CHARACTERISTICS OF PATIENT WITH EMERGENCY TRACHEOSTOMY IN THE COVID-19 ERA

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Abstract

Background: Emergency tracheostomy is surgical procedure which is increasingly being performed. Tracheostomy is surgical opening in trachea which creating opening in anterior tracheal wall and converting it into stoma. Emergency tracheostomy is indicated when an upper airway obstruction cases. **Objective**: To determine characteristic of patient with emergency tracheostomy in dr. Hasan Sadikin General Hospital during covid 19 era. **Methods:** We retrospectively studied the patient who underwent emergency tracheostomy from January 2020 to December 2021 by an otolaryngologist doctors at dr. Hasan Sadikin General Hospital. Characteristics, indication, covid 19 test status and complication of patients were reviewed. **Results:** The study included 260 patients (161 men and 99 women) with median age of 50 of years. Over half presented with dyspnea (58%). Underlying diseases cause of upper airways obstruction are head and neck cancer (65% patients), deep neck infection (22% patients), and laryngotracheobronchitis (5% patients). Stridor with suprasternal retraction was the most frequent symptom (62%). Complication occurred in 31 (12%) patients: subcutaneous emphysema in 24(77%), hemorrhage in 5(16%), and infection in 2(6%). **Conclusion**: Emergency tracheostomy is life-saving procedure for patient with upper airways obstruction. The challenging during this pandemic must be considered such as PPE availability, negative pressure airflow room, and multidisciplinary team. It is safe and effective with low complication rate procedure to secure an airways in this patients.

Keywords: *Emergency tracheostomy, tracheostomy, airways obstruction*

Introduction

Tracheostomy refers to the creation of an aperture in the trachea, which serves to aid in the smooth flow of air through the respiratory tract, particularly in the presence of blockages in the upper airway. Moreover, it plays a significant role in enhancing the elimination of pulmonary secretions or laryngeal retention, particularly in individuals who have been on prolonged intubation. Tracheostomy thus serves as an effective measure in improving the respiratory function of such patients. In essence, tracheostomy is a medical procedure that involves the insertion of a tube into the trachea through a surgically created opening to help patients breathe more easily and promote optimal airway clearance. Therefore, tracheostomy is an essential and lifesaving procedure that has revolutionized respiratory care for many individuals. It was performed almost exclusively as an emergency procedure for upper airway obstruction.[1]

Individuals experiencing upper airway obstruction typically present with acute dyspnea as the primary symptom. This condition may arise from various factors such as tumor growth or inflammation. In some cases, the predominant symptoms may include the development of a neck mass or difficulty in swallowing (dysphagia). It is essential to note that airway obstruction is a severe medical condition that requires prompt and appropriate management to prevent further complications. Upper airway obstruction is a complex medical condition that poses a significant threat to the affected individuals' respiratory function. Therefore, it is crucial to take proactive measures to manage this condition effectively. One of the most critical steps in managing upper airway obstruction is the prompt recognition and diagnosis of the underlying cause. This process involves a thorough evaluation of the presenting symptoms, medical history, and diagnostic tests such as imaging studies and endoscopy. Once a definitive diagnosis is made, appropriate treatment can be initiated to relieve the symptoms and improve the patient's overall well-being Stridor is primary sign of airways compromise.[2,3]

In emergency situations where upper airway obstruction poses a significant threat to a patient's life, tracheostomy may be necessary. This medical intervention involves creating an opening in the trachea to bypass the obstruction and facilitate air movement. Emergency tracheostomy is considered when other interventions, such as intubation or cricothyrotomy, have failed or are deemed inappropriate. It is essential to note that emergency tracheostomy is a delicate and challenging procedure that requires a high level of skill and experience from the healthcare provider. It is not a routine intervention and should only be considered in critical situations where alternative methods have been exhausted or are deemed unsuitable. Moreover, emergency tracheostomy is not without its risks and potential complications, which may include bleeding, infection, and damage to surrounding structures. Therefore, it is crucial to undertake thorough assessments and evaluations before embarking on the procedure. Indications for emergency tracheostomy include malignancies such as laryngeal carcinoma, infection disease such as deep and neck abscesses, congenital disease such as subglottic stenosis, and maxillofacial trauma.[3]

