MANAGING TRACHEOSTOMIES UNDER ANESTHESIA IN THE EMERGENCY ROOM:

A LITERATURE REVIEW

ABSTRACT

Tracheostomy continues to be a lifesaving technique that is frequently performed in many emergency settings. It has been believed to help people with mechanical ventilation, and respiratory failure, and for clearing secretions rapidly where they could not otherwise be cleared due to the immobility and restricted activity of the patient. As a rule of thumb, tracheostomies are commonly performed on patients with a low GCS and for those in whom the prognosis seems to be very predictable in a negative sense. When tracheostomy is done on such patients, either through the open surgical or percutaneous method, it has been seen to bring about a change in their condition slowly. Some patients have also been brought back from the critical care units or ICUs, whereas some did not improve at all. Therefore, it is suitable to say that it is all dependent upon the patient's underlying condition and ruling prognostic factors as well.

This review deals with performing tracheostomy under local anesthesia. This type of tracheostomy is usually performed in the emergency room under certain situations when it becomes necessary to take urgent steps for saving the patient's life. The aim of this paper is to review the procedure of these tracheostomies, while also listing the conditions where it becomes necessary to carry out such a procedure.

Keywords: tracheostomy, emergency, local anesthesia, poor prognosis, emergency department

INTRODUCTION

Tracheostomy is a safe and effective procedure that is widely performed in several critical care settings around the world. It is a procedure through which an opening is created in the anterior wall of the trachea to facilitate respiration by the patient. Tracheostomy is carried out both electively and in emergencies, although the latter is the most common circumstance or situation in which the need to intervene arises first. (1)

Although there have been several changes brought about in the techniques that are used for tracheostomy, it is known to be one of the oldest surgical procedures. It dates back to around 3500 B.C. when it was a common procedure, often performed directly on the battlefields, such as in the case of Alexander the Great. Alexander performed this procedure, where he incised one of his injured soldier's trachea with the tip of his sword to facilitate his breathing. (2)

Even now, tracheostomy is performed regularly whenever the patient's condition is deteriorating and the prognosis is getting poorer by the day. There are two major ways of approaching patients undergoing tracheostomy - either through the open surgical technique or through the percutaneous method. Both methods have their distinct indications and contraindications and are preferred over the other under certain circumstances. (3)

Since the major domain of this article is to talk about tracheostomies that are emergently carried out, sometimes in the ER itself, the discussion will remain limited to this topic. There are several conditions that provoke surgeons to carry out this procedure within the ER, however, the most common one to stand out is an acute airway obstruction that could either be due to a foreign body or some infectious disease affecting the person and making it difficult for them to breathe properly.

The aim of this paper is to explore and elaborate on the procedure of tracheostomy done under emergency conditions, while also keeping an eye on the possible outcomes that it has. So far, there have been both successful and negligible consequences of this procedure and this article shall review them.

CONDITIONS REQUIRING AN EMERGENCY TRAHCESTOMY

The management and intervention of the upper airway is a very important responsibility that often comes under the care of otolaryngology. Sometimes, the case might be so severely alarming and deteriorating that a multidisciplinary approach might be important to bring into the equation. (4)

Although there are many indications that render an emergency tracheostomy necessary, some of the major and commonly encountered ones are listed as follows:

Acute Airway Obstruction:

Any obstruction that arises in the airway could be life-threatening if it does not get resolved easily or within a short time. In many severe cases, the person might succumb to the respiratory distress that arises as a consequence of airway obstruction and thereby, she or he might die as well. (5)

However, one thing worth noting is that not all airway obstructions are caused due to the lodging of foreign bodies. There are several other reasons as well that could give rise to airway obstructions and these include angioedema, any anaphylactic reaction, infections, or cancer as well.

LeFort III Fractures:

A LeFort III Fracture refers to a transverse fracture that causes craniofacial dysfunction to develop in the affected individual. In this type of fracture, there are several fractures in the

posterior parts of the orbit. These orbital fractures cause the middle side of the face to separate from the base of the skull. It is a very extensive type of traumatic fracture that could have severe cosmetic as well as life-threatening consequences. The need for a tracheostomy arises in situations like these, mainly because the affected individual is unable to breathe properly. (6)

Penetrating Laryngeal Trauma:

Although injuries to the larynx are seen to heal easily, there are always some consequences that could arise as a result of these injuries. If there has been some sort of penetrating injury to the larynx encountered, then there could be an urgent need for tracheostomy. (7)

In the majority of cases, tracheostomy is often considered in cases where laryngeal trauma results in significant swelling, bleeding, or other forms of airway compromise that cannot be managed using any other medicinal or conservative methods.

