

New Method of Endotracheal Tube Fixation in Long Term Care Settings- Raheja Hospital Method

Sanjith Saseedharan, Roopa Karanam*, Suyash Kulkarni and Roonam Chaddha

Raheja hospital, Intensive care unit, Mahim, Mumbai, India

Abstract

Endotracheal intubation is a common practice in critical care areas like the intensive care unit. Fixation becomes most important when the duration for which tube is inserted is for a long period of time as in the intensive care unit. Optimal Stabilization of the endotracheal tube is the most important step after the endotracheal tube has passed beyond the vocal chords and the cuff is inflated. We describe a new method of endotracheal tube called tripod fixation which seems to be close to ideal method of endotracheal tube stabilization.

Keywords: Endotracheal intubation; Stabilization; Long term care setting; Tripod Fixation

Introduction

Endotracheal intubation is a common practice in critical care areas like the intensive care unit. Fixation becomes most important when the duration for which tube is inserted is for a long period of time as in the intensive care unit [1]. Optimal Stabilisation of the endotracheal tube is the most important step after the endotracheal tube has passed beyond the vocal cords and the cuff is inflated. Unplanned extubations

and unintended tube migration can be fatal for a critically ill patient and are the most undesirable events post intubation [2,3]. We describe a new method of endotracheal tube fixation which seems to be close to the ideal method of endotracheal tube stabilization.

Materials and Methods

We describe a method of endotracheal tube stabilization which would satisfy most of the points of ideal fixation mentioned. We call it a 'tripod fixation' where three bony prominences namely left and right angle of the mandible and forehead are utilized to hold the tube with a cotton twill tape.

Steps of Tube Fixation

Step 1: Tape tied tightly around mandible with knot centered near tube.

Step 2: Two ends of the tape are counter-fixed and tied around tube.

Step 3: Two ends of tube intertwined around themselves and fixed on forehead with adhesive tape taking care that vision is not obstructed.

The main objective is to rigidly and sturdily support the endotracheal tube in a desired level plane thus resulting in improved mechanical stability and thereby enabling it to withstand large drag force induced by the weight of tubings, its attachments and patient movement [4,5] (Figures 2-4).

In order to test the method of fixation we used a Lardeal airway management trainer which was intubated with a no 6 portex endotracheal tube. A Bucks skin traction device was used to give the drag force to check for movement of the endotracheal tube [6] after securing the tube in a tripod fashion with the cotton twill tape and fixing it to the forehead. The vector of traction was in line with the endotracheal tube as shown in Figure 1. The movement of the tube after placing a 2 kg weight was negligible (<1 mm). The amount of

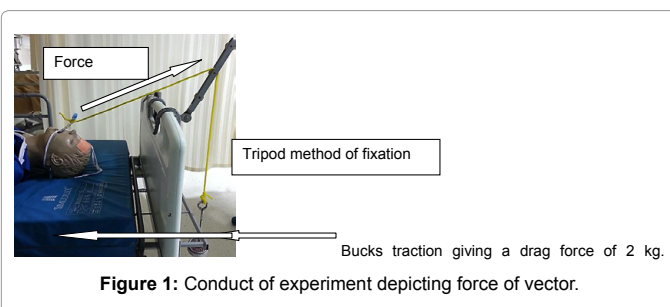


Figure 1: Conduct of experiment depicting force of vector.

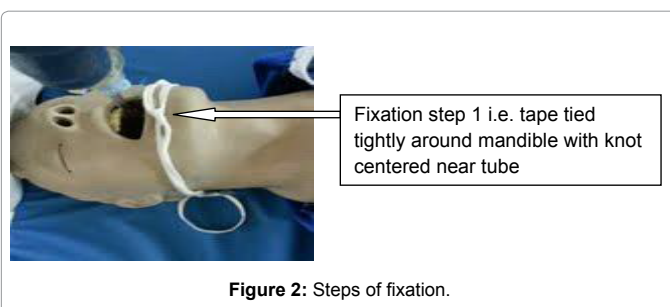


Figure 2: Steps of fixation.

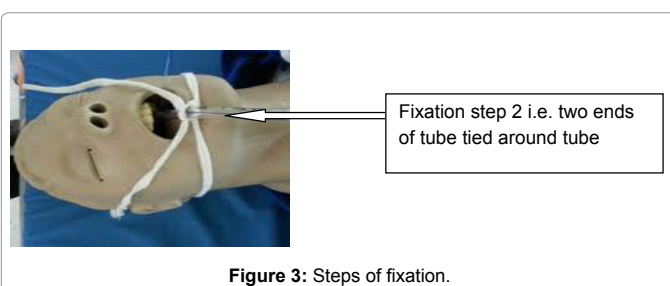


Figure 3: Steps of fixation.

