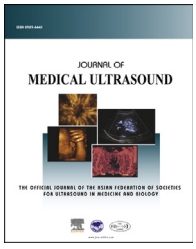
Journal of Medical Ultrasound (2014) 22, 51—52

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.jmu-online.com



LETTER TO THE EDITOR

# Response to "Ultrasonography in Evaluating Tongue Movement"

**Ming-Yen Hsiao [1], Tyng-Guey Wang [2*]**

[1] *Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital, Hsin-Chu Branch, Hsinchu City, and* [2] *Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital and National Taiwan University College of Medicine, Taipei, Taiwan, ROC*

Received 7 February 2014

*Dear Editor,*

We thank Dr Lin for her interest in our recent article, "Ultrasonography in Assessing Oropharyngeal Dysphagia", in which we discussed the techniques of ultrasonographic examination of tongue and larynx/hyoid movement, and the application of ultrasonography in assessing swallowing function in different groups of patients.

The physiology of swallowing is so delicate and complex that any attempt to evaluate swallowing function by a single indicator may be oversimplified. As pointed out by Dr Lin, a complete depiction of the movements of the tongue should include horizontal, vertical, and rotary movement. The shape of the tongue is constantly changing during swallowing, and the displacement of the tongue may not be defined correctly if using only midsagittal imaging. One reason that most researchers use midsagittal imaging to evaluate the movement of the tongue could be that the stage II transport phase (i.e., the propelling of the food to the pharynx) triggers the swallowing reflex and subsequently the pharyngeal stage [1]. It is of the greatest clinical importance when evaluating the oral stage of swallowing. During this stage, the movement of the tongue is mostly in the sagittal plane [1]. In our experience, it is also difficult to define the position of the transducer in other planes of imaging (e.g., the coronal plane). Furthermore, it is only possible in the sagittal plane to visualize the entire contour of the tongue and the hyoid bone [2].

The results of the displacement of the tongue as measured via ultrasonography should indeed be carefully interpreted. In our previous work, large between-trial and interindividual variations occurred in the ultrasonographic measurement of the displacement of the tongue [2]. Other parameters should also be considered. Some researchers have attempted temporal reconstruction [3] or three-dimensional reconstruction techniques [4] to obtain a whole picture of the tongue movement. Other techniques such as pixel analysis of the echogenicity of the tongue [5] or Doppler imaging for quantifying the blood flow of the tongue [6—8] may provide additional information. These techniques are preliminary and not widely accepted, however. A primary advantage of ultrasonography is its accessibility and ease of use, which is important in clinical application. The incorporation of these additional techniques is elaborate and time-consuming and may render ultrasonography less applicable in clinical practice. Further research is needed to define the clinical significance of these ultrasonographic parameters and to enable a more comprehensive, but accessible, evaluation of swallowing function.

Conflicts of interest: The authors declare no conflicts of interest.

* Correspondence to: Dr Tyng-Guey Wang, MD, Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital and National Taiwan University College of Medicine, Taiwan, ROC.

*E-mail address:* tgw@ntu.edu.tw (T.-G. Wang).

## References

[1] Matsuo K, Palmer JB. Anatomy and physiology of feeding and swallowing: normal and abnormal. Phys Med Rehabil Clin N Am 2008;19:691—707. vii.

http://dx.doi.org/10.1016/j.jmu.2014.02.008

[2] Hsiao MY, Chang YC, Chen WS, et al. Application of ultrasonography in assessing oropharyngeal dysphagia in stroke patients. Ultrasound Med Biol 2012;38:1522—8.
[3] Wein B, Bockler R, Klajman S. Temporal reconstruction of sonographic imaging of disturbed tongue movements. Dysphagia 1991;6:135—9.
[4] Miller JL, Sonies B. Three-dimensional volumetric measures of lingual muscle geometry during bolus accommodation [abstract]. Dysphagia; 2001:157.
[5] Van Den Engel-Hoek L, Van Alfen N, De Swart BJ, et al. Quantitative ultrasound of the tongue and submental muscles in children and young adults. Muscle Nerve 2012;46:31—7.
[6] Miller JL, Chi-Fishman G. Lingual hemodynamics following isometric contractions and swallows: preliminary inferences for therapeutic exercise in dysphagia [abstract]. Dysphagia; 2003:151.
[7] Miller JL, Kang SM. Preliminary ultrasound observation of lingual movement patterns during nutritive versus non-nutritive sucking in a premature infant. Dysphagia 2007;22:150—60.
[8] Miller JL, Watkin KL. Color flow Doppler ultrasound of lingual hemodynamics: a preliminary study [abstract]. Dysphagia; 1996:158.