

# HIGH SPEED FILMS OF PATHOLOGICAL VOCAL FOLDS COMPARED WITH VIDEO STROBOSCOPY AND STIFFNESS OF THE VOCAL FOLDS

**M. Pedersen**  
 Ear-, Nose-, Throat specialist  
 FRSM Dr.med.Sci. et h.c.  
 Research Prof. IBC Cambridge  
 UK

**M. Eeg**  
 Cand stat  
**A. Jønsson & B. Akram**  
 Medical student  
 University of Copenhagen

The Medical Center, ear nose throat unit.  
 Oestergade 18, DK-1100 Copenhagen, Denmark  
 Phone: +45 33137700, +45 33159600  
 Mobile: +45 31126184, Fax: +45 33137705  
 E-mail: [m.f.pedersen@dadlnet.dk](mailto:m.f.pedersen@dadlnet.dk)  
 Url// [www.mpedersen.org](http://www.mpedersen.org)

## Introduction

It was a step forward when stroboscopy in the clinic was developed. But as high speed imaging emerged we soon discovered that the diagnoses made by high speed films (HS) were different from the video stroboscopy (VS). With high speed films it is possible to see the vocal folds movement (4.000 frames per sec) in more details than the average pictures provided by the video stroboscopy (mostly 25 frames per sec). Vocal folds move in an adult man ~110 Hz and in a woman ~220 Hz. **It is unknown how often there is a treatment related difference and the relevance of the difference is not known.** The visualization with HS allows advanced analysis of the vocal folds. Glottis Analysis Tools software (Döllinger et al 2002) provides more precise measures.

## Method

We included patients prospectively with hoarseness and assessed each patient with both high speed films and video stroboscopy **in a randomized cross over study**. High speed films were assessed with visual arytenoids-region edema score 1-5, vocal fold abnormalities and front, middle and rear open quotients. Suggested treatments were based on the medical examination, saved before proceeding. With video stroboscopy averaged movements of the vocal folds were seen with averaged mucosal movement, regularity, amplitude, and averaged closure of the vocal folds – not the true ones. The recordings were exported to **Glottis Analysis Tools software** and further analyzed. Comparing diagnosis given for each patient based on the examinations (either video-stroboscopy or high speed film) and the corresponding treatment was saved in this prospective randomized study.

## Results, discussion and conclusion

A total of 19 patients (6 males and 13 females) were included in the study – which was the amount needed for statistical analysis of evidence. The patient's age ranged from 18 to 72 years (average 38y). The base line was hoarseness for two weeks or more without other earlier treatment. The study showed a statistical difference in the need of either voice training or local cortisone/formeterol inhaler with adrenalin of: **37% to 11% when comparing treatment plans based on video stroboscopy and high speed films**, respectively ( $p=0,0190$ ) (Table 1).

We have seen a difference between high quality voices and other voices in terms of stiffness and trajectories parameters. (Fig.1-2-3).

*The future aspects include optical coherence tomography (OCT) and genetics for further understanding of the mucosal function of the upper airways*

Table 1 shows the treatment plan in the cross over study	High speed films 19 patients	Video stroboscopy 19 patients
Voice training or Cortisone/ formeterol inhaler	2 (11%)	7 (37%)

Figure 1 illustrates how the input is made to the Glottis Analysis Tools software, a marking is made of points of interest

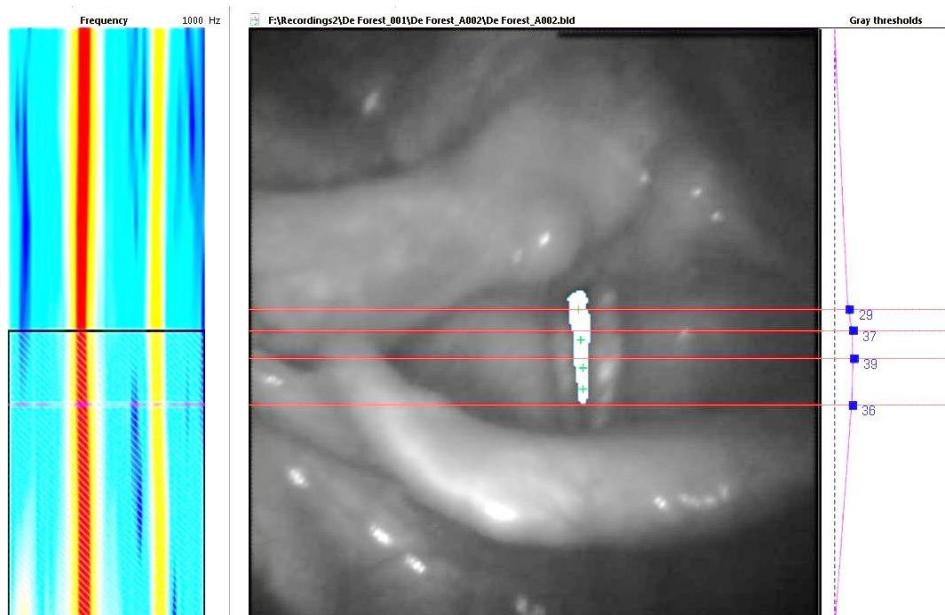


Figure 2. Trajectories of a 59 years old male with acute laryngitis

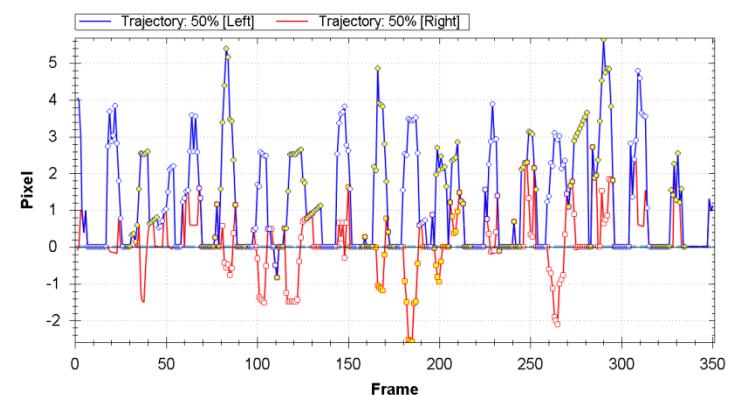


Figure 3. Trajectories of a contest winning female