***Corresponding author:** Roopa Karanam, Raheja hospital, Intensive care unit, Mahim, Mumbai, India, Tel: 919030656487; E-mail: Rk1812@gmail.com

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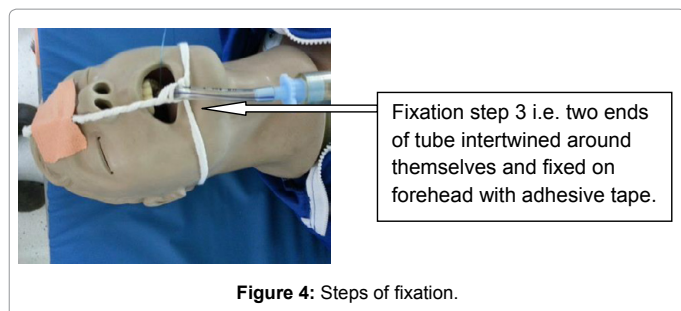


Figure 4: Steps of fixation.

Generic Parameters on a period of 7204 ventilator days	Our ICU Achievement	World-wide averaged Bench Mark
Accidental Extrubation	0%	0.5%-1%
Mucosal breakdown at the angle of mouth	0%	Not available
Ventilator Associated Pneumonia	0.53%	3.3%

Table 1: Indicating the complication rate with the present method of tube fixation is as indicated below.

displacement was measured in centimetres with respect to the teeth which was also negligible.

The same was tried for an endotracheal tube secured with a medical adhesive tape. Two zinc oxide; elastic adhesive tapes of 15 cm length and 1 cm width were used for this purpose.

Tincture benzoine was applied before applying the tapes. Stickiness after drying of tincture benzoine was ascertained before the adhesive tapes were applied encircling the tube to the upper limb and below to the lower lip [7]. Endotracheal tube secured with adhesive tapes could not sustain the drag force and was forced out of the mouth. However side to side movement of the head did not create any displacement in both the methods. Presence of skin reaction, compression of external jugulars could not be tested with this method however.

Discussion

The literature is sparse regarding the ideal method of tube fixation. However a systemic review by Gardner et al. has tried to explain what could be called as the ideal method of tube fixation [4].

As per this review, tube fixation may be called ideal if after fixation there is less than 1 cm of proximal tube displacement, least amount of oral mucosal breakdown, least amount of skin breakdown to lip and facial skin and least amount of accidental or unplanned extubation. The method should also provide for maximum patient comfort, oral hygiene and should be easy to apply requiring minimal nursing time.

Commonly tubes are fixed using white cotton tape/umbilical tape, medical adhesive tape, or a combination of the two and at times a commercial tube holder.

Adhesive tapes cannot be used in patients with impaired face and skin integrity (cellulitis/burns), extreme diaphoresis, patients with beards and allergies. Such tapes are also broad and do obscure the mouth to an extent making it difficult to perform oral hygiene. At times the adhesive part is left open which becomes a nidus for infection and unwanted material like hair to stick to it. Adhesive tapes are also difficult to apply after donning gloves.

Umbilical/cotton tapes when tied horizontally (conventionally) cause increase secretions to be soaked up and thus may harbor infection. They also cause mucosal breakdown at the angles of the mouth. Umbilical tapes/cotton bands can also cause problems with obstruction to venous return if tied too tightly. As the endotracheal tube in the present method is fixed around the mandible (bony prominence) and is counter-fixed to the forehead, thus stabilizing the tie. Chances of the tape slipping (from this position) and not around the neck or to the right or left are minimal. Thus it might not cause compression of the external jugular vein. Also as there is no excess movement (side to side). The tube tie does not touch the tongue or the mucosa of oral cavity in any way (hence no salivation). As the tape does not touch the nose or eye, injury has not been noted. In the presence of a bandage over the forehead it might be difficult to secure the tape. This method of fixation might cause a hindrance to the placement of monitors like a cerebral oximeter, however this can be overcome by decreasing the size of the adhesive tape on the forehead (Table 1).

Conclusion

This method of endotracheal tube fixation has been used in our ICU for more than 7204 ventilator days over the last one year. In our experience we have not noticed any harm or potential for harm. There has been no incidence of accidental extubation, injury /ulcer to angle of the lip. This method of fixation also seems to be cost effective and is also easy to apply.

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