

Increase in the phonotrauma level in presence of an organic glottic lesion: Pilot study on excised human larynges

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Introduction

The force of collision between the vocal folds is one of the components of the phonotrauma.[1]. The objective of this experimental study on excised human larynges was to compare the level of collision force between vocal folds during phonation on a healthy larynx and on a larynx with bilateral oedema (Reinke oedema).

Material and methods

- 1 healthy larynx and 1 larynx with Reinke oedema (both females)
- Collected within 24 to 48 hours after the death of persons who gave their bodies to science according to the ethical laws in France
- Phonatory position of the vocal folds: with symmetrical Montgomery implants and an inter-arytenoid suture
- Experimental bench allowing the controlled supply of phonatory air
- Synchronous collection of acoustic, electroglottographic and aerodynamic measurements, and the measurement of the collision force between the vocal folds as well
- Both larynges subjected to a physiological subglottic pressure ramp (between 0 and 0.15 kPa).

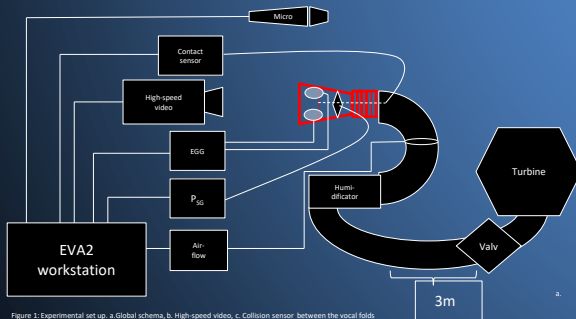


Figure 1: Experimental set up. a. Global schema, b. High-speed video, c. Collision sensor between the vocal folds.



Results

The phonatory threshold pressures were 0.058 kPa for the healthy larynx and 0.23 kPa for the pathological larynx respectively. The mean fundamental frequency was 296 Hz for the healthy larynx and 106 Hz for the pathological larynx. The mean level of the collision force was 12 kPa for the healthy larynx and 158 kPa for the pathological larynx.



Figure 2: High-speed video of the normal larynx (left) and the pathological larynx (right)

Discussion

The phonations obtained with the two larynges were compatible with normal and pathological data known from the literature concerning acoustic and aerodynamic parameters [2]. The level of collision between the vocal folds of the pathological larynx was more than ten times higher than for the healthy larynx. Only one study previously reported a local increase of collision force in patients with vocal polyp, at the contact of the polyp [3]. And the results of the present study are consistent with an increase due to physical properties of the pathological glottis, independently from any vocal effort or vocal abuse.

Conclusion

This finding may explain the existence of the contact lesions located on the contralateral vocal fold to lesion and may be an additional argument for the surgical management of glottic benign lesions.

References

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