

A comparison of vocal fold functions measured by laryngeal ultrasound imaging in children with or without vocal fold paralysis

Abstract

Pediatric vocal fold paralysis may be congenital or caused by nerve injury during cardiothoracic surgery. It results in voice disorder and other complications which greatly compromise the patient's quality of life. Early detection and diagnosis of the problem is important. Laryngeal ultrasound imaging has an emerging role in voice assessment. This study would recruit 30 children with and without vocal fold paralysis from a local hospital and laryngeal ultrasound imaging would be performed. The objectives are, 1) to evaluate the effectiveness of four quantitative parameters in distinguishing children with or without vocal fold paralysis and 2) to explore the use of ultrasound imaging in evaluating supraglottic configuration. It is hoped that the findings could extend our current understanding on the sonographic appearance of larynx and supra-laryngeal structures in children as well as promote the use of laryngeal ultrasound imaging for screening children susceptible to vocal fold paralysis.

Research questions

1. Which quantitative parameter(s) is/are effective in distinguishing children with or without vocal fold paralysis?
2. Can supraglottic configuration be visualized using ultrasound imaging in children with or without vocal fold paralysis?

Methodology

Participants

30 Chinese children (**15** with vocal fold paralysis and **15** with healthy voice) aged between 2-12 years old would be recruited. Children between the two groups would be matched with age and gender for data analysis. For children with vocal fold paralysis, they should have received a formal diagnosis by an otolaryngologist. The paralysis could be unilateral or bilateral. Children with voice disorder caused by multiple etiology are excluded. As for children with healthy voice, their vocal health status would be evaluated based on the information provided by their parents. Children with respiratory diseases or are currently taking medicine that may affect voice quality are excluded.

All participants and their parents would be briefed regarding the laryngeal ultrasound

imaging process. Written informed consent would be obtained from participants' parents prior to data collection.

Procedures

All ultrasound imaging would be performed using an ultrasound system (GE LOGiQ e8) by the investigator over a 4-week period during the summer. High resolution static and video images would be obtained for both phonation and respiration tasks. During the examination, children would be put in a supine position and have their neck stretched, with pillows placed underneath.

Data analysis

Measurements on the ultrasound images would be made with respect to the four parameters below: 1) maximum glottic angle, 2) vocal-fold arytenoid angle, 3) vocal fold length and 4) subglottic airway diameter. The measurements would be done by the investigator for two times to ensure intra-rater reliability.

Location

Data collection will be conducted in **Tseung Kwan O Hospital and Voice Research Lab at the University of Hong Kong**. Preparation work and data analysis will be done at **HKU**.

Timeline

Early April – Late May

Draft and send application to the Faculty Research Ethics Committee

Recruit participants

Early June -Late June

Data collection (first round)

*The period for data collection is subjected to the COVID-19 situation. The investigator would closely monitor the situation and discuss with supervisor the contingency plans.

Early July -Late July

Data analysis (may re-collect missing data, if necessary)

Writing research report