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Review Article

Bronchoscopy findings in recurrent croup: A systematic review and meta-analysis

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ABSTRACT

Importance: The etiology of recurrent croup is often anatomic. Currently there is no set criteria for determining who should undergo diagnostic bronchoscopy and which patients are at most risk for having a clinically significant finding. Few studies have addressed these questions.

Objective: To identify risk factors for clinically significant findings on bronchoscopy in children with recurrent croup and the frequency of bronchoscopy findings in general.

Data sources: PUBMED, Ovid MEDLINE, EMBASE.

Study selection: Articles addressing bronchoscopy in children with recurrent croup, up to July 2016, were reviewed. Related keywords and medical subject headings were used during the search. The abstracts were reviewed to determine suitability for inclusion based on a set of criteria. Manual crosscheck of references was performed.

Data extraction: We analyzed the bronchoscopy findings of individual patients in each study and their associated risk factors when available.

Results: We reviewed 11 articles, published between 1992 and 2016, including 885 patients (654 males, 237 females). Only 5 studies, including 455 patients, had sufficient data for meta-analysis. Our study revealed that the three most common bronchoscopy findings were subglottic stenosis, reflux changes, and broncho/tracheomalacia. Only 8.7% of patients were noted to have clinically significant findings on bronchoscopy. Meta analysis showed an association between significant bronchoscopy findings and History of Intubation [OR = 5.17, 95% CI 2.65–10.09], Inpatient Consultation [OR = 4.01, 95% CI 1.44–11.20], Age < 3 [OR = 3.22, 95% CI 1.66–6.27], Age < 1 [OR = 2.86, 95% CI 1.28–6.40], and Prematurity [OR = 2.90, 95% CI 1.39–6.06]. Our study found a high incidence of a History of GERD (20%) and Asthma/Allergies (35%) among patients with recurrent croup, but these variables did not reach statistical significance in patients with significant bronchoscopy findings ([OR = 1.62, 95% CI 0.79–3.30], [OR = 0.57, 95% CI 0.30–1.08] respectively).

Conclusion: The risk factors most associated with clinically significant bronchoscopy findings in recurrent croup are Intubation, Inpatient Consultation, Age < 3, Age < 1, and Prematurity. A History of GERD and Asthma/Allergy, though highly prevalent in recurrent croup patients, were not statistically associated with significant bronchoscopy findings.

Relevance: The results should guide physicians in selecting which recurrent croup patients are most at risk for significant findings and thus may warrant bronchoscopy.

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1. Introduction

Croup is a common pediatric condition affecting children between 6 months and 3 years. Typically a self-limited viral illness, it presents with a barking cough, stridor, and respiratory distress. Recurrent croup, however, is a different entity affecting 6.4% of children before the age of 4 and is defined as 2 or more croup-like episodes [1]. It should not be considered a definitive diagnosis as there is often an underlying etiology to the condition, whether it is a congenital anatomic abnormality or other pathophysiological process causing narrowing or obstruction of the airway. Multiple studies have shown a high incidence of both asthma/allergies and gastroesophageal reflux (GERD) in patients with recurrent croup [2,3,4,5]. Many children with recurrent croup are taken for direct laryngoscopy and bronchoscopy to evaluate the airway for an underlying etiology. Abnormalities are sometimes found but they are

often not significant and do not alter clinical management. In an era of evidence based medicine and healthcare cost-consciousness, it would be advantageous to identify which patients are at highest risk for having a clinically significant finding on bronchoscopy and who should be taken to the operating room for bronchoscopy. Several recent studies have attempted to answer this question and identify pertinent risk factors [6,7,8]. The objective of this study was to systematically review the literature and identify risk factors that may predict clinically significant findings on bronchoscopy in children with recurrent croup and also note the frequency of bronchoscopy findings in general.

2. Materials and methods

Pubmed, Ovid MEDLINE, and EMBASE database searches were conducted to include all articles that addressed bronchoscopy

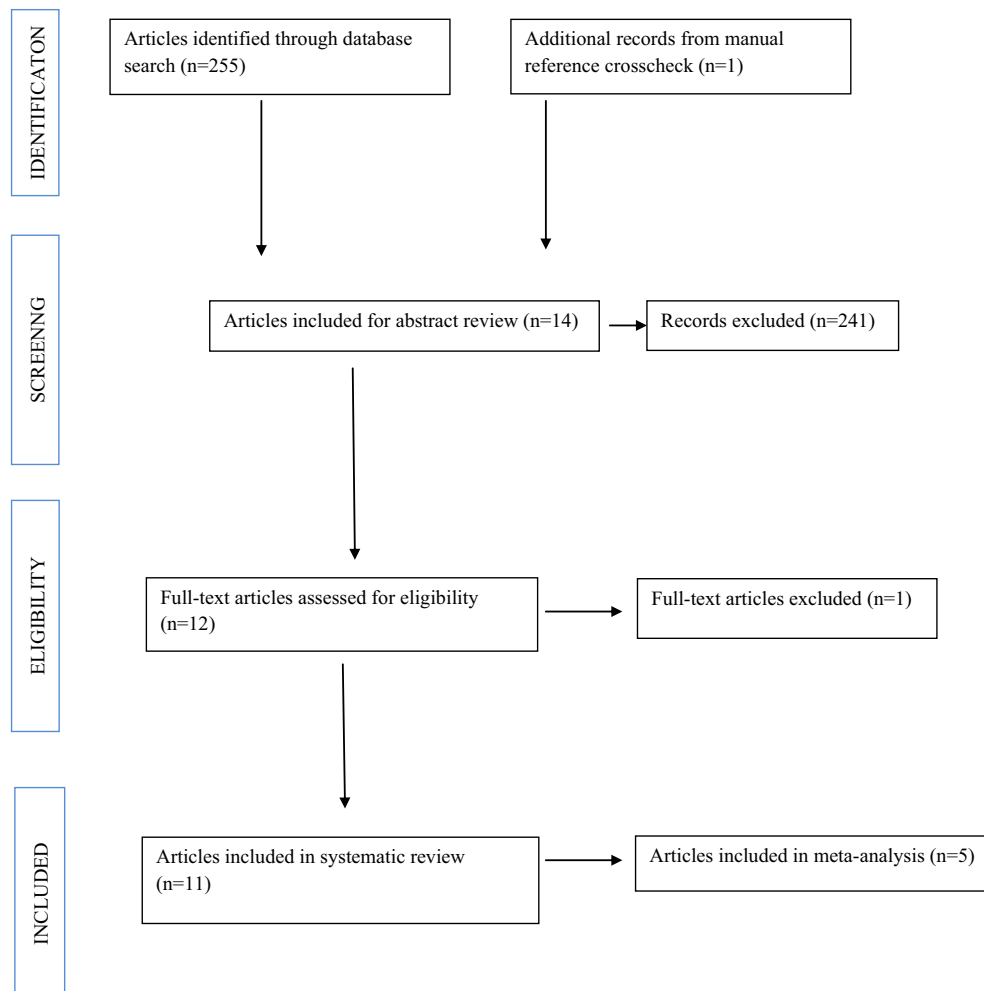


Fig. 1. Flow diagram describing the search strategy used to include articles in the systematic review and meta-analysis.

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