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Novel Draping Technique during Tracheostomy to Minimize Aerosolization in the Times of COVID19 Pandemic

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Abstract

Objective: To create a transparent flexible barrier to limit the aerosol exposure during open tracheostomy procedures in a resource constraint setting.

Methods: We offer a novel draping technique within the infrastructural limits of general operation theatre developed by surgical oncology services. It uses simple equipment including 1. L shaped anaesthesia screen (steel rod), 2. Clear Plastic transparent drape, 3. Marker pen, 4. Sterile surgical Scissors, 5. Staplers/micropore tape as described in the preparatory steps.

Advantage: This technique reduces the aerosol exposure during tracheostomy with simple, easily available equipment. It is reproducible, with no restriction of hand movement during surgery, with adjustable height and breadth of the frame thus making it patient and surgeon friendly.

Conclusion: Novel draping technique can be a useful adjunct to the conventional risk reduction efforts during the surgical tracheostomy procedure in the times of COVID-19 pandemic.

Introduction

WHO (World Health Organisation) declared coronavirus disease as Public Health Emergency of International Concern on 30th January, followed by Pandemic on 11th March 2020 [1]. Since then it has spread its wing all over the globe leaving no major country untouched. Till the month of May, it's infected 5.8 million individuals worldwide leading to 3,60,000 deaths inspite of strict governmental measures taken everywhere on the planet [2]. High transmissible rates are related to its high basic reproductive number (R0) [2,3]. It spreads through human contact via sneezing, coughing, respiratory droplets or aerosols. Transmission of infection becomes more aggressive in airway associated medical procedures.

Challenge

Frontline healthcare workers are at the highest risk of contracting Coronavirus infection which could result in severe illness and death. Till early May, even under-reported value of healthcare worker infected with COVID-19 was as high as 90,000 [4]. Airway associated procedure generate highly infectious aerosols including endotracheal intubation, Tracheostomy, positive pressure ventilation, oral suction, extubation, Decan-

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nulation of tracheostomy and change of tracheostomy tube. It has been estimated that surgical tracheostomy procedure increases the transmission of infection to healthcare worker by 420% [5]. Ineffective infection control, inadequate Personal Protective Equipment (PPE)t and extended exposure contribute to high transmissible rates. Aerosol stimulating procedures not only exposes the surgeons performing the procedure but also the paramedic staff involved in the operations. It has been estimated that coughing can propagate the virus to the distance of 4.5 meters [6]. Thus, the entire operation theatre and other healthcare workers present in the OT are at risk. Also availability of PPE is the challenge even in the developed world [7]. Thus, we propose a novel draping technique to reduce the aerosol exposure to frontline healthcare workers during tracheostomy procedure.

Requirements

Risk reduction procedure require PPE, special operation theatre request, Trained OT personnel for PPE donning and doffing, limited manpower to be present in OT, viral filters, lower FIO_2 levels during exchange of tube, reduced suctioning after the opening of trachea and sequence of holding ventilation [8]. In addition to the above, for this technique we would need the following simple equipment.

a. L shaped screen (steel rod): This is your traditional "L" shaped Anaesthesia Screen that can be mounted to any side rail via a 5/8" round socket. This stainless-steel Ether Screen is solid 5/8" construction. It is 16-26 inches adjustable height and 16 inches across. It is Simple "L" shape Anaesthesia Screen. It fits any 5/8" socket, attaches at one end.

b. Clear plastic transparent drape – clear plastic drapes has been used as a barrier by anaesthetists' world over. Studies has also documented its efficiency in containing the aerosolization during intubation procedures [9].

c. Marker pen to mark six inlets in the drape.

d. Sterile surgical Scissors

e. Staplers/micropore tape.

Preparatory and surgical steps

a) Positioning of the patient, scrubbing and draping on the operation table.

b) Positioning and fixing of cautery, suction tubing.

c) Positioning of the L shaped screen on the operation table (Figure 1 a and b)

d) Draping the L shaped rod

e) Positioning of plastic drape over the L shaped screen (Figure 2 a and b)

f) Fixing of the plastic drape to the OT table

g) Creation of Six inlets – two on each head end, right and left of the patient. (Figure 3 a and b)

h) Positioning of extra suction to create negative pressure.

i) Conventional Surgical tracheostomy procedure. (Figure 4 a and b)

j) Tracheostomy tube is connected to ventilator through one of the inlets created on the head end.

k) Rest of the Inlets closed with micropore tape.

l) Plastic drape to be folded inwards to keep the contact to minimum and cautiously disposed.

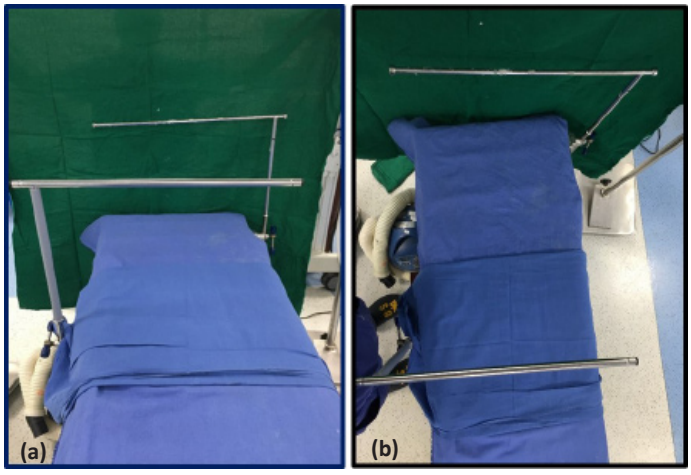

Figure 1: (a-b) Positioning of L shaped rod on the OT table (Parallel and 3 feet apart)

