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Life threatening occlusion of the airway: A role for endoscopic guided decannulation following percutaneous tracheostomy

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Abstract:

Percutaneous Tracheostomy (PT) is a cost-effective, minimally invasive and relatively procedure for bedside tracheostomy tube placement. However, it may result in complications, which can cause airway problems following decannulation, which at present is largely done blindly. We report a rather infrequent occurrence of early onset of total obstruction of the suprastomal trachea following P T, which resulted in a life threatening occlusion of the airway after removal of the tracheostomy tube. We review the relevant literature and make a case for endoscopic guided decannulation to be done routinely.

Key words: Percutaneous tracheostomy, decannulation, endoscopic guided

Introducción:

Percutaneous tracheostomy (PT) is now well established in ICUs throughout the world. It compares favourably with traditional open surgical tracheostomy (OST). It is cost-effective and yet minimally invasive.[1] With improved knowledge and expertise, the incidence of complications with PT has been reduced. It know closely approximates the morbidity associated with OST, which has been the gold standard for bedside tracheostomy tube placement.[2] However serious complications can occur during decannulation, which at present is largely being done blindly.[3]

We herewith present an infrequent occurrence of life-threatening occlusion of the airway. This was because of exuberant granulation totally occluding the suprastomal trachea. Inspection of the airway prior to removal of the tracheostomy tube and appropriate treatment could have averted this catastrophic event. We examine the confounding issues and make a case for endoscopic guided decannulation following PT as a routine.

Case report:

A 73-year old patient with a long-standing Chronic Obstructive Pulmonary disease (COPD) was admitted to the ICU following an acute exacerbation. Two days later, a PT was performed. Introduction of the tube was difficult because the trachea was very calcified. Eventually after considerable pressure a size 8.0 mm Portex tube was inserted. Weaning over the following 3 weeks proved difficult. Nevertheless, decannulation was attempted. Immediately, the patient developed complete obstruction of the airway. He became cyanosed and nearly had a respiratory arrest. The tracheostomy tube was re-inserted and the patient was successfully resuscitated. A fibre-optic examination of the airway revealed florid granulation in the supra-stomal trachea. CT scan demonstrated an obliterative lesion proximal to the tracheostomy site (**Figures 1 & 2**). Later, a microlaryngoscopy and laser excision of the mass was done. The patient was successfully decannulated. He remains asymptomatic at 7 months follow up.

Discussion:

Airway complications following PT vary in degree. They may present as granulations, nodulations, polypoids, tracheomalacia, fibrosis or scarring.[4] Even though most are mild, delayed and self-limited, some of them occur early and are serious enough to cause problems during or after removal of the tracheostomy tube.[3]

In one series, there were four instances of such difficulty due to granulation encroaching into the lumen of the trachea. In each case the stoma involved the cricoid cartilage.[5] In another article, herniation of the suprastomal tracheal wall resulted in obstruction of most of the lumen with similar consequences.[6] In a retrospective study in 42 patients, there were nine instances of significant granulomas, resulting in difficulty in weaning from ventilatory assistance, without any other clinical features.[7]

The present case is unique on two counts. Firstly, there was exuberant granulation totally occluding the lumen and extending up to 1 cm along the length of the trachea. Secondly, it had occurred relatively early i.e. within 3 weeks of the original procedure. Such extensive granulation forming so early and directly attribut-

able to the tracheostomy procedure is a rather rare instance. There could be two factors contributing to this scenario. Firstly, the tube insertion was difficult because the trachea was very calcified. Considerable pressure was exerted during the process. Secondly, there was evidence of stomal infection. Unlike open tracheostomy, tube change following PT has to be delayed because the tract is not well formed earlier. Thus there is a greater chance of local sepsis, which in turn can predispose to formation of granulation tissue.[8]