Post-Cricothyrotomy:

In the majority of the patients who have just recently undergone a cricothyrotomy procedure, the need for a tracheostomy might become inevitable. Although it is required for only the best professional surgeons to perform surgery in this case, there is always a risk for bleeding and other complications to arise in this particular setting. According to the latest recommendations and guidelines, it has been recommended that in patients who have just had their cricothyrotomy done, the tracheostomy stoma should be made as early as possible so as to reduce the chance of any complications or bleeding risks. (8)

Apart from these conditions, severe facial trauma, Ludwig's angina, and aspiration pneumonia are all some other indications that might cause a surgeon to intervene and perform a tracheostomy on an emergency basis. Talking about this from the emergency department's

perspective, there should be enough supplies and resources present at hand that any kind of emergency requiring the need for a tracheostomy could be done conveniently.

LOCAL ANESTHESIA AND EMERGENCY TRACHEOSTOMY

Once it has been declared that the patient needs an urgent tracheostomy, all arrangements must be made as quickly as possible to minimize any risks or complications before, during, or after the procedure has been performed. (9)

For any procedure, irrespective of its length, the most important factor is the choice of anesthesia. Fortunately, the world has progressed to such a higher extent that there are options for both local and general anesthesia when it comes to performing tracheostomies. However, the need of the time in this instance is such that the procedure is performed as quickly and smoothly as could be possible. (10)

Therefore, in the majority of the cases of tracheostomies that are carried out in an emergency situation, local anesthesia is needed. Now, local anesthesia may itself become a risk and challenge at the same time for the surgical team to carry out this procedure. There are obvious adverse effects and the risk of complications attached to this type of procedure that are both, tracheostomy and patient-related. For instance, patients with a low GCS score and poor response rate might already be hypoxic, hence the need for tracheostomy, and therefore, might not be suitable to be placed in a supine position along with the neck in an extended position. This makes it difficult to perform the procedure with full access to the trachea. It was concluded in a study that in any tracheostomy that is carried out under emergency conditions, the risk of complications raises by 5%. (11)

A study was carried out to evaluate the risks and complications associated with urgent tracheostomy cases. This study revolved around 56 patients, who were all in their middle ages,

with the median age being 55 years. Out of these patients, all were candidates for tracheostomy, however, 21% got an emergency tracheostomy done because of their underlying condition. During the course of the study, 15 out of the 56 patients were transferred to a different hospital, due to certain reasons not explained in the study. Among the remaining 41 patients, 21 successfully underwent decannulation or the removal of the tracheostomy tube. (9)

However, there was also a complication profile attached to this study. Out of the 56 patients, 5 of them experienced complications, which concluded at a rate of 12.2%. When talking about the particular complications that had arisen in these patients, three patients dealt with hemorrhage, one had a surgical wound infection, and another developed cervicothoracic subcutaneous emphysema, where the air was trapped under the skin. One fact worth noting is that no deaths were linked to the procedure, indicating a generally safe outcome for the patients. (12)

However, it is a matter of fact that the whole team involved in the tracheostomy procedure must work together in coordination for the best outcome. The anesthetist and surgeons must first carefully decide what is best for their patients and only proceed forward when they have planned what to do in case the procedure goes wrong. It is essential for both of them to have thoroughly evaluated and assessed the airway because both of them are supposed to be working in the same location. In the cases of a large-sized tumor that occupies part or more of the space of the trachea or the airway, there have also been instances of carrying out an awake tracheostomy in the patient. (13)

During the process of introducing anesthesia, certain critical complications like coughing, laryngeal spasm, and complete airway blockage emerge as life-threatening adverse effects to the patient’s life. The severity of airway obstruction caused by tumors plays a significant role: the narrower the airway due to tumor growth, the more challenging it becomes to effectively

ventilate the patient during the initial stages of general anesthesia induction, leading to an increased risk. (14) A significant measure of comfort and ease can be attained through the administration of a neuromuscular blocker, which results in the absence of reflexive coughing, laryngeal spasm, or involuntary muscle movement throughout the surgical procedure. Nevertheless, it is crucial to also prepare for the possibility of intubation failure, arising from potential difficulties in guiding the endotracheal tube into the restricted airway passage. (15)

All in all, tracheostomy is a safe and effective procedure with good success rates. It only needs the right set of hands to perform it, and the patient could easily get a tracheostomy done in the ER, without any complications or adverse events.

