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Automatic Quantification of Vocal Cord Movement Symmetry based on Fibre-optic Nasendoscopy Video Processing

Introduction

Clinical subjective assessment of the symmetry of vocal cord movement may lead to variability in diagnosis, particularly in challenging cases. We aimed to enhance diagnostic practices by quantifying vocal cord motion, recorded in nasendoscopy videos, using bespoke image processing to measure vocal cord movement symmetry.

Materials & Methods

With patient consent, routine clinical video data of vocal cord motion were recorded using flexible fibre-optic nasendoscopy connected to a 25 frame per second camera. In this study, 3 normal cases and 3 unilateral palsies were examined. A sequence of video frames pertaining to abduction movements were manually selected and input into the custom software for automatic processing. The algorithm executes a novel framework to quantify vocal cord motion, with steps involving glottal area segmentation, estimation of motion between successive frames of delineated vocal cord edges and measurement of movement symmetry.

Results

In the normal cases, the horizontal velocity of motion of one vocal cord was at least 80% (±0.58%) of the other. The unilateral paralysed vocal cords were found to achieve only 18% (severe), 58% and 59% motion of the contralateral vocal cord.

Conclusion

The results demonstrate a technique to objectively quantify vocal cord movement. Future work involves a comparative study of the results with subjective clinicians' rating of vocal cord motion, on a discrete 5-point scale. This technique may potentially be used in the diagnosis of subtle vocal cord movement asymmetries and early reduction in vocal cord movement due to pathology, and to aid in the assessment of outcomes of post-surgical interventions.

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