Diagnosis, Management, and Prevention of Button Battery Ingestion in Childhood: A European Society for Paediatric Gastroenterology Hepatology and Nutrition Position Paper

*Amani Mubarak, †Marc A. Benninga, ‡Ilse Broekaert, §Jernej Dolinsek, ||Matjaz Homan, ¶Emmanuel Mas, #Erasmo Miele, **Corina Pienar, ††Nikhil Thapar, §§Mike Thomson, ‡‡Christos Tzivinikos, and Lissy de Ridder

What Is Known

- Button battery ingestions pose a huge health risk for the pediatric population potentially leading to severe morbidity and even mortality.
- Esophageal battery impaction has the highest risk of complications, especially in children <6 years of age and in batteries >20 mm in diameter.
- Prevention strategies include raising public awareness, cooperation with industry to develop safer battery compartments in products, and negotiations with authorities on legislative issues to minimize the risk of ingestion.

What Is New

- The European Society for Paediatric Gastroenterology Hepatology and Nutrition task force for button battery ingestions aims to prevent morbidity and mortality because of button battery injuries.
- The first European position paper with clinical guidance has been developed and discusses controversial topics regarding diagnosis and management of button battery ingestions.

ABSTRACT

Button batteries (BB) remain a health hazard to children as ingestion might lead to life-threatening complications, especially if the battery is impacted in the esophagus. Worldwide initiatives have been set up in order to prevent and also timely diagnose and manage BB ingestions. A European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) task force for BB ingestions has been founded, which aimed to contribute to reducing the health risks related to this event. It is important to focus on the European setting, next to other worldwide initiatives, to develop and implement effective management strategies. As one of the first initiatives of the ESPGHAN task force, this ESPGHAN position paper has been written. The literature is summarized, and prevention strategies are discussed focusing on some controversial topics. An algorithm for the diagnosis and management of BB ingestions is presented and compared to previous guidelines (NASPghan, National Poison Center). In agreement with earlier guidelines, immediate localization of the BB is important and in case of esophageal impaction, the BB should be removed instantly (preferably <2 hours). Honey and sucralate can be considered in ingestions ≤12 hours while waiting for endoscopic removal but should not delay it. In case of delayed diagnosis (first confirmation of the BB on X-ray >12 hours after ingestion or time point of removal >12 hours after ingestion) and esophageal impaction the guideline suggests to perform a CT scan in order to evaluate for vascular injury before removing the battery. In delayed diagnosis, even if the battery has passed the esophagus, endoscopy to screen for esophageal damage and a CT scan to rule out vascular injury should be considered even in asymptomatic children. In asymptomatic patients with early diagnosis (<12 hours after ingestion) and position of the BB beyond the esophagus, one can monitor with repeat X-ray (if not already evacuated in stool) in 7 to 14 days, which is different from previous guidelines where repeat X-ray and removal is recommended after 2–4 days and is also based on age. Finally, prevention strategies are discussed in this paper.

Key Words: caustic ingestion, endoscopy, esophageal perforation, foreign body, pediatric (JPGN 2021;73: 129–136)

Received July 24, 2020; accepted December 19, 2020.

