

PERCUTANEOUS DILATATIONAL TRACHEOSTOMY PERFORMED BY ANAESTHESIOLOGIST IN A LOW RESOURCE SETTING: A PRELIMINARY REPORT ON 19 PATIENTS

Antwi-Kusi A¹, Boakye G¹, Sam-Awortwi W¹, Konney A²

¹Department of Anaesthesiology and Intensive Care, ²Department of Ear, Nose and Throat. - Komfo Anokye Teaching Hospital, Kumasi, Ghana.

Abstract

Background: Percutaneous dilatational tracheostomy (PDT) is an established alternative to surgical tracheostomy in intensive care patients deemed to require prolonged ventilation. The procedure is simple, cheap and is associated with less complication. Even though PDT is the preferred technique of tracheostomy in ICU's in low resource countries like Ghana little is known about this technique. PDT using the percutwist set became available in the ICU of the Komfo Anokye Teaching Hospital recently and we report on 19 consecutive cases done so far.

Objective: To determine the outcome of 19 percutaneous dilatational tracheostomy done under bronchoscopic guidance by anaesthesiologists in an Intensive Care Unit.

Design: Retrospective study.

Setting: Intensive Care Unit of the Komfo Anokye Teaching Hospital, Kumasi, Ghana

Subjects and Methods

Nineteen consecutive patients who underwent percutaneous dilatational tracheostomy at the bedside

using the percutwist set under bronchoscopy guidance.. Using the admission/discharge books and the Nurses report book in the ICU, patients' records were retrieved. The number and success of tracheostomies, and the complications were assessed.

Results: There were 19 patients who underwent PDT during the period. 17 (95.24%) of the tracheostomies done were successful with easy ventilation of the lungs. In one patient (4.76%) PDT was unsuccessful and was converted to surgical tracheotomy. One patient had a problem with ventilation after the tracheostomy tube was inserted. It was detected that the tube was short and was therefore replaced with a normal endotracheal tube. There was bleeding from the incision site in two of the patients (9.5%). This was controlled with pressure dressing.

Conclusion: In a low resource country like Ghana where there is a limited number of ENT surgeons, PDT performed by the anaesthesiologist in the ICU can be an alternative technique to surgical tracheostomy. It is safe and success rate is high if done by skilled Anaesthesiologist in the appropriate patient.

Key Words: *Percutaneous, dilatation, tracheostomy, percutwist.*

Introduction

Recent advances in intensive care medicine recommends early tracheostomy especially in head injury patients who because of their injuries are likely to require prolonged ventilatory support¹. Early tracheostomy performed on patients expected to be on long term mechanical ventilation improves mortality². Tracheostomy has therefore become one of the commonest planned surgeries done by ENT surgeons in the ICU and the demand for it is increasing³. This demand often interferes with the already tight schedule of the ENT surgeon and delays are common for surgical tracheostomies to be performed.. To the ENT Surgeon this is no problem since the patient is already

intubated and there is no emergency about the procedure requested. Again most ENT surgeons are not happy doing this procedure at the bedside since it involves carrying surgical instruments together with the ENT Nurse and a Surgeon assistant to the ICU. This is not only cumbersome but also expensive⁴. There is therefore a need for an alternative to surgical tracheostomy which involves dissecting the pretracheal tissues and inserting the tracheostomy tube under direct vision⁵.

Percutaneous dilatational tracheostomy is an established alternative to surgical tracheostomy in intensive care patients deemed to require prolonged ventilation⁶. Percutwist mainly consists of a screw like dilating device that lifts the anterior tracheal wall during dilatation thus keeping the tracheal lumen open and enabling an unrestricted bronchoscopic view of the dilation site at any given time⁷.

The procedure is simple, cheap and can be done at the bed side by Anaesthesiologists who has no surgical training. It is associated with less complications

Author for Correspondence:
Dr Akwasi Antwi-Kusi
Department of Anaesthesiology & Intensive Care
Komfo Anokye Teaching Hospital
Kumasi
E mail: antwikusi@yahoo.com
Conflict of interest: None declared

compared to surgical tracheostomy. Infections are less, favorable scar after decannulation⁹. This technique using the Percutwist set became available in the ICU of the Komfo Anokye Teaching Hospital recently and we report on 19 consecutive cases done so far.

Methods

Approval was sought from the ethics and research committee of the Kwame Nkrumah University of Science and technology and Komfo Anokye Teaching Hospital, Kumasi, Ghana. Details of all patients who had undergone tracheostomy in the intensive care unit of the Komfo Anokye Teaching Hospital since May 2009 to Dec. 2012 were analysed using the admission and discharge/procedure book and the Nurses record book in the ICU. Patients who had PDT were selected for analysis.

