

Tracheostomy on the intensive care unit for adult patients

B.G. Fikkers¹, in collaboration with the committee “Guidelines Tracheostomy” of the NVIC²

¹ B.G. Fikkers, Radboud University Nijmegen Medical Centre
b.fikkers@ic.umcn.nl

² P. Breedveld, azM, Maastricht
ph.breedveld@mumc.nl
H. Delwig, UMCG, Groningen
h.delwig@umcg.nl
D. Dongelmans, AMC, Amsterdam
d.a.dongelmans@amc.nl
J.G. van der Hoeven, Radboud University Nijmegen Medical Centre
j.vanderhoeven@ic.umcn.nl
J.J. Spijkstra, VU University Medical Center, Amsterdam
jj.spijkstra@vumc.nl
D.P. Veelo, AMC, Amsterdam
d.p.veelo@amc.nl
R.J. de Wit, Medisch Spectrum Twente, Enschede
r.dewit@mst.nl

Conflict of interest: None

Financial support: None

Samenvatting

De percutane tracheostomie heeft de chirurgische tracheostomie verdrongen als techniek voor volwassen intensive care patiënten. Het is lastig precieze aanbevelingen te geven aangaande de optimale timing van een (percutane) tracheostomie, aangezien dit afhangt van de klinische toestand en de prognose van de patiënt. Bovendien behoren vrijwel alle aanbevelingen tot “evidence level D of E”. Indien de beademing langer lijkt te gaan duren dan twee weken, dan is een tracheostomie te overwegen (Level C). De meeste contra-indicaties voor een percutane tracheostomie zijn relatief en hangen af van lokale richtlijnen en individuele ervaring (Level E). De techniek met de conische dilatator lijkt de voorkeur te hebben (Level C).

Dit protocol vervangt het oude uit 2007.

Summary

Percutaneous tracheostomy has replaced surgical tracheostomy as the preferred technique for adult patients in the intensive care unit (ICU). It is difficult to give clear guidelines on the optimal timing of (percutaneous) tracheostomy, because this depends on the clinical situation and prognosis of the patient. Moreover, most recommendations are based on level D or E evidence. When ventilation is expected to last longer than two weeks, early percutaneous tracheostomy, may be considered (Level C). Most contra-indications for percutaneous tracheostomy are relative and depend on individual experience (Level E). The single step dilatational tracheostomy seems to be preferred (Level C).

This protocol replaces the previous one from 2007.

1) Outline

This guideline describes the indications for, and the procedure of percutaneous tracheostomy (PT) in adult patients in the intensive care unit (ICU). It is based on two published reviews in Dutch journals ^{1, 2} and two recent reviews ^{3, 4}. The procedures in an emergency situation are briefly described in paragraph 5 e.

In the literature, the terms tracheotomy and tracheostomy are inconsistently applied and most often used interchangeably ⁵. The committee prefers the term tracheostomy, reserving the term tracheotomy only for the act creating an opening in the trachea.

8) Airway control during PT

Airway control during PT has several pitfalls, such as the risk of accidental extubation, endotracheal tube cuff rupture, or transfixion of the endotracheal tube. There are several ways to secure the airway, although only the two most relevant methods are discussed here.

a. Tube withdrawal.

One method is to withdraw the endotracheal tube under direct laryngoscopic view or with a videolaryngoscope prior to puncturing the trachea, so that the cuff is placed in between or just below the vocal cords. It is also possible to withdraw the tube into the pharynx and, following cuff inflation, leaving only the tip into the laryngeal opening, so the tracheal tube cuff acts as a laryngeal inlet obturator. With this technique, airway loss is likely, so never do so when the intubation conditions are difficult.

b. Tube replacement.

It is also possible to replace the endotracheal tube by a laryngeal mask airway (LMA)⁷⁰⁻⁷². However, this method relies on a second technique of airway control, with inherent complications, most importantly aspiration of gastric contents. Intensive care patients often require high inflation pressures, have impaired gastric emptying and have oropharyngeal and perilaryngeal edema secondary to prolonged endotracheal intubation, making emergency re-intubation hazardous. The advantages of better visualization and preventing damage to the bronchoscope have to be weighed against the possible disadvantages of aspiration and loss of the airway.⁶⁸ (Level C).

10) Discharge from the ICU with a tracheostomy cannula.

