



ORIGINAL ARTICLE

Tracheostomy in COVID-19 Pandemic; did we achieve our aims? A developing country's experience.

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ABSTRACT... Objective: To evaluate the effect of tracheostomy on COVID positive patients and the risk included in the procedure for the patient and health care workers. **Study Design:** Retrospective Observational Study. **Setting:** Shifa International Hospital Islamabad, Pakistan. **Period:** 30th May 2020 to 15th February 2022. **Material & Methods:** The tracheostomies were performed in COVID ICU at bed side by ENT team. This is a study of 22 patients mostly with multiple comorbidities who presented to the hospital with symptoms of SARS-COVID-19. The changes in their ventilation were recorded before and after the tracheostomy. The health care workers included in the study were also kept under observation for any possible cross infection. **Results:** Eight out of twenty two patients were weaned off from ventilator. There was decrease in partial pressure of oxygen after the procedure but the mortality rate was high. None of the members of operating team, ICU team, anaesthesia team was infected with the virus. **Conclusion:** Our study shows that although tracheostomy helps in weaning off from ventilator, it has no role in weaning off COVID patients. There is no benefit of tracheostomy for a COVID positive patients. Furthermore, if adequate personal protective equipment's are used, there is no risk of spread of infection from patient during the procedure of tracheostomy.

Key words: Covid-19, Pneumonia, Tracheostomy, Ventilator, Wean Off.

INTRODUCTION

SARS-CoV-19 Pandemic started in Wuhan, China in December 2019 and spread around the globe causing significant effect on the healthcare facilities. This is a viral infection caused by corona virus which is an enveloped single-stranded RNA virus that is zoonotic in nature. The symptoms range from those similar to the common cold to severe respiratory, enteric, hepatic and neurological symptoms.¹ Tracheostomy is a procedure where surgeons make stoma through the front of the neck and into the trachea. A tracheostomy tube is then placed into the stoma to keep it open for breathing. Tracheostomy can help weaning off from ventilator and reduce the financial burden on patient's family.² It has higher weaning rate and a shorter in-hospital stay in chronically ill patients. Like any other procedure, tracheostomy has its risks as well. These include hemorrhage (intra-operative and post-operative)

and sepsis.³ As stated by McClelland's: "If you think of tracheostomy - intubate and think again".⁴ Therefore the decision to perform the procedure should be taken very carefully.

The aim of our study was to see whether tracheostomy helps in weaning off COVID patients from ventilator or not. As The course of illness of SARS-Co-19 starts from upper respiratory tract infection. With respiratory tract infections patients may require ventilatory support. This is initially provided with non-invasive techniques like BIPAP / CPAP. If disease process progresses these patients can require invasive ventilation with definitive airway access. So, we want to see how effective is the tracheostomy in COVID patients as there were very few studies regarding COVID when it first started.

The second aim of our study was to see the

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chances of cross infection from patient to health care workers during the procedure as tracheostomy is an aerosol-generating procedure. The procedures capable of generating aerosols have been associated with increased risk of SARS-COV-19 transmission to Health care workers.⁵ Keleb et al recommended in *Frontiers in Public Health*, the use of protective equipment's and hand hygiene for protection against coronavirus disease (COVID).⁶ However if adequate protective equipment are used by health care professionals, risk of spread of infection decreases considerable but there is very limited data on this topic and more studies are being added to it every day so here we present our experience of tracheostomies in patients with COVID pneumonia.

MATERIAL & METHODS

This is a retrospective observational study conducted at a tertiary care hospital. The aim of our study is to analyze tracheostomies performed in intubated patients in our hospital over a period of twenty months from 30.05.2020 to 15.02.2022. The study was conducted in Shifa International Hospital Islamabad Pakistan after taking permission from hospital ethical committee with IRB number: 156-21.

Inclusion Criteria

All the patients who were admitted in COVID ICU with COVID pneumonia and needed tracheostomy for ventilatory support were included in the study.

Exclusion Criteria

Patients whose family did not give consent were excluded from the study. Patients with incomplete data were also excluded from study.

