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*Case Report and Literature Review*

# A Case of Pediatric Foreign Body Aspiration: Case Report and Literature Review

*Bir Pediatrik Yabancı Cisim Aspirasyonu Vakası: Vaka bildirimi ve Literatürün Gözden Geçirilmesi.*

**Erdinç ŞENGÜLDÜR** [1]

[1]Ünye State Hospital Emergency Service, Ordu., Turkey

**Corresponding author:**

*Dr. Erdinç ŞENGÜLDÜR*

**Adress**: Ünye Devlet Hastanesi Acil Servisi

**email**: drerdincsenguldur@hotmail.com

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**Abstract:**

Foreign body aspiration is one of the leading causes of preventable mortality and morbidity in children. Foreign body aspiration cases are most common in the first 3 years of life. Not leaving children out of adult supervision is the most important precaution for foreign body aspiration. Educating parents about first aid and the heimlich maneuver will prevent potential negative consequences. In this article, it is aimed to present a case who was brought to the emergency department in cardiac arrest after foreign body aspiration and to examine the subject of foreign body aspiration in the light of current literature.

**Key Words:** emergency medicine, foreign body aspiration, airway obstruction

**Öz**

Yabancı cisim aspirasyonu çocuklardaki önlenebilir mortalite ve morbidite nedenlerinin başında gelir. Yabancı cisim aspirasyonu vakaları en sık hayatın ilk 3 yılı içerisinde görülür. Çocukları yetişkin gözetimi dışında bırakılmaması, yabancı cisim aspirasyonları açısından en önemli önlemdir. Anne babaların ilkyardım ve heimlich manevrası konusunda eğitilmeleri olası kötü sonuçları önleyecektir. Bu makalede yabancı cisim aspirasyonu sonrası kardiak arest halde acil servise getirilen bir olgunun sunumu ve yabancı cisim aspirasyonu konusunun güncel literatür ışığında incelenmesi amaçlanmıştır.

**Anahtar Kelimeler:** acil tıp, yabancı cisim aspirasyonu, havayolu obstruksiyonu

## Introduction

Foreign body aspiration (FBA) is one of the leading causes of preventable mortality and morbidity in children. While FBA is the 4th most common cause of accidental death in children under 4 years of age, it ranks 3rd under 1 year old. 7% of deaths under 3 years of age are associated with foreign body aspirations(1). FBA constitutes 5% of accidental deaths under 3 years of age in the United States of America (USA)(2).

FBA cases are most common in the first 3 years of life. The reason for this is that the molar teeth are not developed, the neuromuscular reflexes that provide swallowing are insufficient, and the children in this age group put everything they hold into their mouths. In addition, crying, talking and walking around while eating at the same time can be shown as a reason(3). FBA is seen more frequently in boys than in girls, which is explained by the fact that boys are more active than girls(1). Lack of attention to children, leaving them without adult supervision, leaving objects around that can be aspirated are other risk factors(1).

The mortality rate in foreign body aspirations occurring outside the hospital is around 36%. This rate is around 0.26% - 13.6% in-hospital aspiration cases(2). The most frequently aspirated foreign bodies are foods(4). Frequent aspirated foods vary by country and region. Nuts, peanuts and seeds of various plants are generally the most frequently aspirated foreign bodies(4).

Although food is the most common cause of FBA, the clinical situation may differ depending on the type of food aspirated. More serious clinical conditions have been shown to occur after aspiration of meat products. In a study conducted in the USA and Canada, it was shown that aspiration of delicatessen products is more associated with fatal clinical pictures(5,6).

Clinical severity is related to the shape, size and origin of the aspirated body. When inorganic bodies are aspirated, if they dont close the airway completeley, they can remain asymptomatic for a long time.On the other hand, organic bodies cause more obstructive symptoms when they are aspirated, since they cause inflammatory processes(6). Large foreign bodies will be more occlusive than small ones. Round or egg-shaped foreign bodies will also close the airway completely and cause more asphyxiation, as they will better fit the airway shapes of the children (7).

In this article, it is aimed to present a case who was brought to the emergency department in cardiac arrest after FBA and to examine the subject of FBA in the light of current literature.

