THE ENIGMA IN MANAGEMENT OF COMPLICATED FOREIGN BODY INGESTION IMPACTED DISTAL TO OESOPHAGUS: A CASE SERIES AND LITERATURE REVIEW

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Abstract

Background: Ingestion of foreign bodies leading to impaction at the pharynx and oesophagus have been extensively described in English literatures. However, impactions at the gastrointestinal tract distal to the oesophagus are less commonly encountered due to the more capacious luminal diameter as it approaches the stomach. While intentional foreign body ingestions impacted distal to the oesophagus are often more complicated, literatures on the management of these distal oesophageal impactions are scarce.

Case presentation: We present five cases of foreign body impaction at varying sites of gastrointestinal tract beyond the oesophagus, contrasting management approach comparing the role of endoscopy, open surgery and conservative management. Cases presented include patients aged 40 to 70 with intentional foreign bodies ingestion. The first case described a cerebral palsy patient with pica who had to undergo difficult evacuation under anaesthesia followed by colonoscopy; the second and third cases presented 2 different schizophrenic patients with 2 differing management approach. The second case was managed with multiple operations due to complications and died eventually, making the only mortality in our case series; whereas the third case was managed conservatively with acceptable outcome after multiple laparotomies prior. Fourth and fifth cases described 2 body packers who swallowed tobacco and 2 phones, respectively; the former was uneventfully managed conservatively, the latter, had to undergo surgical extraction. Individualized approach to these distal impactions of ingested foreign bodies are described with a review of available literatures which are tabulated and discussed in this case series.

Conclusion: Endoscopy, surgery, conservative management and sometimes a combination of approaches are utilised for the management of foreign bodies impacted distal to the oesophagus, especially in complex and recurrent cases. Decision, timing and approach of extraction must be individualised with consideration of risk weighed against the benefit of each intervention over the other.

Keywords: Foreign Bodies Ingestion, Distal Impaction, Surgical Extraction Body Packers, Retrieval

Introduction

Foreign body (FB) ingestion can be unintentional or intentional. The former more commonly seen in children and elderly that have poor chewing coordination whereas the latter was more commonly associated with deliberate concealment or underlying psychological disorders. The commonly ingested foreign bodies include fish and chicken bones, coins or dentures. Majority of the ingested blunt objects may be passed out successfully without major complications. However, there are objects which may be impacted at different sites within the gastrointestinal tract. Literatures on the management of this remain relatively scarce, especially in this part of the world (1). The common site of impaction are oesophagus or above this level, the impaction at distal small bowels, colons or rectum are less frequent (2). The distal impaction at this area may result in bowel perforation, intestinal obstruction or defecatory difficulties. The retrieval of foreign objects is technically more perplexing due to difficult endoscopic access. Herein, we report five cases which have different sites of impacted ingested foreign body at varying point within the gastrointestinal tract distal to oesophagus, comparison of each of the individual approach using endoscopy, open surgery and conservative management. The clinical course and challenges in management of these cases are deliberated.

Case 1

A 62 years old gentleman with underlying cerebral palsy, presented to casualty with 3 days' history of loose stools associated with abdominal discomfort. He had no history of fever, vomiting or rectal bleeding. His caregiver, who helped with most of his daily activities, had reported his unusual habit of ingesting cuts of materials from the distal edges of broom sticks. Physical examination revealed that the abdomen was mildly distended and digital rectal examination had multiple wooden sticks with impacted stools. An abdominal x-ray (AXR) showed impacted faeces through the entire colon (Figure 1C). Due to large amount of faecal impaction with sharp wooden sticks, evacuation was performed under anaesthesia with a sponge clamp and digitation. The operator had multiple gloves worn to prevent puncture and injury by the wooden sticks. Majority of the faecal impaction was dislodged, but only 50% of the wooden sticks was evacuated successfully after an hour. The anorectal mucosa had irregular ulcers and raised edges. A follow up colonoscopy was performed in the endoscopy suite and a complete evacuation of broom sticks was performed. A circumferential polypoid lesion was seen in the rectum (Figure 1D) and biopsy revealed markedly inflamed fibro-granulation tissue with no evidence of malignancy. Post-evacuation, he was kept in the ward for another three days for observation and was later discharged with an appointment with the psychiatric team for pica.