From the *Department of Pediatric Gastroenterology, University Medical Center Utrecht, Utrecht, the Emma Children’s Hospital, Amsterdam University Medical Center, Amsterdam, The Netherlands, the †Department of Paediatrics, Faculty of Medicine and University Hospital Cologne, University of Cologne, Cologne, Germany, the ‡Paediatric Gastroenterology, Hepatology and Nutrition Unit, Department of Paediatrics, LMC Maribor, the §Department of Gastroenterology, Hepatology, and Nutrition, Faculty of Medicine, University Children’s Hospital, University of Ljubljana, Ljubljana, Slovenia, the ¶Unité de Gastroentérologie, Hépatologie, Nutrition et Maladies Hériditaires du Métabolisme, Hôpital des Enfants, CHU de Toulouse, F-31300, France et IRSID, Université de Toulouse, INSERM, INRA, ENVT, UPS, Toulouse, France, the **Department of Translational Medical Science, Section of Paediatrics, University of Naples “Federico II”; Naples, Italy, the ††Victor Babes University of Medicine and Pharmacy, Timisoara, Romania, the ‡‡Department of Paediatric Gastroenterology, Great Ormond Street Hospital, London, United Kingdom, the ‡‡Department of Gastroenterology, Hepatology and Liver Transplant, Queensland Children’s Hospital, Brisbane, Australia, the §§Centre for Paediatric Gastroenterology and International Academy of Paediatric Endoscopy Training, Sheffield Children’s Hospital, Sheffield, United Kingdom, the ‡‡‡Department of Pediatric Gastroenterology, Al Jalila Children’s Specialty Hospital, Dubai, United Arab Emirates, and the Lissy de Ridder, ESPGHAN, NASPGHAN. All rights reserved.
illuminative case, http://links.lww.com/MPG/C191) (3). The European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) task force for BB ingestions was founded as an ongoing initiative of pediatric gastroenterologists to prevent morbidity and mortality because of such ingestions. This is through raising public awareness and developing prevention strategies with the industry in the first place, and secondly by aiming for better diagnoses and treatment. By having such a task force in Europe, we will be able to do so more effectively as we will be able to use a more localized approach. Part of the strategy is also developing the first European clinical algorithm for the diagnosis and management of BB ingestions, which we do in this article. Although there are already American guidelines (NASPGHAN and the National Poison Center), some topics are still subject to debate and are discussed in more detail, such as what to do with a BB that has already passed the esophagus in asymptomatic cases and whether honey or sucralfate should be used as a mitigation strategy post-ingestion. In this article, the ESPGHAN’s view on these topics is discussed in more detail.

METHODS
A systematic search of the literature was performed to identify publications relevant to the aims of this position paper. We performed a search with the following terms: ((coin AND cell) OR button) AND battery AND (ingestion OR consumption). We included randomized controlled trials, cohort studies, cross-sectional studies, clinical trials, epidemiological studies, systematic reviews, meta-analyses, and consensus statements/guidelines published in English up to May 2020. No limitation in the search period was made. We focused on epidemiology, pathophysiology and complications, diagnostics and treatment (clinical presentations, imaging, endoscopy, surgery), follow-up, prevention, and public awareness and formulated clinical recommendations based on the literature.

Epidemiology
BB are found in many household electronics, hearing aids, and toys. Changes in manufacturing over the years have led to larger and more powerful batteries. This has not only increased the risk of esophageal battery impaction but escalated the risk of developing severe complications even more (1–4). According to recent data, there was a 7-fold increase in the relative risk of severe morbidity because of BB ingestion in the last 2 decades (4). Of all children worldwide presenting with foreign body ingestion, the percentage of children with battery ingestion is estimated to be as high as ~7% to 25% (5–8). Most battery ingestions occur in children <6 years of age with a peak at 1 year of age, which is also the age with the highest risk of complications (1,3). Illustratively, according to the US National Poison Center, there were 3467 BB ingestions (10.46 per million) in that country alone in calendar year 2019 including 53% in children <6 years of age, 1.5% who experienced severe complications, and 3 who have died (21). Less is known about European ingestions but these have been described in case reports and series (9,14).

