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NEED OF PROTOCOL, EARLIEST REMOVAL AND PREVENTION OF COMPLICATIONS IN FOREIGN BODY BUTTON BATTERY ESOPHAGUS- OUR EXPERIENCE.

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ABSTRACT Foreign body ingestion is a common occurrence in paediatric population, especially in children less than 5 years old, their inherent nature make them ingest many types of objects. Lithium batteries, also known as button batteries (BBs), ingestion is on the rise because of their common use in household products and toys placing children at a risk of serious injury and even death. In this study we emphasise on the importance of early presentation, early diagnosis and early intervention to reduce mortality and morbidity due to BBs ingestion. The study was conducted in tertiary care centre in the Department of Otorhinolaryngology at M.G.M. Medical college and MYH hospital Indore (M.P),India. A retrospective as well as prospective analysis of 77 patients upto 8 years of age was done in between 2006 to 2019. History,examination and radiological evaluation was done. The BBs were extracted under general anaesthesia using rigid esophagoscopy. 47(61%) out of 77 patients were male and 29(39%) were female, majority of 1-2 years(25.97%) of age. 70(90.90%) of the foreign body batteries got impacted in the cricopharynx. 1 patient had complication and died post operatively. BBs ingestion are potentially life-threatening and can lead to fatal injuries. Early detection is the key to the management. There should be public awareness and education to parents about the serious and life threatening hazards of BBs.

KEYWORDS : button batteries (BBs); lithium battery; esophagus; halo sign; contour sign.

Introduction

Foreign body ingestion is a common occurrence in the paediatric population, especially in children less than 5 years old.[1][2] The natural curiosity of children leads them to ingest many types of non-edible objects. The clinical challenge is to predict which foreign bodies need removal because of risk for serious complications or a low likelihood of spontaneous passage. Lithium batteries, also known as button batteries (BBs) are a great threat as the incidence of their ingestion is on the rise because of their increasingly common use in household products like watches, toys, calculators. Younger children, usually below 5 years old, have a narrow esophageal diameter, enabling the largest 20-mm lithium battery to easily become lodged. Smaller-diameter BBs (15 mm) may pass without incidence because they migrate through the gastrointestinal (GI) tract more readily.[1] There are over 3000 ingestions of BBs per year, placing children at a risk of serious injury and even death.[3] In this study we emphasise on the importance of early presentation, early diagnosis and early intervention to reduce mortality and morbidity due to BBs ingestion and our experience with the patients coming to the hospital with foreign body BBs ingestion.

Materials and methods

The study was conducted in a tertiary care centre in the Department of Otorhinolaryngology and Head Neck Surgery at M.G.M. Medical college and associated MYH hospital, Indore (M.P.)India. A retrospective as well as prospective analysis of cases of foreign body button battery cells ingestion was done in patients admitted in the Department of Otorhinolaryngology and Head Neck Surgery at M.G.M. Medical college and associated MYH hospital Indore(M.P.)India in between 2006 to June 2019. 76 patients upto 8 years of age with suspected or known ingestion of battery foreign bodies were included in the study. Patients with ingestion of foreign bodies other than BBs were excluded. Patient's records were reviewed for demographics, clinical presentations, duration of foreign body impaction. The diagnostic protocol included a thorough history, examination and appropriate radiological evaluation. Patient's parents were advised not to induce vomiting[4] as it rarely expels the battery and can cause further damage and death by aspiration. Clinical presentation of foreign body BB ingestion depends on the duration of impaction.[5] Symptoms include, sudden onset of crying or fussiness; drooling or excessive secretions; decrease in eating and drinking; reluctance to swallow; hoarse voice, stridor, or respiratory compromise; chest pain; abdominal pain or vomiting; and fever. Symptoms may mimic those of a viral or respiratory infection as in several reports of missed foreign body diagnosis where children were treated for suspicion of upper respiratory infections for as long as 12 days before the identification of lithium battery ingestion.[6] After history and clinical examination, radiological assessment was done with X-ray chest both anteroposterior(AP) and lateral view to help differentiate the ubiquitous coin ingestions from button battery. It is distinguishable from coin by a double rim- "radiolucent halo" as well as double contour appearance[7] on AP view.[1] The patient is strictly advised nil by mouth(NBM) from the time of presentation. Informed written high risk consent was obtained from the parents. The BBs were extracted under general anaesthesia by rigid esophagoscopy and a Ryles tube(RT) of appropriate size was secured and advised nil by mouth and kept on total parenteral nutrition(TPN)[8]. RT feed for a variable amount of time ranging from 1-10 days depending on the degree of injury and the risk of complications was started. Antibiotics and anti-inflammatory drugs were given as a 7-day course and steroids were withheld[9].

