Hot Topic: Management of cuffed ETs in paediatric practice

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Quick Practice Points for cuffed tubes:

Select the appropriate size

If the tube does not leak prior to cuff inflation – Down size

Always inflate the cuff

Always check the cuff pressure and maintain below 20cmH20

Is there a guideline covering cuff management in your department?

Introduction

The debate regarding cuffed Vs uncuffed ETTs continues to rage with recurrent editorials and clinical research [1-5]. The science supports the use of properly managed cuffed ETTs as safe, but there is not, at this point, an evidence base that could robustly sate one should be used over the other. Use of cuffed ETTs may be becoming more common [6] and since we are still in era where this comprises a change or evolution of practice it is pertinent to reflect on the application of the evidence base into practice.

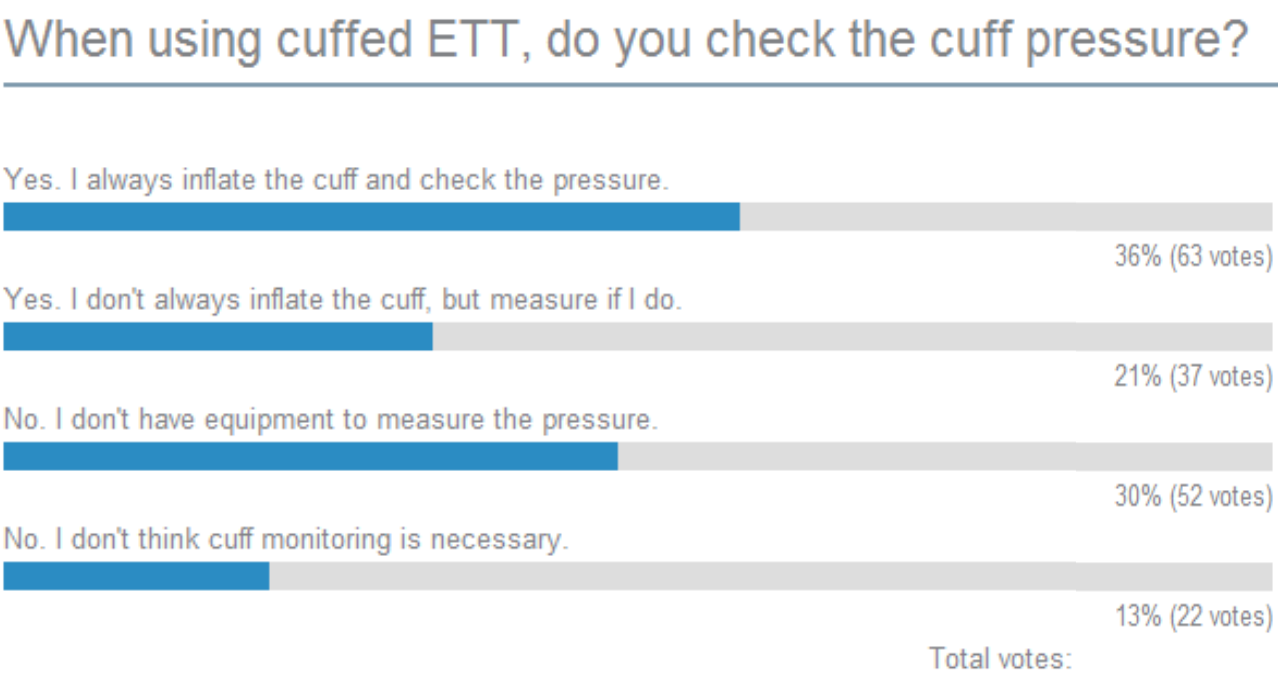
In trials of cuffed ETTs in children all cuffs are inflated and cuff pressure is monitored and maintained at less than 20cm H20. The study by Weiss et al [1] was a landmark study and probably represents a watershed in swing of opinion and practice towards greater use of cuffed ETTs in children. In that study the protocol demanded an audible leak be present prior to cuff inflation, and if not present the tube would be downsized (despite this the tube exchange rate was 2% in the cuffed group). The lower limit for entry to the trial was 3kg, below this use of a cuffed ETT is not recommended. Cuffed ETT sizing was as follows:

ID 3.0 mm for birth (>3 kg) to 8 months;
ID 3.5 mm for 8 to <18 months;
ID 4.0 mm for 18 to <36 months;
ID 4.5 mm for 36 to <60 months.

