

Abstract

Objective

Report on the incidence of structural abnormalities on bronchoscopy and assess whether controlled GERD or negative environmental allergy testing were associated with an increased incidence of anatomic pathology in patients experiencing recurrent croup episodes.

Methods

A single institutional retrospective cohort study was conducted to compare the incidence of subglottic stenosis, tracheomalacia, and bronchomalacia in patients with recurrent croup undergoing acid suppression for GERD versus those testing negative for environmental allergy. Statistical analysis was used to analyze the relationship between negative allergy testing or acid suppression and abnormal bronchoscopy findings.

Results

Out of 168 patients that underwent bronchoscopy with recurrent croup, 48 (28.5%) had pathologic findings. Of those with GERD controlled through acid suppression n = 36 (21.4%) or with previous negative environmental allergy testing (n = 34, 20.2%), 38.8% and 29.4% had structural pathology, respectively, compared to 27.4% of those without GERD or allergy testing (n = 73, 43.4%).

Conclusion

Neither GERD nor a history of allergy effects the likelihood of abnormal bronchoscopy findings in patients with recurrent croup, but multi-institutional research is necessary for broad generalization.

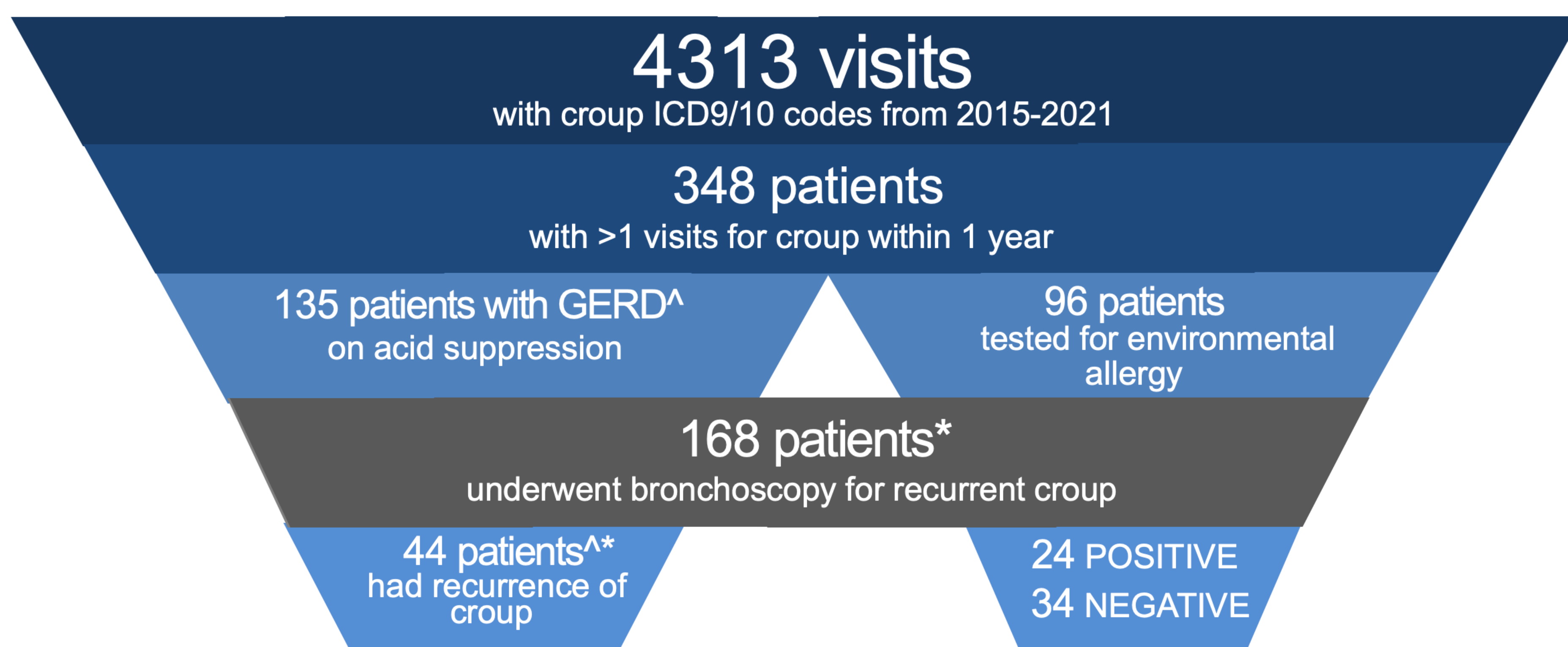
Introduction