The initial emergence of the SARS-CoV-2 virus, which causes COVID-19, took place in China in December of 2019. Due to its highly contagious nature, COVID-19 quickly spread to numerous countries, including Indonesia where the first case was reported in March 2020. Given the ongoing pandemic, healthcare providers must exercise caution when planning tracheostomy procedures to prevent potential transmission and exposure between patients and healthcare workers.[4]

In the past, surgical tracheostomy was viewed as a high-risk procedure, with a higher mortality rate until the surgical technique was described by Jackson in 1909. However, it is now a safe and routine procedure performed in hospitals. There are different types of complications associated with tracheostomy, including immediate complications such as bleeding, pneumothorax, and injury to the laryngeal nerve; early post-operative complications such as dislodgement of the cannula, subcutaneous emphysema,

Y. A. Dewi et al. (eds.), *Proceedings of the 19th Otorhinolaryngology Head and Neck Surgery National Congress (PERHATIKL 2022)*,
Advances in Health Sciences Research 68,
https://doi.org/10.2991/978-94-6463-280-4_13

and surgical site infections; and late post-operative complications such as trachea-oesophageal fistula and tracheal stenosis.[5,6]

The purpose of this study is to assess the features, reasons for use, clinical outcomes, and potential complications of patients who received emergency tracheostomies at the Department of Otorhinolaryngology-Head and Neck Surgery in dr. Hasan Sadikin General Hospital in Bandung during the pandemic period.

Method

This study is a descriptive study with a retrospective method to see the description of the incidence, characteristics, indication, clinical and complication of patients who were subjected to emergency tracheostomy. The sampling technique used is total sampling from medical record data of patients who underwent emergency tracheostomy at Hasan Sadikin Bandung General Hospital for the period January 2020–December 2021.

The inclusion criteria were in the form of medical record data of patients who underwent tracheostomy emergency at Hasan Sadikin Bandung General Hospital in the period January 2020–December 2021. Meanwhile, the exclusion criteria were incomplete or missing medical record data, and patient who underwent elective tracheostomy such as perioperative tracheostomy or prolong intubation were excluded.

Both inpatient and outpatient medical records were reviewed. The analyzed parameters include demographic data, presenting sign and symptoms, indication for tracheostomy, covid 19 test status and complication post emergency tracheostomy. Then, the data will be analyzed using descriptive statistics. The data will be processed using statistical software (Microsoft® Excel 2019 and IBM® SPSS® version 22) and displayed in the tables.

Results

During the study period, 260 emergency tracheostomies were performed. Among these cases, 161 (62%) were male and 99 (38%) were female, with a median age of 50 years. The majority of patients fell within the 50 to 64-year-old age group (Figure I).

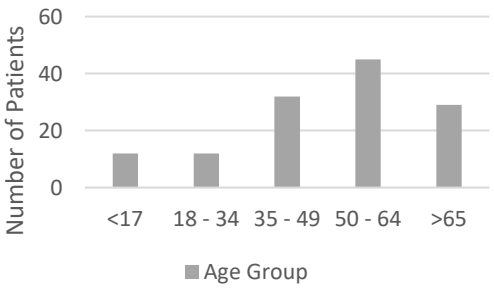

Figure I. Patient distribution by age

Total patients upper airways obstruction with covid 19 were 14 (4%) and without covid 19 were 246 (96%).

Table 1. Covid 19 Status Test

Result	Total (260)	(%)
Positive	14	4%
Negative	246	96%

Presenting symptoms and signs of upper airways obstruction are list in Table 2. The most common presenting symptoms were dyspnea (n=151, 58%), neck mass (n=77, 30%), and Hoarsness (n= 27, 10%). More than half of the patients (n= 161, 62%) exhibited stridor and suprasternal retraction during physical examination.

Table 2. Characteristic of Patients Undergoing Emergency Tracheostomy

Characteristics	Total (260)	(%)
1. Main Symptoms		
• Dyspnea	151	58%
	77	30%
• Neck Mass		
• Hoarsness	27	10%
• Dysphagia	5	2%
2. Sign of Upper Airways Obstruction		
▪ Stridor + Suprasternal Retraction	161	62%
▪ Stridor + Suprasternal Retraction + Epigastric Retraction	76	30%
▪ Stridor + Suprasternal Retraction + Intercostal Retraction	17	6%
▪ Stridor + Suprasternal Retraction + Intercostal Retraction + cyanosis	6	2%

Based on Jackson criteria upper airways obstruction, the most common in this study was stadium I (n= 161, 62%), stadium II (n= 76, 30%), stadium III (n=17, 6%), stadium IV (n=6, 2%).