Pathophysiology and Complications
Several theories have been hypothesized regarding the mechanism of injury in BB ingestions. Local pressure necrosis, corrosive damage from leakage of battery content, heavy metal toxicity, and electric injury all seem to play a role (3). It is, however, the electrolysis that seems to be the most significant mechanism. In case, a battery contacts the esophageal tissue, a current is created with the human tissue being the connector of the circuit around the 2 battery poles. This leads to hydroxide ion formation at the negative pole, which in turn rapidly leads to pH rise causing tissue liquefaction and necrosis, comparable with damage occurring in the esophagus after alkaline liquid ingestion (10–12). Transmural esophageal wall damage may occur leading to fistulization of both the esophageal wall and surrounding tissues (such as trachea, aorta or subclavian artery) leading to several life-threatening complications. Unfortunately, severe damage can occur within 2 hours after becoming lodged in the tissue (1.2). Possible complications after battery ingestions are listed in Table 1. A recent review by Varga et al described 136,191 cases (31 publications, age range 4 months to 19 years) with battery ingestions (alkaline batteries 43.5%, zinc-air batteries 33%, silver oxide batteries 13.6%, lithium batteries 9.7%) in the respiratory and gastrointestinal tract and estimated the risk of complications to be 0.165% with a lethality of 0.04% (61 cases) (3). This may sound low, nevertheless it should be emphasized that these preventable complications usually occur in otherwise healthy children. Fatal outcomes were because of massive hemorrhage because of fistula formation to the great vessels (aortoesophageal fistula, right subclavian artery-esophageal fistula, esophageal-inferior thyroid arteries, and veins in 44.3%) or suffocation secondary to blood aspiration and bronchopneumonia (11.4%). In the other cases (44.3%), the cause of death was unknown. Therefore, battery ingestions should be considered an important hazard to the pediatric population. In addition to impaction of the battery in the esophagus, other factors increase the risk of complications. For instance, injuries are most commonly seen in batteries >20 mm in diameter and in children <6 years of age; this is because the batteries are relatively large in relation to the size of the esophagus and because they have a higher voltage compared with the smaller batteries (3,13). Logically, voltage and duration of the impaction are associated with more rapid and severe injury, although it is important to realize that even used or old batteries can retain sufficient residual voltage to cause tissue damage. Finally, the site of lodgement and adjacent tissue are predictive of complications. Batteries in the esophagus are typically the most problematic, probably because of the alkaline environment and increased risk of lodgment of foreign bodies in the esophagus, compared with the rest of the gastrointestinal tract. Moreover, because of the anatomical position and close contact with the respiratory tract and the major vessels, fistulization of the esophagus can be fatal (Fig. 1). Various published case series have indicated that the location and orientation of the BB (negative
Extremely narrow 2-hour time window to remove BB impacted in the esophagus. Illustratively, most complications occur after un witnessed ingestions leading to delayed diagnosis, as symptoms are variable and nonspecific (13). Moreover, presenting symptoms differ according to the impaction site (2,14,22). Most witnessed ingestions present with acute gastrointestinal or respiratory symptoms, such as vomiting, drooling, dysphagia, odynophagia, irritability, coughing, stridor, and shortness of breath (2,14,22).

In un witnessed ingestions, patients usually present when complications have already occurred, which can take a couple of hours to days (and even weeks). They usually present with hematemesis or hemoptysis, melena, abdominal pain, weight loss, chest pain, cough, stridor, hoarseness, sore throat, decreased range of motion of the neck, and fever. Patients may even present with an acute hemorrhage (2,14,22). Hence, it is of great importance to include foreign body aspiration/ingestion in the differential diagnosis of those cases even if the event was not witnessed.

### Imaging

Two-view (anterior-posterior and lateral) X-ray is paramount to diagnose BB ingestion and confirm its location. It is important that the X-ray includes the entire neck, chest, and abdomen to avoid missing a BB. In addition, close inspection of the image is necessary to identify a double ring or halo sign (Fig. 3), which can distinguish a battery from a coin, and to determine the position of the negative side of the battery, which is the step-off side on the lateral film. One should be, however, aware that in the slimmer batteries, the ring or halo may not be seen (2). Finally, in a recent study using the density of a disc shaped object to distinguish a coin from a battery was not successful (23).

Contrast studies with CT scanning (or MRI scanning after battery removal) are necessary to identify complications, such as mediastinitis, fistulas, and spondylodiscitis. Therefore, if patients have severe symptoms (at presentation or later on) indicative of possible complications (hemorrhage, hemodynamic problems, fever, respiratory symptoms, severe back pain, etc), in case of mucosal injury identified during endoscopy, it is advised to perform (serial) CT/MRI scans of the chest and neck. In delayed diagnosis of an esophageal impaction (first confirmation of the BB on X-ray more than 12 hours after ingestion or time point of removal >12 hours after ingestion) regardless of symptoms (serial) CT/MRI scans of the chest and neck should also be considered as the BB may have been lodged in the esophagus previously. In some cases, a CT scan should even be done before endoscopy or endoscopic removal of the battery (see below). Note that MRI scans should never be performed before removal of a battery.

