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Disk Battery Ingestion; A malpractice case that results in pneumonia

Disk Pil Yutulması; Pnömoni ile Sonuçlanan Bir Malpraktis Olgusu

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Abstract

Alkaline batteries have become the second most swallowed foreign bodies following coins. Most cases have an uncomplicated course, but some may lead to serious complications and even death.

Here we report a 28 months old boy who had experienced discomfort, eating refusal, vomiting and slightly wheezing after falling from a sofa bed. He has been in three different county hospitals and two private hospitals due to complaints, has been examined by two pediatricians and a cranial surgeon. A cranial CT imaging, a cranial X-ray radiograph and a chest X-ray radiograph was obtained. Firstly diagnosed as head and neck trauma, then diagnosed as acute bronchiolitis, and finally pneumonia. Hospitalized twice. Finally a chest radiograph revealed a button battery in the esophagus. The foreign body was endoscopic removed. The child had a quick clinical impairment after removal of the battery.

As a result, alkaline batteries with their increasing risk of engulfment poses very serious problems. The parents and physicians should be informed against increasing frequency of ingestion of alkaline batteries by infants and children. Also clinicians should be careful about the risk of these batteries that they can cause pneumonia and infiltration which may make it difficult to detect the foreign body.

Keywords: Disk Batteries; Pneumonia.

Özet

Alkalin piller madeni paraların ardından en sık yutulan yabancı cisimlerdir. Çoğu olgu sorunsuz seyreder, fakat bazıları ciddi komplikasyonlara hatta ölüme neden olabilir.

Biz çekyattan düşme sonrası hafif wheezing, kusma, beslenme reddi ve huzursuzluk şikayeti gelişen 24 aylık bir erkek çocuk olgusu sunuyoruz. Olgumuz şikayetleri nedeniyle 3 ayrı ilçe devlet hastanesi, iki özel hastaneye gitmiş, 2 pediatri uzmanı ve beyin cerrahi uzmanı tarafından muayene edilmiştir. Olguya bir kranial tomografi, bir kranial ve bir göğüs röntgen filmi çekilmiştir. İlk önce kafa ve boyun travması tanısı konulmuş, sonrasında akut bronşiolit ve pnömoni tanısı konulmuştur. İki kez hastaneye yatırılmıştır. Nihayetinde, çekilen göğüs filminde disk pil tespit edilmiştir. Yabancı cisim endoskopik yöntemle çıkarılmış, sonrasında olguda, hızlı bir iyileşme görülmüştür.

Sonuç olarak, artan yutulma sıklıkları nedeniyle alkalin piller çok ciddi problemler oluşturmaktadır. Çocuk ve adelosanların alkalen pilleri yutma sıklığının artması nedeniyle, aileler ve hekimler uyarılmalıdır. Klinisyenler ayrıca, bu pillerin pnömoni ve infiltrasyona neden olarak yabancı cismin tespitini zorlaştırabileceği konusunda da dikkatli olmalıdır.

Anahtar Kelimeler: Alkalin piller; Pnömoni.

1. Introduction

Foreign body ingestion is seen very often in children aged between 6 months and 3 years. 80% of these bodies leave gastrointestinal system (GIS) often with no serious complications and %10-20% are extracted endoscopically (1, 2). Surgical intervention is required in only 1% of the cases because of obstruction, perforation and fistula development.

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Alkaline batteries account for less than 2% of ingested foreign bodies in children. However, the frequency is increasing (1,3). In recent years alkaline batteries are the second most swallowed foreign bodies following coins which are the most (4,5). These disk-shaped batteries vary between 8 mm and 28 mm in diameter. Most cases have an uncomplicated course, but the rest that stuck in esophagus, may lead to serious complications and even death.

2. Case Report

The case was a 28 months old boy with no prior medical problem. The boy had fallen from a sofa bed (approxi-

mately 50 cm high) and the parents had experienced discomfort, eating refusal, vomiting and slightly wheezing. Within two hours the boy was referred to the emergency department of a county hospital due to complaints. The general practitioner who examined the patient, reported the physical examination as normal. Also biochemical and hematologic parameters were normal. The patient was sent to another county hospital for cranial CT imaging. By CT imaging, the cranial region was reported as normal but the complaints of the child persisted. The child was sent to a cranial surgeon at another (third) county hospital for suspicion of neck trauma. The cranial surgeon hospitalized the patient for three days in cranial surgery clinic. A cranial X-ray radiograph was obtained and reported as normal. On the third day the patient was discharged. But fever was added to the previous complaints. On the same day the patient was examined by the pediatrician at the pediatric outpatient clinic and assessed as normal. The parents were not satisfied and visited another pediatrician at a private hospital on the same day. The boy was diagnosed as acute bronchiolitis and some oral drugs were prescribed. Due to eating discomfort, the parents were not able to apply the treatment at home and the boy was hospitalized in the first county hospital for two days. The complaints persisted and the family again visited the previous pediatrician at the private hospital. An AP chest X-ray radiograph was obtained and reported as pneumonia. The child was hospitalized in the private hospital for another two days but no remarkable clinical impairment was obtained.

