

Ulceration Caused by a Small Alkaline Battery: Case Report and Literature Review

Küçük Alkalın Pil ile Cilt Ülserasyonu: Olgu Sunumu ve Literatürün Gözden Geçirilmesi

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39

Abstract

Small alkaline or lithium-ion batteries, which are commonly referred to as watch batteries or button cells, may cause potentially dangerous organ injuries and tissue damage if swallowed. This condition, which is commonly seen in children, may cause damage, particularly in the respiratory and gastrointestinal tracts, as well as in the nose, external ear canal, and middle and inner ears. Ulceration due to toxin contact is a very rare condition. In this study, we present the case of an 18-month-old male who swallowed a cell which caused damage in the medial femoral area after harmlessly passing through the entire gastrointestinal tract. The battery caused skin necrosis with the contribution of the electrolytic effect of stool in a diaper is an infrequent case and avoidable with only the parents' attention. Usually, swallowing watch batteries does not cause any symptoms or findings, and it easily excreted in stool. However, serious injuries and even deaths in cases involving the nasal cavities, outer and inner ear, esophagus, stomach, intestines, and neighboring organs have been reported in the literature. It is important to acknowledge the negative consequences and signs and symptoms of such conditions, and note that the battery may stick to body parts such as genital, medial femoral, anal, and intergluteal regions that remain in the diaper-covered area and may cause skin ulcerations due to the electrolytic characteristics of the stool.

Keywords: Alkaline battery, diaper ulceration, battery burn

Öz

Genellikle düğme pil veya saat pili olarak bilinen küçük alkalın veya lityum iyon piller, yutulduğunda ciddi organ ve doku hasarlarına yol açabilmektedir. Genellikle çocuklarda rastlanılan bu durum, özellikle solunum ve sindirim yolağında olmakla birlikte burun, dış kulak yolu, orta ve iç kulakta da görülebilmektedir. Bu çalışmada, yuttuğu pilin tüm gastrointestinal yolağı zararsızca kat etmesi sonunda, medial femoral bölgesinde cilt hasarı oluşan 18 aylık erkek bebek vakasını sunmaktayız. Bebek bezi kullanması nedeniyle gaita ile temas eden pilin, elektrolitik etki sonucu cilt nekrozu yapması, nadir ve sadece ebeveynlerin dikkatiyle önlenilecek bir durumdur. Bu tarz pillerin yutulması genellikle herhangi bir bulgu vermeden gaita ile atılımla sonuçlanmaktadır. Ama literatürde nazal boşluk, dış ve iç kulak, özofagus, mide, barsak ve komşu organların hasarına bağlı ciddi yaralanmalar ve hatta ölümler bildirilmiştir. Pile bağlı oluşan hasarların negatif sonuçlarını, bulgu ve semptomlarını bilmek, bebeklerde genital, medial femoral, anal ve intergluteal bölgelerde yapışarak gaitanın elektrolitik etkisiyle cilt hasarına yol açabileceğini akılda tutmak önemli olacaktır.

Anahtar Sözcükler: Alkalın pil, bez ülseri, yanık

INTRODUCTION

Small alkaline or lithium-ion batteries, which are commonly referred as watch or button cells, may cause potentially dangerous organ and tissue damage if swallowed.^{1,2} Skin ulceration due to outer contact is a very rare condition. Thus far, only two cases have been reported in the literature.^{3,4} This condition, which is commonly seen in children, may cause damage, particularly in the respiratory and gastrointestinal tracts, as well as the nose, external ear canal, and middle and inner ear.^{2,3,5-8} In this study, we present the case of an 18-month-old male who swallowed a cell, resulting in damage in the medial femoral area after it passed through the entire gastrointestinal system without causing any harm. The baby was wearing a diaper and the battery caused skin necrosis electrolytic effect of stool in this closed setting. To our knowledge, no other such case has been reported in the literature.

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CASE REPORT

An 18-month-old male was brought to the emergency department of Keçiören Training and Research Hospital by his parents because he had swallowed the battery of his toy. No abnormal findings were detected in his initial physical examination. No symptoms indicating tissue damage or organ injury were found. In his direct thoracic and abdominal radiographs we observed that the battery had already passed through the esophagus and was located in the lower gastrointestinal tract (Figure 1).

The patient was discharged after his parents were informed about the signs and symptoms of the possible situations and the necessity of monitoring his diaper to verify that the battery is excreted in stool and advised to bring him for follow-up. The next day, the patient was readmitted to the emergency department because his mother found that the battery was stuck in the reverse position on the medial side of the baby's left thigh and she had seen a wound under the battery. He was immediately referred to our clinic with this complaint.

