



Use of tracheal palpation to assure correct placement of an endotracheal tube: Letter Two

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To the Editor,

We read with interest the recent article by McKay *et al.*¹ that compared the two techniques used to ensure correct placement of an endotracheal tube (ETT). They showed that tracheal palpation resulted in more correct placements of the ETT (77%) than when using the standard depth at the incisors (61%). However, the authors did not provide the head and neck position of patients when the depth of the ETT was measured by bronchoscopy. It was also unclear whether a uniform head and neck position was maintained during bronchoscopy in all patients. It has been shown that changes in head and neck position can result in upward or downward movement of the ETT in the trachea.^{2,3}

In this study, correct placement of the ETT was defined as the tip being > 2.5 cm from the carina and > 3.5 cm below the vocal cords. In addition to avoiding unintentional main stem intubation, there is the issue during intubation of correctly positioning the upper end of the cuff 2 cm below the vocal cords.⁴ The authors used sizes 7.0 and 8.0 cuffed ETTs (Mallinckrodt Hi-Lo, Mallinckrodt, Juarez, Mexico). The distance from the tube tip to the upper end of the cuff is at least 5.3 cm for size 7.0 or 8.0.⁵ Thus, correct placement of the ETT should be defined as the tube tip > 7.0 cm below the vocal cords. We noted that the distance of tube tip to the vocal cords was < 7.0 cm in some of their patients. The authors did not specify the relationship of the cuff and the vocal cords. We are

concerned that the cuff would have been incorrectly positioned between the vocal cords in a few cases.

All intubations were performed using direct or video laryngoscopy. Placing the distal end of the ETT in the middle of the trachea is a relatively easy maneuver when the ETT can be seen entering the larynx during laryngoscopy. Because the length of the trachea in an average adult is 10–13 cm, placing the upper end of the cuff of a size 7 or 8 ETT 2 cm below the vocal cords may position its distal end approximately 4 cm from the carina. We prefer this maneuver to ensure correct ETT placement when orotracheal intubation is performed under direct or video laryngoscopy. An advantage of this technique is that it can be performed by the intubator, without assistance from other personnel.

Competing interests None declared.

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Reply to Letter One and Letter Two

We thank Mangar *et al.* for their interest in our study.¹ We agree that the distance-at-teeth for assessing endotracheal tube (ETT) depth is inadequate, although is still taught in a major anesthesia textbook.² This inadequacy led to our seeking a better method. In support of Ong *et al.*, we reported that the correct depth is probably better correlated with the patient's height than with the patient's sex.³ As a 33% malposition rate is unacceptable, we are working to develop a better test.

In our study, the ETT was confidently palpated in 84% of patients, not 65%. We did not exclude obese patients: 64 subjects had a body mass index (BMI) of $< 30 \text{ kg}\cdot\text{m}^{-2}$, and 37 had a BMI of $\geq 30 \text{ kg}\cdot\text{m}^{-2}$. Palpability was 86% in non-obese and 71% in obese subjects.

We commend Mangar *et al.* for their bronchoscopic confirmation of depth. It would be interesting to compare bronchoscopy in patients with BMI $\geq 30 \text{ kg}\cdot\text{m}^{-2}$ or a Mallampati score ≥ 3 to other patients without those parameters to confirm their indications for its use. Many malplacements occur during intubations outside the hospital, where a simple clinical test to improve placement would be valuable.⁴

Regarding the letter of Cui *et al.*, bronchoscopy was done with the head stable in neutral position on a small pillow. The ETT depth change with neck flexion probably explains why the results would have been better with a 1-cm pull-back because the occipito-atlantic joint is extended during intubation and then relaxed to neutral as the laryngoscope is withdrawn.

Cui *et al.* correctly noted that an ETT tip 3.5 cm from the vocal cords leaves the cuff partly above the cords and is usually obvious to the intubator. Most techniques concentrate on too-deep placements, which are avoidable

by meticulously placing the cuff 2 cm below the cords.^{5,6} Nonetheless, these malplacements continue to occur, and additional clinical tests may be helpful for avoiding them.

Conflicts of interest None declared.

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