Post-operative surveillance is important as injury to esophagus and surrounding vital structures can continue for days to weeks even after battery removal because of residual alkali or weakened tissues. Parents are explained red flag signs and symptoms to watch for in the post-operative period like: vomiting blood(bright red or specks of black/dark red), melena, cough, fever, chest pain. This may help in earlier diagnosis of complications and early intervention. Discharge criteria for patients after BB removal is generally based on tolerance of oral feeds.

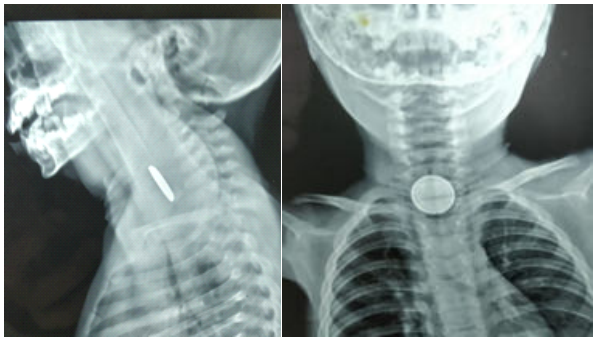


Figure-1 Xray lateral and anteroposterior(AP) view showing a radio-opaque foreign body with double halo sign.

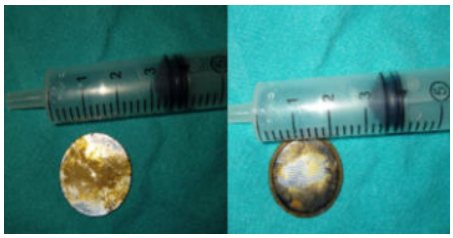
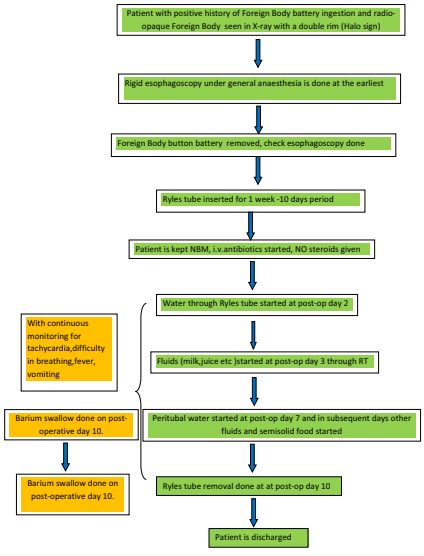


Figure-2 Leaked Foreign body button battery removed.

Algorithm for the management of foreign body-Button Battery(BB) ingestion-

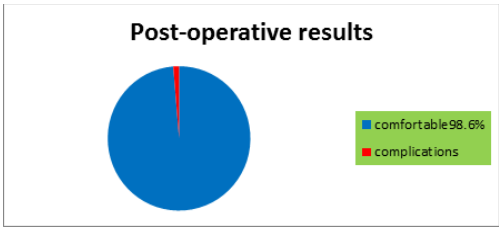


Results

In our study out of total 77 patients with foreign body battery ingestion 7(9.09%)children were <=1 year of age; 20(25.97%) patients were in the age group of 1-2years;7(9.09%) children of 2-3years of age; 15(19.48%) in the age group of 3-4years;19(24.68%) children between 4-5 years of age and 9(11.69%) patients were above 5 years. 47(61%) children were male and 29(39%) were female.