**Case**

A 2-year-old male patient was brought to the emergency room after being told that he had fallen out of the chair. When the emergency health technician reached the scene, he said that the patient was not breathing and his heart was at cardiac arrest. He said that they brought the patient with cardiopulmonary resuscitation (CPR) and tried endotracheal intubation, but they were unsuccessful, they continued by ambulating. In the emergency room examination; cardiac arrest is present. Pupillary bilateral mydriatic, no light reflex. The skin is pale and cold. There are 2 cm bruises under both eyes. There is no examination finding to suggest skull fracture. Abdominal distention presents. No signs of trauma on the thorax, abdomen or extremities.

The patient was immediately intubated and CPR was started. When the lungs were oscultated after intubation, low respiratory sounds were heard in the left lung. This finding was thought to be due to pneumothorax, since CPR was applied to the patient while he was being brought to the emergency department. Cardiac rhythm was restored at the 55th minute of CPR, which was performed in accordance with the European Resuscitation Council Guidelines 2021: Paediatric Life Support(8). Fingertip oxygen saturation was 98 and arterial blood pressure (TA) was 90/60. Brain, thorax and abdominal tomography (CT) was planned for the patient with suspected trauma. We talked to the relatives of the patients in order to deepen the anamnesis. It was learned that the boy was playing with his cousins at his grandmother's house, and his parents were in the neighbor's house at that time. It was learned that when they came because of other children's calls, they found the child on the floor, fallen from the sofa and there was a hazelnut in a bowl next to him. The patient's brain CT imaging showed diffuse cerebral edema, which was associated with prolonged hypoxia.(**Figure 1)** No pathological finding or foreign body was found in thorax CT.**(Figure 2)** Abdominal CT showed hypodense areas in both kidney and liver parenchyma, these findings were interpreted as ischemic infarct areas.

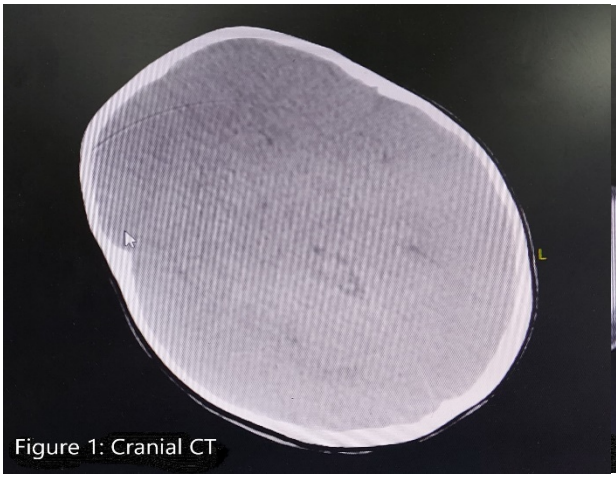
Figure 1: Cranial CT

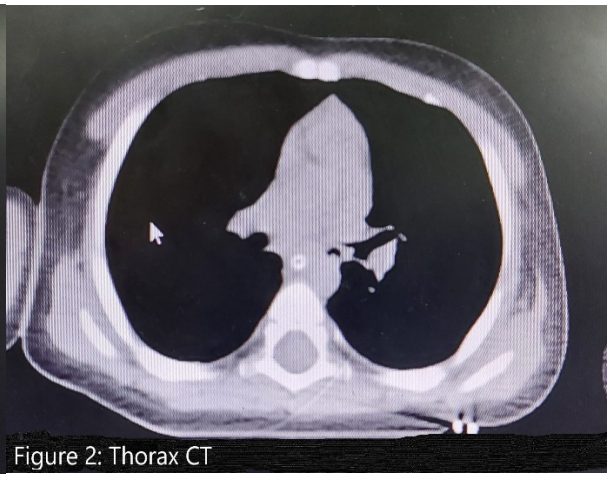
Figure 2: Thorax CT

Blood gas results showed Ph: 6.61, PCO2: 38 mmHg, HCO3: 3.6 mmol/L, SO2: %97. NaHCO3 push and infusion was applied to the patient. In the blood gas taken 30 minutes later, it was seen as Ph: 6.88, HCO3: 8.2 mmol/L, SO2: %97. It was thought that the patient with no low saturation and treatment-resistant metabolic acidosis might be intoxicated with drugs. It was learned that there was no medicine around the child. Deep metabolic acidosis was attributed to kidney damage resulting from prolonged cardiac arrest and hypoxia. During the follow-up of the patient in the emergency room, there was no urine output from the catheter.