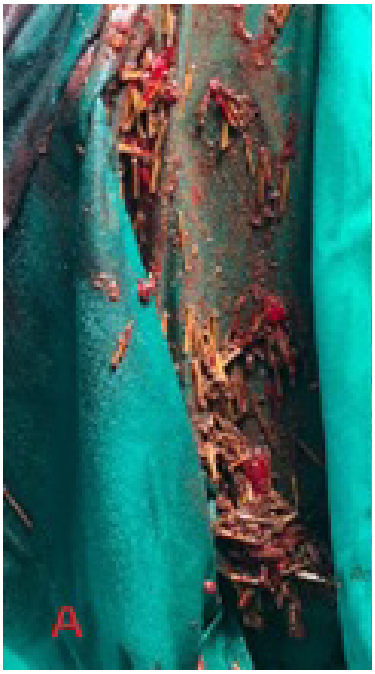

Figure 1A: Sharp Wooden sticks evacuated from the rectum intra-operatively.

Figure 1B: Follow up colonoscopy post operation, where remaining sticks were evacuated from the rectum.

Figure 1C: Abdominal radiograph showing the faecal loaded colon

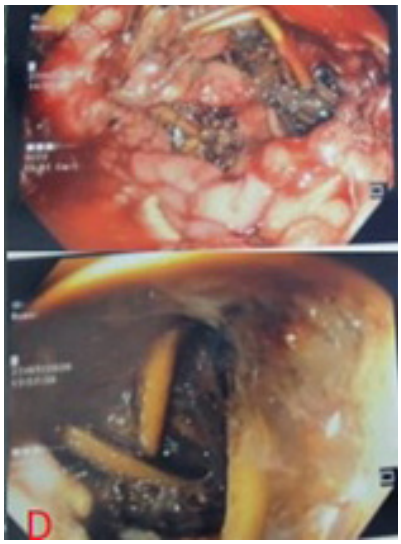

Figure 1D: A polypoidal lesion is seen in the rectum during colonoscopy, with impacted stool and wooden sticks proximal to that.

Case 2

A woman, 52-years old known methamphetamine drug user with underlying schizophrenia had presented to the casualty with abdominal pain after intentional coin ingestion. On presentation, she was septic, normotensive, tachypnoeic at 22 breaths per minute and tachycardic at 140 beats per minute. Physical examination revealed generalized peritonitis and a Pfannenstiel scar which was consistent with a history of total abdominal hysterectomy that was performed 20 years ago for uterine cancer. Full blood counts revealed a raised white cell count of 17 x 10^9/L with thrombocytopenia (platelet, 80 x 10^9/L). Apart from arterial blood gas of metabolic alkalosis, the urea and creatinine levels were within normal limits. A contrast computed tomography (CT) abdomen revealed enhancing foreign body in the terminal ileum with pneumoperitoneum suggestive of small bowel perforation. She was resuscitated with intravenous fluids and was commenced on broad spectrum antibiotics prior explorative laparotomy. Intra-operatively there were gross contamination in the peritoneum with 2 litres of pus and small bowel content. There was small bowel perforation which was identified at 4 cm from the terminal ileum (Figure 2). At the site of perforation there were 3 cupronickel coins with clumps of densely adhered small bowel. Adhesiolysis, peritoneal lavage and a limited right hemicolectomy were performed. The bowel ends were not anastomosed due to severe acidosis with high inotropic requirements. Patient was nursed in the intensive care unit (ICU) post-operatively. Following stabilization, she underwent a relaparotomy and Ileocolic side to side anastomosis. Post relaparotomy, she was nursed in the ICU for 5 days and subsequently transferred to the general surgical ward. Parenteral nutrition and broad-spectrum antibiotic were continued in the general wards. The patient developed laparotomy wound dehiscence and bowel evisceration with suspicions of bowel anastomotic leak that required an urgent re-laparotomy on post-operative day 14. An immediate relaparotomy was performed, revealing a near-complete dehiscence of the anastomosis with gross peritoneal contamination. Following peritoneal lavage, an ileostomy and primary closure of the abdomen were performed. However, after the third operation, she did not recover, but developed septic shock complicated with multiorgan failure. She eventually succumbed despite best medical efforts.

