Correction to: Assessing Hyolaryngeal Excursion: Comparing Quantitative Methods to Palpation at the Bedside and Visualization During Videofluoroscopy

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We are writing to inform the readers of the Dysphagia journal of an error in the following paper:

Brates D, Molfenter SM, Thibeault SL. Assessing hyolaryngeal excursion: Comparing quantitative methods to palpation at the bedside and visualization during videofluoroscopy. *Dysphagia*. 2019, 34(3):298–307.

This paper compares the results of clinician perception of hyolaryngeal excursion, both on tactile palpation during clinical swallowing examination (CSE) and visual judgement on videofluoroscopy, with objective measurement of hyoid excursion on videofluoroscopy. Hyoid excursion was measured using both peak position measures and displacement measures. An open source spreadsheet tool, previously available at <https://www.steeleswallowinglab.ca> was used to calculate the position of the hyoid bone or larynx on lateral view videofluoroscopic images. Subsequently, an error was found in the mathematical formula built into the spreadsheet,

which resulted in a reversal of the results for the X and Y planes of measurement. Consequently, The discovery of the calculation error means that directional findings reported for the X and Y plane are reversed for the peak hyoid position measures, i.e., the previously reported results for peak anterior position were actually measures of peak superior position, and vice versa.. The reported measures of displacement are unaffected.

We would like to take this opportunity to correct one single finding in the analysis:

Comparing CSE to objective measurements, we found that peak *superior* (not anterior) hyoid position was significantly lower in patients judged to have reduced hyolaryngeal excursion (HE) compared to those judged to have functional HE [$t(85) = 3.30$, $p = 0.001$]. There was no significant difference in measures of peak *anterior* or hypotenuse hyoid positions between patients judged to have reduced versus normal HE. These revised results suggest that palpation by the clinicians in our sample was sensitive only to differences in *superior* hyoid movement.

This finding may be related to the increased tactile perceptibility of superior movement. When palpating the hyolaryngeal complex, superior movement is likely more detectable than anterior movement, and thus diminished movement in this dimension is more readily perceived. Depending on palpation method and external barriers, it may even be that the hyoid itself is not directly palpated during this task, and thus superior movement of the larynx is the sole factor being considered during this task.

Despite the previous error in peak position calculations, the overarching conclusions of this study remain unchanged. It remains the case that clinician perception of reduced and normal HE was minimally associated with actual hyoid movement, in that only one out of six directional dimensions measured by palpation and videofluoroscopic visualization was significantly different between swallows judged to have reduced versus normal HE. It also remains that there appears

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Fig. 1 (Correction to original Fig. 2) Comparison of clinical swallow examination ratings to peak hyoid measures. Asterisks represent mean values; vertical lines represent standard deviations; *WFL* within functional limits; * $p < 0.008$

Fig. 2 (Correction to original Fig. 3) Comparison of videofluoroscopy visual ratings to peak hyoid measures. Asterisks represent mean values; vertical lines represent standard deviations; *WFL* within functional limits; * $p < 0.008$

to be increased sensitivity of palpation over subjective VFSS visualization for assessing the adequacy of HE, given that our one significant finding was in judgment via palpation. Corrections to relevant tables and figures are provided in Tables 1 and 2 and in Figs. 1 and 2. Bold cells represent corrected data.

Table 1 (Correction to original Table 3) Reliability across hyoid measures

Reliability measure	Anterior	Superior	Hypotenuse
Intra-rater (ICC)	0.989	0.996	0.990
Inter-rater (ICC)	0.950	0.923	0.892

Bold cells display corrected values

ICC Intra-class correlation coefficients

Table 2 (Correction to original Table 5) Descriptive statistics of objective measures of HE within each group

Hyoid measures (%C2-4 distance)	N-CSE	R-CSE	N-VF	R-VF	All
Peak anterior M (SD)	154.5 (29.5)	154.4 (23)	156.4 (24.3)	152.3 (28.8)	154.5 (26.4)
Peak superior M (SD)	110.6 (26.18)*	89.22 (34.1)*	102.2 (30.1)	98.1 (34.2)	100.3 (31.9)
Peak hypotenuse M (SD)	192.4 (26.3)	181.4 (23.4)	189.1 (24.4)	184.8 (26.5)	187.1 (25.4)

Bold cells display corrected values

%C2–4% of the distance of the second to fourth cervical vertebrae, *N-CSE* rated as within normal limits during clinical swallow examination (CSE), *R-CSE* rated as reduced at CSE, *N-VF* rated as within normal limits during videofluoroscopy (VF), *R-VF* rated as reduced at VF, *M (SD)* mean (standard deviation)

* $p < 0.008$

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