LETTERS TO THE EDITOR

The Height-Based Formula for Prediction of Left-Sided Double-Lumen Tracheal Tube Depth

To the Editor:

In the commonly used double-lumen tube (DLT) intubation procedure, the tip of a DLT is inserted into the mainstem bronchus in a blind fashion, followed by determination of precise DLT position by a fiberoptic bronchoscope. Several studies have suggested that insertion depth for a left-sided DLT is correlated with physical factors including height and neck length.1-3 However, there are no widely used clinical guides based on physical factors for preliminary estimation of depth of the initial blind insertion of a DLT.

In the current study, the authors retrospectively analyzed data from patients whose tracheas were intubated with left-sided DLTs and explored methods that are clinically available to aid in prediction of the appropriate depth of the initial blind insertion of a left-sided DLT.

The authors reviewed the data from patients aged more than 20 years whose tracheas were intubated orally with left-sided DLTs (Broncho-Cath Left; Mallinckrodt Medical, Athlone, Ireland) in the operating rooms of Hokkaido University Hospital between September 1, 1992, and May 31, 2002. The data included age (years), sex, height (cm), weight (kg), size (French size) of the
left-sided DLT used; insertion depth of the DLT (cm); and perioperative complications. The measurements of DLT depth were made at the upper incisor level or the corner of the mouth in 0.5-cm intervals with the patient in the supine position after experienced Japanese board-certified anesthesiologists had determined proper DLT position by fiberoptic bronchoscopy. During the study period, the tracheas of 1,002 patients were intubated orally with a 28F, 35F, 37F, or 39F left-sided DLT. Two hundred thirty-eight patients were excluded from this analysis because height, weight, or insertion depth of the left-sided DLT were not recorded. Spearman’s regression analysis was used to calculate the correlation between DLT depth and patient height and weight. Although depth of left-sided DLTs was significantly correlated with both height and weight (Spearman’s correlation coefficients $p = 0.586$ and $0.339$, respectively; $p < 0.0001$), the correlation between height and DLT depth was stronger. The correlation between depth of insertion of DLT versus height in 764 patients is shown in Fig 1. The regression line of DLT depth versus height is expressed as $DLT\ depth\ (cm) = 13.426 + 0.094 \times height\ (cm)$. However, this equation of the regression line is not available clinically; this equation is too complicated to memorize and calculate easily. Therefore, to predict depth of insertion of a left-sided DLT in the clinical setting, the authors propose a height-based formula $DLT\ depth\ (cm) = 12.5 + 0.1 \times height\ (cm)$, which is similar to the regression line of DLT depth versus height and is easier to remember and calculate. One previous study showed that the average depth of a left-sided DLT was 29 cm for patients 170-cm tall, and, for each 10-cm increase or decrease in height, average insertion depth was respectively increased or decreased by 1 cm.1 This nearly corresponds to our height-based formula. Fig 2 shows the distribution of the differences between the depth predicted by the height-based formula and the actual insertion depth of a left-sided DLT in the present study population. The percentages of patients in whom the differences between the predicted depth and the actual DLT depth were within ± 1.0 cm and within ± 2.0 cm were 62.3% and 91.1%, respectively. This finding shows that this formula can be used as a guide for rough estimation of depth in the initial blind DLT insertion, although this formula cannot predict the precise left-sided DLT position. The authors believe that the height-based formula $DLT\ depth\ (cm) = 12.5 + 0.1 \times height\ (cm)$ is clinically useful for preliminary estimation of left-sided DLT depth in the initial blind insertion of a left-sided DLT.

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REFERENCES

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The Timing for the Use of Heparinase and Thromboelastography to Prevent Excessive Bleeding After Coronary Artery Bypass Graft Surgery

To the Editor:

The medical management of bleeding after cardiopulmonary bypass (CPB) is a complex one and often involves the use of potentially harmful blood products. In the ideal world, the decision to order platelets and fresh frozen plasma (FFP) should only be guided by the extent of microvascular bleeding. Unfortunately, distinguishing between surgical and microvascular bleeding after the chest is closed is not always easy. Moreover, in the real world, hospital laboratory turnaround time for coagulation indices, the time it takes to thaw FFP, the reluctance of some blood banks to accept returned unused FFP and platelets, and the surgeon’s re-exploration rate, among many other problems, all influence the anesthesiologist’s and the intensivist’s decision to order platelets and/or FFP. As such, despite controversies whether laboratory coagulation results are useful in managing post-cardiac surgery bleeding, clinicians continue to use them, and ways on how monitoring technology can be used to improve management will continue to be sought.1 The authors have read with interest the important study by Ti et al1 on the prediction of excessive bleeding after coronary artery bypass graft surgery and wish to suggest how one could improve the timing in applying heparinase and thromboelastography. Rather than performing thromboelastography at 10 minutes and 60 minutes after protamine administration, why not also perform it shortly before the termination of CPB? Previous authors have used heparinase to neutralize circulating heparin in blood samples drawn during CPB and found significant correlation2 or agreement3 with blood samples taken after CPB and protamine administration. Ho et al4 have also found that the prothrombin time performed on blood sampled during CPB and treated in vitro with heparinase predicts the post-CBP prothrombin time with a moderately high degree of confidence. Rosston and von Kier5 have found that a transfusion protocol based on the thrombelastography of a blood sample taken during CPB and neutralized in vitro with heparinase resulted in a dramatic decrease in the use of hemostatic blood products with no difference in postoperative mediastinal blood drainage.