Video-Bronchoscopic Quantification of Airway Sizes and Proportions in Children

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ABSTRACT

Background: A quantitative understanding of airway sizes and proportions and a reference point for comparisons are important to a bronchoscopist. The aims of this study were to measure large airway areas, and define proportions and predictors of airway size in children.

Methods: A validated videobronchoscope technique was used to measure in-vivo airway cross-sectional areas (cricoid, right (RMS) and left (LMS) main stem and major lobar bronchi) of 125 children. Airway proportions were calculated as ratios of airways to cricoid areas and to endotracheal tube (ETT) areas. Mann Whitney *U*, T-tests, and one-way ANOVA were used for comparisons and standard univariate and backwards, stepwise multivariate regression analyses were used to define airway size predictors.

Results: Airways size increased progressively with increasing age but proportions remained constant. The LMS was 21% smaller than the RMS. Gender differences in airways' size were not significant in any age group or airway site. Cricoid area related best to body length (BL): cricoid area (mm^2) = 26.782 + 0.254*BL (cm) while the RMS and LMS area related best to weight: RMS area (mm^2) = 23.938 + 0.394*Wt (kg) and LMS area (mm^2) = 20.055 + 0.263*Wt (kg) respectively. Airways to cricoid ratios were larger than airway to ETT ratios (p=0.0001).

Conclusions: The cricoid and large airways progressively increase in size but maintain constant proportional relationships to the cricoid across childhood. The cricoid area correlates with body length while the RMS and LMS are best predicted by weight. These data provide for quantitative comparisons of airway lesions.

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