

Chapter 24

VSK in clinical practice. Advantages and pitfalls

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Abstract

VSK has the potential to be an effective tool for the qualitative and the quantitative analysis of vibratory patterns of the vocal folds (VF) in both normal and in pathological voices. We base this opinion on our experiences with VSK exams covering over 2200 cases and on qualitative assessment of kymograms derived from various VF pathologies.

Keywords: *videostrobokymography, kymogram, open quotient, closed quotient*

Introduction

In the preceding chapter, we discussed the rationale of assessment of the laryngeal functions using videokymography (VKG) and videostrobokymography (VSK). We demonstrated that VSK has the potential to be an effective tool for the qualitative and the quantitative analysis of the vibratory patterns of the VF in patients with normal voices and in different voice pathologies. Here, we discuss our reservations regarding VSK validity for an unequivocal objective assessment of the vibratory behavior of the VF based on over 2200 exams of dysphonic patients. This work was carried out at the Audiology and Phoniatrics Clinic of the Institute of Physiology and Pathology of Hearing in Warsaw, Poland. In all cases we used the EndoSTROB DX Xion 327 unit (Xion GmbH Berlin, Germany, EU). All recordings were made transorally using a rigid scope with recordings captured at the rate of 25 f/s over phonation sequence lasting between 3-4 sec.

Rationale

As discussed previously in Chapter 23, VSK provides qualitative assessment of the vibratory patterns of the VF. The VSK is based on a standard laryngovideostroboscopic (LVS) exam speed, hence VSK is a subject to inadequate processing of the aperiodic signals. Nonetheless, VSK assessment provides information on differences of VF vibratory amplitude and of phases, on symmetry, and on periodicity of deviations of VF oscillations. Objective quantitative parameters include measures of open quotient (OQ), closed quotient (CQ), and in some cases an asymmetry index (AI) that can be calculated from an obtained kymogram.

Typical VSK from a normal control phonation are shown in Figure 1 A & B. To obtain such an image, a point of interest is chosen by fitting a perpendicular line across such area to analyze the VF vibratory pattern at a chosen location. This allows the extraction of narrow image stripes from each video sequence. Hence, the derived kymogram depicts the vibratory pattern of the mucosal edges of the VF at the selected line (location).

From this procedure, an open quotient (OQ) and a closed quotient (CQ) can be calculated. An OQ is the ratio of the open phase to total phase. A closed quotient (CQ) is the ratio of the closed phase to total phase.

Asymmetry Index (AI) is calculated as $(\text{left glottal area} - \text{right glottal area}) / (\text{left glottal area} + \text{right glottal area}) \times 200$ [1-2]. This method enables analyzing the VF from multiple regions of interest from the same video segment.

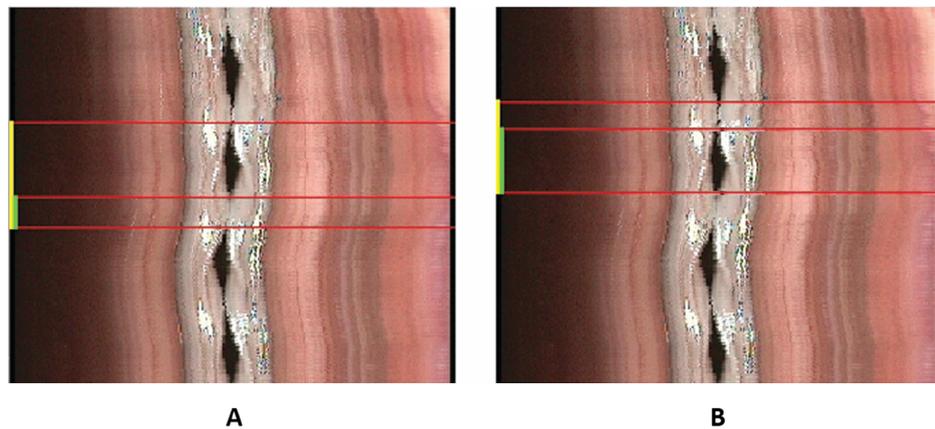


Figure 1. A) Normal VSK and CQ. B) Normal VSK and OQ.

Results

Our VSK examination covered over 2200 patients. From these data we performed a qualitative assessment of kymograms and calculated OQ and CQ for different VF pathologies (see Chapters 25-28). The OQ and CQ were calculated from kymograms constructed from the anterior, medial, and posterior areas of the VF as demonstrated in Figure 1.

Based on our large data base, we observed numerous factors interfering in the calculation of OQ/CQ that may affect their values even within the same group of vocal pathologies. These factors include: 1) location of pathology within the glottis, 2) extension of pathology within the glottis, 3) actual voice intensity during the recording of the phonatory task, and 4) problems with capture of aperiodic vibrations.

Conclusions

Despite the above listed drawbacks, we suggest that VSK is an effective tool for assessment of vibratory patterns in patients with normal voices and with different voice pathologies. When performed cautiously, VSK provides qualitative and quantitative parameters making the evaluation of VF behavior more objective than the visual assessment of laryngovideostroboscopy alone.

References

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