

Corrosive and Button Battery Ingestion in Children

Dr Moinak Sen Sarma

Asst. Professor, Dept of Pediatric Gastroenterology

Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, India

Email: moinaksen@yahoo.com

As an MBBS student, acute substance poisoning was a sure-shot full mark question in forensic medicine (jurisprudence). We remember avidly preparing for the same. As an intern and later pediatric trainee, we learnt to manage some of them with variable confidence, some of us less keen than the others. As a pediatric gastroenterologist, of the acute emergencies that challenges us, the most dreaded perhaps is an acute corrosive ingestion and we are duty-bound to manage them. As we climb the ladder of super-specialisation, do we become more fearful; do we expect the worst outcome? Possibly, our experiences shape our fears. With regard to corrosives and foreign bodies, a gastroenterologist lives to tell the vivid tales of heroism, precision, decisiveness or of dismay, futility and catastrophe to his starry-eyed residents. Unwritten experiences and tips for management are passed on through generations. But what persists at the end of the day is a perpetuating scenario, a vulnerable community, the horrors of acute ingestion and the burden of its sequelae.

Problem in India

Acids and alkali, the two extreme ends of chemistry spectrum are physiologically available in gastric and pancreatic juices. They are gifted by nature and serve a purpose in the human body. When synthesised for commercial use, they are ultimately designed for our domestic use or materialistic pleasure. Alkaline household caustic agents are drain openers and oven cleaners (sodium hydroxide and hypochlorite), household cleaners (ammonium

hydroxide, ammonium chloride), bleaches (hydrogen peroxide) and dishwashing agents (sodium carbonate, sodium silicate). Acidic domestic agents are toilet bowl cleaners (hydrochloric acid, phosphoric acid), metal cleaners (hydrochloric acid), battery fluids (sulfuric acid), jewellery cleaners (nitric acid). These products are colourfully packaged, scented, shelved and ubiquitously available in all grocery stores and urban supermarkets costing Rs 200-400 per litre. The same in their raw forms are sold at Rs 15-30 per litre in the rural and impoverished societies. Illiteracy and unawareness being major deterrents in our country, these caustics are loosely and irresponsibly stored in empty plastic bottles (mineral water or soft drinks) and not kept away from the reach of children. The scenario is further complicated due to the lack of strict government regulations that allow free unrestricted sale, improper packaging and lack of biohazard labeling. Most of the ingestions are accidental, especially under the age of 5 years as they are inquisitive in nature. Children are lured to the soft drink bottle or mistake the clarity of the caustic as potable water. Adolescents may have suicidal intent due to academic challenges, peer discordance, familial disputes or behavioural issues. Button battery, a unique foreign body has intensely alkaline and electrical properties that causes persistent tissue necrosis even after removal. They are found in toys, watches and other electronic goods. Toy safety is a major concern in the West where other than material quality and toxicity, it is mandatory to screw or fasten the battery

compartments. Changing of batteries is hence responsibly performed by the guardian. In India, cheaper toys have accessible battery compartments which can be easily unlocked or broken. Hence young children are prone to accidental ingestion of the battery.

Burden of the disease

Once the caustic ingested, a chain of agony ensues. Scientifically we debate acid versus alkali, coagulative versus liquefactive necrosis, predominant esophageal injury versus stomach injury, so on and so forth. Practically, it does not matter...the damage is done! The child is scarred for life. In an acute setting, fortunate patients are optimally managed, unfortunate ones are mismanaged. Their luck is further dependent on the physician's awareness, timely referral, patient's accessibility to the centre and expertise available. By the time a gastroenterologist receives the case, chronicity would have ensued. Vocal cord and laryngeal stenosis results in voice problems, respiratory issues and chances of life-threatening aspirations. Long, tenacious esophageal strictures cause various grades of dysphagia. The stomach capacity is reduced after fibrosis. Antropyloric stenosis produces gastric outlet obstruction. Compromise in nutrition leads to cachexia, dyselectrolytemia and apathy. Daunting endoscopies, endless complex dilatation procedures, struggle for adequate nutrition and managing the complications are the challenges faced. In refractory cases, when the esophago-gastric tract is replaced by an alternative conduit, newer problems arise as the normal physiology is disturbed. Moreover, compromises are governed by the affordability of patients. An emaciated toddler with a nasoenteric tube lying listlessly on your endoscopy table is a sorry sight. When the weeping parents in their tattered clothes helplessly approach you with folded hands, you are left perplexed as to how you would sustain

the case. I was recently baffled by a 10 month old baby with a 2 cm button battery impacted in the esophagus. The 4 year old elder sibling found the shiny battery on the road side, played with it and left it on the bed. Attracted by the object, the infant who had just attained his pincer grasp, made the full use of his skill. The damage done was irreversible. I wished the infant would have rather swallowed a coin! Dealing with button batteries is perhaps a far worse nightmare than corrosives due to rapidly progressive necrosis of gut wall and surrounding structures. The larger the battery, the more is the charge and greater is the damage. Ingestion of smaller batteries may not be witnessed always by caretakers. They may pass out of the gastrointestinal tract and yet have delayed presentation. Most of the damage occurs above the diaphragm. Invariably the child will require multiple chest surgeries. The surgical planes of resection are challenging for even expert surgeons due to unhealthy friable tissue in the proximity of great vessels and nerves. Leaks, gaping wounds, suture line dehiscence and restenosis of lumen are the recurrent problems. Replacement grafts are expensive. Vascular catastrophes, perforation and tracheo-esophageal fistulae are notorious complications. Registries in United States of America (USA) report 46% short term and 70% long term case fatality.

Action plan

Pediatric caustic ingestion is presently unheard of in developed countries. One unfortunate infant death in USA from a button battery sent shock waves throughout the nation to bring in consensus guidelines for management. Unlike USA which registers battery ingestion, India does not have any registry to record these events. At the national level, corrosive ingestion and its sequelae may seem a minute problem as compared to community diarrhea, respiratory infections and malnutrition. In India, other than anecdotal case reports, no facts can be

presented to the government for a national action plan. Hence a dedicated registry is one of the foremost strategies. Tougher acts such as the Federal Hazardous Substance Abuse Act (USA) will also need to be brought in to our country making it mandatory for every stake-holder (from manufacturer to seller) to comply with rules. As brilliant researchers in scientific forums, we continue to argue timing of endoscopy, role of adjuvant therapy, newer drugs, stents and techniques of dilatation. Is that solving our problem? Are we doing enough justice to our profession? We promote organ donation for cadaveric transplants but we do not speak of simpler preventive medicine for issues such as caustics. This is the glaring paradox in India. As sedulous pediatric gastroenterologists and pediatricians, we need to spread awareness at all levels. Fortunately, India is media-

receptive. We must encourage safe handling, storage and disposal of caustics and battery ingestion at domestic and community level. Through newspapers, television and social media, the awareness must percolate to masses. The effort has to be individual and collective, immediate and sustained.

Of all the acquired diseases we deal with, caustic ingestion is definitely an uncalled for condition. The rewritten modified Hippocratic Oath of 1964 states "I will prevent disease whenever I can, for prevention is preferable to cure". As conscientious doctors, we must rise to this challenge. It is time to bring a permanent change to our system.

This is an author's informal and personal viewpoint with no conflicts of interest with any individual or organisation.