



ORIGINAL ARTICLE

Study using endoscopic procedures for removal of foreign bodies from aero-digestive tract conducted in Jahurul Islam Medical College Hospital, Bangladesh

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Abstract

Foreign bodies (FB) in the aero-digestive tract continue to be a common problem that contributes significantly to high morbidity and mortality worldwide. This study was conducted to describe our own experience with endoscopic procedures for removal of FB in the aero-digestive tract, in our local setting and compare with what is described in literature. This was a prospective descriptive study, which was conducted at Jahurul Islam Medical College Hospital between January, 2011 and January, 2014. Data were collected using a structured questionnaire and analyzed using SPSS computer software version 15. A total of 72 patients were studied. Males outnumbered females by a ratio of 1.4:1. Patients aged 2 years and below were the majority (75.9%). The commonest type of FB in airways was peanuts and coins. The trachea (52.2%) was the most common site of lodgment of FB in the airways, whereas cricopharyngeal sphincter (68.5%) was the commonest site in the esophagus. Rigid endoscopy with forceps removal under general anesthesia was the main treatment modality performed in 87.8% of patients. The FB were successfully removed without complications in 90.8% of cases. Complication rate was 7.1% and bronchopneumonia was the most common complication accounting for 42.8% of cases. The mean duration of hospital stay was 3 days and mortality rate was 4.1%. Aero-digestive tract FB continue to be a significant cause of childhood morbidity and mortality in our setting. Rigid endoscopic procedures under general anesthesia are the main treatment modalities performed. Prevention is highly recommended whereby parents should be educated to keep a close eye on their children and keep objects that can be FB away from children's reach.

Key words: Endoscopic procedures, foreign bodies, aero-digestive tract, Bangladesh.

Introduction

Foreign bodies (FB) in the aero-digestive tract are an important cause of morbidity and mortality posing diagnostic and therapeutic challenges to otorhinolaryngologists.¹ The ingestion and inhalation of FB occur most commonly in children, especially in their first six years of life, with a peak incidence in

between 1 and 3 years.¹⁻⁴ Children are naturally susceptible to be involved in FB injuries due to lack of molar teeth, the tendency to oral exploration and to play during the time of ingestion, and the poor coordination of swallowing.^{4,5} On the other hand, the elderly are those with thoracic neurological disease, decreased gag reflex

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due to alcohol seizures, stroke, parkinsonism, trauma and senile dementia.⁶

Even an experienced clinician may miss the accurate diagnosis of aero-digestive tract FB. The delayed symptoms of FB in the aero-digestive tract may mimic other common conditions like asthma, recurrent pneumonia, upper respiratory infection and persistent cough.^{1,7-10}

FB in the aero-digestive tract present with a wide spectrum of clinical presentation, patients often present in the emergency with acute onset respiratory distress and occasionally in a cyanosed state. At the other end of the spectrum is the patient presenting with nothing more than a history of aspiration and on investigation is found to have a FB in his aero-digestive tract.¹⁰

The symptoms and signs produced depend upon the nature, size, location and time since lodgment of the FB in the aero-digestive tract. A large FB occluding the upper airway or esophagus may lead to severe symptoms and even sudden death whereas a small FB lodged in the aero-digestive tract may present with less severe symptoms.^{10,11} FB lodged in the esophagus for a long time may be associated with complications such as mucosal ulceration, esophageal obstruction, perforation, intrinsic stenosis and esophageal diverticulum¹², whereas foreign bodies retention in the airway may lead to complications such as severe respiratory distress, lung collapse and recurrent chest infection.^{12,13} Early diagnosis and treatment are imperative to prevent mortality as well as complications.

There is paucity of local data regarding the management of FB in the aero-digestive tract as there is no study that has been done in Jahurul Islam Medical College Hospital (JIMCH) or any other hospital in the country.

This study was done in JIMCH to describe the experience with endoscopic procedures for the removal of FB in the aero-digestive tract, with a review of the pertinent literature.

Materials and Method

This was a prospective descriptive study, which was conducted at the Accident and Emergency Department (AED) of JIMCH over a 3-years period between January, 2011 and January, 2014.

The JIMCH is a tertiary care and teaching hospital. The study subjects included all patients of all age groups and gender who presented to the AED with history of FB in the aero-digestive tract. Patients with history of FB in the aero-digestive tract but could not be identified at endoscopic examination and those who died before endoscopic procedures were excluded from the study. All patients included in the study were, after informed written consent to participate in the study, enrolled in the study. The JIMCH ethical review committee approved to conduct the study before the commencement of the study.

All patients with history of FB in the aero-digestive tract were subjected to endoscopic examinations (oesophagoscopy or bronchoscopy). Data were collected using a structured, pre-tested and coded questionnaire. In the questionnaire age, sex, area of residence, family history of FB in the aero-digestive tract, the type of FB, anatomical location of the FB, treatment and outcomes (length of hospital stay, mortality and postoperative complication) were included.