A patient can only be discharged safely from the intensive care unit to a nursing floor if adequate care can be provided. In general, only patients with a cuffless cannula should be transferred to the nursing floor. When an inflated cuff is present, obstruction of the cannula may lead to a potentially lethal obstruction of the airway. When adequate exposure and adequate experience are both present (as for example on a neurology department), patients may be transferred with an inflated cuff. A removable inner cannula should always be used, to facilitate cleaning and to overcome acute cannula obstruction. Cannula displacement also represents a potentially catastrophic complication, in particular in patients who are unable to protect their upper airways (for example EMV<9 or vocal cord paresis) and in particular within the first week of the procedure. Tracheal suctioning by nurses should be necessary only once or twice per shift. In the first 48 hours after transfer, close contact with the referring intensive care unit is advisable, for example with the aid of a consulting intensive care nurse. It is advisable that patients with a tracheostomy should be followed up by a multidisciplinary tracheostomy team, since this will improve care and shorten the duration of cannulation⁷⁸ (Level D). In the absence of such a team, local protocols are important to describe the appropriate aftercare of patients with a tracheostomy cannula on the ward, like who is responsible and which specific measures are necessary (i.e. availability of a tracheal spreader, humidification, physiotherapy, suctioning, stoma care etc).

A speech valve can be used safely, provided the patency of the airway and swallowing are checked prior to transfer by a speech therapist. The indication of the tracheostomy cannula should be questioned daily. Although little evidence is available to guide the optimal timing of tracheostomy cannula removal, the best arguments for this are the presence of an adequate respiratory drive, good cough and the ability to protect the airway⁷⁹. Ideally, there should be follow up of patients until the trachea has properly healed for several months after removal of the tracheostomy cannula. Unless the events are recorded as critical incidents or as part of an ongoing audit, underreporting of acute complications will occur.

Level aanbevelingen

- A. Ondersteund door tenminste twee grote prospectief gerandomiseerde gecontroleerde klinische onderzoeken of een meta-analyse met een kleine kans op een vals positief of een vals negatief resultaat
- B. Ondersteund door één groot prospectief gerandomiseerd gecontroleerd klinisch onderzoek met een kleine kans op een vals positief of een vals negatief resultaat
- C. Ondersteund door één of meerdere kleine prospectief gerandomiseerde gecontroleerde klinische onderzoeken of een meta-analyse met een matige tot grote kans op een vals positief of een vals negatief resultaat
- D. Ondersteund door alleen een niet-gerandomiseerd maar wel gecontroleerd klinisch onderzoek, een cohort studie of een patiëntcontrole onderzoek
- E. Ondersteund door alleen niet-vergelijkend onderzoek, historische controles, case reports of de mening van deskundigen

Reference List

1. Staatsen M, Fikkers BG, van der Hoeven JG. Percutaneous tracheostomy. *Neth J Crit Care* 2005; 9(5):253-258.
2. Dongelmans DA, van der Meer NJ, Schultz MJ. [Percutaneous dilatating tracheostomy in intensive-care patients: technique, indications and complications]. *Ned Tijdschr Geneesk* 2003; 147(48):2370-2374.
3. Scales DC. What's new with tracheostomy? *Intensive Care Med* 2013; 39(6):1005-1008.
4. Durbin CG, Jr. Tracheostomy: why, when, and how? *Respir Care* 2010; 55(8):1056-1068.
5. Pierson DJ. Tracheostomy from A to Z: historical context and current challenges. *Respir Care* 2005; 50(4):473-475.

68. Kunz T, Strametz R, Grundling M, Byhahn C. [Percutaneous tracheostomy in intensive care medicine - Update 2012]. *Anesthesiol Intensivmed Notfallmed Schmerzther* 2012; 47(10):598-604.

70. Dexter TJ. The laryngeal mask airway: a method to improve visualisation of the trachea and larynx during fibreoptic assisted percutaneous tracheostomy. *Anaesth Int Care* 1994; 22(1):35-39.
71. Carron M, Freo U, Michielan F, Ori C. Effects of tracheal intubation on ventilation with LMA classic for percutaneous dilation tracheostomy. *Minerva Anesthesiol* 2010; 76(3):181-187.
72. Linstedt U, Zenz M, Krull K, Hager D, Prengel AW. Laryngeal mask airway or endotracheal tube for percutaneous dilatational tracheostomy: a comparison of visibility of intratracheal structures. *Anesth Analg* 2010; 110(4):1076-1082.

78. Yu M. Tracheostomy patients on the ward: multiple benefits from a multidisciplinary team? Crit Care 2010; 14(1):109.
79. Bittner EA, Schmidt UH. The ventilator liberation process: update on technique, timing, and termination of tracheostomy. Respir Care 2012; 57(10):1626-1634.