

Intracuff pressure during one-lung ventilation in infants and children

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Background

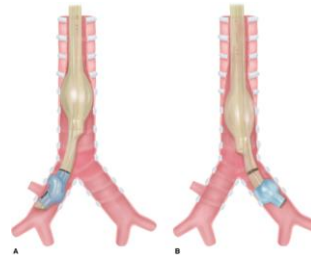
- One lung ventilation(OLV) is vital during thoracic surgery to provide single lung isolation and produce a motionless surgical field.
- Several technique for OLV have been illustrated including a Univent endotracheal tube, a bronchial blocker, and selective endobronchial intubation.
- These devices possess a cuff that is inflated in the bronchus thereby enabling selective ventilation of the lungs.
- Instead, the bronchial cuff is usually inflated during bronchoscopic visualization of the balloon to the point where the bronchus appears to be occluded.

Methods

- Following IRB approval.
- Children ≤ 18 years of age undergoing OLV for thoracic surgery.
- Standard anesthetic technique for premedication and induction were maintained.
- After cuff inflation, ventilation parameters were set to maintain normocarbida with a tidal volume of 7-10 mL/kg and an inspired oxygen concentration of 40-50% in air and oxygen.
- Intracuff pressure were measured after the patient was positioned, bronchial cuff inflated and OLV initiated.

Table 1: Types of devices used and Intra-cuff pressure in cm H₂O.(N=28)

Type of device used	Total number(N)	Cases of bronchial IP >30 cm H ₂ O
Double lumen ETT	14	11
Cuffed ETT alone	6	2
Bronchial blocker	7	7
Univent™ ETT	1	1
Total	28	21



(A) Right and (B) left polyvinyl chloride (PVC) (Mallinckrodt) double-lumen tubes (DLT) shown against a schematic of the trachea and major airways.

Results

- The study cohort included 28 patients. Ranging from 0.4-18 years of age and 40 ± 31.7 kgs.
- A DLT, cuffed Endotracheal tube(ETT) alone (mainstem intubation), bronchial blocker, and Univent ETT were used in 14,6,7 and1 patients.
- Mean tracheal and bronchial IP was 36 ± 22 and 49.5 ± 26.5 cm H₂O respectively.
- Tracheal and Bronchial IP were greater than 30 cm of water in 13 of 22 patients(59%) and 21 of 28 patients(75%) respectively.

Conclusion

- Irrespective of the device used Intracuff pressures were notably high in the majority of children undergoing OLV .
- Given that these cuffs lack the characteristics (high volume, low pressure) of the polyurethane cuff of standard cuffed ETT's, there may be a risk of damage to the bronchus

References:

- 1) Tobias JD. Anesthesia for thoracic surgery in children. Curr Opin Anesthesiol 2001;14:77-85.
- 2.) Krishna SG, Barry N, Rice J, Tobias JD. Cuffed endotracheal tubes in infants and children: A technique to continuously measure the intracuff pressure. Inter J Pediatr Otorhinolaryngol 2013;77:1135-1138.

