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Clinical experience of removing aerodigestive tract foreign bodies with rigid endoscopy in children

[Çocuklarda hava-gıda yolunda kalmış yabancı cisimlerin rijit endoskopi ile klinik araştırması]

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Abstract

Objectives: This study was undertaken to document the aero digestive tract foreign body accidents among children, and to investigate the circumstances surrounding these events. **Methods:** A review of the charts of pediatric patients admitted with the definitive or suspicious diagnosis of aero digestive tract foreign bodies was carried out in the period between January 1, 1998 to December 31, 2002. **Results:** There were 53 eligible children; 39 men and 14 women, with an age range of 7 months to 14 years. Food items were the most common airway foreign bodies and coins were the most common esophageal foreign bodies. Among the 32 patients who underwent bronchoscopy, no foreign body was identified in 9 patients. Among the 21 patients who underwent esophagoscopy, foreign body was removed in 19 patients. In 2 cases, large foreign bodies which we could not be extracted with forceps were pushed into the stomach. **Conclusions:** Foreign bodies in the airway and esophagus constitute a constant hazard in all age groups, which demands immediate approach and management. Although the rigid endoscopic removal of aero digestive foreign bodies was successful in this series, the most effective treatment of foreign body accidents is their prevention.

Keywords:

Aero digestive, foreign body, endoscopy.

Özet

Amaç: Bu çalışma çocuklar arasında hava gıda yolundaki yabancı cisim kazalarını dökümantasyon yapmak ve bu olaylarla ilgili çevresel faktörleri araştırmak için planlandı. **Yöntem:** 1 Ocak 1998 ile 31 Aralık 2002 tarihleri arasında kesin veya şüpheli olarak hava gıda yolunda yabancı cisim tanısıyla hastaneye getirilmiş pediatrik hastaların kartları gözden geçirildi. **Bulgular:** 53 uygun çocuk vardı: 39 erkek ve 14 kız, yaş aralıkları 7 ile 14 arasındaydı. En sık rastlanılan hava yolu yabancı cisim gıda parçaları ve en sık rastlanılan ösafağial yabancı cisim bozuk paralardı. Bronkoskopi uygulanmış 32 hastadan 9 unda yabancı cisim saptanmamıştı. Endoskopi uygulanan 21 hastadan 19 unda yabancı cisim çıkarılmış, 2 olguda büyük yabancı cisimler forseps kullanımı ile mideye itilmişti.

Anahtar Kelimeler:

Hava-gıda yolu, yabancı cisim endoskopi.

1. Introduction

Accidental ingestion of foreign bodies (FBs) is very common in the pediatric age group. Most commonly, FBs are aspirated during the toddler years, ages 1 to 3.

These children had not yet developed a full posterior dentition and neuromuscular mechanisms for swallowing and airway protection are not fully mature. In addition, children of this age have a tendency to explore their world using their mouths. The second

peak is between age's 10 and 11. As a result, chunks of food are often too large and may cause gagging and respiratory compromise. Other risk factors include mental retardation, seizure disorder or other neurological disease, history of structural or functional abnormality of the esophagus including repair of a tracheo-esophageal fistula, and inadequate parental care or an abusive environment.² The specific manifestations of an FB in the esophagus depend on the type of FB, the site where it is lodged, the degree of obstruction, and the length of time between ingestion and evaluation.³ The accurate diagnosis may allude even the sophisticated physician because often the initial choking incidents are not witnessed and the delayed residual symptoms may mimic other common conditions, such as asthma, recurrent pneumonia, or upper respiratory tract infections. Early diagnosis is the key to successful and uncomplicated management of these accidents to avoid significant morbidity and mortality. Some authors have advocated use of a flexible bronchoscope for FB removal.⁴ However, rigid endoscopy is preferable in an operating room dedicated to endoscopy with a variety of forceps readily available.⁵ Common pitfalls in initial management leading to treatment delay and potential complications were presented.

2. Methods

A retrospective review of all esophagoscopies and bronchoscopies performed between January 1, 1998 and December 31, 2002 in the Department of Pediatric Surgery was undertaken. All children, between 6 months and 16 years, who presented with a complaint or suspicion of an inhaled or ingested FB, were

included in the study. Data were recorded for patient age and sex, date of occurrence, date of diagnosis, any significant symptoms or signs at any time, diagnostic radiographic maneuvers employed, radio-graphic findings, and witnessed or unwitnessed event. Additional information included prior medical evaluation, treatment and outcome, procedures undertaken to remove the FB, intraoperative findings and complications. The type of object and localization that was ingested or aspirated and localization were also identified. Both rigid esophagoscopy and rigid bronchoscopy were performed under general anesthesia in the operating room.