Our study reported 51(66%) Foreign Body battery ingestion patients were from rural areas and 26(34%) patients from urban population. Only 8(10.4%) patients out of 77 presented within 2 hours of foreign body battery ingestion all other patients showed delayed presentation, 12(15.6%) children presented in 2-8hours; 39(50.7%) patients reported in 8-24 hours and 18(23.4%) patients presented after 24hours. 65(84.42%) patient's attendant either parents or siblings witnessed foreign body ingestion; 50(64.94%) children had complaint of vomiting; 58(70.32%) had Foreign Body sensation in throat and 62(80.52%) had complaint of dysphagia.

70(90.90%) of the foreign Body batteries got impacted in the cricopharynx; 4(5.2%) in the upper esophagus, 2(2.6%) in the mid esophagus and 1(1.3%) in the lower esophagus. Rigid esophagoscopy was done and foreign body battery removed under general anaesthesia and check esophagoscopy was done. 76(98.70%) patients were comfortable post operatively and 1(1.3 %) out of 77 patients went in respiratory distress and died post operatively(graph-1).



Graph 1- Post-operative results

Discussion

The BB is a single cell and is used to power toys, hearing aids, digital watches, etc. Of young children who ingested BB- the 20-mm lithium cell, 37.3% were from remote controls.[10] Although these cells are sealed, they contain toxic chemicals. Lodgement of BB in the oesophagus can lead to mucosal damage. Discharged cells are less liable to leak or cause tissue injury, when undischarged cells are swallowed the electric current produced by the battery causes a rise in the PH at the anode surface, it is this (possibly combined with the local short circuit current through the tissues) and not leakage from the cell that can cause tissue burns, battery induced injury can extend beyond the esophagus to the trachea or aorta. Ingested charged BB in esophagus can cause mucosal burn as early as 4hours and perforation in 6hours. But disintegration is late process occurring after completion of 48hours.[11]

Most of the button batteries used today are of the alkaline variety, 4 mechanisms of injury have been suggested through:

1. leakage of the battery's contents and direct corrosive damage;
2. Direct electrical current effects on the mucosa and resultant mucosal burns;
3. Pressure necrosis
4. Local toxic effects due to the absorption of substances.[3].

The primary mechanism of injury with lithium BB ingestions is the generation of hydroxide ions, causing severe chemical burns, this is an electrochemical effect of the intact battery,and does not require the casing to be breached or the contents released.[12]

The key to proper management of foreign body BB is early diagnosis and removal. In our study number of male patients(61%) were more than the female patients(39%) as also evident from study of J Kimball et al 2010[6] and Dereci et al 2015[2] and most of the patients were from rural areas(66%) and were referred from nearby or distant health care centres which explains the delayed presentation to the tertiary care centre for management as we reported in 39(50.7%) of the patients in 8-24hours of ingestion and 18(23.4%) patients presented after 24 hours,1 patient presented on 4th day of foreign body battery ingestion. In our study highest incidence is found in 1-2years of age group and 88.31% of the patients were upto 5 years of age as reported by Hiller et al[1].

The most common signs and symptoms of BB ingestion were dysphagia in 62(80.52%) and foreign body sensation in throat in 58(70.32%) of the patients same as also seen by Fiaz et al 2017 with 72.7% with dysphagia and 59.1% with foreign body sensation.[3] Most of the ingested foreign bodies lodge at the level of the cricopharynx.[1] as seen in 70(90.90%) of the patients.

BB ingestion can cause complications such as esophageal perforation, tracheoesophageal fistula(TEF), esophageal stricture, tracheal stenosis, tracheomalacia, aortoesophageal fistula(AEF), vocal cord paralysis (from laryngeal nerve damage),empyema, abscess, and spondylodiscitis.[1] Patient presentation and time lag hold a pivotal role in development of any complication in the post-operative period. Out of the 77 patients of button battery ingestion 76(98.6%) patients were comfortable post operatively with no delayed complications, 1 patient who had a delayed presentation at 4th day went in respiratory distress and died post-operatively. In a study by J Kimball et al 1 out of 4 patients developed a TEF and another died of tension pneumothorax and pneumoperitoneum, 1 patient who was seen within 4 hours of ingestion developed long-term sequelae from esophageal stenosis. This attributes to the fact that esophageal injury can progress very quickly following BB ingestion.[6]

