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Case Report

Tracheostomy Tube Cuff Puncture during Insertion of Tracheostomy Tube: An Unusual Overlooked Complication during Tracheostomy

Deepika Garg[1*], Dhiraj Bhandari [1**], Sharmishta De[1*], Shweta Gadge[1*], Monika Malgonde[2*], Vishal Tyagi[3*], Prakash Nagpure[4*]

[1]Asst. Professor, [2] Ex-Senior Resident, [3] Ex-Assistant Professor, [4]Professor and HOD,
[*]ENT-HNS, MGIMS, Sewagram.
[**]Anaesthesiology, MGIMS, Sewagram

Corresponding Author: Deepika Garg

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ABSTRACT

Tracheostomy is one of the most frequent procedures performed in intensive care unit (ICU) patients and also in operation theatres. It is not only performed by the otolaryngologists but also intensivists, neurosurgeons and general surgeons. It is at time common to forget a particular step done during a particular procedure even if that step appears very insignificant.

We would like to report two cases describing an unusual complication of cuff puncture of tracheostomy tube while performing surgical tracheostomy which can be easily overlooked but at the same time can be easily avoided. During surgical tracheostomy, as well as percutaneous tracheostomy the positioning, anaesthesia, monitoring and landmark identification techniques remains same. In surgical tracheostomy however, after adequate exposure of the tracheal rings surgical incision is made on the trachea. After the incision, it is common teaching and practice to use tracheal dilator to create adequate opening and eyeball for any tracheal spicule, irregularity in the tracheal opening, which was forgotten here.

Use of tracheal dilator during performance of surgical tracheostomy can prevent this complication and therefore not only avoids the morbidity and complications associated with leaked cuff tracheostomy tube in situ but also saves on cost by reducing the wastage of tracheostomy tube. We don't believe that this complication is very rare but believe that its importance has been undermined and therefore not reported.

Keywords: Tracheostomy, Cuff puncture, insertion, complication.

INTRODUCTION

Tracheostomy is one of the most frequent procedures performed in intensive care unit (ICU) patients and also in operation theatres. [1] It is not only performed by the otolaryngologists but also intensivists, neurosurgeons and general surgeons. Introduction of percutaneous tracheostomy procedure had also resulted in significant increase in the number of tracheostomies performed. In today's era when cost concerns regarding health care are a high priority, especially in resource limited countries, practicing evidence based medicine and rationalizing it to the local needs becomes extremely important. In one of the recent studies it was shown that early

tracheostomy decreased significantly cost of the health care, especially in trauma population. [2]

Thus practicing evidence based medicine along with ways to decrease procedural complications will lead to decreased length of ICU and hospital stays and save significantly on resources. However not all what we learn to do can always be backed by literature every time, especially if the topic of interest is related to day to day teaching and an established phenomenon. It is at time common to forget a particular step done during a particular procedure even if that step appears very insignificant .This happens especially when the concerned person performing that procedure is not clear about the minute small details and the clinical importance of that particular step in the procedure.

Here we would like to report two cases describing an unusual complication of cuff puncture of tracheostomy tube while performing surgical tracheostomy which can be easily overlooked but at the same time can be easily avoided.

Case1*:* A 50 year male patient of road traffic accident with diffuse axonal injury and anticipated prolonged mechanical ventilation underwent emergency tracheostomy, by the conventional surgical method, being performed by neurosurgical department in our hospital. During the procedure an unusual complication happened. Every time the surgeon inserted the tracheostomy tube, it resulted in a punctured cuff. The cuff was however checked for any leak prior to insertion. This happened with three tracheostomy tubes. After that the ENT surgeons were called for immediately. When the ENT surgeons examined the tracheostomy site we found that there was a small sharp spicule present on the edge of stoma. Further enquiry about the procedure led us to the finding that tracheal dilator was not used each time. Keeping all these things in mind when we inserted an initially checked tracheostomy tube using a tracheal dilator it resulted in successful inflation of the cuff!

Case2*:* A 53 year old male patient of alveolar carcinoma who underwent excision of growth with hemimandibulectomy and modified radical neck dissection developed cardiac arrest on postoperative day two because of suspected severe pulmonary embolism. He was resuscitated successfully but required prolonged mechanical ventilation due to hypoxic encephalopathy. While surgical tracheostomy was being performed, it was found after insertion of tracheostomy tube that cuff was punctured, probably during insertion. Retrospectively on analyzing it was found that tracheal dilator was somehow not used by the performing surgeon and there was a small sharp tracheal cartilage spicule present. With the use of tracheal dilator next time, new tube was successfully passed.

