

Hospital Peer Review

May 2010

Hospital Peer Review is a monthly newsletter sponsored by the Rural Healthcare Quality Network to alert Critical Access Hospitals regarding findings from the Peer Review Program. Summarized are a few of the key findings and best practices that would be helpful for other critical access hospitals to be knowledgeable about. This newsletter is edited by Myron Bloom, Medical Director and he can be reached at drmbloom@msn.com.

Little Johnny Swallowed Something

It is not uncommon. Parental surveys have shown that up to 4% of their children have swallowed a coin, the most commonly swallowed foreign body (after food boluses) with an incidence greatest from 6 months to 4 years of age. So, always keep the possibility of foreign body ingestion in mind with pediatric presentations of otherwise unexplained irritability, drooling, crying, coughing, palatal abrasions, and dysphagia or refusal to eat or drink. However, studies have shown that up to a quarter of children with a history of foreign body removal were asymptomatic and most patients with a foreign body ingestion have no abnormalities on physical exam. While imaging is indicated, children with foreign body ingestion usually do not need any laboratory testing. Airway management is the first concern and then management of the ingested foreign body can be addressed.

After protecting the airway, the next task is to identify and localize the position of the ingested foreign body. Radiographs should run from the jaw to below the diaphragm and should be done in both frontal and lateral projections to identify possible multiple adherent foreign bodies, to distinguish coins from button (disk) batteries (which demand special attention), and to identify edema that may have bearing on removal modality. It has been shown that up to 5% of cases of foreign body ingestions by children involve more than one foreign body. Coins in the esophagus generally appear as a disk on frontal chest films, while coins in the trachea tend to become aligned in the sagittal plane (end on). Since impacted objects lie over the spine, a low radio-density object may be missed on frontal chest x-rays, but is less likely to be obscured on lateral chest x-rays. The lateral chest x-ray, therefore, is better than a frontal view in detection of a beverage can pull-top.

The longer the foreign body remains in the esophagus, the greater the likelihood of esophageal ulceration, perforation, and extension of injury to the trachea, mediastinum, or great vessels. Significant esophageal edema at the site of the foreign body may begin to occur within 48 hours of impaction. Thus, whenever an esophageal foreign body of uncertain duration is seen on the AP view, a lateral view looking for a widening of the tracheo-esophageal interspace should be done to identify esophageal edema. Whenever there is any suspicion of significant esophageal edema, the foreign body should be removed under more controlled conditions by endoscopy and not blindly removed by the Foley catheter or bougie method.

For simplicity, the esophagus can be divided into thirds but there are five anatomic sites of narrowing in the pediatric esophagus:

1. the cricopharyngeus muscle level at C6;
2. the thoracic inlet at T1;

3. the cardioesophageal level or aortic arch at T4;
4. the tracheal bifurcation at T6; and
5. the gastroesophageal junction.

The most common site of impaction (~2/3) is in the upper third between the cricopharyngeus muscle and the thoracic inlet and often found between the clavicles on a frontal chest view where the esophageal skeletal muscle changes over to smooth muscle. Another common site of anatomic narrowing with subsequent impaction is the gastroesophageal junction (15-20%). Impaction of food boluses or foreign bodies at this site usually is the result of the size and shape of the object, or is due to an LES malfunction or anomaly. Esophageal abnormalities (e.g. repair of a tracheoesophageal fistula) are likely to trap an ingested foreign body at the site of the abnormality, so the possibility of a previously unknown esophageal abnormality should be considered when a blunt foreign body becomes lodged at a location other than the typical locations.

Localization of the swallowed foreign body is important. Coins lodged in the proximal or mid-esophagus may need to be removed earlier, as more proximal coins are less likely to progress to the stomach. The observation period for coins in the distal esophagus can be extended to 24 hours safely, according to most studies. Because any esophageal foreign body may pass spontaneously, chest imaging should be repeated immediately prior to beginning any delayed removal procedure.

Esophageal burns have occurred when a button battery has been lodged in the esophagus for only several hours, with esophageal perforation occurring in as few as six hours after time of ingestion. Because of this potential for serious injury, immediate endoscopic removal is indicated if the battery is in the esophagus. A non-invasive approach is reasonable if the battery is in or past the stomach and has not become lodged on serial images.

Because endoscopy is invasive and expensive, 2 other methods of esophageal foreign body removal are probably more cost-effective when performed by experienced operators; but they are reserved for healthy children whose ingestion of a blunt object is known to be less than 24 hours prior to the procedure.

