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IMAGES IN ANESTHESIA

Button battery ingestion in children: a role for angiography?

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A 15-month 8.2-kg girl presented to the emergency room with an insidious history of progressive drooling and not eating following ingestion of a button battery two days previously. She was alert with bilaterally clear breath sounds and was hemodynamically stable. A chest radiograph revealed a button battery lodged in the esophagus at the level of the tracheal carina. As we had previously experienced catastrophic bleeding with batteries lodged in the esophagus below the thoracic inlet, she was brought to the cardiac catheterization laboratory for endoscopic button battery removal. Following induction of anesthesia and tracheal intubation, vascular access (femoral vein and artery) was secured. The cardiac surgery team, perfusion equipment, and a primed cardiopulmonary bypass machine were present in the room.

Simple fluoroscopy (Figure, panel A) showed the confirmatory "halo sign" of a button battery, and angiography imaging in the anteroposterior (AP) view (Figure, panel B) and the lateral view (Figure, panel C) verified the battery to be 3-4 mm from the innominate artery and 10-mm from the aortic arch, although with no direct vessel involvement. The narrowest end of the battery, which is always the negative pole (Figure, panel C), was directed posteriorly, away from the aortic vessels. After an endoscope was advanced using fluoroscopic guidance and then direct visualization, the battery was removed with forceps. Following removal, two large ulcers at ten o' clock and five o'clock were present with associated edema, causing 3 cm of significant, longitudinal esophageal narrowing. The mucosa, although friable, showed no active bleeding. The patient made a satisfactory recovery and remains asymptomatic, although with a mild esophageal stricture.

Pathophysiology of button battery ingestion

Button batteries are ubiquitous in toys and electronics. When ingested, particularly 20-mm batteries, can easily lodge in a small child's esophagus. They may go unrecognized for hours or days.[1] These batteries can cause significant tissue necrosis by generating an external electrical current when the poles are in contact with the mucosa.[2] Even spent lithium batteries that can no longer power devices retain enough residual voltage to cause severe tissue injury.[2] The accumulation of hydroxide ions at the negative pole, due to hydrolysis and electrolysis, elevates the local tissue pH, leading to caustic burns, and significant tissue necrosis can develop rapidly (within as short a time as 15 min).[3] Injury is most severe in structures exposed to the battery's negative pole and has led to adoption of the ingested button battery "3 N mnemonic" – i.e., "negative pole, narrowest, necrotic." [2,3]

Reported injuries have included mouth and nasopharyngeal burns, laryngeal nerve injuries, tracheoesophageal fistula formation, lower gastrointestinal injury, and

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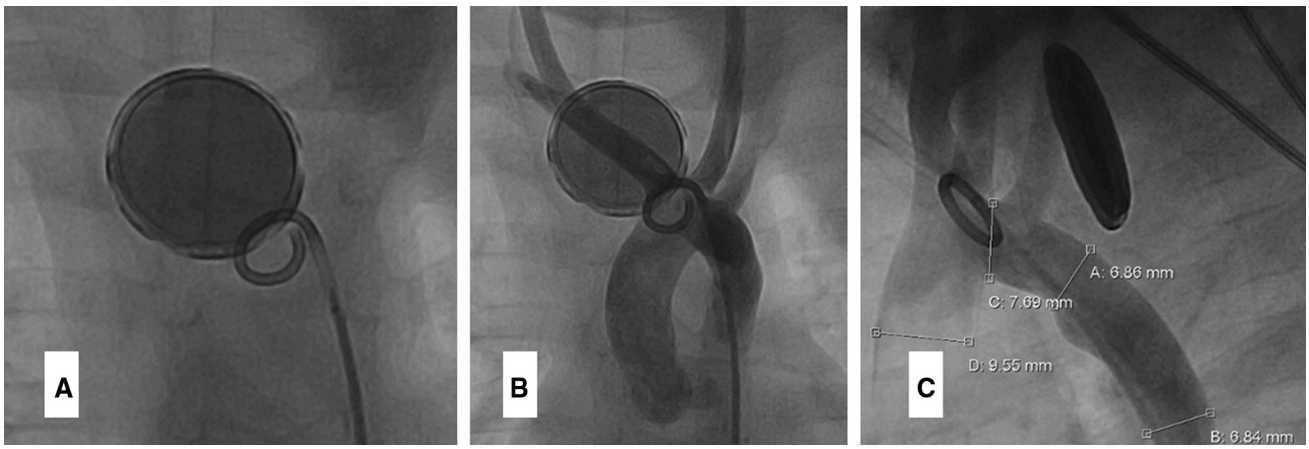

Figure Fluoroscopy images from the cardiac catheterization laboratory: A. Button battery lodged in the esophagus at a level just above the tracheal bifurcation. The peripheral "halo sign" of button-type batteries is clearly seen. B. Major branches of the aorta can be seen in close relation to the impacted battery. C. The lateral view shows the proximity of the aortic vessels to the battery and the battery's electrode orientation, with the narrow negative pole of the battery directed posteriorly

catastrophic bleeding caused by erosion into major vessels.[1,2] Expedient triage for button battery impaction requires a multidisciplinary approach. Aortic angiography can be very helpful for ascertaining and managing potential bleeding. Anesthesiologists should prepare for severe hemorrhagic complications during battery removal under anesthesia.

Conflicts of interest None declared.

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