CONCLUSION

Tracheostomy is a safe and effective procedure that is performed on patients with complicated diseases or poor prognosis. The reason for performing tracheostomies varies from person to person and also depends on the underlying disease that has caused the patient to become a candidate for tracheostomy in the first place.

However, there are often some conditions in which the patient has to be emergently operated in the ER and get a tracheostomy done. The conditions that require this to happen are laryngeal trauma, Le Fort III fracture, airway obstruction, infections, and malignancy.

In these conditions, either an awake tracheostomy is done or a local anesthesia is given. The reason for this is the rate of complications and risks are automatically elevated when it comes to performing this procedure under a local or awake anesthesia. However, recent studies have found it to be safe for tracheostomies to be conducted under such modes of anesthesia, but only under the supervision of experts of this field.

REFERENCES

1. Raimonde AJ, Westhoven N, Winters R. Tracheostomy. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 [cited 2023 Aug 17]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK559124/

2. Lewith H, Athanassoglou V. Update on management of tracheostomy. BJA Educ. 2019 Nov;19(11):370–6.

3. Singh A, Zubair A. Pediatric Tracheostomy. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 [cited 2023 Aug 18]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK560622/

4. Whitmore KA, Townsend SC, Laupland KB. Management of tracheostomies in the intensive care unit: a scoping review. BMJ Open Respir Res. 2020 Jul 28;7(1):e000651.

5. Fusco P, Iuorio A, Della Valle M, Ferraro F. Awake tracheostomy in a patient with acute upper airway obstruction: an emergency application of an elective percutaneous procedure. Open Access Emerg Med OAEM. 2019 Jul 24;11:167–70.

6. Ghabach MB, Abou Rouphael MA, Roumoulian CE, Helou MR. Airway management in a patient with Le Fort III Fracture. Saudi J Anaesth. 2014;8(1):128–30.

7. Malvi A, Jain S. Laryngeal Trauma, Its Types, and Management. Cureus. 14(10):e29877.

8. Zasso FB, You-Ten KE, Ryu M, Losyeva K, Tanwani J, Siddiqui N. Complications of cricothyroidotomy versus tracheostomy in emergency surgical airway management: a systematic review. BMC Anesthesiol. 2020 Aug 27;20:216.

9. Costa L, Matos R, Júlio S, Vales F, Santos M. Urgent tracheostomy: four-year experience in a tertiary hospital. World J Emerg Med. 2016;7(3):227–30.

10. Faris C. Scott-Brown's Otorhinolaryngology, Head and Neck Surgery, 7th edn. Ann R Coll Surg Engl. 2011 Oct;93(7):559.

11. Goldenberg D, Ari EG, Golz A, Danino J, Netzer A, Joachims HZ. Tracheotomy complications: a retrospective study of 1130 cases. Otolaryngol--Head Neck Surg Off J Am Acad Otolaryngol-Head Neck Surg. 2000 Oct;123(4):495–500.

12. Halum SL, Ting JY, Plowman EK, Belafsky PC, Harbarger CF, Postma GN, et al. A multi-institutional analysis of tracheotomy complications. The Laryngoscope. 2012 Jan;122(1):38–45.

13. Kim CY, Cho S, Ryoo SH. Anesthetic management for emergency tracheostomy in patients with head and neck cancer: a case series. J Dent Anesth Pain Med. 2022 Dec;22(6):457–64.

14. Hohn A, Kauliņš T, Hinkelbein J, Kauliņa K, Kopp A, Russo SG, et al. Awake tracheotomy in a patient with stridor and dyspnoea caused by a sizeable malignant thyroid tumor: a case report and short review of the literature. Clin Case Rep. 2017 Oct 5;5(11):1891–5.

15. De Leyn P, Bedert L, Delcroix M, Depuydt P, Lauwers G, Sokolov Y, et al. Tracheotomy: clinical review and guidelines☆. Eur J Cardiothorac Surg. 2007 Sep 1;32(3):412–21.