Results

During the period under study, 72 patients with established FB in the aero-digestive tract were studied. The males and females were 42 (58.3%) and 30 (41.7%) with a male to female ratio of 1.4:1. Their ages ranged from 1 year to 63 years (mean 7.04 years and SD 14.62 years). The median was 2 years. Patients aged ten years and below were the majority and accounted for 64 (88.8%). Of these, 55 (75.9%) patients were aged 2 years and below. The majority of patients 47 (65.3%) were from the urban areas around Austogram. No patient had family history of FB in the aero-digestive tract.

Patients with FB in the esophagus were the majority accounting for 40 (55.1%) of cases and 46 (64.3%) of the patients presented to hospital within 24 hours, whereas 15 (20.4%) presented between 1 day to 7 days and the remaining 11 (15.3%) presented to hospital after 7 days. The most common reasons for delay presentation were lack of money for transport and inappropriate diagnosis and treatment given in the peripheral hospitals. A positive history of FB in the

Table 1. The type of foreign bodies in the esophagus

Age groups	Type of FB
Common esophageal FB(Children)	Coins, plastic materials
Common esophageal FB(Adult)	Denture, meat bone, fish bone, ect

Table 2. The type of foreign bodies (FB) in the airways

Vegetable/Non-vegetable	Type of FB
Vegetable FB	Peanuts, fruits, food particles, etc
Non-vegetable FB	Pins, metal wires, plastic toys, buttons, etc

Table 3. Anatomical location where foreign bodies (FB) were lodged in the aero-digestive tract

Location	Distance from a distinctive point
At the pharyngo-oesophageal junction (cricopharyngeal sphincter)	15 cm from upper incisor (most common) 63 (87.8%)
At the level of arch of the aorta	22.5 cm from upper incisor
At the crossing of the left bronchus	27.5 cm from upper incisor
Diaphragm (cardiac end)	40 cm from upper incisor

aero-digestive tract were recorded in 68 (93.9%) of the cases, whereas in the remaining 4 (6.1%) patients the diagnosis of FB in the aero-digestive tract was made based on clinical presentation and radiological investigation on admission. Of the patents, 50 (69.4%) were asymptomatic on admission despite positive history of FB in the aero-digestive tract. The most common clinical presentations were cough, wheezing, dyspnea, choking, vomiting, and drooling of saliva and difficulty in swallowing. Coins were the most common type of FB in the esophagus accounting for 72.2% of patients, whereas peanuts were the most common type of FB in the airway accounting for 72.7%. The type of FB in the aero-digestive tract (airway and esophagus) is shown in Table 1 and 2, respectively.

The trachea was the most common site of FB lodgment in the airways accounting for 52.2% of the cases, whereas cricopharyngeal sphincter was the commonest site in the

esophagus in 68.5% of the cases. Table 3 shows the anatomical location where FB were lodged in the aero-digestive tract.

In the bronchus, the right bronchus was the most common site of FB impaction in 9 (75%) of the cases and the remaining 3 (25%) were in the left bronchus. Plain neck/chest X-rays reviewed radiopaque FB in 40 (56.1%) of the cases. Rigid endoscopy (oesophagoscopy and bronchoscopy) with forceps removal under general anesthesia was the main treatment modality performed in 63(87.8%) of the patients. In 7 (9.2%) patients, the FB especially in the upper esophagus were removed by Magill forceps extraction. Foley's catheter without fluoroscopic control was used to remove esophageal FB in the remaining 2 (3.1%) patients. The FB were successfully removed without complications in 65 (90.8%) of the cases. A total of 49 (68.4%) patients especially those who had bronchoscopy required at least an overnight hospitalization to be able to moni-

tor immediate postoperative complications resulting from the procedure and anesthesia. The remaining 23 (31.6%) were treated in Out Patient Department. Seven post operative complications were recorded giving a complication rate of 7.1%.

The majority of in-patients were discharged between 1 day and 7 days after FB removal. The overall duration of hospital stay of in-patients ranged from 1 day to 13 days (mean 3.4 days). Four patients died giving a mortality rate of 4.1%. The most common causes of death were cardiopulmonary arrest, severe respiratory distress and severe pneumonia.

Discussion

FB lodged in the aero-digestive tract are a common surgical emergency presenting to the AED in many centers and contribute significantly to high morbidity and occasionally mortality.¹ Children aged between 1 and 3 years are commonly affected.^{1,4} In the present study, the majority of patients were children aged 2 years and below which is in agreement with other studies.^{1,4,14,15} Several factors contribute to high incidence of aero-digestive tract FB in this age group including social factors (e.g. carelessness of parents, children's habit of putting objects in their mouth, crying/playing during eating) and anatomical factors (e.g. absent of molar teeth, inadequate control of deglutition) have been mentioned.¹⁶⁻¹⁸

In the present study, males were slightly more affected than females with a male to female ratio of 1.1:1 which is in agreement with other studies.^{15,19,20} The reasons for the male preponderance in this study may be attributed to the overactive nature of male babies as compared to the females.