Bronchoscopy is the gold standard of lower airway evaluation in patients with recurrent croup; however, a diagnosis of structural pathology is uncommon. The objective of this study was to report on the incidence of structural abnormalities on bronchoscopy and assess whether GERD controlled through acid suppression or negative environmental allergy testing were associated with an increase in anatomic pathology in patients experiencing recurrent croup episodes.

Methods

An institutional review board-approved retrospective cohort study of patients presenting with croup to a single tertiary care center between 2016 and 2021 was conducted. Inclusion criteria consisted of patients age < 18 years who presented to the emergency department, urgent care, or otolaryngology office with recurrent croup (ICD9-464.4 or ICD10-J05.0 and having symptoms at least twice in a year) and underwent bronchoscopy. Demographic features, abnormal findings on first bronchoscopy, allergy testing results, history of reflux and GERD, acid suppression therapy, and active croup concurrent with GERD intervention were noted. Abnormal findings on bronchoscopy included subglottic stenosis, tracheomalacia, and bronchomalacia.

Figure 1. Patient Inclusion Process



[^]Diagnosed based on response to acid suppression or EGD with biopsy and bronchoscopy.

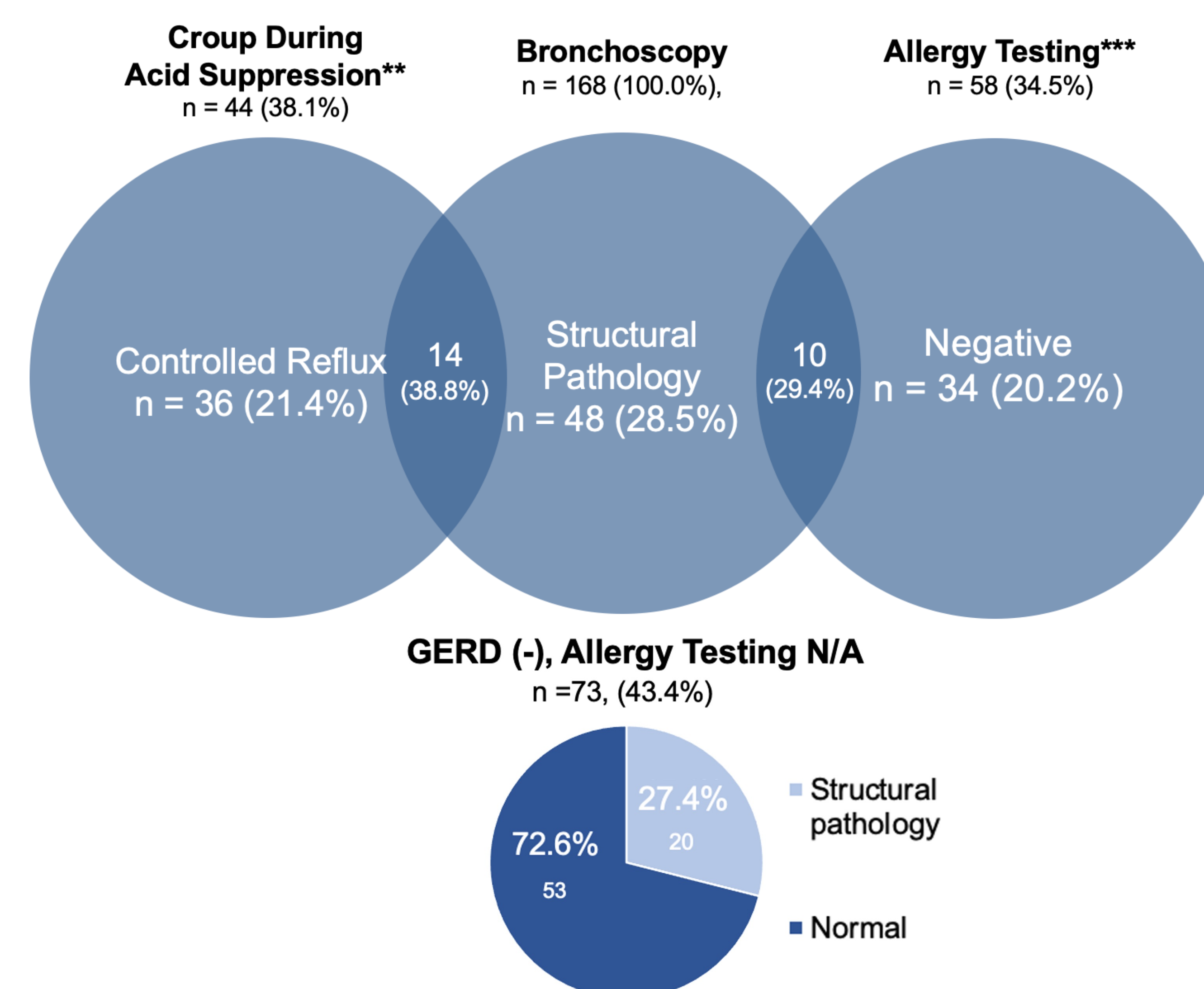
^{^^}Those exclusively with neonatal reflux (<6 months old) were excluded.