Leinwand et al 2016 reported most deaths due to the development of AEF with resulting catastrophic hemorrhage, data from the National Capital Poison Center indicate that among the 41 reported fatalities. All these studies emphasize that delayed presentation and delay in initiation of treatment has higher chances of developing complications. In a study of Huang et al 1 child with esophageal BB developed esophageal stricture and one died of sudden cardiac arrest perioperatively.[13] Medical literature and National Battery Ingestion Hotline cases reported 13 deaths and 73 major outcomes involving esophageal or airway BB lodgment.[14]

Conclusion

BB ingestions are potentially life-threatening for children and can lead to fatal injuries. Early detection is the key to the management of button battery as they have a distinctive radiological appearance. It is an

emergency to the otorhinolaryngologists and lodgement in the oesophagus is an indication for prompt removal, within two hours to minimize injury to the tissues. There should be more public awareness and education to parents about the serious and life threatening hazards of BB ingestion.

Conflict of interest

The authors hereby disclose that they have no conflict of interest.

References

1. "The OH–NO of Pediatric Foreign Body Ingestions: Lithium Batteries (Button Batteries)" | CE Article | NursingCenter. Available from: https://www.nursingcenter.com/cearticle?an=01781601-201407000-00008
2. Dereci S, Koca T, Serdaroğlu F, Akçam M." Foreign body ingestion in children". Turk Pediatri Ars. 2015 Dec 1;50(4):234–40.
3. Fiaz M, Bhatti AB, Abbas K, Choudary A." Ingestion of Foreign Body (Button Battery): 3 Years Experience at Tertiary Care Hospital". 2017;05(12):7.
4. David TJ, Ferguson AP. "Management of children who have swallowed button batteries". Arch Dis Child. 1986 Apr;61(4):321–2.
5. "Oesophageal button battery injuries: Think again" - Jarugula - 2011 - Emergency Medicine Australasia - Wiley Online Library [Internet]]. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1742-6723.2011.01403.x
6. J Kimball S, H Park A, Rollins M, Fredrik Grimmer J, Muntz H." A Review of Esophageal Disc Battery Ingestions and a Protocol for Management". Archives of otolaryngology--head & neck surgery. 2010 Sep 1;136:866–71.
7. Scott brown ent book-Lin VY,daniel SJ. "button batteries in the ear,nose and upper aerodigestive tract" scott brown - Yahoo Search Results Yahoo India Search Results [Internet]
8. Leinwand K, Brumbaugh DE, Kramer RE. "Button Battery Ingestion in Children: A Paradigm for Management of Severe Pediatric Foreign Body Ingestions". Gastrointestinal Endoscopy Clinics. 2016 Jan 1;26(1):99–118.
9. "Corrosive injuries of the oesophagus and stomach: experience in management at a regional paediatric centre". [Internet]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2502539/
10. " Preventing battery ingestions: an analysis of 8648 cases". [Internet]. Available from: https://reference.medscape.com/medline/abstract/20498172
11. Chouhan M, Yadav JS, Bakshi J. "Foreign body button battery in esophagus—Time for intervention?" International Journal of Pediatric Otorhinolaryngology Extra. 2011 Dec 1;6(4):329–30.
12. Lithium battery. In: Wikipedia [Internet]. Available from: https://en.wikipedia.org/w/index.php?title=Lithium_battery&oldid=903771805
13. Huang T, Li W-Q, Xia Z-F, Li J, Rao K-C, Xu E-M." Characteristics and outcome of impacted button batteries among young children less than 7 years of age in China: a retrospective analysis of 116 cases". World J Pediatr. 2018 Dec 1;14(6):570–5.
14. "Emerging battery-ingestion hazard: clinical implications". - PubMed - NCBI [Internet]. Available from: https://www.ncbi.nlm.nih.gov/pubmed/20498173