

Endotracheal tube cuff pressures – still a problem!

Endotracheal intubation for mechanical ventilation has a central role in the intensive care unit (ICU), but is associated with numerous complications. One serious – but largely preventable – complication is tracheal stenosis, secondary to excessive pressure in the cuff of the endotracheal or tracheostomy tube. The high pressure in the cuff compresses the mucosa against the rigid tracheal cartilage rings, resulting in mucosal damage and ischaemic necrosis.^[1] Fibrotic healing of this lesion leads to the gradual stenosis of a section of the trachea. Patients may present weeks to months after discharge from the ICU when obstruction in the trachea reaches a critical degree. Stenosis may also make subsequent intubation of the trachea impossible. Other complications of high cuff pressure (Pcuff) range from frequent sore throat to rare but disastrous events such as tracheo-oesophageal fistula.^[2]

In the early days of critical care, rubber endotracheal tubes were used with high-pressure, low-volume cuffs that inevitably transmitted a high pressure to the tracheal wall when inflated to occlusive pressures. Large-volume, low-pressure cuffs were developed, which could occlude the trachea at low pressure, but the same complication occurs if a pressure >30 cmH₂O is applied for any length of time.^[3]

Too low a Pcuff, however, results in decreased ventilation due to leakage and a risk of aspiration. A Pcuff of <20 cmH₂O is associated with an increased incidence of ventilator-associated pneumonia.^[4] A recent observational study has suggested that combining continuous Pcuff control with subglottic drainage reduces the incidence of ventilator-associated pneumonia.^[5]

This Journal recently published a survey of ICU nurses by Jordan *et al.*,^[6] which showed that only 22% of nurses were aware of the recommended pressure range (25 - 30 cmH₂O) and that Pcuff measurements were performed less frequently than 6-hourly by more than half the respondents. Another report from Cape Town noted an increased incidence of tracheal stenosis following mechanical ventilation, and found, in a snap survey of ICUs, that Pcuffs exceeded 30 cmH₂O in 30% of patients.^[7]

In this issue, Memela and Gopalan^[8] report on their study of continuous Pcuff measurement. Although the mean Pcuff values were in the acceptable range, and there was no difference between the means of the intermittent pressure readings and the continuous

readings, the continuous readings revealed that patients spent an average of 13% of the time below the acceptable range and 23% of the time above the acceptable range. Indeed, one patient was exposed to high pressures, averaging 66 cmH₂O, for the whole of the study period!

The failure to maintain safe Pcuffs seems to be a particular problem, even in units that otherwise provide excellent critical care nursing. Suggested reasons include the lack of appropriate pressure gauges, the widespread use of agency staff, and the lack of clear, evidence-based protocols.^[7] Another reason could be that bedside nurses are focused on the clear and present dangers of aspiration and hypoventilation, and regard tracheal stenosis as a remote and theoretical event.

Whatever the reasons, awareness of the problem is growing. Simple aneroid pressure gauges are not expensive and there is no good reason not to monitor Pcuffs on all intubated patients continuously, in order to maintain them in the 25 - 30 cmH₂O range, and to document this at least 4-hourly.

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