Editorial

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# Appropriate tube size selection based on radiological images

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When endotracheal intubation with a plain tube or double-lumen tube (DLT) is needed, selecting the appropriate tube size is important. A large tube may cause laryngotracheal injury, whereas a small tube may cause inadequate ventilation, due to air leak. Moreover, an overly large or small tube increases the chances of repeated intubation, which may cause airway trauma.

In clinical practice, selection of the tube size is usually based on clinical experience, which may be clinically acceptable in most adult patients. In pediatric patients, unfortunately, the age-based formula for predicting tube size, which is used worldwide, is not always successful because of differences in physical development [1]. Recently, technical developments in radiological imaging have allowed measuring the diameter of a patient's airway at various points. Chest computed tomography (CT) or plain X-ray can be used to predict the appropriate size of a DLT or an uncuffed plain tube by measuring the diameter of the left main bronchus or the tracheal transverse diameter at the $7^{th}$ cervical vertebra [1-5]. Moreover, because the tracheal width is closely correlated with the left main bronchus width, if direct measurement of the left main bronchus width is impossible, the tracheal width can be more helpful in estimating the left main bronchus width than demographic data, such as height, weight, and age [6,7].

Ultrasound can also be useful for measuring the diameter of a patient's airway, especially the tracheal diameter. Sustić and colleagues demonstrated a strong correlation between the tracheal width measured by ultrasound and the tracheal width by CT [8]. Additionally, they found a strong correlation between the tracheal width, measured by ultrasound, and the left main bronchus width, measured by CT, and that 25% of patients had the incorrect size of left-sided DLT. In pediatric patients, ultrasound can also be helpful in selecting the proper size of an uncuffed endotracheal tube [9].

More recently, three-dimensional (3-D) spiral chest CT, with which multi-planar reconstruction is possible, has been introduced. It allows more precise evaluation of a patient's airway. A study in this issue of the *Korean Journal of Anesthesiology* [10] demonstrated a moderate correlation between the anteroposterior (AP) diameter at 2 cm below the carina of the left main bronchus, obtained from the 3-D images, and the 2-D images, and that the AP diameter was longer on 3-D images than on 2-D images. In the study, if left-sided DLTs were chosen based on the AP diameter measured 2 cm below the carina of the left main bronchus from the 3-D and 2-D images, the same sized left-sided DLTs were expected in 51% of patients. This suggests that prediction of the left-sided DLT size, based on the AP diameter on 2-D images, may be reconsidered, although a large prospective study should be performed to confirm the superiority of 3-D images in predicting the appropriate size of left-sided DLT.

In conclusion, appropriate tube size selection is important. Tube size selection based on radiological images may be reasonable and may have a greater likelihood of successful intubation at the first attempt than tube size selection based on clinical experience.

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