In this study, it was found that the majority of cases (65%) which required emergency tracheostomy were due to upper airways obstruction caused by malignancy. Of these cases, the larynx was the most common site of malignancy, accounting for 29% of cases (n=75). The nasopharynx and oropharynx were the second and third most common sites of malignancy, accounting for 19% (n=51) and 17% (n=44) of cases, respectively. These findings highlight the significant role that malignancy can play in the development of upper airway obstruction, and the importance of prompt intervention such as emergency tracheostomy to ensure patient safety and improve outcomes. The remain 90 cases (35%) had non malignant etiologies (Table II). The most common non malignant etiologies was deep neck infection (n= 55, 21%). None of our cases were conversions from cricothyrotomy.

Table 3. Indication of Emergency Tracheostomy

Indication	Total (260)	(%)
1. Neoplasm		
Larynx	75	29%
Nasopharynx	51	19%
Oropharynx	44	17%
2. Infection		
Deep neck infection	55	21%
Laryngotracheobronchitis	12	5%
Acute Epiglotitis	11	4%
3. Trauma		
Maxillofacial Trauma	5	2%

Bilateral Vocal Cord Paralysis	4	1%
4. Congenital		
Subglottic Stenosis	2	1%
Laryngeal Cyst	1	1%

Early and immediate complication of emergency tracheostomy were observed in 31 (12%) patients. The most common complication in this study was subcutaneous emphysema in 24 patients which were treated conservatively or used needle puncture. Peristomal hemorrhage in 5 patients which were solved with local compression using hemostatic material.

During the course of this study, it was found that two patients developed surgical wound infections following emergency tracheostomy. Fortunately, both cases were promptly addressed through a combination of local hygiene and intravenous systemic antibiotic therapy. While these cases represent a small minority of the overall patient population, they nevertheless underscore the importance of careful postoperative monitoring and follow-up care for individuals who undergo emergency tracheostomy. By remaining vigilant for potential complications and promptly addressing any issues that may arise, healthcare providers can help ensure the best possible outcomes for their patients.

Table 4. Complication of Emergency Tracheostomy

Complication	Total (31)	(%)
Subcutaneous Emphysema	24	77%
Hemorrhage	5	16%
Stoma Infection	2	6%

Discussion

In this study, 260 medical records of patients who have been performed emergency tracheostomy at Hasan Sadikin General Hospital from January 2020 to December 2021 that meet the criteria of inclusion and exclusion. The median age in the subjects of this study was 50 years with the largest age distribution in the age group of 50 - 64 years as many as 99 people (35%). Number of male who obtained about 161 people (62%) was the highest in this study compared to female about 99 (38%). The same results occurred in a study conducted by Liliana in 2016 that received the highest presentation at the age of more than 50 years and in a study conducted by Cristina in 2018 that got the highest presentation at the age of more than 45 known where the highest number of males were found. [3] Some studies have shown that old age is the highest prevalence of patients with tracheostomy because the most cases encountered in the study are head and neck malignancy that occurs in the elderly and male gender groups such as laryngeal malignancy.[5] It can occur some laryngeal region such as supraglottic, glottic ,and infra glottic. The prevalence was about 0.7% with a mortality rate of 0.3%. Laryngeal malignancy is ten times more common in men than women with an average age of about 40 - 70 years.[6]

Patients who underwent emergency tracheostomy in this study were 14 (4%) positive covid 19 test. Emergency tracheostomy in covid 19 patient were performed under multidisciplinary team, hospital infrastructure (including provision of side room and negative pressure airflow), and level 3 personal protective equipment (PPE). [4]

The most major complain in this study was dyspnea as many as 151 people (58 %). The same thing happened in the study conducted by Liliana who obtained from 50 people studied there were 80% with dyspnea in patients performed emergency tracheostomy.[3] Dyspnea is the main complaint of upper airway obstruction. This is due to blockage of oxygen flow in and out of the respiratory tract due to secondary upper airway obstruction.[7]

The most signs of upper airway obstruction are stridor and suprasternal retraction as many as 161 people (62 %). Liliana got the same results in the study conducted for four years with the result that stridor is the main sign of upper airway obstruction as much as 52%.[3] Some other studies get the same results as in America studies get results that stridor as much as 54 %.[4] This is because pathophysiologically something that clogs the upper airway at the supraglottic level, glottis and infra glottic will cause additional breathing sounds when inspiration and expiration. The additional sound is called stridor.[8]