Traditionally, decannulation is carried out using any of the following three methods, namely replacement with a fenestrated tube, using progressively smaller tubes or the use of a stomal button.[9] But none of these are infallible. Trial with smaller tubes may give a false sense of security even in the face of an obstruction above the tube. Besides, it can delay weaning if secretions are viscid and copius.3 Fenestrated tubes though useful and desirable in terms of allowing phonation, can hamper decannulation because even small granulation tissue can occlude the fenestra and cause needless difficulties.[10] A tracheostomy button may be difficult to maintain in place, with chances of inward or outward dislodgement.[11]

It has been speculated that the airway be inspected prior to decannulation in order to circumvent these problems.[2] In its early days, PT was associated with complications like poor placement of the tube, perforation of the posterior tracheal wall and subcutaneous emphysema. All these have now been reduced by the routine use of an endoscope at the time of insertion of the tracheostomy tube. It therefore stands to reason to even decannulate under vision. This would help in recognising potential problems, which could manifest as an inexplicable difficulty in weaning or respiratory distress and lead to potentially life threatening mishaps as in the present case. Bedside fibre-optic endoscopy has several advantages. It is well tolerated by the patient, is relatively safe, easy to perform, quick and cost-effective. Therefore we recommend that it be performed routinely prior to removal of the tracheostomy tube. There are three chief benefits. Firstly, it would provide information about the anatomical and functional status of the airway. This would facilitate removal of the tube and in the post-decannulation care.[3] Secondly and more importantly, steps could be taken to tackle potential situations that could threaten the airway in the period around tube removal. Thirdly, recognising and tackling these lesions earlier on would be easier than dealing with them later on. After all it is easy to treat small granulation, polyp or nodules than frank stenosis or prominent scarring. In the present case our patient could have been spared a critical incident had this protocol been followed.

A detailed prospective study would be most appropriate in commenting for sure whether our idea is justified. We are at present conducting an observational trial looking into this issue.

References:

1. Cobean R, Beals M, Moss C, Bredenburg C E. Percutaneous dilatational tracheostomy: a safe cost-effective bedside procedure. Arch Surg 1996; **131**: 265-271
2. Douglas D M, Shonan Y, David M P et al. Bedside tracheostomy in the Intensive care unit: a prospective randomised trial comparing open surgical tracheostomy with endoscopic guided percutaneous tracheostomy. Laryngoscope 2001; **111**: 494-500
3. Lee T S, Wu Y. Bedside fibreoptic bronchoscopy for tracheostomy decannulation. Resp Med 1995; **89**: 571-575
4. Law J H, Barnhart K, Rowlett W, Lowenberg S. Increased frequency of obstructive airway abnormalities with long-term tracheostomy. Chest 1993; **104**: 136-138
5. Benjamin B, Kertesz T. Obstructive suprastomal granulation following percutanoeus tracheostomy. Anaesth and Intensive care 1999; **27**: 596-600
6. Osborne J E, Osman E Z, Cuddihy P, Ranta M. tracheal ring herniation following percutanoeus dilatational tracheostomy and its resection under endoscopic control. J Laryngol Otol 1999; **113**: 1116-1118
7. Pinet C, Quenee V, Sainty J M. Contribution of systematic endoscopic decannulation: a retrospective study in intensive care patients. Rev Pneumol Clin 1998; **54**: 81-84
8. Levin R, Trivikram L. Cost-Benefit analysis of open tracheostomy in the OR and at the bedside with percutaneous tracheostomy. Laryngoscope 2001; **111**: 1169-1173
9. Plummer A L, Gracey D R. Consensus conference on artificial airways in patients receiving mechanical ventilation. Chest 1989; **96**: 178-180
10. Siddarth P, Mazzarella L. Granuloma associated with fenestrated tracheostomy tubes. Am J Surg 1985; **150**: 279-280
11. Kirchner J A. Trachesotomy and its problems. Surg Clin No Amer 1980; **60**: 1093-1104

Summary points:

- Percutaneous tracheostomy (PT) is a cost-effective and minimally invasive procedure for bedside placement of tracheostomy tube
- The morbidity associated with it closely approximates that with open surgical Tracheostomy (OST)
- Complications following this procedure can vary in degree; most are mild and delayed. However, some can be serious and occur early on
- Early onset complications are otherwise silent except for difficulty in weaning. Hence these cannot be recognised with the tracheostomy tube in place
- Decannulation methods currently used are blind and have limitations