*Did not undergo bronchoscopy with acid suppression, n = 91, or after allergy testing, n = 38.

Results

Among 168 patients with recurrent croup who underwent bronchoscopy, median age was 2.8 years (IQR 1.70-4.8) and 71.4% (n=120) of the cohort were males. Of these patients, 28.5% (n = 48) had pathologic findings, most commonly tracheomalacia (15.4%), followed by subglottic stenosis (12.5%), and bronchomalacia (4.2%). Of those with GERD controlled by acid suppression therapy during a croup episode (n = 36, 21.4%) or with previous negative environmental allergy testing (n=34, 20.2%), 38.8% and 29.4% had structural pathology, respectively, compared to 27.4% of those without GERD or allergy testing (n = 73, 43.4%). Univariate logistic regression was used to analyze the relationship between negative allergy testing (P=0.563, OR 1.69, 95% CI 0.28-10.09) or GERD controlled through acid suppression (P=0.663, OR 0.52, 95% CI 0.27-9.91) and abnormal bronchoscopy findings.

Figure 2. Bronchoscopy Findings and Relationship with Reflux Control and Negative Allergy



**Uncontrolled GERD, n = 8 (18.2%), with structural pathology n = 3 (37.5%)

***Allergy test (+), n = 24 (14.3%), with structural pathology n = 5 (20.8%)

Discussion

Recurrent croup from allergy and GERD presents similarly to viral and structural causes, but their correlation with structural pathology on bronchoscopy is unclear. Bronchoscopy is the gold standard of lower airway evaluation in patients with recurrent croup; however, diagnosis of structural pathology is uncommon. This study aimed to determine whether the incidence of structural pathology in recurrent croup increased when reflux is treated, or allergy is ruled out. Identifying extraneous influences in findings of structural pathology in patients with recurrent croup may provide insight into whether bronchoscopy will yield significant findings for a given patient. This study found no significant correlation between acid suppression therapy or negative allergy testing and structural pathology in patients with recurrent croup, but further research is required for generalization.

Conclusions

Neither controlled reflux nor negative allergy testing effects the likelihood of finding structural pathology in patients with recurrent croup, but multi-institutional research is necessary for broad generalization.