

Comparing the immediate complication rates of percutaneous dilatational tracheostomy on a tertiary referral surgical intensive care unit: Ciaglia Blue Rhino™ versus Tracoe experc®

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Introduction

- In the UK 16% of intensive care patients receive a tracheostomy and units perform an average of 65 per year.⁽¹⁾
- Percutaneous dilatational tracheostomy (PDT) is undertaken aiming to minimise complications of prolonged tracheal intubation and aid ventilatory weaning.
- Relative to surgical tracheostomy PDT is thought to be a safe, efficient and cost effective alternative.⁽²⁾ There is limited data to suggest that tracheostomy, using either technique, does actually result in direct benefit to the critically ill patient compared to prolonged intubation.
- Complication rates for PDT are not insignificant with 6% major and 30% minor complications as classified by Fikkers et al.⁽³⁾ Directly attributable deaths have been reported, including from our own unit.⁽⁴⁾ (see table 1)
- Given the paucity of data defining who will benefit from tracheostomy and the complication rate, it is imperative that we regularly review our own practice.

Table 1- Complications of percutaneous tracheostomy

Complications	Range (2,3,5,6)	Fikkers ⁽³⁾
Mortality	0 - 0.1%	0%
Major complications		6%
Bleeding requiring exploration	0 - 3%	3%
Desaturation below 90%	0 - 12.5%	0%
False passage	0.3 - 1.3%	1%
Tension pneumothorax	0 - 2%	2%
Minor complications		30%
Bleeding controlled by local pressure	1.6 - 16%	14%
Tracheal tube puncture	4.7 - 5.6%	5%
Subcutaneous emphysema	0 - 1.2%	1%
Posterior tracheal wall injury	0 - 1.2%	2%
Hypotension (SBP<90mmHg)	1 - 5%	1%
No complications	37-96%	70%

Our Practice

- Our unit has 17 level II/III beds. The majority of our admissions are surgical including liver transplantation and vascular surgery.
- Prior to 2002 we performed 96 percutaneous tracheostomies. There was a 3% mortality rate.
- In 2002 we developed local guidelines for PDT and began using Ciaglia Blue Rhino™ tracheostomies.
- We audited our practice in 2005 and demonstrated a reduced immediate complication rate compared to a previous standard.^(3,7)
- An equipment change to Tracoe experc® in late 2006 led to this further audit.

Aims and Methods

- Our primary aim was to assess the immediate complication rate of the Tracoe experc® PDT and compare to our previous experience with the Ciaglia Blue Rhino™ PDT.⁽⁷⁾
- Secondary aims included review of the patients with a coagulopathy and the incidence of bleeding in this sub-group and whether they underwent correction of the coagulopathy compared to our previous audit.
- Coagulopathy was classified as PT ≥16s, APPT >39s or platelets <50x10⁹/l.
- This was performed via a prospective audit of 123 patients
- At the end of the audit period operators were asked to subjectively comment on the ease of insertion of Tracoe experc® and Ciaglia Blue Rhino™ PDT.
- Comparisons were made using Chi-squared; p<0.05 was regarded as significant.



Results

- **Patients** - Ages ranged from 17-88 years old (median 68). The majority of the patients are surgical (56% post-operative admissions and 12% non-operative surgical) and 32% were medical patients.
- **Timing of tracheostomy** - Duration of intubation prior to PDT ranged from 1-63 days (mean 8.7, median 7), extubation trial was undertaken in 28% of patients.
- **Complications** (see table 2)
Three patients (2.4%) suffered major complications, which were all episodes of oxygen desaturation to <90%.
24 patients (20%) suffered 27 minor complications, these were 19 episodes of minor bleeding, 7 difficult tube placements, 1 posterior tracheal wall injury and 1 case of surgical emphysema. 1 patient with a major complication also had a minor bleed.
- This complication rate is almost identical to our previous audit which showed a major complication rate of 3% and minor complication rate of 18% (p=0.755).⁽⁷⁾
- **Abnormal clotting parameters** - 38 patients had a coagulopathy: 58% of this group underwent correction of the coagulopathy compared to 93% in our 2005 audit (p=0.312).

The incidence of bleeding was not significantly increased in coagulopathic patients, 58% of bleeding episodes were in patients with normal clotting indices (p=0.25).

- **Insertion of device** - Of those operators who felt able to comment (n=8) 88% found the Tracoe experc® PDT easier to insert.

Table 2 – Current results compared to our audit reference standard and our previous audit.

	Audit reference (Fikkers ⁽³⁾)	Previous audit 2005 ⁽⁷⁾	Current results 2008
Number of patients	100	200	123
Mortality	0%	0%	0%
Major complications	6%	3%	2.4%
Bleeding requiring exploration	3%	0.5%	0%
Desaturation below 90%	0%	1.5%	2.4%
False passage	1%	0.5%	0%
Tension pneumothorax	2%	0.5%	0%
Minor complications	30%	18%	20%
Bleeding controlled by local pressure	14%	12%	13.8%
Tracheal tube/cuff puncture	5%	2%	0%
Subcutaneous emphysema	1%	1%	0.8%
Posterior tracheal wall injury	2%	0.5%	0.8%
Difficult tracheostomy placement	3%	3%	4.8%
Accidental extubation	2%	0.5%	0%
Hypotension (SBP<90mmHg)	1%	0%	0%
Conversion to Surgical tracheostomy	2%	?	0.8%
Total complications	30%	20%	21%
No complications	70%	80%	79%

Conclusion

- The Tracoe® PDT is as safe as the Ciaglia Blue Rhino™ PDT, with complication rates in our hands below published audits, and we subjectively find it easier to insert.
- Additionally we appear to have a less cautious approach to PDT in coagulopathic patients without any increase in bleeding complications, which suggests our guidelines in such patients require review given our change in practice and the evolving evidence base.⁽⁵⁾
- It is crucial that we continue to audit our clinical practice, especially if tracheostomy is proved to be better earlier than current practice following "Tracman" trial.

References

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