Patients were identified with two identifiers: Name and Medical Record number. A positive PCR was considered diagnostic for SARS-COVID-19.

All these tracheostomies were performed in COVID ICU at bed side by ENT team. Monitoring of the patients including oxygen saturation, vitals and ventilator settings were performed and recorded by anesthesia and ICU team before, during and after the procedure. Post procedure chest X-ray

was done to confirm the correct placement of tracheostomy tube.

This is a study of 22 patients mostly with multiple comorbidities who presented to the hospital with symptoms of SARS-COVID-19. They had severe respiratory failure secondary to Covid infection and required prolonged mechanical ventilation. Tracheostomy was performed for possible weaning. Out of the 22 patients, 7 were female and 15 were male. FiO₂ difference was compared 24 hours apart before and after the tracheostomy. The procedure was performed with full Personal Protective Equipment. The health care workers involved during the procedure were kept on record and were advised to report as soon as they get any symptoms of COVID-19.

RESULTS

Patients' ages ranged from 39 years to 77 years with mean age of 59.86 were included in the study as shown in Table-I

Total Number of Tracheostomies	Age Range	Mean Age
22	39 - 77 years	59.86 years

Table-I showing Mean age of patients

A total of 22 tracheostomies were performed of which the mean FiO₂ before the procedure was 56.1 % as shown by Figure-1.

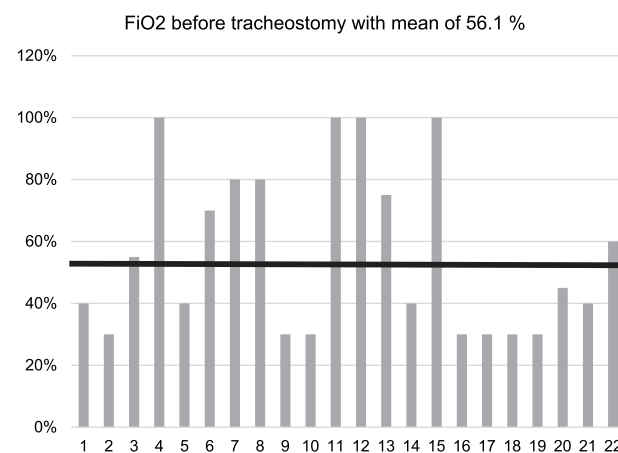


Figure-1. Showing FiO₂ before the procedure. The red line denotes mean FiO₂

A difference of 14.1 % was obtained in FiO₂ after the tracheostomy with mean FiO₂ after the tracheostomy of 42 % as shown in Figure-II

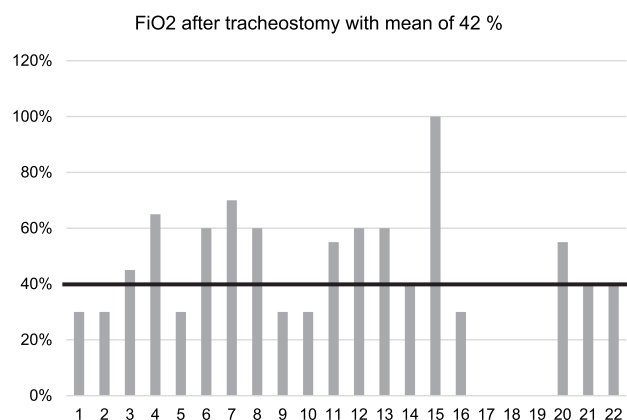


Figure-II. Showing Fio₂ after the tracheostomy with red line showing mean.

It shows that there is better oxygenation after the tracheostomy.

The survival rate in our study was 36 % which could be attributed to factors like development of other complications during the stay.

None of the members of operating team, ICU team, anesthesia team were infected with the virus.

