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Review Article

Paediatric haemoptysis and the otorhinolaryngologist:
Systematic review

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ABSTRACT

Objectives: Childhood haemoptysis is an uncommon presentation to the otolaryngologist but has a varied aetiology and can be life-threatening. We performed a systematic review of the literature to assess paediatric otolaryngologists' experience with haemoptysis, the aetiology involved, investigations performed and management provided. Using this, we produce an evidence-based treatment algorithm to guide clinicians.

Methods: Systematic literature review of the PubMed, EMBASE and Cochrane Collaboration using the search terms 'paediatric', 'child', 'neonate', 'adolescent', 'haemoptysis', 'coughing blood', 'spitting blood' and 'otorhinolaryngology'.

Results: Five articles were retrieved meeting the search criteria including 106 patients (age range 3 weeks to 18 years). The 3 most common aetiologies were bronchitis (n = 9), idiopathic/ no cause found (n = 9) and pneumonia (n = 7). Flexible bronchoscopy was the commonest investigation performed in non-active cases whilst rigid bronchoscopy was performed for active haemoptysis to provide therapeutic interventions. Chest x-ray was performed as a screening investigation rather than CT scan, which was reserved to assess pathology further, in recurrent cases and when x-ray is inconclusive. Management depended on aetiology. There was no difference in aetiology between age ranges.

Conclusions: Haemoptysis aetiology is varied and non-cancerous but is life-threatening in cases of pulmonary agenesis and vasculature abnormalities. No cause may be found. Clinicians' investigations and management plans should be based on the established care of haemoptysis. There is no difference between otolaryngologists and respiratory physicians' experience.

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1. Introduction

Haemoptysis is an uncommon presenting symptom in children. However, cases may present to the otolaryngologist for

review to assist with assessment or following inconclusive investigation in primary care. Limited experience with paediatric haemoptysis, the aetiology and management can present a challenge to the otolaryngologist. We performed a systematic review of the published English literature assessing paediatric otolaryngologists' experience in caring for such patients, to produce a

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range of differential diagnoses and a suggested algorithm for their investigation and management.

2. Materials and methods

A systematic review using the PubMed, MEDLINE® and Cochrane Collaboration medical search engines using the key words 'haemoptysis', 'hemoptysis', 'paediatric', 'otolaryngology', 'ear, nose and throat' and 'otorhinolaryngology'. Only articles published in the English language were included. No time period for publication was included other than that placed by the medical search engines.

3. Results

One hundred and ninety-four abstracts were reviewed. One hundred and eighty-nine were excluded as the articles discussed haemoptysis management in adults, in children by non-otolaryngologists or discussed haemoptysis as an associated symptom of other diseases. Five articles were included in the review including 4 case series ranging from 9 to 40 patients and one case report [1–5]. The articles discussed the aetiology, investigation and management of 106 cases of paediatric haemoptysis cared for by otolaryngologists. Fifty-five patients were male (52%) and 51 female (48%) ($p = 0.96$, two-tailed t -Test) with an age range of 3 weeks–18 years. Patient age was identified with a specific aetiology in only 13 cases (12%) throughout the 5 articles, making categorisation of age: risk and age: aetiology difficult. The majority of these 13 cases were under 2 years of age. There was no correlation between aetiology and patient age at presentation. The commonest aetiological causes were infective (38%) though in a large number no cause was discovered (14%). Foreign body inhalation and haemorrhage related to tracheostomy use were also significant causes [6–9] (Table 1). The commonest investigations performed as part of the assessment are chest radiography, sputum culture and bronchoscopy (either rigid, flexible or both). Chest x-rays revealed pathology corroborating with the final diagnosis reached in the

majority of cases (range 53%–80%). In one series chest x-rays were normal in 47% despite pulmonary pathology being identified on bronchoscopy (range 20%–47%). Sputum sampling produced a positive culture corroborating with the infection identified in less than half of cases (range 44%–53%); the majority of sputum sample cultures failed to identify an infectious agent in the presence of infection identified on bronchoscopy.