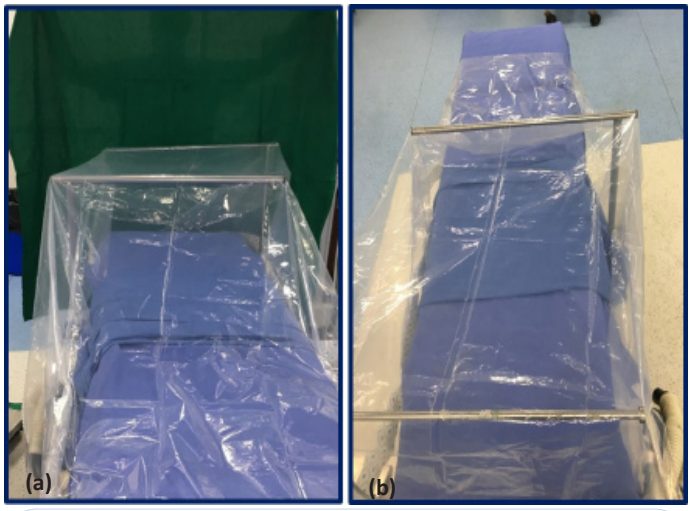

Figure 2: (a-b) Positioning and fixing of the plastic drap over the L shape Rod and OT table.

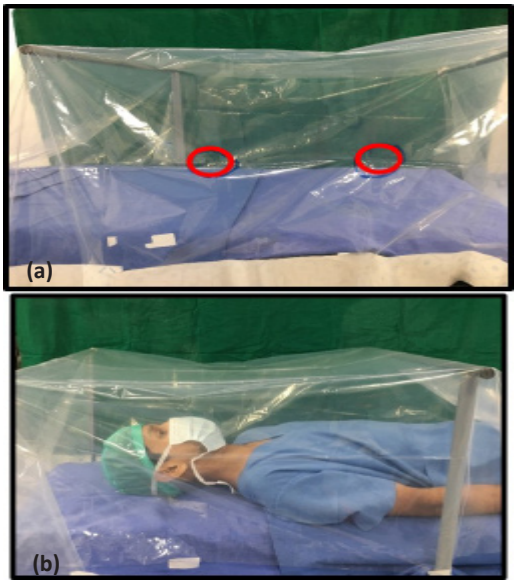

Figure 3: (a-b) Positioning of the slit and the volunteer within the Drap.

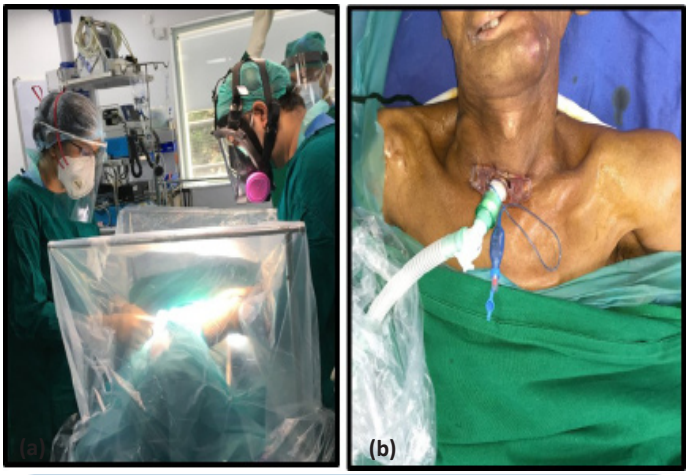

Figure 4: (a-b) Intraoperative and post-operative images.

Important points for effective surgical procedure and infection control

1. Drape fixed to the L screen rods and to the OT table must be devoid of crease for proper visibility during the procedure.
2. L shaped rod should be placed 3 feet apart with the height of 45 cm and parallel to each other to create an effective space for the procedure.
3. OT head lights must be centred over the operative area to reduce the refection.
4. Extra suction should be placed away from Head end to create negative pressure environment.
5. Inlet should be a slit, approximately smaller than the size of the wrist to create an effective (seal) one-way valve during the procedure.
6. It should not be considered as a replacement to other conventional infection control procedures.
7. Plastic polypropylene drapes should be thick enough to avoid propagation of the slit.

Other methods available in literature

1. Rigid transparent Intubation are being used by the anaesthesia personnel for intubation and extubation procedures. It is produced by Indian students at Guwahati [10] which is placed above the patient to limit the flow of virus laden aerosols to the doctor especially during intubation. However, it doesn't fully enclose the patient, hand manuverability is questionable, correct time to removal of device is not clear as it may remain contaminated for hours after the procedure thus limiting its performance status [11].

Advantage

1. It can be an adjunct to standard risk reduction efforts including PPE.
2. it reduces the aerosol exposure at source therefore in addition to the protection to the operating surgeon, this technique also reduces the probability of infection to other healthcare personnel (Anaesthesia Team, OT technician, Nursing Team) present in the OT.
3. It is safe, simple, easily available and cost-effective technique thus it can be applied even in resource constraint setting without additional infrastructure and delay.
4. It also gives enough space for manuverability of the hands and passage of equipment due to the flexible nature of the drape.
5. Height of the draping can be adjusted according to the size of the patients thus its flexible as compared to other rigid intubation boxes.
6. Usage of new drape makes this technique the most sterile and many airway procedures can be performed one after the other without delay.

Limitations

1. Visibility can be reduced in the presence of crease on the plastic drape and odd reflection of the OT headlights.
2. This technique should only be used as an adjunct to the usage of personal protective equipment's to perform tracheostomy in COVID positive patients.

Conclusion

Novel draping technique can be a useful adjunct to the conventional risk reduction efforts during the surgical tracheostomy procedure in the times of COVID-19 pandemic.

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