

# [NM-154] Continuous monitoring of intracuff pressure in cuffed endotracheal tubes in children undergoing prolonged surgical procedures

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## Introduction:

With the introduction of thin polyurethane cuffed endotracheal tubes (cETTs), there has been an increasing trend toward their use in pediatric patients. Despite improvements in design, an unintended and prolonged hyperinflation of the cuff can compromise tracheal mucosal perfusion especially in pediatric patients. Even though care is taken at the time of the initial inflation of the cuff to achieve an optimal tracheal seal, it is well known that several perioperative factors can affect the cuff pressure (CP) subsequently. In the current study, we prospectively monitored CP continuously over time in patients undergoing prolonged procedures using the transducer (TD) of an invasive pressure monitoring setup (IPMS) as has been previously described.

## Methods:

After IRB approval, the prospective observational study was conducted on pediatric patients who were scheduled to undergo prolonged surgical procedures (more than 4 hours) with a cETT in place. After placement of the cETT, the cuff was inflated using the air-leak test with a CPAP of 20 cmH<sub>2</sub>O in the anesthesia circuit. After inflation, the inflating port of the pilot balloon was connected to the TD of the IPMS and measurements were obtained initially and after every 30 minutes until the end of the procedure.

## Results:

The cohort for the study included 30 patients who ranged in age from 1.2 to 17.6 years and in weight from 9.4 to 113.4 kilograms. There were 15 boys and 15 girls. The size of the cETT ranged from 3.5 mm to 8.0 mm ID. The baseline CP at the time of inflation was  $19.3 \pm 14.3$  cmH<sub>2</sub>O. The change in the intraoperative CP when compared to the baseline CP ranged from -25.8 to +16.3 cmH<sub>2</sub>O. In 7 patients (23%), the CP decrease was more than 10 cmH<sub>2</sub>O and in 4 patients (13%), the decrease was more than 20 cmH<sub>2</sub>O from baseline. On the other hand, the CP increased from the baseline by more than 10 cmH<sub>2</sub>O in 7 patients (23%). In 7 of 30 patients (23%), the absolute CP was greater than 30 cmH<sub>2</sub>O at least once intraoperatively. Also the CP remained the same as the baseline throughout the procedure in no patient.

## Discussion:

The CP of a cETT may be altered by several intraoperative factors including body temperature, use of nitrous oxide, variations in the head and neck position of the patient. In this study, the CP increased by more than 10 cm H<sub>2</sub>O in at least 23% of the patients when compared to the CP at the time of initial inflation. This unintended increase can be critical in patients with low mean arterial pressure. However, we also noticed a gradual decrease in the CP over time. This decrease in CP may increase the risk of aspiration or affect the efficacy of mechanical ventilation. Our study suggests the need for continuously monitoring CP if a cETT is used in children.

## References:

1. Anesth Analg 2003;97:1612-6.
  2. Expert Rev Med Devices 2007;4:73-82.
  3. Int J Pediatr Otorhinolaryngol 2013;77:1135-8.
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