

Foreign body aspiration in children

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Abstract

Aim: Foreign body aspiration (FBA) is a life-threatening conditional. We aimed to share the results of FBA in children.

Material and Methods: We evaluated retrospectively files of 61 patients between the ages 1-10 underwent rigid bronchoscopy. It were evaluated the types and anatomic localization of aspirated foreign bodies, the age distribution of children, treatment procedures. The results was assessed by Chi-square test or Fisher's exact test. $P < 0.05$ was considered significant.

Results: The mean ages were 3.29 ± 1.91 . 62% of the patients were male, and 38% were female ($p < 0.05$). Aspirated foreign body localized right in 38 patients, left in 13 patients, tracheal in 6 patients. Foreign body was observed in the right main bronch in 18 patients, in the right lower lobe bronch in 19 patients, in the medium lobe bronch in 1 patients, in the left main bronch in 9 patients, in the left lower bronchus in 4 patients. Bronchoscopies were negative in four patients, although foreign body aspiration is considered.

Conclusion: FBAs are common in children. In children younger than 3 years are more common. The gold standard in treatment is rigid bronchoscopy. The incidence and severity of airway FBA can be reduced by parental education and public awareness.

Keywords: Airways; aspiration; bronchoscopy; foreign body

INTRODUCTION

Foreign body aspiration (FBA) is the escape of an object into the tracheobronchial system. It is the most common cause of sudden respiratory distress (1). More than 75% of children are between 1-3 years of age and it is responsible for 7% of deaths in this age group (2). The most of foreign bodies escape to the right main bronchus. Also, it is seen 5-7% in both bronchus, 1-2% in the subglottic region (3). The type of foreign body aspirated varies by country, region, socioeconomic level. Both organic and non-organic objects may aspirated (3). Symptoms vary according to the size of the aspirated object and the level of bronchus. It may be seen as cough, agitation, cyanosis, loss of consciousness and death. (4).

The most important criterion in diagnosis is the story taken from family or child. Also, in 10-20% of the cases without any a story also are found foreign body, as well. (3).

The main imaging modalities are chest radiography, computed tomography, and bronchoscopy. Chest X-ray is

the first method to be consulted (5). In studies conducted, 90% of aspirated foreign bodies were found to be non-radiopaque (6). In non-radiopaque object aspiration, increased aeration on the aspiration side and expansion in intercostal distances are seen. Computed tomography is another method used for non-opaque foreign bodies. The main treatment method is bronchoscopy. Bronchoscopy are divided into two as fiberoptic and rigid bronchoscopy. Rigid bronchoscopy are the most preferred method.

In our study, We aim is to share the types, localizations of aspirated foreign bodies, the age distribution of children, treatment procedures and the outcomes.

MATERIAL and METHODS

Patients

A total of 61 patients with suspected aspiration or foreign body aspiration who applied to our clinic in the last 14 years were included in the study.

Study design

Files of 61 patients were analyzed retrospectively. Data of

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patients were assessed using a review of the hospital's medical records. Patients outside the age range 1-10 were excluded from the study. Age and gender of the patients were evaluated. Localizations in the respiratory system of aspirated foreign bodies were evaluated and classified. The Types and proportions of aspirated objects were determined.

In statistical analysis, continuous variables were expressed as mean \pm standard deviation and categorical variables were explained as the number-ratio. The results were analyzed by Fisher's exact test. $P < 0.05$ was considered significant.

RESULTS

The mean age of patients were 3.29 ± 1.91 . Of the patients, 62% (n: 38) were male, and 37% (n: 23) were female ($p < 0.05$). Foreign body aspiration was significant in male gender.

Table 1. Distribution and anatomical placement of aspirated foreign bodies

Variable	Outcome	Percentage (%)
Sex	61	
Male	38	62
Female	23	38
Localization	57	
Trachea	6	11
Right/Left main and lobe bronchi	51	89
Lung localization	51	
Right Lung	38	75
Left Lung	13	25
Right Lung bronchial localization	38	
Right main bronch	18	47
Midle lobe	1	3
Lower lobe	19	50
Left Lung broncial localization	13	
Left main bronch	9	69
Lower lobe	4	31

Negative bronchoscopy in four patients (%6)

The most common symptoms were coughing and wheezing. Other symptoms were drooling and shortness of breath, chest pain.

The most commonly used method in diagnosis was bilateral chest x-ray. In addition, bronchoscopy was preferred as the other diagnostic method after physical examination findings.

Foreign body localized right in 38 patients, left in 13 patients, tracheal in 6 patients ($p < 0.05$). Aspiration into the right respiratory tract was significant ($p < 0.05$).

