



A heuristic approach to foreign bodies in the paediatric airway



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ABSTRACT

Objectives: This retrospective study reviews the clinical presentation and management of children with airway FBs in our centre. It suggests a safe and reliable guideline to help differentiate which patients should proceed to investigation with rigid laryngobronchoscopy.

Methods: A retrospective review of all case notes of laryngobronchoscopies performed for suspected FB aspiration from January 2003 to August 2013 at a tertiary paediatric institution was undertaken. Patient characteristics, history, clinical examination, radiological findings and outcomes were analysed.

Results: 158 patients underwent rigid laryngobronchoscopy for suspected FB aspiration between January 2003 and August 2013. The baseline population demographics, the location and type of FBs retrieved were comparable to other similar studies; however, there is a statistically significant higher proportion of Pacific, Maori and Middle Eastern/Latin American/African children compared with the baseline population. Two or more positive findings in the presence of an acute history, any examination or radiology findings is a good indicator to proceed to laryngobronchoscopy with over 99% sensitivity.

Conclusion: In a hospital presentation population, this retrospective study suggests that a guideline to proceed to laryngobronchoscopy in a case of suspected FB aspiration is two out of the three positive findings in the presence of an acute history, any examination or radiology findings. Patients who are stable and who do not have two of the three broad category findings can be considered for conservative management and observed on the ward, however, this is a guideline and must be combined with the clinical expertise of the paediatric airway specialist. Further studies are recommended to investigate contributing factors for the disproportionately higher incidence amongst Pacific, Maori and Middle Eastern/Latin American/African children.

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1. Introduction

Possible FB aspiration is a common cause for presentation to the emergency department in the paediatric population. It is one of the leading causes of accidental death in the under one year old age group [1,2]. While it is potentially life threatening, the majority of cases will present in a stable manner and often with non-specific findings [3–7]. Timely diagnosis and management is imperative as delayed diagnosis can result in death as well as complications such as pneumonia, atelectasis, lung abscess or bronchiectasis [8,9].

Rigid laryngobronchoscopy is the most reliable tool for removal of airway FBs [4,10] and is required if there is sufficient suspicion of FB aspiration. However, more commonly the presentation and diagnosis of FB aspiration can be challenging: there may not be a witnessed event suspicious for FB aspiration, the classic triad of cough, wheeze and unilateral decreased breath sounds is

frequently absent [8], and a chest X-ray may be normal. Co-existing respiratory pathology may further confuse the clinical picture.

This retrospective study reviews the clinical presentation and management of children with airway FBs in our centre. It outlines a safe and reliable way to help differentiate which patients should proceed to investigation with rigid laryngobronchoscopy, and which can be managed conservatively.

2. Methods

This study (A+6084) was approved by the Auckland DHB Research Review Committee (ADHB-RRC) on 27th September 2013.

All procedures coded as laryngoscopy and/or bronchoscopy at Starship Children's Hospital (Auckland, New Zealand) from January 2003 to August 2013 were pooled and patients who underwent this procedure for suspicion of FB aspiration were included.

Patient data was collected using the computerised hospital database, which records all procedures performed and all clinical

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notes. Baseline characteristics (gender, age, ethnicity), presenting symptoms, clinical examination findings, radiology reports, procedure findings and postoperative course were collected and analysed. If the details being analysed were not recorded in the patient history, the symptom or finding was recorded as negative. Seven patients were excluded from the study as they did not undergo any radiological investigations prior their laryngobronchoscopy.

Statistical analysis was carried out using statistics software “Medcalc” and the Chi-squared test was used to compare proportions.

3. Results

3.1. Patient demographics

A total of 165 children from January 2003 to August 2013 were identified to have undergone a laryngobronchoscopy with a suspicion of FB aspiration. Seven patients were excluded from the study as they did not undergo any radiological investigations prior their laryngobronchoscopy. Referrals were mainly from the Auckland region but did include referrals from the rest of New Zealand as well as two International referrals from Samoa. 41 (25.9%) patients were transferred from centres outside of Auckland, and 4 patients had already undergone a laryngobronchoscopy prior transfer.

