

Assessing vocal fold movement in infants and children using laryngeal ultrasound by speech and language therapists (SLT): a feasibility study



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INTRODUCTION

- Vocal fold mobility impairment (VFMI) could present in the paediatric clinical populations due to numerous causes, such as iatrogenic, congenital cause, or cranial nerve injury secondary to cardiothoracic surgery
- VFMI can lead to difficulties with swallowing, breathing and phonation
- Assessment and diagnosis carried out by paediatric otolaryngologists using flexible nasal endoscopy (FNE) (Ongkasuwan et al., 2017)
 - is an invasive assessment and can present a participation challenge for infants and young children
 - long wait times could mean that SLT management may be limited
- Recent development of using laryngeal ultrasound to observe VF movement may improve access and care experience
- Extending this practice to SLT could:
 - improve access to information on VF movement to inform management
 - extend the contribution of SLT's unique knowledge on phonation, airway function and swallowing to the multidisciplinary diagnostic process

OBJECTIVES

- Evaluate the feasibility of a laryngeal ultrasound protocol for observing the VF movement in infants and children across functional activities by SLT
- Qualitative reflection to support the refinement of the protocol

METHOD

Participants:

- 11 children (nine 3 & 4 years old and two 0-6 months old) were recruited
- no history of VFMI, airway surgery

Equipment:

- 40mm linear ultrasound probe
- Micro-pocket ultrasound system
- Standard Windows laptop running Telemed Wave II Echo B software



Protocol:

- All 3 & 4 years old took part in a seated position and both infants were in a supine position
- Ultrasound probe was placed on the anterior neck at the level of the glottis to obtain a transverse image of the VF
- Visualization of bilateral arytenoid cartilages was used as landmark
- Tasks include
 - At rest/quiet breathing
 - Swallowing (spontaneous/prompted)
 - Vocalisation
 - Sustained vowels
 - Sustained consonants
 - Counting

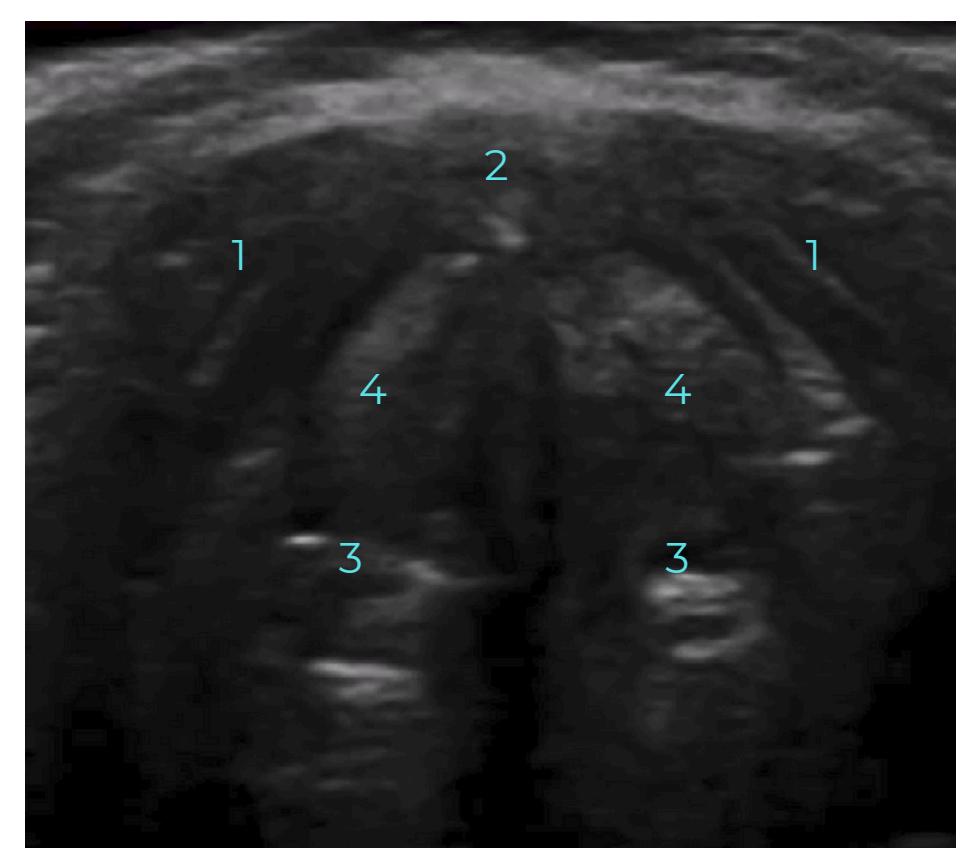
RELATED LITERATURE

Ongkasuwan et al. (2017). doi:10.1002/lary.26051
Slinger et al. (2023). doi:10.3233/ACS-230003
Burton et al. (2023). doi:10.1002/jum.16283.

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LARYNGEAL ULTRASOUND



Anatomical structures identified:

1. Thyroid cartilage
2. Anterior commissure
3. Arytenoid cartilages
4. False vocal folds

Symmetrical arytenoid position, indicative of symmetrical VF position

RESULTS

- Anatomical landmarks, including the thyroid cartilage, vocal folds, arytenoid cartilages and the anterior commissure, were successfully identified for all participants.
- Only 44% of the children completed the full protocol.
- Ultrasound images were captured for all children on quiet breathing, and during speech. In some cases, swallowing images were also captured.
- Symmetrical VF movement was observed in all children except during the speech task of one child (11%) due to the poor quality of the images captured.
- For infants, symmetrical VF movement was observed during vocalisation or crying. Further reflections on the positioning, setup and participant engagement were carried out.

DISCUSSION & CONCLUSION

- Possible for SLT to use laryngeal ultrasound to visualise VF movement
 - Important to consider the pathway in developing competency
- Observation across a range of activities impacting speech production and swallowing provides invaluable information
- The current protocol will need to be simplified and evaluated across wider age groups
- The use of age-appropriate materials helped prepare the young participants to take part in this study

In preparing our young participants to take part in this study, we co-produced a short stop-motion video to explain laryngeal ultrasound to the children.

The preparation of this material includes:

- A public engagement day in a primary school, demonstrating laryngeal ultrasound and asking the pupil to describe their experience
- Content analysis of their feedback to capture their experience in their language
- Work with children to develop the video material



Scan here for video