

Beware of button batteries! A potential hazard for young children

Small, flat, round button batteries are invading our homes and yet few people are really aware of the risk of accidents associated with their ingestion. They are found in numerous everyday objects: in addition to toys, they can be found in remote controls, car keys, thermometers, hearing aids, kitchen scales, light pens, musical greeting cards, bathroom scales, etc.

Young children are very attracted to these small, round, shiny objects and like to put them in their mouths. As well as being in the various objects already mentioned, children can also come across these batteries on their own (left within reach, just purchased and still in the packaging, in containers for used batteries, etc.)

Like any other foreign body, if a child puts one of these batteries in their mouth, it can be inhaled, entering the airways and causing coughing or even respiratory distress, which always requires urgent treatment. But these batteries can also be swallowed and become stuck in the oesophagus or even in the stomach.

However, unlike coins, to which they are often wrongly compared, these button batteries are not inert objects. When they come into contact with a moist mucous membrane, they can cause potentially deep chemical burns. This is because they deliver an electric current responsible for hydrolysis, which then produces highly alkaline hydroxide ions leading to internal damage. Thus, regardless of the route of penetration (children can also put them in their nose or ears), these batteries can lead to deep burns related, among other factors, to the battery's size, charge and voltage, and to its contact time with the mucous membrane.

If the battery gets stuck in the oesophagus, there is a very high risk of complications, mainly because the oesophagus is close to the airways and the large vessels (particularly the arteries and aorta). Oesophageal burns can therefore lead to perforation of adjacent structures and result in respiratory distress, or sudden massive haemorrhage leading to the child's death [1].

A young child can ingest a button battery without the parents' knowledge, and this is an alarming situation. Indeed, if the battery is lodged in the oesophagus, the child may initially remain asymptomatic and then present very unspecific symptoms that are often not of great concern, such as fever and anorexia, which are common to many other disorders (particularly infectious digestive diseases) and do not point to a diagnosis of button battery ingestion. It is usually only when a late complication has already become serious that the diagnosis is made.

This is why, even if ingestion is only suspected (there is no room for doubt), the child should be given an urgent X-ray to locate the battery and, if one is found to be trapped, it should be removed immediately by emergency oesophageal duodenoscopy. The French Society of Clinical Toxicology recently published an opinion on the initial management of calls about suspected button battery ingestion by young children [2].

International and French poison control centres (PCCs) have already addressed this issue, and numerous articles have appeared in the international literature. For example, in 2017, French PCCs published a retrospective observational study based on cases registered in the PCCs' information system (SICAP) between 1 January 1999 and 30 June 2015 [3]. In this study, 4,030 cases were found, including 21 severe cases, and two deaths were observed. In both fatal cases, the button battery had become lodged in the oesophagus. Both deaths occurred even though the battery had either been passed spontaneously in the stool (death 19 days after spontaneous expulsion of the battery) or removed by fibroscopy (death 10 days after battery removal).

Following this study, the PCCs suggested conducting a prospective study (Pilboutox® study¹) to describe cases of exposure to button batteries more precisely.

1. Study design available at <https://clinicaltrials.gov/ct2/show/NCT03708250?term=pilboutox&rank=1>

This study was conducted between 1 June 2016 and 31 May 2018: it included any exposure to a button battery that had led to a call to a PCC. The parameters studied were age, route of exposure, symptoms, abnormalities observed on initial fibroscopy, severity according to the Poisoning Severity Score (PSS²) and characteristics of the battery involved. Five hundred and nine cases were reported, of which 465 (91%) were by ingestion

Subjects were aged between 3 months and 96 years; 375 children (74%) were under 6 years of age. Nine cases (2%) of high severity (PSS3) were observed and four deaths, all ages combined (including two in children under 3 years of age). The detailed results of this study are currently being analysed, but a preliminary review of the results confirmed the characteristics already described in other studies, in particular, severity related to the young age of the child and to a battery diameter greater than 15 mm.

Although the complications related to button battery ingestion by children are well documented, few studies have analysed the time that passes before treatment, the early clinical signs, with a view to the creation of a specific care system for these poisonings.

The expected results of the Pilbutox[®] study should shed new light on certain aspects of this medical management.

Lastly, in conjunction with the industrial federations concerned, ANSES, experts from the PCCs and the Necker Hospital (Paris), the Ministry of Health and the Ministry of the Economy have taken joint action to:

- alert the general population, healthcare professionals and early childhood professionals to the risk of ingesting button batteries through the distribution of an information sheet (https://solidarites-sante.gouv.fr/IMG/pdf/infographie_piles_bouton.pdf);
- work with industry federations to obtain voluntary commitments from them to improve the safety of their products or the information provided to consumers.

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References

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- [3] Labadie M, O'Mahony E, Capaldo L, Courtois A, Lamireau T, Nisse P, et al. Severity of button batteries ingestions: data from French Poison Control Centres between 1999 and 2015. *Eur J Emerg Med Off J Eur Soc Emerg Med*. 13 Dec 2017

2. <https://www.who.int/ipcs/poisons/pss.pdf>