Blunt foreign bodies may be removed by passing a Foley catheter balloon past the object, then inflating and gently withdrawing it, extracting the foreign body. After sitting for initial catheter placement, the patient should be prone in Trendelenburg (head-down) position during catheter withdrawal. Typically, the catheter is passed beyond the visualized foreign body with fluoroscopic guidance, and once the balloon is beyond the foreign body, it is inflated with a water-soluble contrast agent, and the withdrawal observed fluoroscopically. When the foreign body appears in the hypopharynx, it may be expelled by coughing or grasped with forceps. There is the potential risk of aspiration of a coin flipping into the trachea as it is pulled up through the oropharynx. Despite the potential for aspiration, numerous studies have shown the Foley catheter method first described by Bigler in 1965 to be safe and effective. Sharp, ragged, radiolucent, multiple, or unknown foreign bodies; esophageal disease; or complete obstruction are contraindications to balloon catheter removal. Obviously, resuscitation equipment and forceps should be at hand when the procedure is performed.

Alternatively, distal blunt esophageal foreign bodies may be pushed into the stomach by a bougie, and then expected to pass through the rest of the GI tract. However, this procedure should not be performed on children with known lower GI tract abnormalities. For instance, children who have had surgery to correct pyloric stenosis are more likely to retain a foreign body in the stomach.

Endoscopy is the most commonly used means of removal and often is the procedure of choice. Most children with esophageal foreign bodies are stable and endoscopy can be delayed to ensure the child's stomach is empty. However, sharp or pointed objects and button (disk) batteries should be removed as

rapidly as possible to avoid further injury to the esophagus. The rigid endoscope has been shown to be more successful in the management of sharp foreign bodies, enabling the endoscopist to accomplish ensheathment prior to removal. Flexible fiberoptic endoscopy is more popular for its ease of use compared to the rigid endoscope, and is more useful for distal esophageal foreign bodies.

A study involving 1,746 pediatric patients compared endoscopy, Foley catheter removal, and the bougienage success and complication rates. Endoscopy was performed on 1,005 of these patients, with a 100% success rate and a 2.5% complication rate. The Foley catheter method was performed on 658 patients, with a 94% success rate and a 2% complication rate. The bougienage method was used on the fewest patients (83), with only an 83% success rate, yet this method had a 0% complication rate. The charges for endoscopic removal were four times the expected charges of either of the other two methods. Another study involving 620 pediatric patients compared endoscopy to bougienage finding similar results.

Magill forceps may be used for extraction of an upper esophageal coin lodged at or just below the level of the cricopharyngeus muscle, especially when they can be seen on examination. One retrospective review of 36 children who had upper esophageal coins found that all coins were removed without complication in approximately 45 seconds (33 on the first attempt, 3 on the second attempt). In another study of thirteen children with a median age of 20 months who underwent rapid sequence intubation, all successfully had coins removed from their upper esophageal tract by emergency physicians. In 10 cases, the coin was visible at laryngoscopy and removed with Magill forceps. In 3 cases, the forceps failed and a Foley catheter was used to remove the coin. All were discharged home from the emergency department with no significant complications.

Another similar removal technique for more distal esophageal foreign bodies is known as the “penny pincher.” With the aid of fluoroscopy, endoscopic forceps ensheathed in a catheter is inserted into the esophagus. One study describing the technique mentions that the procedure was performed without the aid of anesthesia or sedation. By using the penny pincher technique, the total time of removal from start to finish was 41 seconds on average, with 20 coins removed from 19 children. The mean age of the children studied was 34 months. The penny pincher is claimed to provide the simplicity, cost effectiveness, and speed of Foley catheter or bougienage techniques, as well as the safety and sure grip of endoscopic forceps removal.

Foreign bodies in the distal esophagus may be helped to advance by the use of glucagon. Glucagon relaxes the mid and lower esophageal smooth muscle and lessens lower esophageal sphincter tone. Because the upper third of the esophagus contains striated muscle, glucagon will be ineffective for foreign bodies in the proximal portion of the esophagus. Glucagon should not be used if there is a possible sharp component to the esophageal foreign body, nor should it be used if there is a pre-existing esophageal anomaly. Side effects of glucagon, such as dizziness, nausea, and vomiting are usually transient.

A brief observation period and a repeat radiograph should be considered following any removal procedure to rule out retained foreign bodies and other complications (e.g. pneumomediastinum).

Things to remember:

- Children may have vague symptoms that do not immediately suggest foreign body ingestion.
- Children without symptoms still may have an esophageal foreign body that requires removal.
- When in doubt, obtain both frontal and lateral radiographs from proximal neck to below the diaphragm.
- Button (disk) batteries in the esophagus should be removed immediately.

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