

## Removal of Tracheobronchial Foreign Bodies Using Flexible Bronchoscopy - A Retrospective Study.

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### Abstract

**Introduction:** Foreign body in tracheobronchial tree is a potentially life threatening situation and it requires emergency removal.

**Materials & Methods:** We conducted a retrospective, descriptive study of the patients in which we performed flexible bronchoscopy with suspicion of tracheobronchial foreign bodies from 1<sup>st</sup> October, 2012 to 30<sup>th</sup> September, 2014 (2 Years).

**Results:** Out of 56 suspected cases, tracheobronchial foreign bodies were found in 42 occasions (75%). Among these 42 cases, most were male (69%) and common age group was below 5 years (53%). Most of the patients presented with choking (40%) while few were asymptomatic (12%). Most common complication due to delayed removal of foreign body was pneumonia. X-ray was suggestive of foreign body only in 6 cases (14%). Most common location of foreign body was in right bronchial tree (52%). Seeds were most common foreign bodies (38%).

**Conclusion:** Diagnosis of tracheobronchial foreign bodies is challenging as few patients can be asymptomatic and plain X-ray fails to detect foreign bodies in majority of cases. Considering the risks associated with tracheobronchial foreign bodies, it is advisable to perform diagnostic bronchoscopy in all suspected cases.

**Keywords:** Flexible bronchoscopy, Foreign body, Tracheobronchial tree

### I. Introduction

Foreign body in tracheobronchial tree is a potentially life threatening situation and it requires emergency removal. It is one of the common causes of sudden death in children under 6 years of age.<sup>1</sup> The diagnosis is often missed initially, especially in children where the history may be vague and the patient cannot verbalize the events.<sup>2</sup> In as many as 30% of patients, symptoms are treated as those of other common diseases, especially in patients with minimal symptoms.<sup>3,4</sup> A high index of suspicion is required to make the diagnosis, especially in children and patients who are debilitated.<sup>5</sup> Extraction by bronchoscopy is the treatment of choice for tracheobronchial foreign bodies.<sup>6,7,8,9</sup> In the present study, we reviewed our experience of diagnosing & treating such cases in last 2 years.

### II. Materials & Methods

We conducted a retrospective, descriptive study of the patients in which we performed flexible bronchoscopy with suspicion of tracheobronchial foreign bodies from 1<sup>st</sup> October, 2012 to 30<sup>th</sup> September, 2014 (2 Years). Approval for the study was taken from the Institutional Ethical Committee and Scientific Committee. We reviewed bronchoscopy register, operation notes and discharge certificates of all the patients and contacted patients when ever needed.

### III. Results

Out of 56 suspected cases, tracheobronchial foreign bodies were found in 42 occasions (75%). Among these 42 cases, most were male (Table 1) with male (69%) to female (31%) ratio of 2.2/1. Most common age group was below 5 years (53%) (Table 2).

| Table 1: Sex of the patients (n=42) |        |    | Table 2: Age of the patients (n=42) |        |    |
|-------------------------------------|--------|----|-------------------------------------|--------|----|
| Sex                                 | Number | %  | Age (Years)                         | Number | %  |
| Male                                | 29     | 69 | <5                                  | 22     | 53 |
| Female                              | 13     | 31 | 5 - 15                              | 14     | 33 |
|                                     |        |    | >15                                 | 6      | 14 |

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The commonest symptom was choking (40%) followed by cough (24%) and stridor (17%). 12% patients were asymptomatic (Table 3). Clinical examination was normal in majority of cases (48%). Wheeze and decreased air entry noted in 28% and 24% of cases respectively (Table 4).

| Symptoms     | Number | %  |
|--------------|--------|----|
| Choking      | 17     | 40 |
| Cough        | 10     | 24 |
| Stridor      | 7      | 17 |
| Asymptomatic | 5      | 12 |
| Haemoptysis  | 3      | 7  |

| Signs               | Number | %  |
|---------------------|--------|----|
| No sign             | 20     | 48 |
| Wheeze              | 12     | 28 |
| Decreased air entry | 10     | 24 |

X-ray was suggestive of foreign body only in 6 cases (14%). Most commonly removed foreign bodies were seeds (Table 5). Most common location of foreign body was in right bronchial tree (52%) followed by left bronchial tree (29%) and trachea (19%). After removal of foreign bodies, bronchoscopic examination of underlying mucosa was normal in 62% cases, but granulation and scarring noted in 33% and 5% cases respectively. All the foreign bodies were removed successfully by using flexible bronchoscopy. Most commonly used removal tool was three-teethed forcep (in 33% cases). Combination of different tools used in 11% of cases (Table 6).

| Type              | Number | %  |
|-------------------|--------|----|
| Seeds             | 16     | 38 |
| Peanut            | 9      | 21 |
| Bone              | 6      | 14 |
| Button            | 4      | 10 |
| Plastic object    | 3      | 7  |
| Metallic fragment | 2      | 5  |
| Chocolate piece   | 2      | 5  |

| Tool                                  | Number | %  |
|---------------------------------------|--------|----|
| Three-teethed forcep                  | 14     | 33 |
| Alligator forcep                      | 9      | 22 |
| Wire basket                           | 7      | 17 |
| Biopsy forcep                         | 4      | 10 |
| Ureteric forcep                       | 3      | 7  |
| Combinations of above mentioned tools | 5      | 11 |

Complications due to delayed removal noted in 12 cases and most common complication was pneumonia (67%) followed by atelectasis (25%) and abscess (8%). In all cases, general anaesthesia was given. Average procedure time was 20 minutes. Most patients (75%) were discharged on next day. No procedure related complication was noted.



