Deviations in Endotracheal Cuff Pressure During Intensive Care

Adequate sealing of the extra-luminal airway in endotracheally intubated patients is pivotal to allow efficient positive pressure ventilation and to avoid micro-aspiration of subglottic secretions into the lower respiratory tract potentially causing ventilator-associated pneumonia (VAP). On the other hand, excessive cuff pressure causes tracheal damage resulting in substantial morbidity such as fistula or stenosis formation. As such, the endotracheal cuff pressure must ensure adequate sealing while, simultaneously, avoiding compromised tracheal perfusion. In general, this objective corresponds with a cuff pressure that ranges 20 to 30 cm H₂O.¹

In the past decades, distinct endotracheal tubes have been developed to either reduce the risk of tracheal damage or optimize sealing capacity.²³ Despite innovative endotracheal tube designs, maintaining an optimal cuff pressure remains an Achilles heel. Indeed, endotracheal cuff pressure may decrease over time⁴ and is also influenced by position changes,⁵ core temperature, ventilator pressures, and tracheal suctioning.

A recent survey about cuff pressure management⁶ indicated that 53% of nurses check cuff pressure only every 8 hours and frequently by means of finger palpation of the pilot balloon. This practice has been shown to result in excessive cuff pressure, whereas monitoring the cuff with a manometer yields fewer postintubation complications.⁷ To anticipate alterations in cuff pressure and poor monitoring practice, a continuous automatic cuff pressure control device has been developed. This device successfully keeps cuff pressure within target limits.⁸ Yet, any benefits in terms of reduced risk of VAP were absent. Therefore, its use remains an unresolved issue in the prevention of VAP.⁹ Perhaps the favorable effect of continuous cuff pressure monitoring and control is more within the reduced risk of tracheal damage,¹⁰ but until now such data are lacking.

In the March 2011 issue of the American Journal of Critical Care, Sole et al¹¹ described the results of a study to evaluate the effect of an intervention to adjust endotracheal cuff pressure. When pressure fell out of a predefined range (20-30 cm H₂O) an alarm warned the nurse who set cuff pressure at 22 cm H₂O. In the control group, cuff pressures were monitored, however, no alarm signal occurred when they went out of range. In addition, all caregivers were blinded for monitored cuff pressure values. In the intervention group, cuff pressure values were less frequently out of range (11% of the observation time vs 52%).

The work done by Sole et al is unmistakably an additional call for increased attention for cuff pressure monitoring and surely will contribute to an increased awareness among nurses, respiratory therapists, and anesthesiologists. In previous research Sole et al identified some factors influencing cuff pressure.¹² We wonder if their present study brought deeper insights in particular care aspects inciting alterations in endotracheal cuff pressure. We want to congratulate Sole and colleagues with their valuable work and would greatly appreciate if they could elaborate on this matter.

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REFERENCES

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cuff pressure within a narrow range, and why ensuring constancy in pressure (such as with a controller device) has resulted in mixed effects on prevention of aspiration and ventilator-associated pneumonia (VAP). In Valencia’s study, no significant decreases in VAP were noted, whereas Nseir reported a significant reduction in aspiration, pepsin levels in tracheal secretions, and VAP.

The observations also emphasize the importance of adjusting the pressure to a midpoint therapeutic range (such as 25 cm H2O) anticipating that “dips” in pressure may occur. Furthermore, the importance of regular suction of oropharyngeal secretions and ensuring patency of ETT with subglottic secretion ports cannot be underestimated in preventing microaspiration of secretions should dips occur.

Further research is needed to identify if similar changes in ETT cuff pressure occur with tubes designed with the newer thin-walled polyurethane cuffs. And although it is important to maintain the cuff pressure at a level to prevent aspiration of secretions, the relationship between cuff pressure and the development of tracheal stenosis warrants additional study.

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Endotracheal Cuff Pressure Monitoring: Another Alarm in the ICU?

I read with interest the article by Sole and colleagues’ on continuous monitoring of cuff pressure. The authors evaluated the impact of an intervention to reduce underinflation and overinflation of tracheal cuffs in intensive care unit (ICU) patients.

During the intervention period, cuff pressure was continuously monitored and an alarm was used to inform nurses that cuff pressure was out of range (20-30 cm H2O) in order to adjust it. The intervention was successful because the percentage of cuff pressure values out of range was significantly reduced.

Figure The study patient’s propofol infusion was turned off at 10:18 (12974s) and restarted at 10:28 (13574s). ETT cuff pressure recorded in mm Hg. Note the greater variability and multiple “dips” while the infusion was turned off.

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