### Endoscopy and Surgery

#### Esophageal and Airway Impaction

When the battery is located in the esophagus, immediate endoscopic removal is necessary, if possible within 2 hours of ingestion. Endoscopy should not be delayed even if the patient has eaten. This procedure should be performed under general anesthesia, after intubation of the patient thereby guaranteeing the airway. During endoscopy, the mucosa should be inspected for extent, depth and location of the injury and the direction of the negative pole (side without the “+” sign and without the imprint) should be determined, as this is commonly the most damaged site. In case of significant mucosal damage, a nasogastric tube should be carefully placed endoscopically to maintain patency of the lumen and the patient should not receive any food by mouth until it is certain that no perforation or other complications have occurred (see follow-up section). In case of severe mucosal injury, delayed
diagnosis or severe symptoms indicative of complications (such as bleeding), the (cardiothoracic) surgeon should be consulted and further imaging (CT-scan) should be performed even before the removal, as moving the battery might lead to acute perforation or hemorrhage through a fistula. In these cases, a joint approach with (cardiothoracic) surgeons and a cardiac catheter lab may be necessary. Endoscopic removal of the foreign body in the cardiac catheterization laboratory operation room with fluoroscopic guidance and arteriogram of the aorta allows direct visualization of the BB and its proximity to the aorta.

If the ingested battery is located in the airway or in the gastrointestinal tract above the clavicles, an Ear, Nose and Throat (ENT) doctor should be consulted to remove objects from the (upper) airways or upper part of the esophagus by rigid endoscopy (16). Sometimes, it is necessary to perform the endoscopic procedures in collaboration (pediatric gastroenterologist and ENT doctor).

**Location Beyond the Esophagus**

Once the BB passed the esophagus almost three-quarters of ingested batteries pass spontaneously within 4 days (24). According to the NASPGHAN guideline, removal is, therefore, advised if a BB is still in the stomach after 2 to 4 days (30). As virtually all (99.9%) batteries will, however, still pass within 7 to 14 days while rarely causing complications, in this guideline we suggest a different approach in order to prevent (unnecessary) endoscopies (24). Therefore, based on this evidence, we recommend that once the BB has passed the esophagus, asymptomatic cases should be followed-up after 7 to 14 days with an X-ray to confirm passage unless the battery has been noticed in the stools by the parents (parents should be instructed to check all stools) (3,24). Only if the battery still has not passed the stomach by 7 to 14 days, endoscopic removal is necessary as by then the chance that it will pass spontaneously is expected to be minimal. The same advise goes for symptomatic patients with a battery located in the stomach, although the risk of complications in these patients is still low.

In case, a battery is lodged in the small intestine and causes symptoms or does not pass spontaneously, surgical evaluation and removal is necessary, which fortunately is rarely needed. Once in the colon, a battery will almost always pass without intervention. Nevertheless, it should be noted that the presence of a BB in the stomach or beyond does not exclude esophageal injury, especially in unwitnessed ingestions when the total time of BB exposure is unknown. BBs can transiently lodge in the esophagus and cause severe erosion and ongoing injury. Even after passage of the battery into the stomach or beyond, necrosis of the esophagus and surrounding tissues is an ongoing process that can lead to fistulization and associated severe outcome. In fact, fatalities in children where
the battery was initially discovered in the stomach have been reported (21). In these cases, the cause of death was indeed likely because of esophageal injury that occurred from the BB transit. In addition, gastric necrosis of uncertain clinical significance has also been reported by BB within the stomach in asymptomatic children (25–28). Likewise, a recent multicenter retrospective cohort study of 68 patients with BB in the stomach has shown that after adjusting for age and symptoms, the likelihood of visualizing gastric damage among patients who had BBs removed after 12 hours post ingestion was 4.5 times higher compared with those with BB removal within 12 hours of ingestion. The clinical relevance of this, however, seems low as data show that arrested battery progression did not lead to adverse outcomes (24,29).

So presence of a BB in the stomach is most likely not permanently harmful to the stomach itself but in specific circumstances (unwitnessed ingestion, delayed diagnosis (>12 hours after ingestion), symptomatic child), emergency endoscopy may still be indicated (to exclude esophageal damage). Another indication for endoscopic removal in the stomach is the co-ingestion of a magnet as this may lead to entrapment of the stomach or intestinal wall between the battery and the magnet causing necrosis. If a battery and magnet have already passed the stomach, consultation of a surgeon is necessary; the patient should be either monitored closely or the battery and magnet should be removed surgically.

Our recommendations to remove gastric BBs in symptomatic cases, in patients with unwitnessed ingestion or delayed diagnosis (>12 hours after ingestion) and in case of a magnet co-ingestion are only slightly different from the recent recommendation of The National Button Battery Task Force (BBTF) (30). They recommend that in asymptomatic cases with BBs in the stomach, outpatient observation may be considered in case-to-case basis only if the patient is asymptomatic, has no history of prior esophageal disease, no co-ingestion with magnet and if reliable follow-up is possible. In other cases, a BB in the stomach should be removed (30). At present, there is not enough evidence to make stronger recommendations, and larger prospective studies are needed to assess and stratify the risk for BB in the stomach.

