

# CONIC DEFORMATION OF THE SUBGLOTTIC MUCOSA AND ITS IMPACT ON THE AERODYNAMICS OF THE AIRFLOW OVER THE VOCAL FOLDS

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## Abstract:

**Objective:** This study mapped the variation in tissue elasticity of the subglottic mucosa, applied that data to provide initial models of the likely deformation of the mucosa during the myoelastic cycle, and hypothesised as to the impact on the process of phonation.

**Study Design:** 6 donor human larynges were dissected along the sagittal plane to expose the vocal folds and subglottic mucosa. A Linear Skin Rheometer was used to apply a controlled shear force, and the resultant displacement was measured. This data provided a measure of the stress/strain characteristics of the tissue at each anatomical point. A series of measurements were taken at 2mm interval inferior of the vocal folds, and the change in elasticity determined.

**Results:** It was found that the elasticity of the mucosa in the subglottic region increased linearly with distance from the vocal folds in all 12 samples. A simple deformation model indicated that under low pressure conditions the subglottic mucosa will deform to form a cone, which could result in a higher velocity thus amplifying the low pressure effect resulting from the Venturi principle, and could assist in maintaining laminar flow.

**Conclusions:** This study indicated that the deformation of the subglottic mucosa could play a significant role in the delivery of a low pressure air flow over the vocal folds.