Case 3

A 40-years-old lady with underlying schizophrenia was attended by the surgical team for non-specific abdominal pain following ingestion of metal nails. This patient had a history of multiple admission for similar complains and successful retrieval was performed on each admission. Abdominal radiograph during the last admission revealed multiple metal nail lodged at the upper pelvis (Figure 3A). During her previous admission and retrieval via laparotomy, the nail was found at sigmoid colon and colotomy was performed to retrieve all metal nails. The

Figure 2: Intraoperative picture of coin at the site of perforated ileum, likely the cause of perforation.

procedure was uneventful and the colotomy was repaired primarily following complete removal of the nails (Figure 3B, C). This time, she presented again for ingestion of fluorescent tube bulbs and screws (Figure 3D). However, conservative management was opted this time as she had multiple histories of midline laparotomies which led to possibility of hostile abdomen with dense adhesions. Furthermore, there were no evidence of intestinal obstruction and subsequently managed by the psychiatric team with electroconvulsive therapy. Follow up visits after 3-months, revealed that the patient was well and clinically no signs of intestinal obstruction. We did not repeat an abdominal radiograph after discussion with family members and treating psychiatrist, we decided no further invasive intervention for her with refractory schizophrenia. She passed away 6 months later due to pneumonia at psychiatric hospital.

Figure 3A: Abdominal radiograph showing multiple metal nails situated in the pelvis

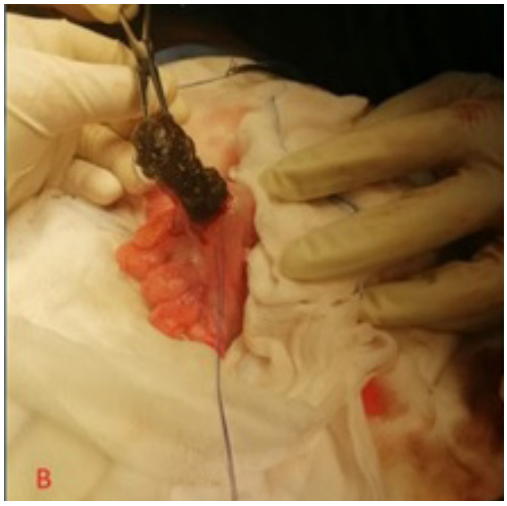

Figure 3B: Colotomy done with extraction of metal nails.

Figure 3C: Nails extracted during operative extraction.

Figure 3D: Repeated abdominal radiograph upon follow up visit, showing pieces of fluorescent tubes, and screws retained in the right iliac fossa.

Case 4

A 59 years-old gentleman, known drug offender under police custody presented to the emergency department with three days' history of vomiting, generalised abdominal pain and distension. Further history revealed that the patient ingested tobacco leaves wrapped in a plastic in an attempt at drug smuggling activities. On presentation, vital signs and blood investigations were within normal limits. Abdominal examination revealed a distended abdomen with no signs of peritonism. There was no free air on erect chest radiograph whilst AXR showed small bowel dilatation with a right ureteric stent previously inserted. The patient was scheduled for an emergency laparotomy and evacuation of foreign body which caused small bowel obstruction evidently seen on the abdominal radiograph (Figure 4A). Fortunately, the foreign body was successfully passed out prior theatre call which relieved the intestinal obstruction. Surgery was avoided and the inspected object (Figure 4B) was as described, handed over to the police as evidence. The patient was observed in the general ward with uneventful recovery and subsequently back to police custody.

Figure 4A: Abdominal radiograph revealing the dilated small bowels and opacity demonstrating presence of foreign body in pelvis, and pre-existing right ureteric stent.

Figure 4B: Tobacco wrapped in plastic pack, spontaneously passed out while waiting for operation.

Case 5

A 42 years-old man in trial for alleged drug offenses was brought to the emergency department with a 2-days' history of epigastric pain and vomiting. Preceding it, he had ingested 2 small packets of heroin with intention to smuggle while under custody and small mobile phones. On presentation, he was haemodynamically stable with a soft abdomen. Blood investigations were within normal limits, abdominal radiograph revealed no dilated bowel and an erect chest X-ray showed 2 foreign bodies at the gastric fundus (Figure 5A). An esophagogastroduodenoscopy (EGD) revealed a mobile phone impacted at the pre-pylorus of the stomach that was irretrievable endoscopically (Figure 5B). The patient subsequently underwent a laparotomy and anterior gastrotomy for retrieval of the foreign bodies. 2 mini handphones with the size of 6.9 cmx 2.8 cm x 1.2 cm and 1 sealed cuboid package with the size of 4 cm x 3cm x 1.5 cm were successfully retrieved (Figure 5C). Postoperative recovery was uneventful, and he was discharged back to police custody after 48 hours.

Figure 5A: Abdominal radiograph showing opacity in the left upper abdomen, consistent with the history of foreign body ingestion.

Figure 5B: One of the phones impacted at the prepyloric region, irretrievable via endoscopy.

