Percutaneous Tracheostomy "Ciaglia Blue Rhino": Experiences in 120 Critically Ill Adults

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Objective: In 1999, an extensively modified technique of percutaneous dilatational tracheostomy (PDT) was introduced: "Ciaglia Blue Rhino" (CBR). Stoma dilation is performed in one step technique with a special, hydrophilically coated dilator, that allows dilation with minimal force. Aim of the study was to evaluate practicability, perioperative gas exchange, and complications during CBR.

Methods: 120 adult patients on long-term ventilation underwent elective CBR. All tracheostomies were performed at the bedside on the ICU and under general IV anesthesia. Ten (10) minutes before tracheostomy, the positive end-expiratory pressure (PEEP) was reduced stepwise to 5 mmHg as required, and all patients received positive-pressure ventilation with 100% of oxygen throughout the procedure. After insertion of the tracheostomy tube, the fraction of inspired oxygen (FIO_2) and the PEEP were reset to the preoperative levels. If under this regimen hemoglobin saturation (SaO_2) measured by pulse oximetry decreased below the preoperative level, the FIO_2 was increased stepwise until the baseline SaO_2 was reestablished. Beside pulse oximetry, intraoperative monitoring consisted of invasive blood pressure monitoring and electrocardiogram. To assess the influence of tracheostomy on the patient's oxygenation, arterial blood gas samples were obtained before tracheostomy and again after completion of the procedure and reestablishment of the initial preoperative SaO_2.

Results: Tracheostomy was performed on day 8 of intubation (median value, range: 1-22 days). Five (5) severe complications were noted and required immediate intervention: Posterior tracheal wall injury occurred in 2 patients, one of which was combined with esophageal perforation. In 2 patients, CBR was aborted due to a calcified trachea or paratracheal dilation, respectively, and an alternative percutaneous technique performed instead. Injury to a subcutaneous vein resulted in aspiration of blood and short oxygen desaturation in 1 patient. Perioperative gas exchange was not significantly affected. (See Table.)

	before CBR	after CBR
FiO_2	0.5∀0.15	0.54∀0.18
PaO_2 (mmHg)	101.8∀33.7	101.2∀32.4
$PaCO_2$ (mmHg)	39.0∀7.4	40.0∀9.0

No postoperative complications were observed during 1,962 days of cannulation (Median: 12 days, range: 1-94 days). Fifty-six (56) patients died on the ICU due to their underlying disease. Forty-five (45) patients were successfully decannulated on the ICU, and 21 patients were transferred to a secondary or tertiary care hospital with the tracheostomy tube still in place.

Conclusions: Because of its technical simplicity and the low complication rate, we consider the Ciaglia Blue Rhino an attractive technique for percutaneous tracheostomy. Since long-term results are not yet available, further studies need to be conducted.