All tracheotomies were performed at the bed site in the intensive care unit with bronchoscopy guidance under general anaesthesia using propofol, morphine and vecuronium. The incision site was also infiltrated with xylocaine with adrenaline to reduce bleeding.

From the records we looked for the indications for the tracheostomies, any adverse effects and complications recorded during and after the procedure. A Percutwist set with a Percuquick tracheostomy cannula (Ruesch GmbH, Kern, Germany) was used for all the tracheostomies (Fig.1).

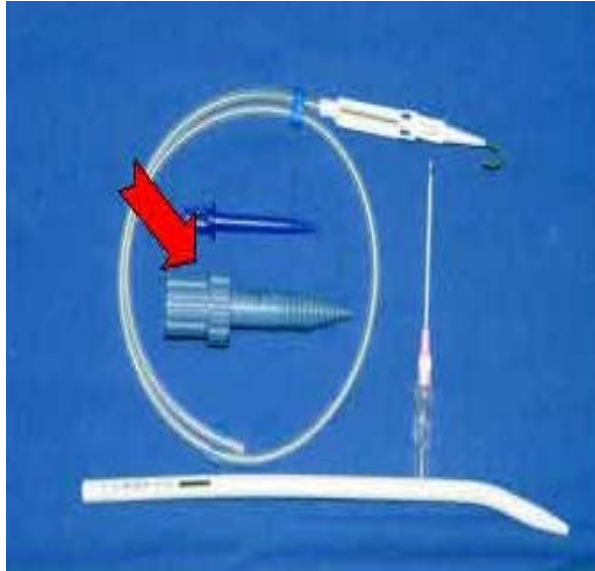


Figure 1. Picture of Percutwist (Arrowed)

Description Of The Procedure

Sand bags were placed under the shoulders of the patient to extend the neck and the surgical area cleansed and draped. The patient is ventilated with 100% oxygen and SPO₂ as measured by pulse oximetry, blood pressure and ECG were monitored continuously. A 1.5cm incision is placed one to two finger breadths above the jugular notch (Fig. 2) and the subcutaneous fat is separated using a curved artery

there is less bleeding and it leaves an aesthetically forniceps. At this point a flexible bronchoscope is inserted and aligned with the tip of the endotracheal tube (ETT). The bronchoscope and ETT are slowly withdrawn until the incision is maximally trans-illuminated, allowing continuous visualization of the entire procedure. A 14-gauge introducer needle is

inserted between the second and third tracheal rings and positioned centrally in the midline of the trachea (Figs. 3&4).



Figure 2. Picture showing Patient position and incision for dilatative tracheostomy.



Figure 3. Picture showing Percutwist inserted over guide wire. Inset shows introducer needle in trachea lumen.

Results.

The demographic characteristics and initial diagnoses of the 19 patients requiring tracheostomy are shown in Table 1. The percutwist procedure was successfully performed in 18 out of the 19 patients giving a success rate of 94.7%. The tracheostomy tubes were passed easily and the lungs ventilated without any problems.

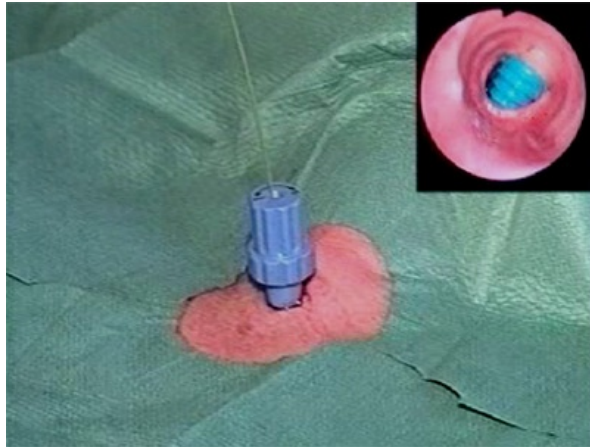


Fig.4: Percutwist screwed into the trachea

Table 1. Summary of patient demographics, diagnoses and number of days on ventilator before tracheostomy

Diagnosis	No.	Av. Age (yrs)	Av. no. days on Ventilator before tracheostomy	M	F
Severe Head Injury	8	29.7	11	1	7
Eclampsia	2	26	8	0	2
Severe Sepsis	4	49.2	10	1	3
Guillan Barre Syndrome	2	24	7	1	1
Upper Airway Obstruction	1	56	7	0	1
Post Extubation Obstruction	1	27	4	0	1
Post Cardiac Arrest	1	31	9	1	0

There was one major incident associated with the procedure. This was inability of the percutwist to fully dilate the trachea. After the whole length of the Percutwist had been screwed, only a tip of the Percutwist could be seen on bronchoscopy. This made it impossible to insert the tracheostomy tube. The procedure was abandoned and the ENT surgeon called in to convert it to surgical tracheostomy.