In our clinic, the baby was actively moving during his physical examination. No signs and symptoms related to the gastrointestinal tract were detected. Tissue damage, which was compatible with the shape of the battery and limited to the

superficial dermis in depth, was observed in the medial femoral area where the anode and cathode of the battery had stuck (Figure 2).

The wound was treated with daily antibiotic ointment dressings. After 15 days, wound healing was accomplished without any functional deficiency (Figure 3). The parents of the patient were informed about the case report and requested to sign the informed consent form.

DISCUSSION

Small alkaline batteries are industrially known as AG 13 (LR-44). Positive and negative poles are in the shape of nested rings and very close to each other. These batteries are usually 11.4 ± 0.2 mm in diameter and 5.2 ± 0.2 mm in thickness and have an average current capacity of 1.5 V and 150 mAh. They include zinc, magnesium oxide, and alkaline structures. Lithium-ion batteries also have properties similar to small alkaline ones.¹⁻⁴ Lithium-ion batteries, particularly large ones, may cause the most serious injuries due to their larger surface area.^{2,5,6} These batteries have a wide range of usage including clocks, control devices, calculators, hearing aids, toys, figurines, flashlights, pointer instruments, and souvenirs.^{1,6} Within the home environment, they are easily found by children while playing and can lead to unintended consequences. Exposure

40

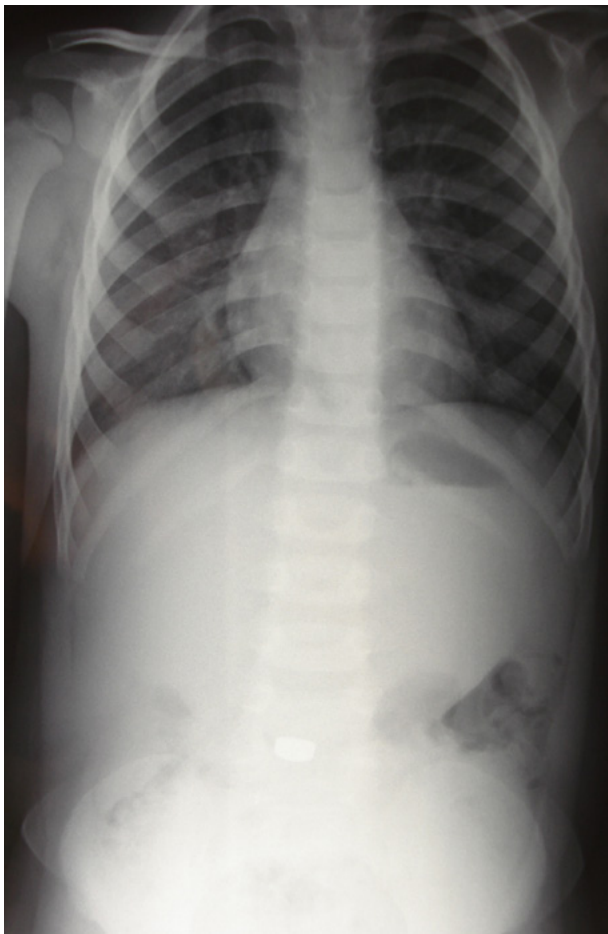


Figure 1. Battery in the gastrointestinal tract



Figure 2. Skin ulceration caused by a small alkaline battery



Figure 3. Scar of the healed wound 15 days after treatment

to the harmful effects of batteries may occur in people of any age; however, the great majority of patients are children, particularly those younger than 6 years.^{1,6}

Swallowing these types of batteries usually does not cause any symptoms or findings, and they are easily excreted with stool. However, serious injuries and even deaths in cases involving the nasal cavities, outer and inner ear, esophagus, stomach, intestines, and neighboring organs have been reported in the literature.^{2,5-8} If these batteries stick to any site after being swallowed, severe burns may occur within 2–2.5 h. Such injuries can result in serious life-threatening conditions. Unfortunately, such cases can be easily overlooked, which may thus result in burns. According to studies, 27% of cases with major complications that may cause severe problems and 54% of those that may be fatal are overlooked.^{2,6,8} To our knowledge, our case is the first reported in the literature in which the battery passed through the entire gastrointestinal system, was excreted without causing any injury, and then resulted in ulceration on the skin due to the electrolytic characteristics of the stool.

CONCLUSION

It is important to acknowledge the negative consequences and signs and symptoms of such conditions and note that the battery may stick to body parts such as genital, medial femoral, anal, and intergluteal areas that remain in the diaper-covered area and may cause skin ulcerations due to the electrolytic characteristics of the stool. It is also important to inform the parents about the necessity of removing the battery from the body as soon as possible.

Informed Consent: Written informed consent was obtained from the patient's parents who participated in this study.

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