DISCUSSION

COVID 19 is still an emerging topic. A frequent problem with COVID 19 is that Some of these patients go into severe respiratory failure with high oxygen demands, requiring prolonged ventilation in ICU. It has resulted in unprecedented numbers of patients being admitted to intensive care units (ICUs) with additional capacity created in many hospitals all over the world to meet this overwhelming demand.⁷ Tracheostomy is often done by emergency care physicians to help with ventilatory wean when mechanical ventilation is of longer times (7–10 days).⁸ A great amount of patients admitted with COVID-19 are therefore expected to require tracheostomies as a result of this pandemic.⁹

The benefits of tracheostomy include the ability to wean sedation, facilitate gradual reduction in ventilatory support, improve communication, participate in rehabilitation, reduce dead space, facilitate bronchial toilet, and potentially reduce long-term complications such as vocal cord

granuloma formation, subglottic stenosis and scarring.¹⁰

A study compared the outcome of trans laryngeal intubation with tracheostomies in patients who required mechanical ventilator for more than 14 days. This study concluded that patients who underwent tracheostomies in comparison to intubation had a shorter hospital stay and better weaning rate.¹¹ Another prospective observational cohort study focused on 30-day outcome of tracheostomies. 30-day survival rate for tracheostomized patients was higher (85%) in comparison with non-tracheostomized patients which was 42%.¹² Another study compared the outcome of tracheostomies done before and after 14 days of onset of symptoms. They had a better survival rate with late tracheostomies (after 14 days) in comparison to tracheostomies done before 14 days.¹³ In our study Out of 22, five tracheostomies were performed before 6th day of intubation. Two out of those five patients were weaned off on 8th and 13th day of tracheostomy. Remaining three patients who had tracheostomy before 6th day, two of those developed NSTEMI and one developed renal failure and could not survive. There was no correlation of early weaning of ventilator with an early tracheostomy in our study.

Most of the studies available at the time of publication, focused on the survival rate and the timing of tracheostomies. However, survival rate can be affected by multiple variables like comorbidities at the time of presentation and complications during the stay. Emine et al states that the three-year survival rate in patients with heart failure and cerebrovascular disease is significantly less than those who have neuromuscular or chronic obstructive pulmonary disease.¹⁴ In our study 8/22 patients were weaned off from ventilator but unfortunately the mortality rate was 64%. The percentage of patient who had no comorbids was 9% while 91% of the patients had one or more comorbidities.

Different strategies to minimize the spread of infection during the procedure has been proposed by different studies which include

reducing routine suction and inner cannula care to a minimum and using closed suction systems. Use of heat and moisture exchange (HME) filters in ventilator circuits instead of heated water-based active humidification systems.^{15,16}

COVID-19 spreads primarily through contact and droplet routes so careful attention to infection control during tracheostomy management is of paramount importance to prevent cross-contamination between patients and medical staff. The risk of transmission may be increased by aerosolization of particles.¹⁷ Zhang et al states that airborne transmission is the dominant route of transmission of COVID-19.¹⁸ Zhou et al states that respiratory system is the most common system involved in COVID-19 disease and respiratory droplets and aerosols are the most common modes of transmission of disease.¹⁹

The Airway and Swallowing Committee of the American Academy of Otolaryngology-Head and Neck Surgery recommends strict adherence to the donning and doffing protocol of the institution to protect the health care providers from cross infection. They also recommend to limit the number of health care professionals participating in the procedure and also post procedure care.²⁰ Our study also shows that if adequate personal protective equipment is used by the team, there are minimal chances of getting infected during the procedure.

Although our sample size is small and there is still room for improvement, we are sharing our experience to contribute in the available data.

CONCLUSION

Our study concluded tracheostomy does not help weaning off COVID patients from ventilator and if adequate personal protective equipment are used, there is no risk of spread of infection from patient to health care workers during the procedure.






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2	Abdus Saboor	Data collection, Writing and editing, Manuscript calculating, Results.	
3	Shayan Shahid Ansari	Main idea, Critical assessment, Editing.	
4	Tafiya Erum Kamran	Data collection, Calculating Results.	
5	Muhammad Saqib	Data collection, References, Editing manuscript.	
6	Muhammad Inam Ul Haq	Data collection, References.	