Online Supplemental Text

Supplemental Materials and Methods

Data acquisition hardware

Our CLE apparatus features a flexible fiberoptic laryngoscope (Olympus ENF-P4 Olympus, Tokyo, Japan), metabolic cart (MGC Diagnostics, St. Paul, MN). And cycle ergometer (Lode Corival; Lode B.V., Groningen, the Netherlands).

Supplementary description of statistical analysis

Several alternative longitudinal models were used to fit the data to check for consistency with results from the primary model. Two such alternatives were: (i) use of a standard linear mixed model (which is somewhat crude for our data since the real outcome of interest has only 4 possible values), and (ii) use of a longitudinal logistic regression model, using specific cut-points for the outcome of interest. Both models allowed for modeling serial correlation in the data, accomplished by using the first-order autoregressive [AR(1)] correlation structure. For (ii), the primary cut-point considered separated the zero and nonzero data. Like the primary models, these models consistently showed significant mean differences between time windows for both the glottis and supraglottic outcomes. Some examination of other covariance structures was performed. The UN structure allowed more flexibility to model correlation but lead to mean estimates and standard errors that were similar to models based on the AR(1) structure.

In the final analysis, restricting the data to those with moderate or severe glottic obstruction prevented convergence of the model. In this single situation, we used average reviewer scores in the model (rather than treating them individually), for which the model did converge. To assess the validity of this approach, we modeled supraglottic obstruction using both individual reviewer and reviewer-averaged approaches, and the estimates and confidence intervals across windows were fairly similar.

Supplemental results

Figure s1. Inspiratory laryngeal obstruction across rest, incremental ramp exercise to a symptom-limited peak, and recovery in all subjects (A) and subjects with moderate or severe inspiratory glottic adduction in any test window (B). Data points represent the average obstruction ratings across all patients as per the scoring scale of Roksund et al. with larger numbers representing increased obstruction. Closed circles and solid lines represent glottic obstruction and open circles on dashed lines represent supraglottic obstruction. These raw averages are similar to modeled estimates displayed in Figure 2.