3. Results

Our review identified 53 patients who underwent endoscopy for a suspected aero digestive tract FB. There were 14 (26.4%) girls and 39 (73.6%) boys. The mean age of occurrence was 3.62 ± 3.7 with a range of 7 months to 14 years. Rigid esophagoscopy was performed in 21 (39.6%) patients, rigid bronchoscopy in 30 (56.6%) patients, and both esophagoscopy and bronchoscopy in 2 (3.8%) patients. Thirty-nine patients (73.6%) were age 4 or younger, and 14 (26.4%) were over age 4 (Table 1). Most of the children were admitted to our hospital within the first 24 hours after the accident (69.9%). Delayed presentation (>1 week after onset of symptoms) was seen in 20.9% of the cases. Aspiration events were witnessed or reported by the patient in 45 (84.9%) of the cases. Radiologic examination was documented as part of evaluation in all of 53 cases, with radioopaque FBs recorded in 27 (50.9%) of them.

Table 1. Age and sex distribution of the patients with airway and esophageal foreign bodies

| | Esophageal (n=21) | Airway (n=32) |
|-------------------|-------------------|---------------|
| Age groups | | |
| 0-4 years | 15 (71.4%) | 24 (75%) |
| 5-9 years | 4 (19.1%) | 4 (12.5%) |
| 9-14 years | 2 (9.5%) | 4 (12.5%) |
| Sex | | |
| Boys | 17 (80.9%) | 22 (68.7%) |
| Girls | 4 (19.1%) | 10 (31.25%) |

Among the 32 patients who underwent bronchoscopy, no FB was identified in 9 patients, yielding a negative bronchoscopy rate of 28.1%. Most patients (84.6%) had a clear history of FB ingestion and all had symptoms to suggest the presence of an FB. Overall, 70% of the airway FBs were food items, with nuts and seeds alone accounting for 44% of the total (Fig. 1). Among children 4 years and younger, food items were presented in 50%. Right bronchial FBs accounted for

47.8% of the total, while left bronchial FBs were present in 26%. Tracheal, laryngeal, and both of right and left bronchial FBs were present in 17.3%, 4.3%, and 4.3%, respectively. Among the 21 patients who underwent esophagoscopy, FB was removed in 19 patients. In 2 cases, large FBs which could not be manipulated with forceps were pushed into the stomach. Coins were the most common object found in this group (Fig. 2). Thirty-two of the 53 children had

one or more significant symptoms (choking, gagging, stridor, drooling, dysphasia, throat pain, vomiting, cough, wheeze, shortness of breath, localization of FB sensation). Thirty of the 32 patients in this group required removal of the FB. Twenty-one of the 53 children had no significant symptoms. But 17 patients required removal of the FB in this group. Two of the patients who died (3.8%) were admitted to the emergency department in coma status, which emerged

suddenly. These patients underwent bronchoscopy and esophagoscopy with a suspicion of FB aspiration. No FBs were found in those patients in both procedures. Unfortunately, their cause of death remained unclear. A prolonged hospital course (>24-hour stay) after removal of the FB was required in 24.5% of the children (13/53) for whom total hospital stay was recorded.