The children ranged in age between five months and 14 years (median age: one year nine months). Three-quarters (75%) of the patients were under three years old (Table 1) with a 63.5% male predominance (Table 2). When compared to the Auckland population, there is an over-representation of the Pacific, Maori and Middle Eastern/Latin American/African ethnic groups (Table 3), which are statistically significant ($P = 0.0427$, 0.0230 and 0.009 respectively), even when adjusted for the Auckland subset of the study population.

3.2. Inhalation to procedure

Two-thirds (65.9%) of the patients underwent a laryngobronchoscopy within three days of symptom onset or suspected

Table 2
Gender distribution of study population.

Gender	Study population (n)	Study population (%)
Male	100	63.3
Female	58	36.7
Total	158	100.0

FB aspiration and 15.4% from greater than three days to one week. In 9.5%, there was a delay of over a month. In 8.9%, the onset of symptoms until procedure time was between one week and one month (Table 4).

A FB is more likely to be found in patients with a longer onset of symptoms to procedure time (Table 4). FBs were retrieved in all patients who presented over a month after the onset of symptoms compared with 62.5% in those who presented within the first 24 h. Patients presenting earlier were more likely to present with an acute history of FB aspiration. All patients with three weeks to one month between onset of symptoms to laryngobronchoscopy had positive clinical examination findings.

3.3. Clinical and radiology findings

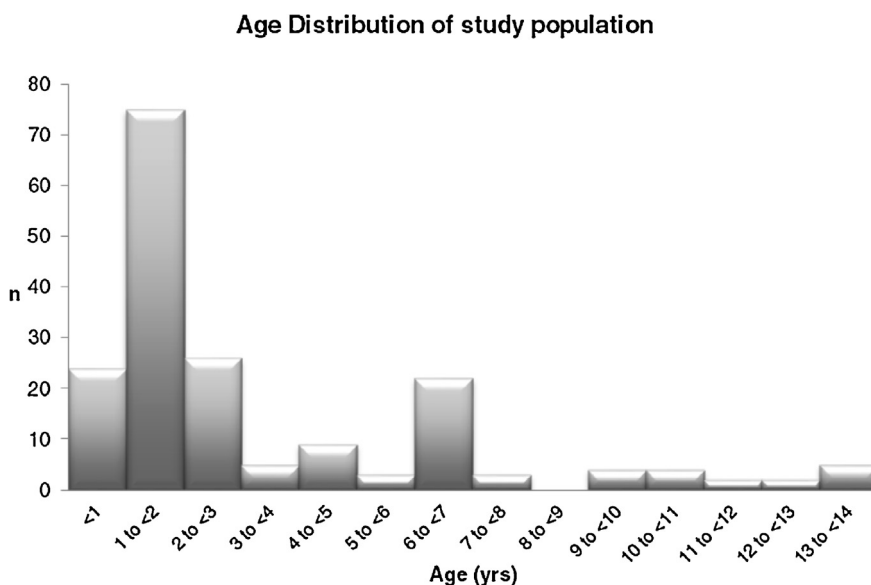
Of the patients with a FB in the airway, 85.2% presented with an acute history of FB aspiration defined as witnessed aspiration, choking or coughing fit (Table 5).

Over 90% (91.3%) of patients had positive examination findings which included unilateral diminished breath sounds, wheeze, stridor, increased work of breathing, decreased oxygen saturation or crackles. Almost half (47.0%) had audible wheezing on examination, one-third (33.9%) had unilateral diminished breath sounds, and only 10.4% had stridor (Table 5). 59.1% of the patients had other findings which included increased work of breathing, decreased oxygen saturation and crackles.

Less than one in five patients (18.3%) had normal radiology findings. Interestingly, almost half (47.8%) were noted to have air trapping or hyperexpansion seen in their radiology results. In one-fifth of patients, a radio-opaque FB was seen.

Based on these results, performing a laryngobronchoscopy on one positive finding will identify all patients with a FB in the

Table 1
Age distribution of study population.



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