Finally, in otherwise healthy children (especially toddlers) with acute onset of hematemesis, a high index of suspicion for battery ingestion should be maintained and diagnostics should be performed to expose the battery.

**pH Neutralization Strategies to Mitigate Injury Progression After Ingestion**

There are several reasons why timely removal of the battery may not be possible. For example, people living far from hospitals may not reach the hospital in time or the anesthetist may be

**FIGURE 2.** Diagnostic algorithm for button battery ingestions.
unavailable because of another emergency intervention. Even in a large urban setting, parents will often present to a health facility without pediatric endoscopy available and as a result precious or crucial time can be lost. In such cases, early and frequent ingestion of honey, and if available, sucralfate in the clinical setting may have the potential to reduce injury severity and improve patient outcomes (31). It is, however, important to realize that available data are based on promising in-vitro and in-vivo studies of piglets while human studies are still lacking. The mechanism of action is thought to be not only coating of the battery and thereby limiting electrolysis but also neutralization of generated hydroxide as both honey and sucralfate are weak acids. Esophageal perforation is less likely in the first 12 hours after ingestion but this period does contain the peak of electrolysis activity and battery damage (32). Therefore, giving honey and/or sucralfate (1 g/10 mL suspension) might be considered within this time span. The advised dose for both is 10 mL (2 teaspoons) every 10 minutes with a maximum of 6 doses of honey and 3 doses of sucralfate, respectively (21,31).

One should be cautious in case of a delayed diagnosis, clinical suspicion of perforation, mediastinitis, sepsis, swallowing difficulties, allergies to honey or sucralfate, and in children <1 year of age because of the small risk for infant botulism with honey intake (21). Moreover, administration of honey or sucralfate should never be the reason to delay endoscopy removal, which is always the most important intervention. Parents calling the emergency room may be, however, advised to directly start giving honey if the history is strongly suggestive of BB ingestion and no signs of perforation are present.

Another mitigation strategy is neutralization of accumulated tissue hydroxide through acetic acid irrigation immediately following battery removal and may be considered an option (21). This can be done with 50 to 150 mL 0.25% sterile acetic acid and should only be considered if signs of perforation are absent (21,32–36). Again, it is important to note that this recommendation is based on a study in piglet esophagus preparations and a very small study in children (n = 6) (33,35).

Anesthetists in every center should be aware of these pre-endoscopic removal strategies and get involved in the formulation of agreed protocols in an effort to avoid unnecessary delays in procedures. The entire specialty needs to be aware of the supporting data on general peri-operative considerations for management and potential complications of BB ingestion (34,37).

Postremoval Evaluation and Management and Follow-up

All patients with mucosal injury after battery removal should be admitted to the hospital and monitored closely. In these patients, a second look within 2 to 4 days after removal may be considered, as this could provide useful prognostic information (38). A clear liquid diet may be started if there are no signs of perforation on esophagogram. The esophagogram can be performed 1 to 2 days after removal (21). In complicated cases, this period should be extended until the patient is stabilized. When a clear liquid diet is tolerated, the diet can progress to soft foods. Depending on the severity of the injury, this may be considered to be continued up to for 4 weeks in order to avoid mechanical injury. Broad-spectrum antibiotics to prevent mediastinitis should be considered in patients with severe injury, perforation, and/or fever. As described above, (serial) MRI and CT scans are necessary to detect complications in patients with significant injury and/or delayed removal.

Long-term follow-up after removal depends on the presence and extent of esophageal injury. In case of injury, contrast esophagograms and/or repeat endoscopies are necessary to detect stricture formation, which can occur weeks after the incident. Early dilatation of a stricture will lead to better swallowing function; however, one should wait 4 weeks postingestion for the tissue to be healed (2). Studies on long-term follow-up are scarce and are encouraged. Exhaustive discharge instructions need to be provided outlining the signs and symptoms of upper gastro-intestinal bleeding. Use of acid blockade to minimize the impact of acid reflux on the esophageal injury has not been studied but seems well justified in cases of mucosal injury.

