P 2-121

Predictive value of pharyngeal width at rest(JOSCYL width) in post-stroke penetration and aspiration

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Introduction

We have demonstrated correlation between pharyngeal width at rest (JOSCYL width) and post-stroke aspiration risk in our previous study. The aim of this study was to investigate whether JOSCYL width was correlated with not only aspiration but also penetration after stroke.

Methods

Lateral cervical spine roentgenograms were obtained from 466 stroke patients with dysphagia (age: 68.6±11.4 years, stroke stage (acute/chronic): 156/310) and 35 healthy controls (age: 65.5±3.1 years). Pharyngeal widths were measured at oropharynx (Figure. 1). We named the average of the two pharyngeal widths as the JOSCYL width and calculated the 'JOSCYL width×100 / neck circumference' as the JOSCYL scale. A video fluoroscopic swallowing study was performed and the PAS and DOSS scores were determined. JOSCYL width and JOSCYL scale were compared between patients and controls and correlations between the values and the scores of PAS and DOSS were examined in patients. To determine the optimal cutoff points for predicting penetration and aspiration, a ROC curve analysis was performed on pharyngeal width. All statistical significances were defined as CI > 95% and p value < 0.05.

Results

The JOSCYL widths and scales of the whole stroke group (width: 17.3 ± 5.9 mm; p = 0.007, scale: 48.6 ± 16.6; p = 0.028, acute stroke group (width: 16.8 ± 5.8 mm; p = 0.038, scale: 47.1 ± 16.0; p = 0.048), and chronic stroke group (width: 17.6 ± 5.9 mm; p = 0.004, scale: 49.3 ± 16.8; p = 0.017) were larger than those of the control group (width: 14.6 ± 4.3 mm, scale: 42.3 ± 12.0). Correlations were confirmed between the JOSCYL widths and the dysphagia scales in all patients (with PAS: r = 0.096; p = 0.039, with DOSS: r = -0.103; p = 0.026), in chronic stroke patients (with DOSS: r = -0.139; p = 0.014). The cutoff points of the JOSCYL widths for predicting penetration were 16.4 mm (sensitivity = 55.3%, specificity = 54.4%), 16.4 mm (sensitivity = 53.5%, specificity = 55.6%) and 16.4 mm (sensitivity = 56.1%, specificity = 56.1%) in all patients, acute stroke patients, chronic stroke patients respectively. The cutoff points of the JOSCYL widths for predicting aspiration were 16.9

mm (sensitivity = 51.9%, specificity = 52.0%), 16.7 mm (sensitivity = 48.3%, specificity = 49.0%) and 17.2mm (sensitivity = 54.2%, specificity = 55.0%) in all patients, acute stroke patients, chronic stroke patient respectively.

Conclusion

The JOSCYL width was significantly wider and the JOSCYL scale was higher in whole stroke patients compared with controls. The JOSCYL width was significantly correlated with dysphagia scales in whole stroke patients. The cutoff points of the JOSCYL width for penetration are smaller than that of aspiration regardless of stroke stage, therefore, we recommend that physiatrists should pay close attention to stroke patients who have JOSCYL width above the cutoff points of penetration for the early rehabilitation of dysphagia and the prevention of aspiration.

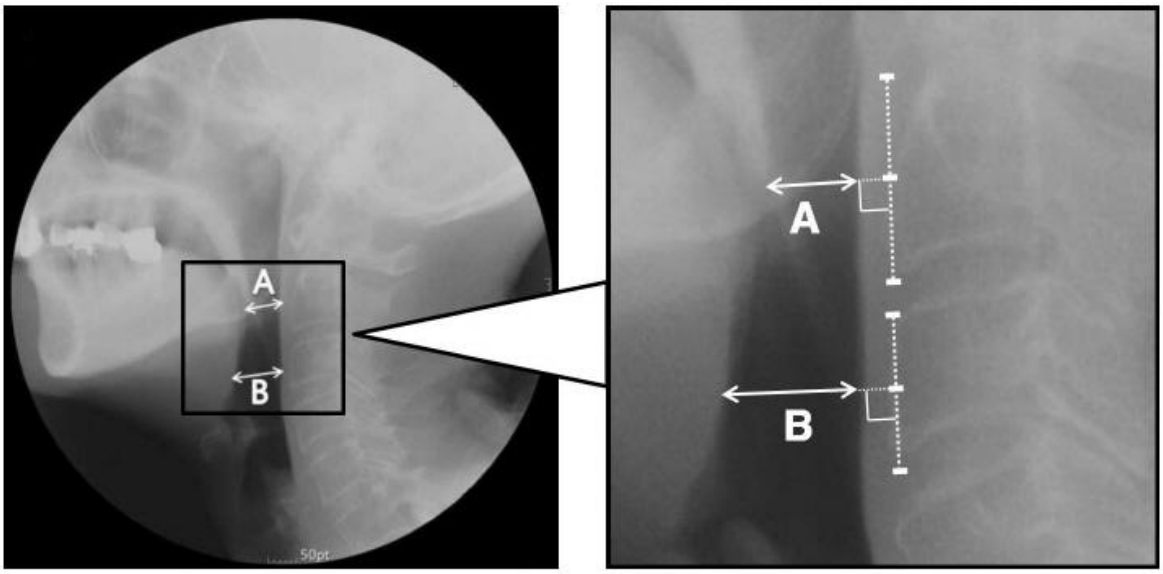

Figure1. The JOSCYL width. The perpendicular line A and B from the posterior pharyngeal wall was located at the position corresponding to the middle level of the second and third cervical vertebral bodies. The JOSCYL width was calculated as an average of two pharyngeal widths, A and B.