There were two minor complications: In the first case there was bleeding from the incision site in two of the patients (9.5%). This was controlled with pressure dressing. In the second case it was realized that the tracheostomy tube was short making ventilation difficult. It was therefore changed for a longer one.

One patient (4.76%) had problem with ventilation after the tracheostomy tube was inserted. The tube was therefore changed for a normal endotracheal tube.

Discussion

Tracheostomy is the most common operative intervention in the intensive care unit⁹. Despite the long experience with surgical tracheostomy, the technique still has many complications with an overall incidence of 6%-60% including pneumothorax, subcutaneous emphysema or tube dislodgement^{10, 11}. Our result has shown a good success rate of 95.24% with very few complications. Two (11%) of our patients had bleeding from the incision site. Indeed bleeding is the most common complication reported in all studies with up to 8% of patients bleeding from insertion site¹². PDT is safe when performed on appropriately selected ICU patients by competent intensive care doctors in ICU setting equipped to respond immediately to airway and surgical emergencies¹³. Before PDT is performed there is the need for an intensivist or senior trainee to perform a risk/benefit assessment of the procedure for an individual patient. A thorough clinical examination of the anterior neck anatomy must be performed with additional imaging as indicated. The one patient in whom PDT was unsuccessful had a large neck such that the percutwist could not dilate the trachea. Even though Leinhardt et al¹⁴ recommended to keep this technique in the domain of surgery, he also pointed out that some doctors in non-surgical specialties such as intensive care and anaesthesia already skilled in vascular access using the Seldinger technique could also be trained to perform percutaneous tracheostomy¹³. Our report confirms Leinhardt's recommendation.

Conclusion

In a low resource country like Ghana where there are a limited number of ENT surgeons, PDT performed by the Anaesthesiologist in the ICU can be an alternative technique to surgical tracheostomy. It is safe and success rate is high if done by skilled Anaesthesiologists in the appropriate patient. This technique should be incorporated into the anaesthesia residency program.

References

1. Rumbak MJ, Newton M, Truncale T et al A prospective, randomized study comparing early percutaneous in critically ill medical patients. *Crit. Care Med* 2004; 32:1689-1694.
2. Devarajan J, Vydyanathan A, Due M, Murthy SM. Early tracheostomy is associated with improved outcomes in patients who require mechanical ventilation after cardiac surgery. *J Am Coll Surg*. 2012 Jun; 214: 1008-1016.
3. Heffner JE, Miller KS, Sahn SA. Tracheostomy in the intensive care unit Part I: Indications, technique, management. *Chest* 1986; 90:269-274.
4. Toursarkissian B, Zweng TN, Kearney PA et al. Percutaneous dilatational tracheostomy: Report of 141 cases. *Ann Thoracic Surg* 1994; 57:862-867.
5. Reeve IR. Percutaneous tracheostomy in: Anaesthesia Review No. 15 edited by Kaufman L and Ginsburg R, Toronto, Churchill- Livingstone: 1999; pp 169-183.
6. Ciaglia P, Firsching R, Syniec C. Elective percutaneous dilatational tracheostomy. A new simple bedside procedure; preliminary report. *Chest*. Jun 1985; 87: 715-719.
7. Westphal K, Maeser D, Scheifer G et al. A new single-dilator technique for percutaneous tracheostomy. *Anesth. Analg* 2003; 96:229-232.
8. taneous dilatational tracheostomy to prolonged translaryngeal intubation (delayed tracheostomy)
9. Park H, Kent J, Joshi M, Zhu S, et al Percutaneous versus open tracheostomy: Comparison of procedures and surgical site infections. *Surg. Infect* (Larchmt). 2013 Feb 21(Epub ahead of print).
10. Byhahn C, Wilke HJ, Lischke V, et al. Bedside percutaneous tracheostomy: clinical comparison of Griggs and Fantoni techniques. *World J Surg* 2001;25: 296-301.
11. Turkmen A, Altan A, Turgut N et al. Comparison of percutaneous dilatational tracheostomy with surgical tracheostomy. *Middle East J. Anaesthesiol* 2008; 19(5): 1055-1067.
12. Westphal K, Maeser D, Scheifer G et al. A new single-dilator technique for percutaneous tracheostomy. *Anesth. Analg* 2003; 96:229-232.
13. Pandit RA, Jacques TC, Audit of over 500 percutaneous dilatational tracheostomies. *Crit Care. Resusc* 2006; 8:145-50.
14. Leinhardt DJ, Mughal M, Bowles B, Glew R, Kishen R, MacBeath J, et al: Appraisal of Percutaneous tracheostomy. *Br J Surg* 1992; 79:255-258.