Finally, at the 14 day of the beginning of the respiratory and eating complaints the family visited a tertiary child health care facility. Physical examination and chest radiograph (Figure 1) revealed a foreign body in the esophagus and pneumonic infiltrations at the lungs. The foreign body was a button cell battery. The foreign body was endoscopic removed. The child had a quick clinical impairment after removal of the battery. The child was hospitalized for 55 days for endoscopic removal of the foreign body, treatment of esophageal mucosal injury and pneumonia.

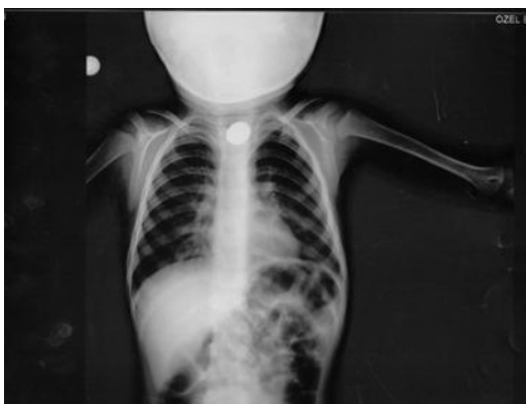

Figure 1. Chest radiograph on the 14th day of the beginning of the respiratory and eating complaints revealed a foreign body in the esophagus and pneumonic infiltrations at the lungs.

3. Discussion

Foreign body ingestion is a common clinical problem in children. Approximately 80% of the cases are children between 6 months and 3 years of age especially due to the fact that they can tend to take every object in their mouth in this age (3). Foreign body ingestion is rare in children in the older age group except in children with autism. The situation is also rare in adults, and often arises as a result of accident. Metallic money, toy parts, watch batteries, needles, fish bones and chicken bones are located in the first row of the most frequently ingested foreign bodies. These foreign bodies are usually expelled spontaneously without any damage and without the need for any intervention from the intestinal system (4).

Alkaline batteries with their increasing risk of engulfment related to the increase of technological tools, poses very serious problems. Alkaline batteries don't get stuck in the esophagus if they are smaller than 15 mm diameter. Only less than 3% of the batteries are greater than 20 mm and are responsible for severe esophageal damage. Animal experiments have shown that severe esophageal damage can occur after a short period of time after interaction with alkaline batteries. In these experiments, transmural esophageal necrosis has occurred within an hour in the dogs and within 2-4 hours in cats (6, 7). Batteries are damaging by creating an alkaline environment, electrolyte leakage, pressure necrosis or mercury toxicity. Emission of concentrated potassium hydroxide in these batteries has a corrosive effect which may lead to occurrence of mediastinitis or tracheoesophageal fistula (8). The disk-shaped batteries are commonly used in watches, calculators, cameras and toys. These batteries are one of the major reasons that makes caustic esophageal injury in infants and children (9, 10).

There are four type alkaline batteries including: mercuric oxide, silver oxide, manganese oxide or lithium. All the four types include %20-45% potassium or sodium hydroxide (11, 12). One of the most common and dangerous ingredient of these batteries is mercuric oxide. Elemental mercury releases by the reduction of mercury oxides in the acid environment of the stomach and can lead to mercury poisoning (13).

Alkaline batteries get in contact with salty human tissue allowing the releasing of sodium hydroxide and

chlorine gas which causes denaturation and necrosis. An alkaline battery causes tissue damage by four mechanisms: (1) cellular damage due to the propagation of heavy metals; (2) bidirectional diffusion of the fluid in the fluid surrounding the battery; (3) electric potential in the battery between the cathode and the anode forming electricity production that is the common cause of the external low-voltage burns; (4) The effects of local pressure necrosis (14).

Disk battery ingestion is also an unusual cause of pneumonia in pediatric population (15, 16). The chemical effects of battery or tracheoesophageal fistula may help occurrence of pneumonia as seen in our case. Also when pneumonia occurs the pulmonary infiltrations may draw a veil over the radiological findings. The time passed before the removal of the foreign body is determining for occurrence of complications. The case we present is educative in many aspects; 1) clinicians should be suspicious for foreign body aspiration in children with persistent respiratory complaints 2) use of radiological diagnostic methods should be target directed. The most effective and the less harmful method should be selected 3) Multidisciplinary approach and consultation should be encouraged for cases with persistent health problems.

As a result, the parents and physicians should be informed against increasing frequency of ingestion of alkaline batteries by infants and children. Especially alkaline batteries which are found in esophagus should be removed endoscopically without losing time as they carry high risk of morbidity and mortality. Also clinicians should be careful about the risk of these batteries that they can cause pneumonia and infiltration which may make it difficult to detect the foreign body.

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