ORIGINAL ARTICLE

Application of Endotracheal Tube Cuff Pressure Monitoring during Percutaneous Dilatational Tracheostomy: A Novel Technique

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Abstract

Endotracheal tube (ETT) cuff pressure monitoring during percutaneous dilatational tracheostomy (PDT) procedure is an easy-to-use innovative addition to the standard blind technique in a resource-limited setting. This technique can be carried out without disconnecting the breathing circuit, resulting in a lower risk of infectious aerosol generation.

Keywords: Endotracheal tube cuff pressure manometer, Endotracheal tube positioning, Percutaneous dilatational tracheostomy.

Indian Journal of Critical Care Medicine (2021): 10.5005/jp-journals-10071-23961

Introduction

Percutaneous dilatational tracheostomy (PDT) is a preferred bedside method for performing tracheostomy in a patient on mechanical ventilation. During this procedure, the in situ endotracheal tube (ETT) needs to be withdrawn appropriately to perform trachea needle puncture. The fiberoptic bronchoscope (FOB) is a valuable addition for positioning the ETT and to confirm the needle entry point during the procedure. However, in a resource-limited setting, FOB is not readily available. Thus, withdrawal of ETT is frequently performed using conventional laryngoscopy, as during the PDT procedure, there is limited space for laryngoscope manipulation with the neck in hyperextension position; this is a crude method for ETT positioning. The length of the ETT to be withdrawn is not fixed and may vary according to the neck anatomy. Inadequate withdrawal can lead to puncture needle and guidewire getting stuck in the ETT; whereas more than required withdrawal can lead to inadvertent extubation.[1,2] We describe a cuff pressure monitoring technique to locate the appropriate ETT position during its withdrawal.

Technique

After proper neck positioning, under all aseptic precautions and local analgesia, a transverse midline skin incision (2 cm) was given two fingers breadth above the sternal notch. After gentle oropharyngeal suctioning, the ETT cuff was first completely deflated and then minimally inflated with air (1.5–2 mL in 7.5–8.5 ID). The ETT was then gently retracted under continuous cuff pressure monitoring by a cuff pressure manometer (Fig. 1). As soon as the ETT mark at the angle of mouth reached around the desired length (15–17 cm), we observed a sudden rise in ETT cuff pressure, most likely at the point where the partially inflated ETT cuff starts crossing the vocal cord, which is the appropriate position of ETT for performing PDT procedure.

Discussion

The PDT is commonly indicated in critically ill patients, who are on mechanical ventilation and with poor respiratory reserve.

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How to cite this article: Mohammad H, Jain G, Agarwal A, Kausar S, Sama S. Application of Endotracheal Tube Cuff Pressure Monitoring during Percutaneous Dilatational Tracheostomy: A Novel Technique. Indian J Crit Care Med 2021;25(9):1040–1041.

Source of support: Nil

Conflict of interest: None

Fig. 1: ETT cuff pressure monitoring during percutaneous tracheotomy

When using FOB during a PDT procedure, there is a risk of hypercapnia, lung de-recruitment, hypoxia, and increased intracranial pressure.[3] Because ETT cuff pressure monitoring can be performed without disconnecting the breathing circuit, the risk of infectious aerosol transmission to healthcare workers is reduced. Moreover this technique does not require any additional training or expertise.

The PDT procedure is associated with a significant rise in intracranial and tracheal pressure.[4] Additionally, ETT cuff pressure monitoring may be useful to check the change in tracheal pressure during its manipulation and dilatation, especially in patients with raised intracranial pressure, and for the prevention of tracheal trauma.

Conclusion

We recommend use of ETT cuff pressure monitoring while undergoing ETT withdrawal for performing PDT procedure in addition to a standard blind technique in the resource-limited setting.

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