Use of ultrasound for prediction of difficult laryngoscopy in adult patients

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To the Editor: In a prospective, self-controlled, assessor-blinded, observational study, Wang *et al*^[1] evaluated the associations of ultrasound-measured indicators with difficult laryngoscopy. By the multivariate logistic regression analyses and the receiving operator characteristic (ROC) curve analysis, they concluded that the magnitude of the angle between the epiglottis and glottis under ultrasound was highly associated with difficult laryngoscopy. Furthermore, difficult laryngoscopy might occur when this angle was less than 50°. Given the facts that difficult airway remains one of main reasons for adverse outcomes of surgical patients receiving general anesthesia and no clinical indicator with high sensitivity can reliably predict difficult airway,^[2] their findings have potentially clinical implications. However, we noted some methodological issues in their study that would have made their findings questionable.

First, a modified Cormack-Lehane scoring system was used to assess the ease of direct laryngoscopy and the grades 3 and 4 were defined as difficult laryngoscopy. By this scoring system, the incidence of difficult laryngoscopy reported in this study was up to 9.4%, though patients with risk factors of difficult laryngoscopy such as maxillofacial deformities and fractures, limited mouth opening and limited neck movement had been excluded. The obvious questions of their study design were that experience of anesthesiologists in direct laryngoscopy and the number of laryngoscopy attempt were not mentioned. In the Practice Guidelines for Management of the Difficult Airway by the American Society of Anesthesiologists Task Force on Difficult Airway Management, difficult laryngoscopy is described as not being able to visualize any portion of the glottis (ie, grades 3 and 4) after multiple attempts at direct laryngoscopy by an experienced anesthesiologist.^[3] Moreover, it was unclear whether the optimum external laryngeal manipulation was allowed to improve the laryngeal view obtained by direct laryngoscopy. It has been shown that optimum external laryngeal

manipulation can improve the direct laryngoscopic view by at least one grade in adult patients.^[4] Thus, we are concerned that these undetermined factors in the study design would have resulted in an incorrect definition of difficult laryngoscopy and a high incidence of difficult laryngoscopy.

Second, the ROC curve analysis was performed and the area under the ROC curve was used to assess the diagnostic accuracy of ultrasound-measured indicators for difficult laryngoscopy in this study. By the ROC curve analysis, the authors provided the maximal area under the ROC curve of the angle between the epiglottis and glottis for difficult laryngoscopy, and its sensitivity (81%) and specificity (89%) at a cut-off point of 50°. However, the authors did not give the Youden index at a cut-off point of 50°, and positive and negative predictive values of the angle between the epiglottis and glottis for difficult laryngoscopy. The Youden index is a direct measure of diagnostic accuracy of an interested indicator at the optimal cut-off point, that is, the maximum overall correct classification rate that the interested indicator can achieve. Actually, even an interested indicator with a large area under the ROC curve may have an unsatisfactory overall correct classification rate at the optimal cut-off point, and vice versa.^[5] After the ROC curve analysis in this study, thus, not providing the Youden index, positive and negative predictive values of the angle between the epiglottis and glottis has resulted in difficulty determining whether this ultrasound parameter has a good discriminative power for difficult laryngoscopy.

Finally, just like the authors had described, other ultrasound parameters, such as soft tissue thickness at the level of the hyoid bone, epiglottis and vocal cords as well as the visibility of hyoid bone in sub-lingual ultrasound examination, hyomental distance in the head-extended position and hyomental distance ratio, have been shown as independent predictors of difficult

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laryngoscopy.^[1] One design limitation of Wang *et al*' study is the lack of comparisons on the discriminative power of the angle between the epiglottis and glottis with other ultrasound parameters for difficult laryngoscopy. Thus, an important question that remains unanswered in this study is whether ability of the angle between the epiglottis and glottis for identification of difficult laryngoscopy is better than the other available ultrasound parameters.

Conflicts of interest

None.

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