B17

TITLE: A NEW TECHNIQUE FOR PERCUTANEOUS TRACHEOSTOMY USING SINGLE-STEP DILATION: CIAGLIA BLUE RHINO

AUTHORS: C. Byhahn MD, S. Mierdl MD, S. Kessler MD, V. Lischke MD, S. Halbig MD, K. Westphal MD
AFFILIATION: Dept. of Anesthesiology, J.W. Goethe-University, D-60590 Frankfurt, Germany

Objective: Percutaneous dilatational tracheostomy (PDT) according to Ciaglia's technique of stepwise dilation described in 1985 has become the most popular technique for percutaneous tracheostomy and is demonstrably as safe as surgical tracheostomy (1, 2). In 1999, an extensively modified technique of PDT was introduced: the Ciaglia Blue Rhino (CBR) that consists of one-step dilation by means of a curved dilator with hydrophilic coating (3).
Methods: After approval of the institutional ethics committee, a prospective, randomized trial was done in 50 critically ill adults on long-term ventilation to compare CBR to the basic technique of PDT. 25 of these patients had PDT, and 25 had CBR. Tracheostomy was performed at the patient's bedside and under general intravenous anesthesia. The fraction of inspired oxygen was set to 1.0 5 minutes prior to tracheostomy, and the PEEP-level was reduced to a maximum of 5 mmHg if necessary. Flexible fiberbronchoscopic control was used throughout the whole procedure. Intraoperative monitoring consisted of ECG, arterial line, central venous pressure, and pulse oximetry.
Results: Average operating times were less than 3 minutes for CBR, and less than 7 minutes for PDT ($P<0.0001$, Wilcoxon-Mann-Whitney-Test). Tracheostomy was successfully completed in all patients. When CBR was performed, 11 minor complications were noted. In the case of PDT, 7 complications occurred of which 3 were severe (see Table).

	CBR (n=25)	PDT (n=25)
Intraoperatively		
Tracheal ring fracture *	9	2
Posterior tracheal wall injury	-	2
Pneumothorax	-	1
Oxygen desaturation <90%	2	1
Postoperatively		
Bleeding during tracheostomy tube exchange	-	1

*: $p<0.05$ (Fisher's Exact Test)

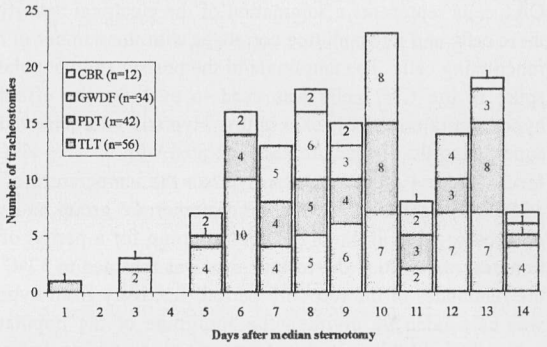
Based on clinical findings, the tracheal ring fractures were not a cause for concern and did not require further intervention. Regardless of whether PDT or CBR was performed, no significant deterioration of the oxygenation variables was noted perioperatively, and likewise the $PaCO_2$ did not rise throughout the procedure. During the postoperative period, elective tracheostomy tube exchange on day 12 after PDT resulted in a minor bleeding episode in one patient. No infection of the tracheostomy was noted in any of our patients.
Conclusion: Based on our data, we conclude that new CBR is as safe as and more practicable than PDT. As a result of the Blue Rhino dilator's special shape and its hydrophilic coating, stoma dilation can be achieved in a single step, very rapidly, and with minimal force and thus external pressure against the anterior tracheal wall. Therefore, CBR does not interfere with adequate ventilation throughout tracheostomy. Despite these encouraging results, follow-up studies need to be done in order to adequately assess eventual adverse long-term effects due to the tracheal cartilage fractures.
References:
(1): Ciaglia et al., Chest 1985;87:715-719
(2): Westphal et al., Ann Thorac Surg 1999;68:486-492
(3): Byhahn et al., Anaesthesist 2000;49:202-206

B18

TITLE: EARLY PERCUTANEOUS TRACHEOSTOMY AFTER MEDIAN STERNOTOMY

AUTHORS: K. Westphal MD, S. Halbig MD, S. Kessler MD, S. Mierdl MD, V. Lischke MD, C. Byhahn MD
AFFILIATION: Dept. of Anesthesiology, J.W. Goethe-University, D-60590 Frankfurt, Germany

Objective: Tracheostomy offers significant advantages over endotracheal intubation in patients on long-term ventilation. However, in patients who have undergone median sternotomy, it is felt that the danger of microbial contamination and consecutive infection of the sternal wound with microbes from the tracheostomy is high when conventional tracheostomy is performed (1). In contrast, percutaneous techniques are less likely to result in tracheostomy infection and thus bacterial contamination of neighboring structures (2). Nonetheless, to date there is no prospective study confirming or disproving this assumption by means of appropriate microbiological testing.
Methods: After approval of the institutional ethics committee, we prospectively studied a total of 144 cardio-surgical patients who underwent elective percutaneous tracheostomy at the bedside within the first 2 weeks after median sternotomy during a 41-month period. 4 different percutaneous techniques were used: PDT Ciaglia, GWDF Griggs, TLT Fantoni, and new Ciaglia Blue Rhino (CBR). Tracheal secretions were routinely obtained on the day of tracheostomy and on postoperative day 2, whereas sternal wound swabs were only obtained when sternotomy infection was suspected within a week before and after tracheostomy. All samples underwent microbiological testing.
Results: Tracheostomy timing was identical between the different techniques (p: ns; One-Way ANOVA). On the average, tracheostomy was performed on postoperative day 9 (see Figure).



Of 144 patients, 104 (72.2%) had tracheal cultures positive for either bacteria and/or fungi on the day of tracheostomy, however, in only 13 patients sternal wound infection was suspected on the basis of clinical findings, but was confirmed in only 4 (2.8%) patients who actually showed microbial contamination of the sternum. In two of these patients, the identified microbes were not identical to those cultured from the trachea. The other two patients had both sternal and tracheal cultures positive for methicillin-resistant Staphylococcus aureus before and after tracheostomy. Cross-contamination of the sternotomy with microbes from the patient's airways was therefore ruled out. Sternal wound swabs tested negative in the other 9 patients and thereby excluded wound infection. No patient showed clinical signs of tracheostomy infection. The complication rate from tracheostomy itself was 2.8%.
Conclusions: Based on our data, we conclude that cross-contamination of the sternal wound with microbes from the trachea is not a problem. Elective percutaneous tracheostomy is safe even if performed during the first 14 days after median sternotomy.
References:
(1): Brown et al., J Thorac Cardiovasc Surg 1969;58:158
(2): Holdgaard et al., Acta Anaesthesiol Scand 1998;42:545