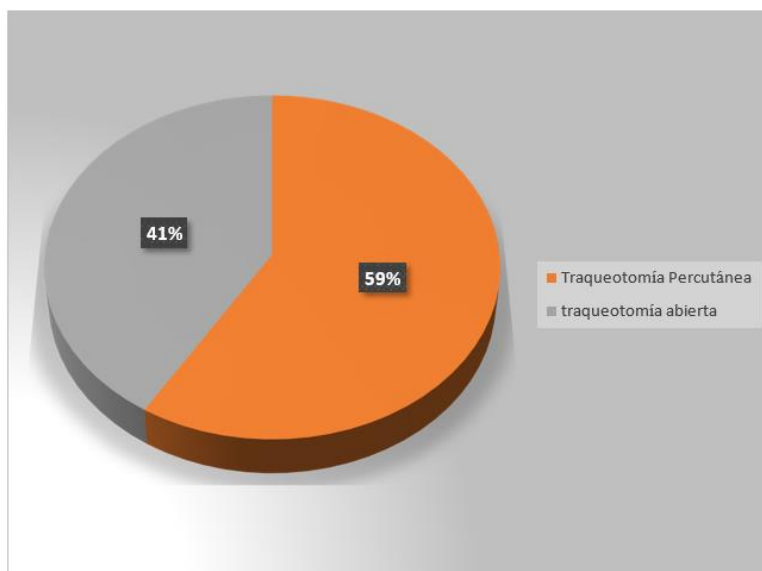


Figure 7. Distribution of tracheotomized patients who received bronchial hygiene techniques.
Source: Own elaboration



5. Discussion

Once the information was collected, and the statistical results were analyzed, the most frequent complications of percutaneous tracheotomy in adults in the intensive care unit were determined.

A comparative study in the Department of Intensive Care Medicine of the Hospital Virgen de la Luz in Spain shows no difference between the most frequent complications of percutaneous tracheostomy and hemorrhage in a sample of 100 patients with the level of significance for the total complications. The same study compares percutaneous tracheostomy with Guide Wire Dilating Forceps, with 48 patients with PT and 52 patients with GWDF, where the high rate of some complications is striking, the main one being hemorrhage in both groups (1).

About data from other studies conducted by the Chilean Society of Anesthesiologists of a descriptive cohort of cross-sectional design based on adult patients admitted to the ICU, they describe that percutaneous tracheotomy is a safe, fast and efficient alternative that can be performed at the patient's bedside by the trained anesthesiologist, concluding that its percentage of complications was different, compared to 7.4% worldwide, referring to the fact that the most frequent complication of percutaneous tracheotomy was pneumothorax with no mortality or infection rate. This difference is because in the Alfredo Noboa Montenegro Hospital, percutaneous tracheotomies are performed by professionals of the specialties of general surgery and intensive care, among others; since professionals of the same specialty do not perform them, the learning curve takes a long time compared to this study which was performed by professionals prepared for this surgery (2).

According to Enrichi et al. and Zanata et al., the main criteria determining the success and safety of the decannulation process are level of consciousness, ventilation, airway integrity (upper airway obstructions), swallowing, secretion management and active and reflex cough. These findings show the way forward for therapeutic intervention in tracheostomized patients who can reach tracheostomy removal, i.e., in those in whom the clinical problem that justified the use of the cannula has been resolved (non-mechanically ventilated patients, without upper airway obstruction and severe alterations in the level of consciousness (10).

It is difficult to predict the success or failure of tracheostomy removal, just as the ideal time to perform the procedure is not known. For this reason, numerous studies have evaluated the validity of different assessment criteria for decannulation: pulmonary function tests, ability to mobilize secretions, swallowing, cough strength, upper airway obstructions, level of consciousness, oxygen requirements, presence of stridor or other added noises, frequency of endotracheal suctioning performed, phonation, respiration and intubation difficulty, among others (10).

6. Conclusions and recommendations

The predominant population was male, and the age range was between 46 and 61.

The immediate complication of percutaneous tracheostomy was hemorrhage or bleeding, which corresponds to 63%, while the late complication was surgical site infection, which corresponds to 37%.

These techniques can aid in the clearance of secretions in tracheostomized patients because they mobilize secretions from the middle and distal airways to the proximal airways. Therefore, they predict a clinical evolution for the decannulation of such patients in 8 to 15 days.



Of the 100% of the patients who entered the study, 35% decannulated in the appropriate time and there were no respiratory complications; 32% corresponded to sedated patients who received physical therapy, mobilization of the lower and upper limbs, 15% corresponded to patients who did not improve their decannulation time because there was no collaboration from the patient and incorrect execution of the technique, and 18% consisted of 6 patients who died before 72 hours after the start of the study.

Percutaneous tracheostomy vs. surgical tracheostomy benefited equally with ETGOL, DA, TD, TEF, AFE techniques, decannulation, and time without presenting airway complications.

There were no significant differences in those patients who received respiratory physiotherapy during the decannulation process in both percutaneous and surgical tracheotomy, achieving decannulation in both techniques without respiratory complications and in an adequate time.

Recommendations

It is essential to train nursing and respiratory therapy staff in tracheostomy care in order to reduce the number of accidental cannulations.

It is important to perform extensive follow-ups of patients who have undergone tracheostomy to reduce the rate of both immediate and late complications.

The use of imaging assistance is necessary when performing percutaneous procedures, such as fiber bronchoscopy and ultrasound guidance, to eliminate cases of false tracheostomy when performing a tracheostomy.

The Respiratory Physiotherapist should work with the team performing percutaneous or surgical tracheostomy procedures to support airway preparation before, during and after the procedure.

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