A recent publication of three case reports [7] demonstrates the challenges of faithfully translating trial protocol to clinical practice. Clearly a finding of equal safety record for cuffed ETTs only applies if the tube and cuff are managed in accordance with the trial protocol. The case reports describe cuff management and tube sizing varying from that in the trial in three infants who presented with post extubation stridor. The accompanying editorial highlighted these issues along with the question of ongoing management in NICU (8). The potential damage caused by uninflated cuffs is highlighted both by that editorial and by Holzki et al [9]. The article by Holzki et al is also a fine description of the importance of selecting the correct size tube and, if cuffed, proper placement and management of that cuff. It is worth noting that Holzki et al wrongly conclude that the enemy is the cuff, despite showing that catastrophic laryngeal damage can arise from inappropriately sized uncuffed ETTs.

So, the poll question posed on the APA website for June sought responses related to the management of ETT cuffs, inflated or not? Cuff pressure measured or not?

Results



The current survey reveals that 36% of respondents checked the 'best practice' answer – always inflate and always check the cuff pressure.

All the other answers involved some element of either not inflating the cuff or inflating it but not checking the pressure.

The nature and intent of a survey such as this precludes further meaningful analysis. For example the maximum pressure respondents accepted was not sought, nor the size chosen. What do you do in your practice?

Conclusions

The vital part of using an ETT in a child, irrespective of cuff, is selection of the correct size as evidenced by a leak, before cuff inflation in the case of a cuffed tube.

The purpose of posing the survey question and of this discussion is not to persuade any practitioners that they should switch from uncuffed to cuffed or vice versa. Rather to encourage reflection on best practice if one does choose to use a cuffed ETT and highlight the need for diligent management of cuffs where they are used. Manufacturer of cuffed ETT is also important as cuff technology, geometry and position on the ETT vary greatly [(10)].

Correct management of the cuff does require equipment to measure the pressure. There are many options for this ranging from simple and inexpensive through to complex and expensive devices for continuous monitoring and regulation of cuff pressure to a pre-set value. In our institution we have

found a simple hand held manometer (around £80) is more than adequate and it is easy to maintain training amongst various staff groups.

Finally, given the importance of selecting the correct size, proper cuff management and the potential interaction between theatre and ICU environments, publishing a guide line and placing a printed sizing guide on intubation trollies could both be effective measures to facilitate consistent best practice.

References

1. Weiss et al. Paediatric Endotracheal Intubation Study Group. Prospective randomized controlled multi-centre trial of cuffed or uncuffed endotracheal tubes in children. *BJA* 2009; 103(6): 867-73.
2. Lonnqvist. Cuffed or uncuffed tracheal tubes during anaesthesia in infants and small children: time to put the eternal discussion to rest? *BJA* 2009; 103(6): 783-5.
3. Weber et al. Cuffed vs non-cuffed endotracheal tubes for pediatric anesthesia. *Pediatric Anesthesia* 2009; 19(Suppl. 1): 46-54.
4. Gerber A.C. Cuffed tubes for infants and children in anaesthesia and intensive care: Why we should change to cuffed tubes in paediatric airway management. J Paed Respirology and Critical Care 2008: 4(4):3-9
5. WEBER, T., SALVI, N., ORLIAGUET, G. and WOLF, A. (2009), Cuffed vs non-cuffed endotracheal tubes for pediatric anesthesia. Pediatric Anesthesia, 19: 46–54. doi: 10.1111/j.1460-9592.2009.02998.x
6. Boerboom, S. L., Muthukrishnan, S. M., de Graaff, J. C. and Jonker, G. (2015), Cuffed or uncuffed endotracheal tubes in pediatric anesthesia: a survey of current practice in the United Kingdom and The Netherlands. Pediatric Anesthesia, 25: 431–432. doi: 10.1111/pan.12594
7. Sathyamoorthy *et al.* Inspiratory Stridor after Tracheal Intubation with a MicroCuff® Tracheal Tube in Three Young Infants. *Anesthesiology* 2013; 118:748-50
8. Ronald S. Litman, Lynne G. Maxwell. Cuffed *versus* Uncuffed Endotracheal Tubes in Pediatric Anesthesia. Anesthesiology 2013; 118:500–1
9. HOLZKI, J., LASCHAT, M. and PUDER, C. (2009), Stridor is not a scientifically valid outcome measure for assessing airway injury. Pediatric Anesthesia, 19: 180–197. doi: 10.1111/j.1460-9592.2009.03004.x
10. M. Weiss *et al.* Shortcomings of cuffed paediatric tracheal tubes. British Journal of Anaesthesia 92 (1): 78±88 (2004) DOI: 10.1093/bja/aeh023