During surgical tracheostomy, as well as percutaneous tracheostomy the positioning, anaesthesia, monitoring and landmark identification techniques remains same. In surgical tracheostomy however, after adequate exposure of the tracheal rings surgical incision is made on the trachea. At times a particular flap is made for passage of the tracheostomy tube in special cases. After the incision, it is common teaching and practice to use tracheal dilator to create adequate opening and eyeball for any tracheal spicule, irregularity in the tracheal opening. This however was forgotten here.

In percutaneous tracheostomy, after adequate exposure and hemostasis trachea is dilated by either single or multiple dilator technique or using Griggs dilator forceps technique (depending on the technique being used by the operator). This indirectly ensures smoothening of the tracheal stoma most of the times created for the passage of tracheostomy tube most of the times.

Cuff leaks have been reported as minor complications in quite few studies. In one study it was identified as perforation of the tracheostomy balloon within first 24 hours. [1] However in another study [3] it was identified as 2nd most common minor complication not noticed immediately but often 7 days post tracheostomy. Both the studies however did not elaborated in detail about the mechanism leading to cuff leak.

In one of the detailed articles on tracheostomy, [4] Cuff leak was identifies as a common encounter, however the exact percentage was not mentioned. The author very rightly pointed out that tracheostomy tube cuffs needs to be checked prior to insertion and malfunctioning tube if identified should be replaced immediately. They later went on to add that tracheomalacia and thereby causing tracheal dilatation as one of the common reasons for tracheal cuff leak. Though not punctured cuff, but a dilated trachea produces leak around the inflated tracheostomy tube cuff because of creation of potential space between the dilated tracheal wall and inflated tracheal tube cuff.

Cuff leaks can be identified as clear audible leaks around the tracheostomy tube, bubbling around the stoma or loss of ventilated volume (the expiratory tidal volume) as noted on ventilator in volume controlled ventilation mode.

In both the above cases slight delay in insertion of tracheostomy tube could have potentially resulted in continuous aspiration of blood and secretions by the patient which could have further increased their morbidity or could have been fatal too.

Furthermore cuff leaks leads to inappropriate ventilation in anaesthetized patients, in patients who have requirements for high driving pressures or Positive end expiratory pressure (PEEP). This can hamper gas exchange and can cause potential cardio respiratory embarrassment in patients particularly those who have significant cardio respiratory disease.

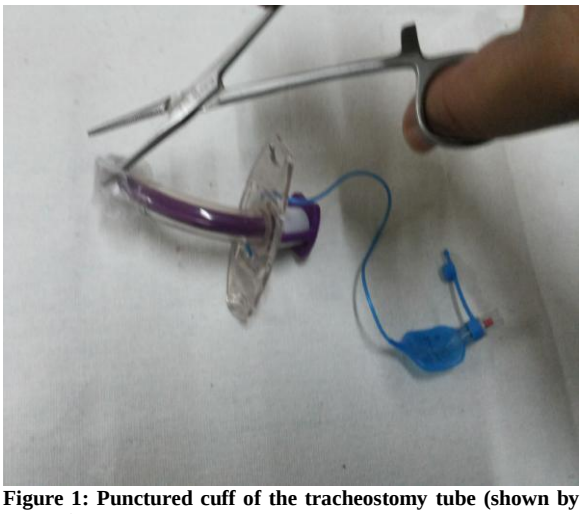

Figure 1: Punctured cuff of the tracheostomy tube (shown by artery forceps), damaged during insertion.

So to conclude, tracheostomy tube cuff puncture is an unusual complication which can occur during performance of tracheostomy (especially surgical tracheostomy) that can be easily overlooked. This can be more common in elderly patients where the cartilage starts ossifying. Use of tracheal dilator during performance of surgical tracheostomy can prevent this complication and therefore not only avoids the morbidity and complications associated with leaked cuff tracheostomy tube in situ but also saves on cost by reducing the wastage of tracheostomy tube.

We searched for literature on "cuff puncture during insertion of tracheostomy tube during percutaneous or surgical tracheostomy" but could not find literature. When going through excellent reviews [1,3,4,5] on tracheostomy covering wide aspects, we still could not find mention of this particular complication. We don't believe that this complication is very rare but believe that its importance has been undermined and therefore not reported. Also we feel that since checking for irregularity in tracheal stoma is common bedside

teaching, authors, reviewers, editors of various journal may had a natural bias in not publishing this complication.

The reporting of this complication is to only underline and reinforce the concept that adequate dilation of tracheal stoma and making sure that the stomal edges are smooth before inserting tracheostomy tube. We therefore recommend and reinforce that all medical personnel who are doing surgical tracheostomy should have tracheostomy set with tracheal dilator as its essential component.

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