Figure 5C: Extracted phones via operative retrieval.

Discussion

Majority of foreign body ingestion causing impaction in adults' patients is within the upper gastrointestinal (GI) tract. Impaction at these sites is frequently managed by endoscopic retrieval. Less frequently, surgery may be required to retrieve these foreign bodies owing to the large dimensions, endoscopic inaccessibility or when dealing with complications such as perforation (3). In contrary to impaction at upper gastrointestinal tract, distal impaction is less commonly observed. The reported cases of distal impaction at ileum or colon are limited. The common objects involved were dentures, tooth picks and pens (4) (5) (6) (7) (8). Majority of literatures often describe the management strategies for upper gastrointestinal foreign body impaction. American Society for Gastrointestinal Endoscopy (ASGE) recommends various timing endoscopy depending on the type of foreign body. Sharp objects or FB impacted at oesophagus are preferably intervened early. Coins or FB impacted at stomach may have a non-urgent endoscopy. The guideline recommends surgical consultation when non progression through GI tract or those beyond endoscopic reach. (9) This case series is unique as the impactions of foreign bodies occurred at various point distal to oesophagus.

The reported cases of foreign body impaction distal to the oesophagus are limited. Hence, a review of cases on the impaction at various location distal to oesophagus was performed. These reported cases were mainly from Middle Eastern nations and Pakistan. The ingested objects range from nails, dinner forks, food, dentures, toothpicks, pens, coins, and needles. The location and the characteristic of foreign bodies ingested is the major determinants in the approach for retrieval. Objects that were large, sharp in nature or impacted in the small bowels are particularly difficult to retrieve endoscopically (Table 1). However, there were few cases that reported successful retrieval via double balloon enteroscopy (10) (11). In our case series, 3 cases required invasive surgery for retrieval of ingested foreign body. In the presented case of patient 2, invasive laparotomy was required as the patient was in peritonitis due to bowel perforation. However, the outcome of surgery in such cases complicated with adhesions is least

Table 1: Review of cases with impaction of foreign body distal to oesophagus in adult

Author(s)	Site & presentation	Foreign Body	Treatment	Outcome
Rey JW et al (10), Germany	Jejunum, history of swallowing needle prior	Safety needle	Endoscopic removal with double balloon enteroscope with a thick t-type overtube	Successful
Neumann H et al (11), Germany	Jejunum, 8 days' history of ingestion	Coin	double balloon enteroscope	Successful
Müller KE et al (8), Hungary	Sigmoid colon, chronic abdominal pain, weight loss and occult GI bleeding for 6 months	Pen	Colonoscopy dislodgement	Spontaneously passed out after the pen dislodge from its impaction site at sigmoid colon
Ossola L et al (7)	Small and sigmoid colon, abdominal pain for 2 days	Toothpick	Laparoscopic retrieval and primary repair of small bowel and colon perforation	Successful removal with surgery
Ghanimeh MA et al (6), US	Cecum, 84 years old 2 weeks history of denture ingestion	Denture	Colonoscopy was performed three weeks after the ingestion and showed that the dental plate had embedded in the caecal wall by a wire	Removed endoscopically
Rashid F et al (5), UK	Ileum, 53 years old with sudden abdominal pain	Dental bridge	Open surgery	Ileocecal resection for distal ileal perforation
Yagmur Y et al (17), Turkey	Ileum, 22 years old with abdominal pain and history of ingestion of multiple foreign bodies	Plastic clothes pegs, a 10 cm pencil, couple of stones, a 10 cm wood nail, nail scissors and a small size battery	Laparotomy	Open retrieval and bowel repair
Bunni J et al (4)	Ileum	Dentures	Open surgery	Successful retrieval with primary closure.
Malik AM et al (18), Pakistan	Small bowel	Multiple injurious foreign bodies	Open surgery	Successful, discharged well.
Atila K et al (19),Turkey	Small bowel obstruction with perforation in a 73-year-old female	Accidental swallowing of an apricot pit	Open surgery	Successful retrieval, but complicated with enterocutaneous fistula post operatively
Atila K et al (20), Turkey	Gastric outlet obstruction	Dinner fork, ingested 25 days before	Gastrostomy	Open retrieval
Khan KU et al (21), Pakistan	Stomach, young adult	2562 nails	Gastrostomy	Open retrieval then psychiatric care

favourable as demonstrated in case 2. From the literature search, we did not identify any coin impaction resulting in bowel perforation. This highlighted when there is previous abdominal surgery with adhesions, a lower threshold or short observation interval shall be advocated. Early surgery should be considered when abdominal pain worsened or FB showing non progression.