The patient was referred to Ondokuz Mayıs University Medicine Faculty Hospital for bronchoscopy and intensive care follow-up. In bronchoscopy performed there, it was learned that 2 hazelnuts were seen in the left main bronchus. It was learned that the patient died due to cardiac arrest that developed shortly afterwards.

**Discussion:**

Not leaving children out of adult supervision is the most important precaution for FBA. However, it should be noted that many cases of FBA develop under adult supervision. Hard foods such as hazelnuts and peanuts with a high risk of aspiration should not be given to children without adult supervision(9). In our case, it is seen that the 2-year-old child was left with his cousins a few years older than him, without adult supervision, and was next to the hazelnut, which could potentially aspirate.

Studies have shown that FBA is more common in boys. This is explained by the fact that boys are more active than girls(1). Our patient was also a boy.

The typical physical examination finding in FBAs is decreased breath sounds on the affected side. Wheezing is also a common finding (4). In our patient, respiratory sounds were found to be low in the left lung after intubation. This situation suggested that there may be foreign body aspiration.

The first medical intervention to a child who is thought to have aspirated a foreign body is cleaning the inside of the mouth with a finger and then the heimlich maneuver. The Heimlich maneuver is a fast and effective method for removing foreign bodies in the respiratory tract. It is easy to learn and apply. Complications are rare (10). For infants under one year old, alternating sequences of five back blows and five chest thrusts are performed until the object clears or the infant becomes unresponsive. If child becomes unresponsive, basic life support must be performed(10). abdominal compression should not be applied in children because their livers are more vulnerable to injury (11). In our case, it is not known how many minutes passed after the child aspirated foreign body until adults came. It was stated that the ambulance arrived about 15 minutes after the call, but no intervention had been made until then. The medical team who came to the scene tried to intubate the patient, but when

they were unsuccessful, they ambulated him with CPR and brought him to the emergency room. It has been learned that this journey took about 20 minutes.

Direct chest X-ray is the first-stage imaging method in FBAs. Lateral radiographs may also be helpful. However, a normal chest X-ray does not exclude the diagnosis of FBA. Computed tomography (CT) can also be performed, but FBs that are not radio-opaque will not be seen. Atelectasis or increased aeration on the obstructed side may be seen as secondary signs of obstruction. Non-opaque objects can also be seen as filling defects on barium radiographs (12). No foreign body was observed in the thorax CT taken in our patient.

In the studies, it was found that the right bronchus is the area where FBs are most frequently inserted in the respiratory tract. This is explained by the fact that the right main bronchus is shorter, wider and in a more upright position.Rigid bronchoscopy is the gold standard in the detection and removal of FBs in the respiratory tract (13). In our case, the patient was referred to an advanced center for bronchoscopy and intensive care follow-up after successful resuscitation. In our patient, 2 hazelnuts were found in the left main bronchus in the bronchoscopy performed in Ondokuz Mayıs University Medical Faculty Hospital. It should not be forgotten that the patient was intubated before bronchoscopy, CPR was performed for a long time, and the nuts may be at a higher position before intubation.

The expected blood gas results in a patient with airway obstruction are respiratory acidosis, hypoxia, and hypercarbia. However, deep metabolic acidosis was present in the blood gas of our patient and it was resistant despite bicarbonate treatment. therefore, intoxications were among our preliminary diagnoses (14). It should be kept in mind that deep metabolic acidosis, which is seen in patients who remain hypoxic for a long time due to airway obstruction and whose cardiac arrest and resuscitation time is prolonged, may develop due to kidney damage.

## Conclusion

FBA is an important cause of childhood mortality and morbidity. Educating families, teachers, and babysitters about FBA is important to prevent fatal complications. Educational programs to be organized throughout the country and educational programs to be included in the media can be beneficial in this regard. It would be beneficial for newly born parents to be warned about frequently aspirated foreign bodies before discharge. Educating parents about first aid and the heimlich maneuver will prevent potential negative consequences. Above all, it should be ensured that children are not left alone without parental supervision.

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