**Figure 1:** Removal of foreign body from right bronchial tree.



**Figure 2:** Instruments for flexible bronchoscopy and foreign body removal.

#### **IV. Discussion**

From our experience, tracheobronchial foreign body cases are less common and similar studies in other centres also experienced so.<sup>10,11</sup> Male/female ratio in our study is 2.2/1 which is similar to other studies.<sup>5,10,12</sup> Most of the patients were under 5 years of age and most common symptom was choking. A witnessed choking event is the most important historical information to make an early diagnosis of foreign body aspiration.<sup>3</sup> Clinical examination is often normal in majority of cases.<sup>13</sup> Foreign Body aspiration may be occult and remain undiagnosed for years.<sup>14</sup> A high index of suspicion is therefore necessary, especially if there are predisposing factors like neurological deficits, sedative or alcohol use.<sup>15</sup>

Most of the foreign bodies were located in right bronchial tree (52%) which is similar to other studies.<sup>10,16</sup> This is because proximal right main bronchus is consistently steeper and slightly wider than the left.<sup>17</sup> In our study most common foreign bodies were seeds which is similar to other study done by Madkour A et al.<sup>18</sup> while others found bone<sup>10</sup>, head pin<sup>13</sup> and peanut<sup>19</sup> to be most common foreign bodies in their respective studies.

Although postero-anterior and lateral chest X-ray are used as an initial screening test, but often it fails to detect it.<sup>10,20</sup> This is especially true because the majority of tracheal foreign bodies (seeds) are radiolucent. Radiographic signs that may help in the diagnosis of tracheobronchial FB include atelectasis, post-obstructive pneumonia and air trapping.<sup>21</sup> Computed tomography (CT) is rapidly becoming the imaging study of choice in stable patients with suspected aspiration.<sup>22,23,24</sup> We advised CT scan of thorax in selected cases.

Extraction by bronchoscopy is the treatment of choice for tracheobronchial foreign bodies.<sup>6,7,8,9</sup> We successfully removed all the foreign bodies by using flexible bronchoscopy. The success rate of the flexible bronchoscope in removing foreign bodies can be as high as 100% in experienced hands.<sup>25</sup> To increase its success rate, flexible bronchoscopy use should be coupled with the necessary equipments like special foreign body forceps.<sup>26</sup> Although rigid bronchoscopy is considered the gold standard for the removal of foreign bodies from the airways, flexible bronchoscopy should be considered as the first-choice method.<sup>27</sup> Even just localisation of the foreign body during the initial flexible bronchoscopy allows subsequent rigid bronchoscopy to be shorter in duration with fewer complications.<sup>25</sup> In all of our cases, general anaesthesia was given; but foreign bodies often can be removed with a flexible bronchoscope under local anaesthesia.<sup>28</sup>

Bronchoscopy, performed for tracheobronchial foreign body aspiration, carries a potential life-threatening risk during and after the process.<sup>29</sup> Though no procedure related complication was noted in our study, several complications like laryngeal edema, bronchospasm, tracheobronchial system bleeding and even death can occur because of the procedure.<sup>29,30</sup> Close communication between the anesthesiologist, bronchoscopist, and assistants is essential.<sup>31</sup> While removing an object located in the main bronchia, it is possible for it to cause obstruction if it falls in the trachea. Objects that are too big to be taken out with the bronchoscope should be firmly grasped with forceps, when being taken out by bronchoscopy. When the size of the object is larger than the laryngeal gap, which can happen when the object is grasped on one side with the forceps and turned, the object can be grasped right in the middle. If this is not possible, it should be grasped simultaneously with two forceps on both sides.<sup>29</sup>

Delayed removal of foreign body can cause several complications like unresolving pneumonia, lung abscess, recurrent haemoptysis, lung fibrosis, obstructive emphysema and bronchiectasis.<sup>10,32</sup> It is essential to consider FBA in the differential diagnosis of the above pathologies as removal of the foreign body by a flexible bronchoscope may provide a complete resolution without necessitating a more invasive procedure.<sup>33,34</sup>

The clinician needs to be aware of these risks, take proper precautions, and perform bronchoscopy by taking the medical condition of the patient and characteristics of the inspired foreign body into consideration.<sup>29</sup> Education aimed at increasing diagnostic acumen of the physicians and heightening of public awareness are the most important steps needed to reduce the morbidity and mortality.<sup>19</sup>

#### **V. Conclusion**

Diagnosis of tracheobronchial foreign bodies is challenging as few patients can be asymptomatic and plain X-ray fails to detect foreign bodies in majority of cases. Considering the risks associated with tracheobronchial foreign bodies, it is advisable to perform diagnostic bronchoscopy in all suspected cases. A good coordination between anaesthetists and surgeons is needed to successfully complete this technically challenging procedure.

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