The most indications of emergencies tracheostomy are airway obstruction due to head and neck neoplasm 170 people (65%) and deep neck infection in 55 people (21%). The same thing happened in the research conducted by Liliana who obtained the results of pharyngeal or laryngeal tumors and deep neck infection is the most indicated diseases in patients performed emergency tracheostomy.[3]

The prevalence of laryngeal cancer ranks as the third most common form of head and neck cancer. This is a significant finding as laryngeal cancer has the potential to cause a direct blockage of the upper airway, leading to life-threatening complications. It is therefore crucial for healthcare providers to remain vigilant for signs of upper airway obstruction, particularly in patients with a history of laryngeal cancer. By identifying and addressing potential obstructions in a timely manner, healthcare providers can help prevent the need for emergency interventions such as tracheostomy, ultimately improving patient outcomes and quality of life.[9]

Deep neck infection is a serious condition that can occur as a result of spreading infection from various sources, such as the teeth, mouth, throat, paranasal sinuses, middle ear, and neck. It is characterized by an infection in the potential space between the inner neck fascia, which can lead to the development of deep neck abscess. This occurs when pus accumulates in a pathologic cavity in reaction to the body's defenses against foreign bodies. There are several potential spaces within the inner neck that can become filled with abscesses, including the parotid space, submandibular space, peritonsillar space, retropharyngeal space, danger space, prevertebral space, and masticator space. Healthcare providers must remain vigilant for signs of deep neck infection, as prompt identification and treatment are critical in preventing the spread of infection and the development of potentially life-threatening complications. By staying informed about the various potential sources and spaces involved in deep neck infection, healthcare providers can better educate their patients and ensure timely and effective care. Therefore, the deep neck abscess can cause direct airway blockage when the abscess has spread into some potential space. [10]

The incidence rate complication of tracheostomy ranges from 5-65%. [10] This study get the incidence complication of tracheostomy as many as 31(12%). The most common complications were subcutaneous emphysema in 24(77%), followed by intraoperative hemorrhage in 5(16%),and infection 2(6%). Currently more subcutaneous emphysema occurs due to the majority of primary diseases are head and neck cancer that can easily make tissue damage during tracheostomy. Another cause is the use of unsuitable cannula because of that generally more head and neck cancer have a large enough neck mass so that air from trachea easily exits into the subcutaneous tissue causing subcutaneous emphysema. It is necessary to select the appropriate cannula which is a longer cannula (extended cannula*)* that must be provided if needed.[12]

Walvekar said complications in the form of subcutaneous emphysema can occur due to a considerable air pressure in the mucosal tissue when the patient coughs strongly during a tracheostomy or shortly after the tracheostomy. Subcutaneous emphysema post tracheostomy can also occur in the stitching of incision wounds or the use of gauze on stoma when we use cannula without cuff so that air from the trachea is trapped in the soft tissues surrounding the stoma. Too small tracheostomy cannula size or too large trachea incision can also cause airflow to be trapped in subcutaneous tissue through the between the cannula and trachea. Subcutaneous emphysema can be prevented by the use of intubation so as to prevent coughing during the installation of tracheostomy cannula and avoid too wide dissection of the trachea. Most cases of subcutaneous emphysema can be reabsorbed spontaneously by the body within a few days therefore subcutaneous emphysema belongs to the category of mild complications so it does not include worrying life-threatening complications.[13]

CONCLUSION

To summarize, emergency tracheostomy is a vital procedure that can save the lives of patients with acute upper airways obstruction. Our study found that the most frequent reason for needing emergency tracheostomy was upper airways obstruction due to head and neck malignancy. Despite the potential for complications, the rate of adverse events associated with emergency tracheostomy was within an acceptable range. Therefore, emergency tracheostomy is a reasonable and practical option for securing airways in an emergency setting. These findings underscore the importance of prompt recognition and intervention for patients with acute upper airways obstruction, and provide valuable insight for healthcare providers seeking to optimize patient outcomes in emergency situations The challenges of emergency tracheostomy during this pandemic era must be considered such as PPE availability, multidisciplinary team, and availability of room that have negative pressure airflow.

ETHICS AND CONSENT STATEMENTS

This study was approved by the Ethical Committee of dr. Hasan Sadikin General Hospital. The method was based on approved guidelines. Informed consent was written by all participants.

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