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Predictive value of pharyngeal width at rest(JOSCYL width) for penetration and aspiration in elderly

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Introduction

We have demonstrated correlation between pharyngeal width at rest (JOSCYL width) and aspiration risk in elderly in our previous study. In this study, we included 48 additional patients and investigated whether JOSCYL width was correlated with not only aspiration but also penetration in elderly people.

Methods

Lateral cervical spine roentgenograms were obtained from 81 patients who complained of dysphagia (age: 78.6±7.3 years) and 45 healthy, age-matched controls (age: 77.3±8.6 years). Pharyngeal width at rest was measured at mid-oropharynx (A) and lower oropharynx (B) (Figure 1). We named the average of these two pharyngeal widths 'JOSCYL width' and calculated the 'JOSCYL width × 100 / neck circumference' as the JOSCYL scale. A video fluoroscopic swallowing study (VFSS) was performed and the Penetration-Aspiration Scale (PAS) and the Dysphagia Outcome and Severity Scale (DOSS) were determined by three physiatrists who did not know the participants' pharyngeal width. JOSCYL width and scale were compared between patients and controls and correlations of individual JOSCYL width and scale with PAS and DOSS scores were analyzed for the dysphagia group. To determine the optimal cutoff points for predicting penetration and aspiration, a receiver operating characteristic (ROC) curve analysis was performed on JOSCYL width and JOSCYL scale. All statistical significances were defined as CI > 95% and p value < 0.05.

Results

The JOSCYL width and scale of the dysphagia group (JOSCYL width: 16.9 ± 5.2 mm; p = 0.007, JOSCYL scale: 49.3 ± 15.5; p = 0.013) were larger than those of the control group (width: 14.4 ± 4.04 mm, scale: 42.5 ± 12.5). The correlation between the JOSCYL width and severity of dysphagia was significant for the dysphagia group (PAS, p = 0.012, DOSS, p = 0.024). The correlation between the JOSCYL scale and severity of dysphagia was also significant for the dysphagia group (PAS, p = 0.020, DOSS, p = 0.021). The optimal cutoff for JOSCYL widths and scale for predicting penetration were 14.9mm (sensitivity = 67.2%, specificity = 64.7%) and 45.0 (sensitivity = 64.1%, specificity = 64.7%) respectively (Figure 2-A). The optimal cutoff for JOSCYL width and scale for predicting aspiration were 16.5mm (sensitivity =

56.7%, specificity = 58.8%) and 47.4 (sensitivity = 56.7%, specificity = 54.9%) respectively (Figure 2-B).

Conclusion

The cutoff points of the JOSCYL width for penetration and aspiration were 14.9 mm and 16.5 mm respectively. The cutoff points of the JOSCYL scale for penetration and aspiration were 45.0 and 47.4 respectively. The cutoff points of the JOSCYL width and JOSCYL scale for penetration are about 2 mm and 2.0 lower than that of aspiration, therefore, we recommend physiatrists should pay close attention to elderly people with dysphagia who have JOSCYL width and scale above the cutoff points of penetration for the early rehabilitation of dysphagia and the prevention of aspiration.

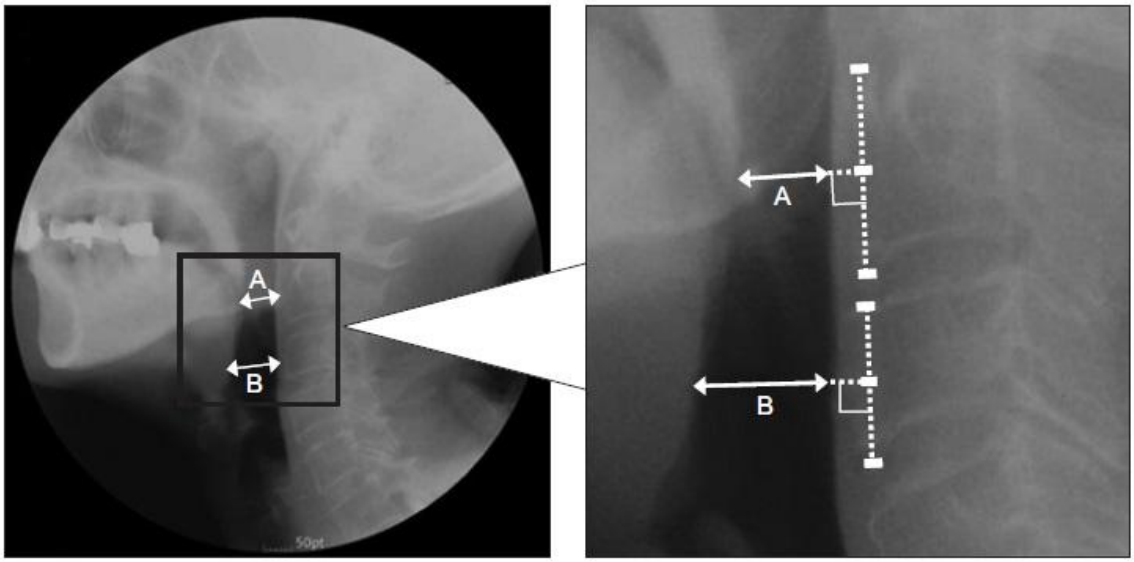

Figure 1. JOSCYL width is average of two pharyngeal width measured at mid-oropharynx (A) and lower oropharynx (B)