Foreign body was observed in the right main bronch in 18 patients, in the right lower lobe bronch in 19 patients, in the medium lobe bronch in 1 patients, in the left main bronch in 9 patients, in the left lower bronchus in 4 patients. although foreign body aspiration is considered. Aspiration to the right main and right lower lobe bronchus was significant ($p < 0.05$) (Table 1).

It was identified coins in 29 the patients, scarf pin in 7 the patients, chickpeas in 2 the patients, hazelnut in 4 the patients, pistachio in 2 the patients, food crumbs in 3 the patients, egg shell in 2 the patients, pomegranate in 1 the patient, corn in 3 the patient, bone in 1 the patient, hour battery in 1 the patients, ball breather valve in 1 the patient and eggs part in 1 the patient. It was observed in 4 patients with negative bronchoscopy. Coin aspiration was found significant compared to other objects ($p < 0.05$) (Table 2).

Table 2. Distribution of aspirated foreign bodies

Foreign bodies	Number	Percentage (%)
Coins	29	48
Scarf pin	7	11
Chickpeas	2	3
Hazelnut	4	6
Pistachio	2	3
Food crumbs	3	5
Egg shell	2	3
Pomegranate	1	2
Corn	3	5
Bone	1	2
Hour battery	1	2
Ball breather	1	2
Eggs part	1	2
Total	57	94

Negative bronchoscopy in four patients (%6)

DISCUSSION

If early diagnosis and intervention are not performed in foreign body aspiration, different and serious complications can be encountered until recurrent pneumonia, pulmonary abscess and bronchiectasis (2). If large objects are usually located in the larynx and trachea, they may cause aphonia, agitation, cyanosis, loss of consciousness and death (4).

Small diameter solids block the right or left main bronchus or more distal bronchi. In this case, the first symptom may be coughing and wheezing. Dyspnea, chest pain, fever, nausea and vomiting can follow this (4). In our study, the most common symptoms were coughing and wheezing. Other symptoms were drooling and shortness of breath, chest pain.

The most important criterion in the diagnosis is the story taken from the family or the child and most of the aspirations are with the family members. Although 10% of the cases had no history, a foreign body was found (3). The main imaging modalities are chest radiography, computed tomography, and bronchoscopy. The main treatment method is bronchoscopy. In our study, the most commonly used method in diagnosis and treatment were bilateral chest x-ray and physical examination.

Rigid bronchoscopy is used in the diagnosis and treatment of foreign bodies. The rigid bronchoscope is of various diameters and lengths to be compatible with age in children. When rigid bronchoscopy is performed in experienced hands, it is close to 100% diagnosis and treatment. Complications are reported in 2-8% of the studies (5). Emergency complications during removal of foreign body include bronchospasm, laryngeal edema, pneumothorax, pneumomediastinum, complete and/or partial removal of foreign body, injury to teeth, gums, hypoxia, larynx and tracheobronchial injury, laryngospasm, subglottic edema, vomiting and aspiration, cardiac arrhythmia and arrest. Late complications include granuloma, pneumonia, atelectasis, lung abscess, tracheo-esophageal fistula. The incidence of complications is increased in the cases diagnosed after 24 hours, so early diagnosis and treatment are important (1). There was no complication in our patients.

CONCLUSION

In conclusion, tracheobronchial foreign body aspirations are common in children who are starting to take new foods and play with toys. The morbidity and mortality rate is high when not intervened in time. Bronchoscopy should be performed for definitive diagnosis and treatment even in

cases with suspicious history. Normal radiological images should not mean no foreign bodies. Treatment should be started at the place of the incident and the patient should be evaluated by the experts in the emergency outpatient clinic. One of the most important points to keep in mind is to raise awareness of family members and to explain the seriousness of the event.

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REFERENCES

1. Capan N, Alici IO. Tracheobronchial foreign body aspiration. *Solunum hastalıkları* 2009; 20:39-42.
2. Sirmali M, Turut H, Kisacik E, et al. Tracheobronchial foreign body aspiration in children. *Tıp Araştırma Dergisi* 2005;3:8-12.
3. Buyukyavuz I. Foreign body aspiration in children. *Klinik Ped* 2003;2:47-51.
4. Zur KB, Litman RS. Pediatric airway foreign body retrieval: surgical and anesthetic perspective. *Pediatric Anesthesia* 2009;19:109-17.
5. Cevizci N, Dokucu AI, Baskin D, et al. Virtual bronchoscopy as a dynamic modality in the diagnosis and treatment of suspected foreign body aspiration. *Eur J Pediatr Surg* 2008;18:398-401.
6. Kosucu P, Ahmetoglu A, Koramaz I, et al. Low-dose MDCT and virtual bronchoscopy in pediatric patients with foreign body aspiration. *AJR* 2004;183:1771-7.