Endoscopic retrieval was not attempted in case 3 and 5 as it was deemed impossible to retrieve via natural orifice due to the size and nature of the ingested objects. On the other hand, case 1 was the only case among the case series that was successfully managed non–operatively although it took a long time to carefully evacuate the foreign bodies from the rectum and sigmoid colon. We did not allow spontaneously evacuation of the wooden splinter as the wooden splinters were impacted onto anorectal mucosa causing inflammatory polyps which made it unlikely to pass spontaneously.

According to the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5), pica is diagnosed by the following characteristics: 1) repeated eating of non-food substance for at least a month, 2) eating behaviour

inappropriate to developmental level and not socially normal, and 3) in patients with pre-existing medical or mental disorder, pica is only diagnosed when eating of non-food substances is dangerous and requires additional medical investigation or treatment (12). In this case series, case one and three exhibit pica and had recurrent admissions for foreign body ingestion.

The selection of approach in foreign body retrieval requires the balance between the risk of morbidity to the patient and success rate of retrieval. This is illustrated in case three which would have been better managed conservatively due to the small calibre of the coin and success of spontaneous passage. However, this was complicated by adhesions that led to bowel obstruction and perforation. As a result, difficult index surgery with subsequent complications led to mortality in case three. In addition, prevention of further ingestion of foreign body by good control of underlying condition such as schizophrenia, highlights the importance of multidiscipline management of surgical and psychiatric teams.

"Body packers" describes people who voluntary insert or swallow drug-filled packs into a body cavity with the intention to smuggle. Medical attention is required for evaluation during custody for signs of systemic drug toxicity due to ruptured drug packs or complications such as intestinal obstruction and perforation (13). Large series support expectant management and close monitoring without surgical intervention until spontaneous passage of all packages (14) (15). While expectant management is advised, it is important to recognize the danger of container rupture resulting in systemic toxicity. In those cases timely surgical intervention and retrieval is crucial (16).

American Society for Gastrointestinal Endoscopy (ASGE) recommends earlier non-urgent extraction of foreign body such as battery and coins via endoscopy at 24-48 hours (9). However, limited literatures or guidelines have proposed the same for more distal retention of ingested foreign bodies. Only a small fraction of body packers (as small as 1.6%) usually requires surgical intervention, and observation up to seven days have been proposed, before surgical removal for intestinal retention (15). However, if conservative management have been chosen, possible complications of retained foreign bodies such as drug substance leak causing toxicity, obstruction, perforation with consequent sepsis, as well as healthcare burden of prolonged stay and monitoring must be considered. The timing of operation for intestinal retention of foreign body should be decided based on the patient's clinical condition, age, comorbidities, type of foreign body and anatomic site. As presented in case 3, customized management for complicated recurrent foreign body ingestion with histories of multiple operations, can be managed conservatively with close follow-up and easy access to healthcare facility.

Conclusion

The management of foreign body ingestion impacted beyond the oesophagus remains an intricate subject of discussion. The management of this surgical enigma becomes more sophisticated in repeated foreign body ingestion. Individualized management of complex foreign body ingestion is vital, weighing the risks of delayed treatment and operative morbidity. Endoscopy, surgery, conservative management and sometimes a combination of approaches are utilised to manage foreign bodies impacted distal to the oesophagus, especially in complex and recurrent cases. Decision, timing and approach of extraction must be individualised with consideration of risk weighed against the benefit of each intervention over the other. A standard protocol algorithm in the treatment of these patients require further studies with a larger sample size.

Informed consent

Ethical Approval and consent to participate

This case series reported is in line with the local ethics protocol and all the photographs and records included have obtained patients' or guardians' consent, whichever applicable. The records, radiographs and images were the property of the institution and local approval has been obtained for both retrieval and publication.

Consent for publication

Approval has also been obtained from the National Medical Research Registry (NMRR) for the publication of this report.

Availability of supporting data

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

All the authors included are sequenced in accordance to the contribution of each. Lim RZM, Ang AAW and Tan JH were involved in the conception of this series idea. Lim RZM had drafted, planned and organised the overall process; Ang AAW had acquired and summarised the patients' cases, and together with Tan JH were the major contributors of the literature review and the write up of the manuscript. Lee EP, Chiew JL and Tan HCL have each contributed a case presented and were involved in the revision of the manuscript and final write up. All authors read and approved the final manuscript.

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