Reminder of important clinical lesson

Procedural sedation associated displacement of sharp oesophageal foreign body

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Oesophageal foreign body is a common clinical problem. The therapeutic intervention varies from endoscopic removal to observation for spontaneous passage of foreign body. The authors illustrate a case of sharp board pin ingestion by a child, which stayed impacted at C₇–T₁ level for 8 h with indentation of tracheal mucosa. However, upon administration of midazolam and ketamine for procedural sedation, the pin spontaneously advanced to stomach when muscle relaxation had set in. A few oesophageal mucosal erosions were noted on the endoscopy. The foreign body could not be retrieved by the procedure and was spontaneously egested impacted in faeces. This case presents a distinctive hazard associated with procedural sedation for a foreign body in aero-digestive tract, where the associated muscle relaxation can lead to complications due to spontaneous movement of foreign body.

BACKGROUND

Foreign body (FB) ingestion is a common clinical problem encountered in paediatric emergency department. Coins are among the most commonly 'swallowed article' in children.¹ The management includes emergency endoscopy and FB removal for sharp objects, and if there is any evidence of respiratory distress.¹ However, a period of observation for spontaneous passage of FB is suggested in some other scenarios.² Hence, it is critically important to promptly determine the type of FB ingested and to assess the clinical status of the child to select the therapeutic intervention. This case illustrates a rare presentation of a child with board pin ingestion wherein upon midazolam-ketamine sedation for endoscopy, the pin spontaneously slid down. This case highlights the potential complication of procedural sedation, and associated smooth muscle relaxation, in patients with FB ingestion.

CASE PRESENTATION

A 2-year-old boy presented 8 h after having swallowed an 'unfamiliar object'. He had non-specific discomfort in the lower neck. There was no drooling, feeding problems, cough or increased work of breathing. His physical examination was normal. With the presumptive diagnosis of FB ingestion, antero-posterior (AP) and lateral radiographs of neck were performed.

INVESTIGATIONS

The AP radiograph revealed a discoid FB (figure 1). The lateral radiograph showed an end-on narrow object, at the level of C₇–T₁ vertebrae, and a sharp pin pointing anteriorly from the disc, and indenting the tracheal air shadow (figure 2). These images demonstrated the ingestion of a board-pin (inset figure 2) with indentation of tracheal lumen by its tip.

TREATMENT

The child was instantly shifted to operating room for its endoscopic removal. The child was sedated with midazolam (0.10 mg/kg, intravenous) and ketamine (1 mg/kg, intravenous) for procedural sedation. However, the FB could not be found in the oesophagus. There was evidence of erosions of oesophageal mucosa in the cricopharyngeal area and along the gastro-oesophageal junction. The endoscopy revealed the pin to be in gastric cavity, but could not be retrieved.

Figure 1 Antero-posterior radiograph of neck illustrating a foreign body in aero-digestive tract.

Figure 2 Lateral radiograph of neck depicting a pin lodged at C7–T1 level with the pin impinging on the tracheal mucosa; Inset: board pin which was subsequently egested by the child.

OUTCOME AND FOLLOW-UP

The pin was egested spontaneously 24 h later embedded in faeces. The child had non-specific discomfort while swallowing during the subsequent 72 h, for which he was given oral sucralfate. He has been asymptomatic for subsequent 6 months.

DISCUSSION

Oesophageal FB is a frequent occurrence and is responsible for over 1500 deaths per year.³ Children have a precarious 'oral habit', which explains occurrence of up to 80% oesophageal FBs in paediatric age group.¹ Coins are the most commonly ingested objects.

The clinical presentation varies from an asymptomatic child to severe symptoms like drooling, cough and chest pain.^{2 4–6} Children may also present with respiratory complaints like stridor, choking and increased work of breathing if the oesophageal FB is compressing the trachea and reducing the column available for air-flow. The physical examination cannot be relied upon to confirm or refute an oesophageal FB. The main diagnostic tool for oesophageal FB is radiography. AP and lateral films of neck and chest are required to confirm and localise the FB. In cases in which plain films are non-diagnostic, a barium swallow may be performed.¹

The management of oesophageal FB ranges from observation to endoscopic removal of the FB. Some authors have recommended a period of observation in stable patients who have no known oesophageal anomalies.^{2 4 7}

This approach is based on likelihood of spontaneous passage of FB from oesophagus to stomach. The coins, in one study, located in upper, middle and lower third of oesophagus were noted to pass spontaneously to stomach in 14%, 43% and 67% of time respectively.⁸ However, observation is not indicated in patients who present 24 h after ingestion. Sharp metallic objects (like pins, nails), and caustic ingestions (like button batteries) should always be removed endoscopically.^{1 9} The choice of flexible versus rigid endoscope depends on comfort and expertise of the surgeon. Balloon catheter extraction of oesophageal FBs has gained popularity as a cost-effective alternative to endoscopy. However, this should be reserved for single, smooth, radio-opaque FB in an otherwise normal oesophagus.¹⁰

For endoscopic removal of foreign bodies, midazolam and ketamine are the most common procedural sedatives. Midazolam administered intravenously, in a dose of 0.1–0.3 mg/kg, induces centrally mediated muscle relaxation.¹¹ Ketamine used in a dose of 1–1.5 mg/kg primarily induces sedation and analgesia but also leads to associated smooth muscle relaxation, primarily of airway.¹² While in most of the procedures this muscle relaxation is desired for facilitating the procedure, it proved deleterious during our endoscopic removal of pin. The muscle relaxation induced by midazolam and ketamine might have led to displacement of FB from oesophagus to gastric cavity. It can be argued that spontaneous peristalsis might have led to this movement. However, the FB, which was impacted at the level of C7–T1 for past 8 h moved soon after the administration of sedatives, suggests the muscle relaxation effect as an incriminating factor. In addition, there have been animal reports suggesting inhibition of lower oesophageal sphincter relaxation by both midazolam and ketamine.¹³ This might explain the erosions of oesophageal mucosa primarily at the site of impaction (near the crico-pharynx) and in vicinity of gastro-oesophageal junction.

There were two peculiarities in the case presented here. First, the AP radiograph gave an impression of a coin lodged at the level of C₇–T₁ vertebrae. A coin at this level, in an asymptomatic child could have been given some time for spontaneous passage. However, the lateral radiograph showed sharp pin abutting from the disc and lifting the mucosa anteriorly, confirming it to be a board pin rather than a coin. This changed the management strategy to an immediate endoscopic removal of the sharp object. This reasserts the old doctrine of assessing FB ingestion with both AP and lateral radiographs. The lateral radiograph aids in deciphering the location of FB and, as in our case, assists in determining the type of FB.

Second, the muscle relaxation accompanying the administration of midazolam and ketamine triggered the spontaneous passage of pin into the stomach and causing few oesophageal mucosal erosions. Although relaxation of muscles makes the likelihood of complete piercing of mucosa and perforation less likely, but such spontaneous movement of sharp objects can be dangerous.

To conclude, though muscle relaxation is desirable while performing endoscopic removal of foreign bodies, one has to be careful about spontaneous movement of foreign bodies in the aero-digestive tract.

Learning points

- ▶ Every FB in the aero-digestive tract should be assessed by AP and lateral radiographs.
- ▶ Though procedural sedation and muscle relaxation are necessary for endoscopic removal of foreign bodies, but one has to be careful about spontaneous movement of foreign bodies in aero-digestive tract once muscle relaxation has set in.

Competing interests None.

Patient consent Obtained.

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