Prevention

As mentioned before, BB ingestions may cause severe morbidity and even mortality, and prevention is of extreme importance. According to Litovitz et al (12), in around 60% of cases, batteries are directly taken from an electrical device by the child himself whereas around 30% of the children ingest loose batteries. In approximately 10% of cases, the batteries were obtained from the packaging. In fact, Lahmar et al (39) calculated that almost 70% of the ingestions can be prevented with screw-secured compartments and individual blisters for batteries. Therefore, securing the battery compartment of the product is the most important intervention to prevent battery ingestion. For this, it is essential to collaborate with industry to ensure a clear understanding of the hazards that come with poorly secured products (40). Making the battery less attractive for children could be an option. With this perspective, a new bitter coating has been developed by the industry, but of course we do not know yet whether this will truly decrease ingestions (41). Regulatory agencies could also play a role by re-evaluating current battery legislation by implementing national strategies for improving the
safety of button batteries, such as those by the Australian Competition and Consumer Commission (42). Additionally, raising public awareness making parents and caregivers aware of the dangers of battery ingestion is essential as this could increase their cautiousness with products containing batteries and seek early medical attention when an ingestion has occurred. To raise public awareness, involvement of the industry, media, schools, family doctors, and pediatricians (through National Pediatric Societies) is also very important. Finally, it is important that professionals are aware of the diagnostic and management approach when a child presents with a battery ingestion. This could be done by giving more attention to this subject in medical school, postgraduate pediatric, emergency, and family medicine training. In addition, BB flyers in local languages can be prepared by experts and distributed to the professionals, educators, parents, and so forth. As ESPGHAN task force for battery ingestions, we aim at contributing to all these factors, which are paramount for the prevention of BB ingestion. As a first step, the task force will aim to organize symposiums during several (medical) conferences, set up a European registry collecting data on BB ingestions and set up media campaigns throughout Europe.

Conclusions and Recommendations

On the basis of the available data, the ESPGHAN task force for BB ingestions concludes that:

1. Presence of a BB in the esophagus is considered to be a medical emergency and endoscopic removal is necessary as soon as possible (<2 hours).
2. Mitigation strategies with honey and sucralfate can be considered in specific cases while waiting for endoscopy, but should not delay it.
3. Imaging (CT scan) is important to uncover vascular injury and should be performed in case of delayed (>12 hours after ingestion) diagnosis/removal (before removal) or if severe mucosal damage is seen during endoscopy.
4. Removal of gastric BB is necessary in symptomatic cases, in case of co-ingestion with a magnet or in delayed diagnosis.

The ESPGHAN task force for BB ingestions recommends further research on:

1. Avoidance of the risk of mucosal injury in case of a battery ingestion, for example, changes in battery design and technology.
2. Immediate ingestion of mitigating substances, such as honey.
4. Follow-up after battery ingestion.
5. Evaluating current guidelines in clinical practise.

SUMMARY

Children with BB ingestion commonly present in the emergency department. Such cases are considered highly emergent as mucosal damage can occur within 2 hours if the battery is impacted in the esophagus necessitating urgent endoscopic removal. Children may, however, present with nonspecific respiratory or gastrointestinal symptoms where the ingestion has not been witnessed. Therefore, including battery ingestions in the differential diagnosis of unexplained symptoms is paramount to avoid delaying the diagnosis and increasing the risk of severe complications and even death. The first step after suspected battery ingestion is to stabilize the patient and to perform X-ray studies to localize the battery. If still present in the esophagus or located in the stomach in a symptomatic patient, immediate endoscopic removal is necessary. When located in the airway or above the clavicles, the ENT doctor should be consulted. In asymptomatic cases with location of the battery in the stomach or in the small intestine or colon, patients can be followed up with X-ray 7 to 14 days after ingestion. It is important to keep in mind that delayed diagnosis or removal may be associated with more life-threatening complications. In these cases, it is necessary to perform additional imaging (CT scan with contrast) and to consult the surgeon before endoscopy. When a battery is removed, it is also important to follow-up the patient for the development of complications, such as esophageal strictures.

Finally, it is of great importance to develop different prevention strategies along with the industry and regulatory agencies. The ESPGHAN task force for BB ingestions aims at playing an important and ongoing role in these prevention plans.

REFERENCES