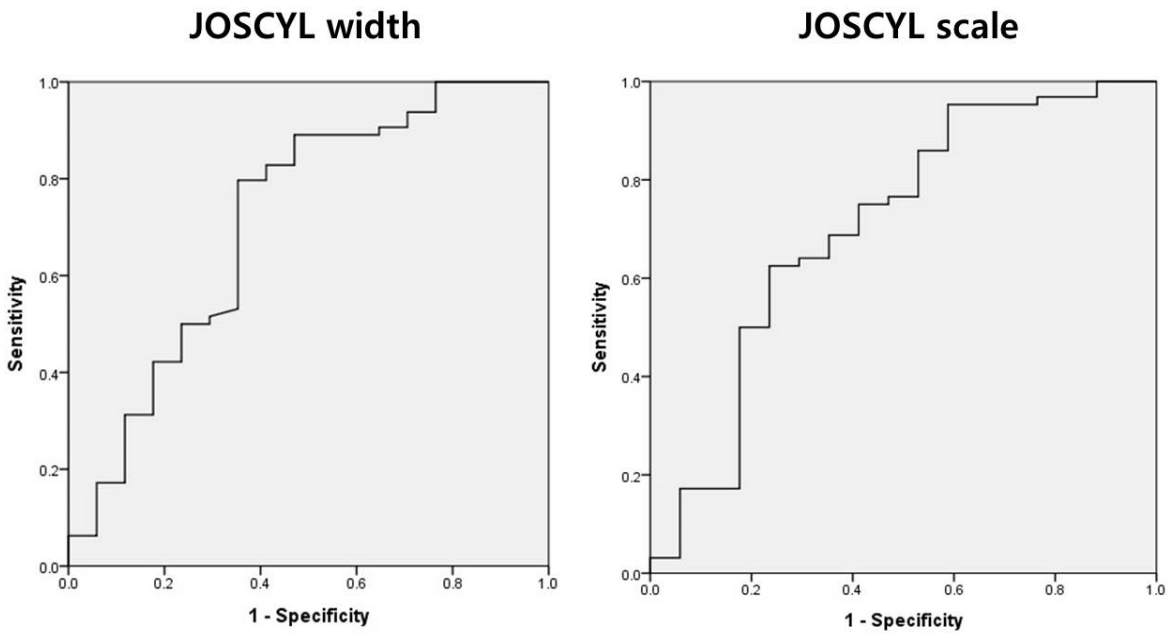

Figure 2. receiver operating characteristic (ROC) curve analysis on JOSCYL widths and scale for predicting penetration

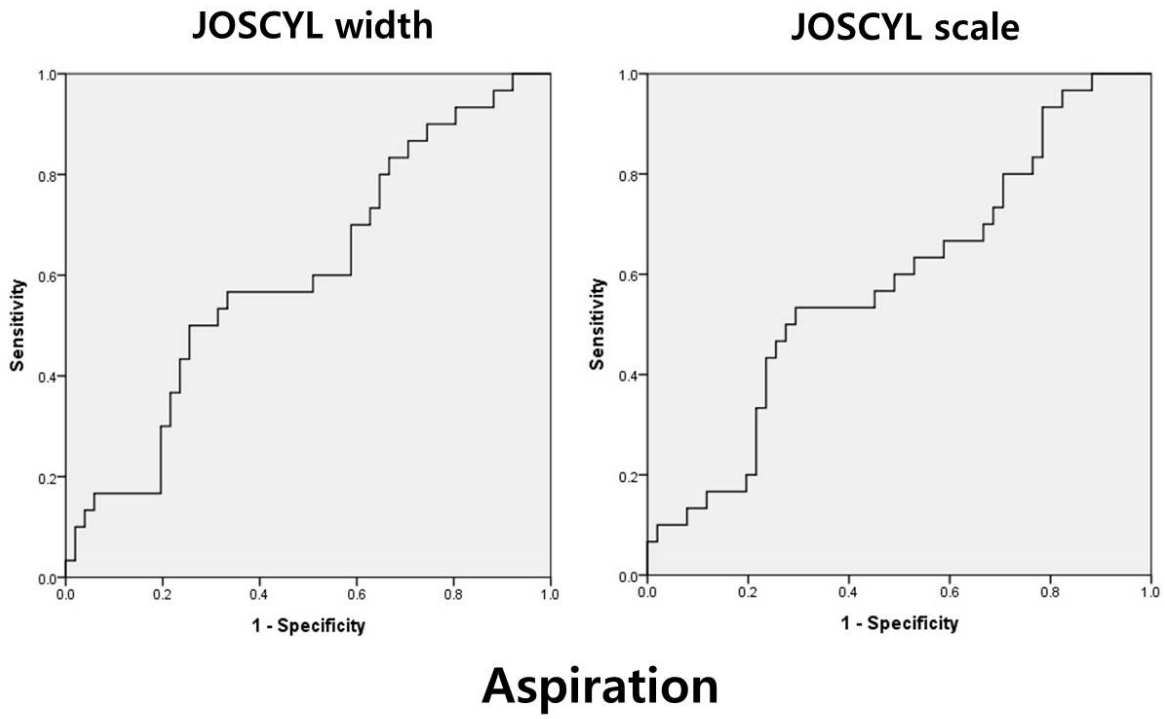

Figure 3. receiver operating characteristic (ROC) curve analysis on JOSCYL widths and scale for predicting aspiration