In the present study, a positive history of FB in the aero-digestive tract was recorded in 93.9% of cases and 69.4% of these were found to be asymptomatic on admission which is comparable to other studies.^{1,8,9,16} Cohen has strongly advocated that all patients presenting with positive history of FB in the aero-digestive tract, even when the physical finding and radiological examinations is negative must be subjected to endoscopic evaluation.²¹ In this study, all

patients with a positive history of FB in the aero-digestive tract were subjected to endoscopic removal.

The commonest FB found in this study were coins and peanuts in the esophagus and airways respectively, which is similar to findings reported by other studies.^{22,23} The reason for high incidence of these FB in this study is due to the fact that these commodities are widely used in this area. The preponderance of the coins may be due to the free access of the children to coins in the social environment, which are usually given as gifts.

The trachea was the most common site of FB lodgment in the airways and cricopharyngeal sphincter was the commonest site in the esophagus. Similar FB lodgment pattern was also reported by others.^{1,22,23} In the bronchus, the majority of FB in this study come to rest in the right bronchus which is in agreement with other authors.^{1,16,24} This observation is attributed to the fact that the right bronchus is more vertical and wider than the left one.

The majority of the patients presented to the AED within 24 hours of inhalation/ingestion of FB which is similar to other reports.^{22,23} The present experience shows that early presentation is common with very young children, and when there are more serious symptoms of respiratory distress and swallowing difficulty, thus compelling the frightened patients or parents to seek medical attention. Late presentation is more common in asymptomatic cases.

Radiography plays a vital role in the diagnosis of radio-opaque FB in the aero-digestive tract. In agreement with other series, the plain radiography of chest/neck in this study detected FB in the aero-digestive tract in 56.1% of the cases.^{2,22,23} This percentage is high enough to warrant radiographic surveillance of all patients presenting with history of FB in the aero-digestive tract. However, a negative radiographic result does not exclude the presence of FB in the aero-digestive tract as radio-lucent objects like rubber materials, groundnuts and bolus of meat are not easily detected by plain radiography.

Endoscopic removal of FB in the aero-digestive tract using rigid scopes under general anesthesia has been reported to be a golden standard procedure.²²⁻²⁸ Rigid endoscopy, as compared to flexible endoscopy is a useful method to diagnose and remove FB in the aero-digestive tract as it has a large lumen and allows better visualization of the potential anatomic sites of FB impaction in the aero-digestive tract.²⁹ However, the procedure is not without risks especially perforation which has a high morbidity and potential mortality.

Besides the surgical risks, the patients are also subject to anesthetic risks. Other treatment modalities in the removal of FB in the aero-digestive tract include use of Magill forceps and Foley's catheter in the removal of FB in the esophagus.^{30,31} In the present study, rigid endoscopy (oesophagoscopy and bronchoscopy) with forceps removal under general anesthesia was the main treatment modality performed which conforms with others studies.²²⁻²⁸ In the view of potential complications resulting from rigid endoscopic procedures and the use of general anesthesia, the patients in this study required at least an overnight hospitalization so as to monitor these complications. Magill forceps extraction and Foley's catheter without fluoroscopic control were used to remove esophageal FB in 9.2% and 3.1% of the cases, respectively. It is therefore recommended that in places where rigid endoscopy is not available like in most peripheral hospitals, Magill forceps and Foley's catheter without fluoroscopic control can safely be used in the removal of FB in the esophagus.

In this study, the FB were successfully removed without complications in 90.8% of the cases which is similar to other studies reported elsewhere.²²⁻²⁸ However, the complication and mortality rates in this study were found to be higher than that reported in other studies.²⁸⁻³¹ The reasons for this observation could be as a result of either of the two reasons. First, the removal of FB in the aero-digestive tract were often performed or attempted by inexperienced resident doctors who were the first on call. This

removal of FB in the aero-digestive tract were often performed or attempted by inexperienced resident doctors who were the first on call. This observation calls for urgent training of resident doctors on how to perform these procedures and that only experienced endoscopist should be allowed to perform endoscopic procedures for the removal of FB in the aero-digestive tract.

Conclusion

FB in the aero-digestive tract are among the most common causes of surgical emergencies presenting to the AED of JIMCH and contribute significantly to high morbidity and occasionally mortality. Children aged 2 years and below are commonly affected. Rigid endoscopies with forceps removal under general anesthesia are the preferred management modality. It is recommended that the removal of FB in the aero-digestive tract should only be performed or attempted by experienced endoscopists. Since aero-digestive tract FB are preventable surgical condition, preventive measures should be directed at the high risk group (children) whereby parents should be educated to keep a close eye on their children and keep objects which can be FB away from children's reach.

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