The management of each case depended on the final aetiological diagnosis with no interventions performed out with normal practise (see Fig. 1).

4. Discussion

Haemoptysis is a symptom that is overwhelmingly managed by respiratory physicians. It is very uncommon for patients to present to otolaryngologists though they may be asked to assess cases where lesions of the upper aero-digestive tract are thought to be involved. The role of otolaryngologists in managing haemoptysis appears to be well-established though, with articles from as early as 1920s discussing this aspect of otolaryngology practise [10,11]. However, the level of evidence in adults is limited to case reports and small series, as it is in children.

Paediatric haemoptysis has a far less sinister aetiology than that of adults but several conditions do cause significant morbidity in children and are potentially fatal. Whilst infections and inhaled foreign bodies can be relatively easily treated, chronic conditions require further care to be provided from other paediatric specialists.

When comparing the aetiology to that described in two recent large reviews of paediatric haemoptysis there appeared to be no difference in otolaryngologists' experience compared to that of medical paediatricians. Infection of the lower respiratory tract remains the commonest cause, accounting for 33% of haemoptysis Aetiology [12,13]. This is supported by an older review also [14]. Interestingly, a study of adult haemoptysis cases managed by otolaryngologists reported similar findings with infection causing 47% of episodes [15]. Paediatric haemoptysis is not associated with any head and neck congenital syndromes or any other disease processes from this review. Most cases of haemoptysis are mild and have a duration last less than 24 h. Torrential haemoptysis results from cases of abnormal pulmonary vasculature e.g. pulmonary artery agenesis, pulmonary arteriovenous malformation or severe trauma.

Although flexible nasolaryngoscopy was rarely performed in the articles included in the review, based on the aetiologies reported in these articles, flexible nasolaryngoscopy would have been of use as an investigation to both discover and exclude diagnoses. The majority of chest films do reveal abnormal features, most commonly features of infection, which suggest a cause for patients' haemoptysis, though chest radiography can be normal in up to 47% of cases despite thoracic pathology. Computerised tomography is useful in confirming the findings of chest radiography but is not performed routinely. Sputum cultures may yield a microbiological diagnosis in up 53% of patients suffering with either pneumonia or tracheo-bronchitis, though in half of patients no other symptoms are present that suggest infection. Not enough information is provided in the articles included to calculate sensitivities, specificities and predictive values for these investigations when compared to bronchoscopy as a 'gold standard' investigation.

Whilst flexible bronchoscopy provides as good a diagnostic investigation as rigid bronchoscopy, the latter is preferred as it allows more therapeutic procedures to be performed to control haemorrhage e.g. vasoconstrictor application, endobronchial tamponade, whilst ventilating the patient. Angiography with or without embolisation is reserved for vascular anomalies with

Table 1
Aetiology & numbers of paediatric haemoptysis (n = 106).

Infection (n = 40)		Upper airway trauma	5
Pneumonia	15		
Tracheo-bronchitis	15	Abnormal pulmonary architecture (n = 4)	
		Aberrant bronchial circulation	3
Cystic fibrosis	5	Pulmonary artery agenesis	1
Bronchiectasis	3		
Laryngitis	1	Upper airway causes (n = 3)	
Tuberculosis	1	Laryngeal papillomatosis	2
		Nasal	1
Idiopathic	15	Cardiac (n = 3)	
Inhaled foreign body	8	Congenital heart disease	2
Tracheostomy-related	9	Unspecified cardiac	1
Unspecified (n = 7)			
Unspecified pulmonary source	3	Blood aspiration from GI tract	3
Unspecified neoplasm	2	Pulmonary haemosiderosis	3
Unspecified bronchial mass	1	Factitious	1
Unspecified granulation	1	Oesophagitis	1
Vascular lesion (n = 5)		Leech ingestion	1
Arterio-venous malformation	3	Kaposiform	1
		haemangioendothelioma	
Hereditary telangiectasia	1	Spontaneous tonsil haemorrhage	12
Tracheal haemangioma	1		

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