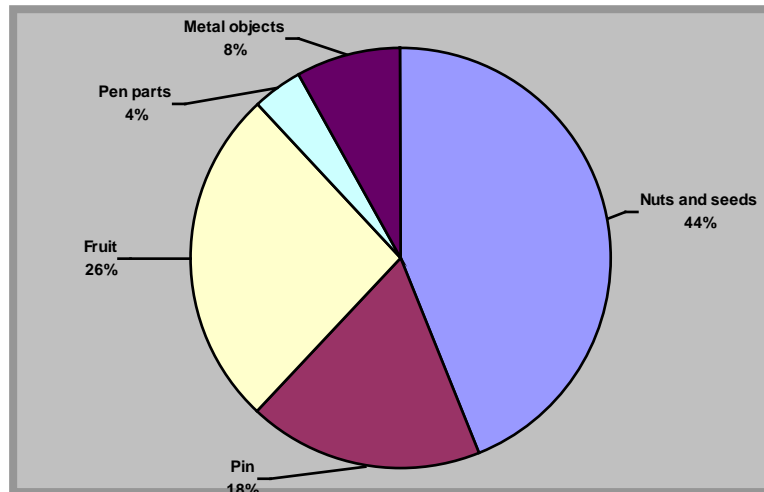


Figure 1. Nature of airway foreign bodies

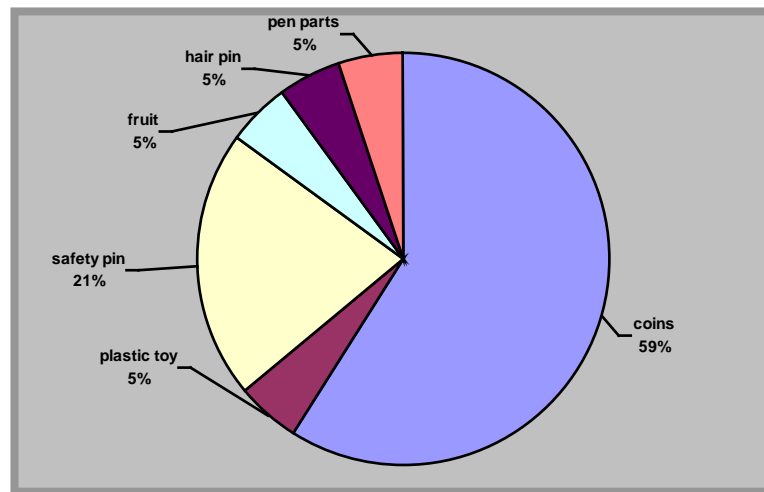


Figure 2. Nature of esophageal foreign bodies

Discussion

Foreign bodies of the upper aero digestive tract are common in children, and it has been established that endoscopic removal is both the most efficacious and the least morbid treatment. Signs and symptoms associated with aspiration of an FB are typically observed in 3 stages. Initially, there is a history of a choking episode followed by violent coughing, gagging, and possibly complete airway obstruction. An asymptomatic interval follows. The FB becomes lodged and reflexes become fatigued resulting in the subsiding of symptoms. This stage accounts for a large percentage of delayed diagnoses. The third stage is

characterized by symptoms of complications. The most serious sequelae of FB aspiration are complete obstruction of the airway. Without an adult witness, it can become difficult to document the acute event, and without the confirming history the diagnosis of an FB may produce any of a variety of respiratory symptoms. Frequently, these children are treated for prolonged periods for asthma, pneumonia, or allergy. Nevertheless, unexplained recurrent pneumonia, other respiratory illnesses, or conditions that do not respond to appropriate medical management in children should always raise the suspicion of an aspirated FB.6 FBs in the esophagus are particularly interesting because the

most common symptoms are laryngeal irritation, coughing, or choking caused by the highly compliant party wall between the trachea and the esophagus in the child.⁷ Upper airway obstruction may be caused by posterior tracheal compression by the FB or by subsequent periesophageal inflammation and edema. Aspiration secondary to esophageal obstruction may lead to pneumonia. Dysphagia is a later finding and its absence may lead to a low level of suspicion concerning this diagnosis. Coins are the most frequent esophageal FB in children although indigested food, fish bones, and safety pins are also common.⁸ The most common location for an esophageal FB to lodge is at the normal anatomic narrowing of the esophagus—most frequently at C-6 or the level of the cricopharyngeus.⁸ This study supported the slight predominance of male children seen in most studies.^{9,10} The median age of 3 years and 6 months was consistent with others. Coins were the most commonly swallowed FB, as has been noted by others, and nuts were the FBs most commonly implicated in inhalations. Twenty-one of the 53 children had no significant symptoms. But the FBs were removed from 17 patients in this group. In children with airway FBs, chest radiograph findings are frequently normal and can display abnormalities uncharacteristic for FB aspiration. Children witnessed to choke while having small particles in their mouths and noted subsequently to have raspy respiration, wheezing, or coughing should undergo prompt bronchoscopy regardless of radiographic findings. In Islamic countries, aspiration of turban pins by young girls is seen very frequently. The 3 of the 4 patients who inspired a needle did not have any symptoms and their diagnosis was made under fluoroscopy. FB was not found in 9 patients who underwent bronchoscopy. In case of perforating FB aspiration (needle, pin etc.), tracheal symptoms may not be present so the trachea should be imaged in all cases.

In our series, the number of witnessed cases was higher than the other reports. Both parents usually work in the western countries. However, mothers usually take care of their children in our country. We may speculate this could be the reason for high rate of witnessed cases in this paper.

Among 25% of bronchial FB aspiration patients required prolonged hospital stay. These patients were from the rural area of our city and their admission time was longer than the others. We speculated that delayed admission in cases of aspiration could be a reason for prolonged hospitalization.

The safest method for the retrieval of an esophageal FB is under general anesthesia with a protected airway. The removal of an esophageal FB under fluoroscopy in the radiology suite with the use of a balloon catheter can be dangerous because of the risk of aspiration.

In conclusion, FBs in the airway and esophagus constitute a constant hazard in all age groups, which demands immediate diagnosis and management. Delayed treatment with observation is not recommended. Rigid endoscopic procedures performed in the OR facility would make a dramatic improvement in the clinical picture and is often life saving when this emergent diagnosis reached upon a focused history and use of proper instruments indicates its performance in an otherwise healthy child. Early diagnosis and improved management have resulted in favorable outcomes. In any suspicion, a bronchoscopy should be considered even if there is no positive history for aspiration. Children should be followed up after bronchoscopy for complications. Although this result is encouraging, prevention must remain as our goal. Many measures have been undertaken both by the government and private sector that have improved public safety. Just as pediatricians use well-child visits to advise parents of infants and toddlers not to feed their children nuts and seeds, they should similarly educate older children and their parents on the risks of storing school supplies and other objects in their mouths.

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