

A Case Report of Severe Ocular Injury from a Button Battery

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ABSTRACT

A 3 year-old girl presented to the emergency department at 4:00 h with severe pain in her right eye and a rust coloured, blood stained frothy discharge that had woken her. An examination of her eye revealed a shiny metallic looking foreign body, which was immediately removed by the on-call ophthalmologist. That morning the patient underwent ocular examination under anaesthesia and was found to have severe tissue necrosis resulting from an electrochemical burn. She was treated with daily rodding for 3 days and betamethasone ointment four times a day, which was gradually tapered. At 3 months her only eye pathology was a mild symblepharon between the bulbar and tarsal conjunctiva. This is the first case of delayed symptoms after placement of a button battery into the conjunctival fornix. This case highlights the serious nature of button battery injuries to the eye and the potential to miss the diagnosis owing to a delayed onset of symptoms.

KEYWORDS : OCULAR TRAUMA

Introduction:

Button batteries have become commonplace in many household electronic items ranging from children's toys to hearing aids. They are known to cause significant necrotic injury in the oesophagus, nasal and auditory cavities that can lead to severe morbidity and even mortality from perforation of vital structures.¹⁻¹¹ The National Capital Poison Centre has reported 116 cases to date of non-fatal button battery ingestion with severe oesophageal or airway injury and is a useful information source for both patients and health professionals.¹¹ Local current generation and subsequent hydroxide ion formation is believed to be the main mechanism of tissue necrosis.⁷

Although exploding batteries have been reported to be a source of ocular injury, the extent of injury from intact button batteries is not well understood.¹²⁻¹⁴ The authors present an unusual case of a 2-year-old child who accidentally lodged a button battery from a singing birthday card under her lower eyelid. The child had a delayed presentation to the emergency department as she was relatively asymptomatic for 8 h.

Case report:

A 2-year-old girl presented to the emergency department at 03:00 h with severe pain in her right eye and a rust coloured, blood stained frothy discharge that had woken her from sleep. The previous evening at 18:00 h she had apparently scratched her right eye causing her mild discomfort. Her grandmother, a retired general practitioner, examined her eye and saw nothing unusual; the discomfort settled and she went to bed and slept well until 02:00 h when she awoke with severe eye pain.

On arrival to the emergency department the child's right lower eyelid was swollen and erythematous. Suspecting a foreign body the emergency department doctor instilled proxymethacaine eye drops, which alleviated the pain enough for a brief examination. Deep in the inferior fornix a shiny metallic looking foreign body surrounded by brown rust was seen. Owing to the difficulty of examining a child in severe distress as well as the depth of insertion of the foreign body the emergency staff physicians were unable to remove the foreign body and therefore an urgent on-call ophthalmology review was requested. Facial x-rays showed a button shaped metallic foreign body in the inferior fornix. Further history taking revealed the child had been playing with a singing birthday card the previous afternoon, which was known to contain a button battery. It was concluded the child must have accidentally inserted this button battery under her lower eyelid and rubbing had caused it to become lodged deep in the inferior fornix. The ophthalmologist removed the button battery using a pair of non-toothed forceps guided by palpation of the battery through the skin. The pH of the tear film was found to be approximately 8 and the battery was later identified as a silver oxide type (figure 1).

Figure 1. Photograph of the removed silver oxide battery.



That morning the patient underwent ocular examination under anaesthesia to establish the full extent of the injury resultant from the electrochemical burn (depicted and described in figure 2).

Figure 2 : Photographs during surgery and at 3 months following the incident. Top left, ocular damage from the cathode side of the battery causing erosion through the bulbar conjunctiva and episclera with an avascular looking injury sclera. Top right, tissue damage



On the following day her visual acuity and eye movements were found to be normal. Her right lower eyelid was erythematous and swollen, there was chemosis of the conjunctiva but no signs of infection (figure 3).

Figure 3: Photograph a day after the surgery showing swelling and erythema of the eyelid and inflammation and chemosis of the bulbar conjunctiva.



Investigations

Facial x-rays showed a button shaped metallic foreign body in the inferior fornix.

Treatment

She underwent daily rodding for 3 days and was started on beta-methasone 1% ointment four times a day, which was gradually tapered over 3 months.

Outcome and follow-up

At 3 months her only eye pathology was symblepharon between the bulbar and tarsal conjunctiva (figure 2), which did not restrict her eye movements. She has subsequently been discharged.

Discussion

An electrical current is generated after a contact between the button battery and local tissue that results in the hydrolysis of surrounding fluid and the generation of hydroxide ions; this is believed to be the cause of tissue necrosis. The hydroxide ions accumulate around the cathode and therefore this is the site of most substantial alkali injury, which is clearly illustrated from the rusted appearance in the bottom right photograph of figure 3.7 15–18 Other sources of injury can be direct leakage and mechanical trauma, exemplified during battery explosion injuries.12–14

To the author's knowledge this is the first case in the English literature of ocular injury from a button battery after (non-projectile) placement into the conjunctival fornix. A Japanese case report has described corneal and conjunctival injury within 5 min of contact with a button battery on experimental pig's eyes.¹⁹ Interestingly, in this case the child did not develop serious symptoms until 8 h after the battery had been inserted. Another case report described a 90 min presentation time after ocular injury from a button battery travelling at high velocity in which there was also subsequent alkaline injury.²⁰ The deep positioning of the battery in the inferior fornix away from the sensitive corneal nerves may have accounted for the delayed presentation. Several factors contributed to the severe nature of the ocular injury: the moist mucosa surface of the bulbar and tarsal conjunctiva; the tight close apposition of the battery between these two surfaces; and immersion in the electrolyte rich tear film which helped to establish external electrical currents.

This case demonstrates the need for greater public and professional awareness of the potential dangers that button batteries pose for young children and adults with learning difficulties. When implicated a detailed ocular examination and an urgent removal of the button battery is required, which can be difficult if the patient is distressed. Delay in removal must be avoided as the chemical injury can cause permanent tissue damage within just a few hours. The accompanying oedema makes removal much more difficult with time so early surgical involvement is advised. It is vital that these button batteries are not regarded like other ingested or lodged benign foreign bodies, where removal time is not so crucial. The authors suggest they should be removed as a priority and if general anaesthesia is required starvation times may need to be compromised together with elevated priority on emergency surgical lists.¹

Family practitioners and emergency department physicians should be aware of the variations in clinical presentation of such foreign bodies on the conjunctiva mucosa. In this case report there was a relatively asymptomatic early phase followed by a sudden deterioration resulting in severe local tissue necrosis.

Conclusion:

Tissue necrosis from button batteries leads to severe ocular injury.

Button battery injury to the eye can be potentially missed owing to a delayed onset of symptoms.

Cases of button battery injury require prompt and senior involvement at the earliest stage if permanent damage is to be avoided.

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