

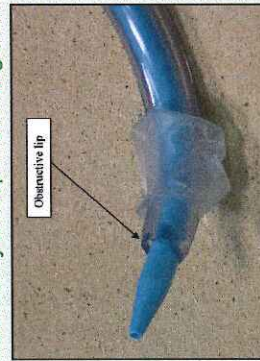
Abhiram Mallick, Stuart Elliot,  
Adult General Intensive Care Unit, Leeds General Infirmary, Great George Street, Leeds, UK.

## INTRODUCTION

A recent UK survey<sup>1</sup> demonstrated that the preferred method of performing percutaneous tracheostomy (PDT) is using a single dilator technique. Although the complications of PDT have shown a decreasing trend, there remains a concern that posterior tracheal wall damage can potentially occur during tracheostomy tube placement over the loading dilator.

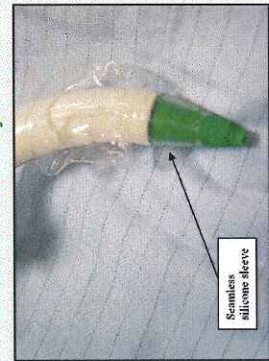
The lip between the loading dilator and the tracheostomy tube tip often causes an obstruction to tracheostomy tube passage through the stoma in the anterior tracheal wall (Fig 1). This requires a greater degree of operator force for tube placement which can potentially cause damage to the posterior tracheal wall.

Fig 1. Loaded tracheostomy tube demonstrating the lip between tracheostomy tube tip and loading dilator



Tracoe Experc Tracheostomy set (Tracoe Medical, GmbH, Frankfurt) claims to overcome this problem by having a tracheostomy tube-loading dilator assembly with a novel seamless lip. This consists of a collapsible silicone sleeve on the tip of the loading dilator. When the tracheostomy tube is loaded onto this, its tip is covered by the sleeve (Fig 2). We evaluated this PDT set clinically to determine whether it makes tracheostomy tube placement easier.

Fig 2. Photograph demonstrating the seamless transition of tracheostomy tube over loading dilator with silicone sleeve clearly visible.



## METHODS

A total of 51 patients scheduled for elective PDT were enrolled in this open prospective observational clinical trial. Assent was obtained from the immediate relatives. Patients were excluded if they had unidentifiable anatomy of the neck, severe coagulopathy, a history of difficult tracheal intubation or required significant levels of ventilatory support ( $\text{FiO}_2 > 0.6$  or PEEP  $> 10$  cm  $\text{H}_2\text{O}$ ).

Fig 3. Photograph of Tracoe Experc tracheostomy set components.



Experienced operators conversant with PDT techniques performed all the procedures whilst the airway and bronchoscopy were maintained by an anaesthetist. The trachea was punctured in all cases between the 2nd and 3rd tracheal rings and dilated using the Experc Single Rhino Dilator (Fig 3). The tracheostomy tube-loading dilator assembly was then inserted. The ease of tracheostomy tube insertion was graded by the operator on a scale of 0 to 10, 0 being extremely difficult and 10 very easy. All complications were recorded during the procedure.

## RESULTS

A total 37 male and 14 female patients aged  $53 \pm 21$  years (mean  $\pm$  SD) were enrolled. Patients were ventilated for  $5.1 \pm 2.3$  days (range 3-9 days) before tracheostomy. The operating time was  $5.27 \pm 2.3$  minutes (range 2-10 minutes). Stoma dilatation and placement of a size 8 tracheostomy tube was successful at first attempt in 49 patients. Two patients required a second dilatation before tracheostomy tube placement.

Median ease of tracheostomy tube insertion grade was 9 (range 7-10). The operators stated that the force required to place the tracheostomy tube was less than that required with other single dilator kits. There were no serious peri-operative complications such as pneumothorax or surgical emphysema. Blood loss was estimated for all cases between 3-5 ml except in one patient where a surgical ligation of a venous bleed was required. No clinically significant difference was observed between pre and post tracheostomy arterial blood gases.

## DISCUSSION

Posterior tracheal wall damage is a potentially fatal complication of PDT<sup>2</sup>. It remains uncertain as to whether using a single or serial dilatation technique carries a higher risk of this complication. The gap between the tracheostomy tube tip and loading dilator has been considered to be another important risk factor.

Minor incomplete tears are more common but are usually unnoticed. Normally these heal without intervention. Larger complete tears can present with airway bleeding, air leak around the tracheostomy tube or into the mediastinum, inability to achieve adequate ventilation or pneumothorax. Urgent surgical intervention may be indicated and the approach may necessitate cardiopulmonary bypass. However, patients who require tracheostomy in the intensive care unit frequently have other significant co-morbidities which can render surgical intervention high risk or prohibitive. The other alternative is to insert a stent, using rigid bronchoscopy, into the trachea to seal the defect.

It is therefore imperative to avoid posterior tracheal wall damage during PDT. Obviously the more resistance caused by the lip between the tracheostomy tube tip and loading dilator, the greater the force required by the operator to insert the tracheostomy tube. The only alternative to this is to over-dilate the stoma but this has its own inherent disadvantages.

Using too much force during tracheostomy tube placement can cause tracheal collapse and increases the chances of the tube tip causing trauma to the posterior tracheal wall and potentially the oesophagus.

## CONCLUSION

This case series suggests that the Experc Tracheostomy Set allows for a single step dilation of the tracheal stoma with easier tracheostomy tube placement when compared to operator's experiences with other commercially available kits.

A randomised controlled trial is warranted to assess its advantages over the other single dilator kits.

## References

- Krishnan K, Elliot SC, Mallick A. *Anaesthesia* 2005; 60: 380-4
- Walz MK, Schmidt U. Tracheal lesion caused by percutaneous dilatational tracheostomy - a clinic-pathological study. *Intensive Care Med* 1999; 25: 102-5