- Endoscopic inspection of the airway prior to removal of the tube would recognise potential problems and enable pre-emptive action
- Endoscopy has several advantages and benefits
- Decannulation following percutaneous tracheostomy would become a much safer procedure with endoscopic guidance and should be done as a matter of routine

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Figuras:

Figure 1: Axial scan of the neck: Complete circumferential obstruction of the trachea by a soft tissue mass (*). Tracheostomy tube seen anteriorly

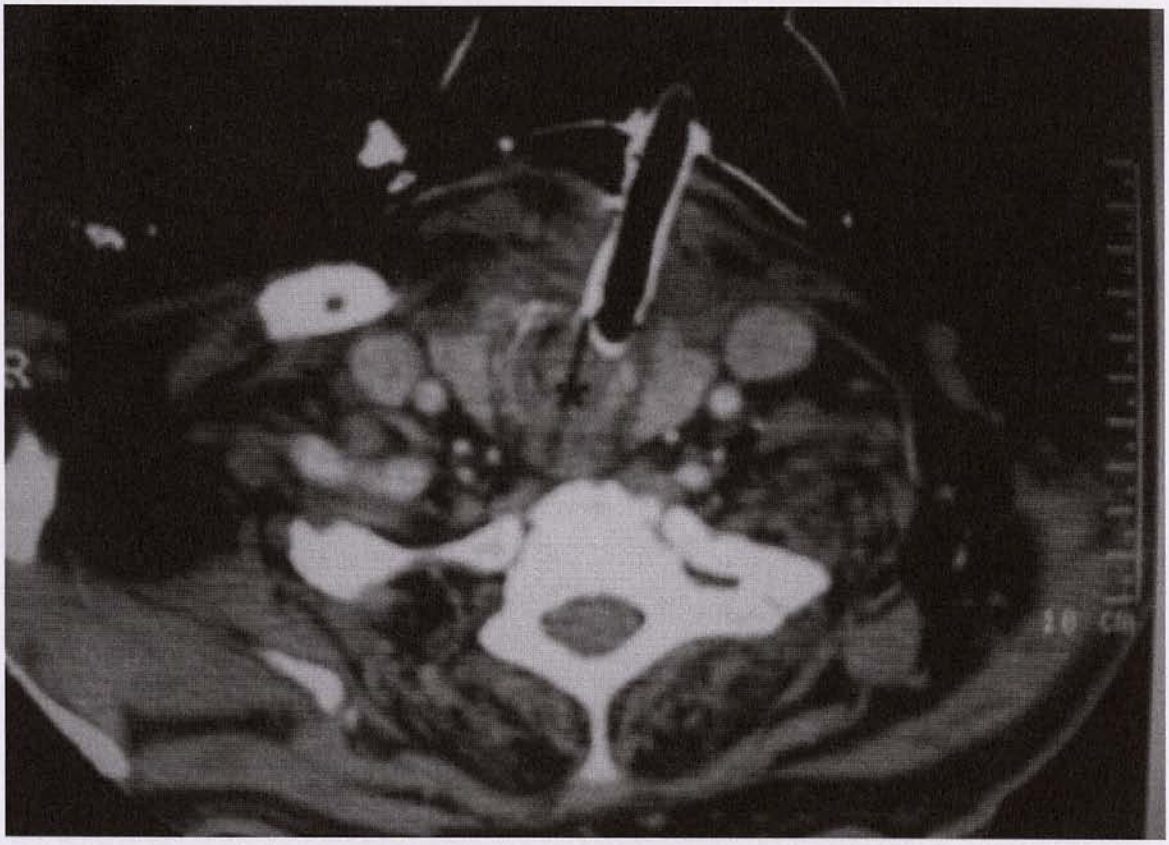

Figure 2: Coronal reconstruction: Mass (*) extending for 1 centimetre in the vertical plane