

Problems of Diagnosis and Treatment Caused by Ingested Foreign Bodies

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Rezumat

Probleme de diagnostic și tratament determinate de corpuri străine ingerate

Un corp străin ingerat de multe ori trece tractul gastro-intestinal fără apariția unei complicații. Pot provoca perforații ale tractului gastro-intestinal diferite corpuri străine așa cum ar fi oasele de pește, oasele de pui și scobitorile. Vă prezentăm 4 cazuri: 2 cazuri, în vârstă de 27 de ani, sex masculin și respectiv în vârstă de 48 de ani sex feminin, cu abdomen acut, peritonită difuză purulentă, prin perforație de ileon, cauzată de ingerarea accidentală de sârmă, 1 caz de sex masculin 64 de ani cu perforație de colon sigmoid, cauzată de ingerarea accidentală a 2 scobitori și 1 caz 52 ani de sex feminin prezentată cu tumefacție perianală stângă veche de o săptămână asociată cu febră, iar examenul fizic a relevat un abces ischio-rectal. În timpul tratamentului chirurgical în interiorul cavității abcesului a fost găsit un os de pui lung de 3 cm. Evoluția a fost favorabilă în toate cele 4 cazuri.

Cuvinte cheie: perforație ileon, perforație sigmoid, abces ischio-rectal

Abstract

An ingested foreign body often passes the gastrointestinal tract without any complications. Foreign bodies, such as fish bones, chicken bones and toothpicks, have been known to cause perforation of the gastrointestinal tract. We present 4 cases: the first 2 of a 27-year-old male and a 48-years-old female respectively, with acute abdomen, diffuse purulent peritonitis, with ileum perforation, both caused by accidentally ingesting a wire, 1 case of a 64-year-old male with sigmoid perforation, caused by accidentally ingesting a toothpick and 1 case of a 52-year-old female presented with left buttock painful swelling for 1 week associated with fever, physical examination revealed an ischio-rectal abscess. During incision and drainage a 3 cm chicken bone was found inside the abscess cavity. Evolution was favorable in all 4 cases.

Key words: ileal perforation, sigmoid perforation, ischio-rectal abscess

Introduction

Ingestion of an unusual foreign body is a possible occurrence and most foreign bodies pass through the gastrointestinal tract without complications (1). In a few cases the presence of foreign bodies in the gastrointestinal tract results in acute surgical abdomen requiring emergency surgery (1,2,3). Intraoperative exploration remains critical in most cases (1). As foreign bodies such as dentures, chicken bones, fish bones and toothpicks are ingested they can cause perforation of the gastrointestinal system (1,4,5). The best way to remove foreign

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bodies remains controversial. Rigid endoscopic removal of foreign bodies is safe and effective. In the last decade, surgeons have taken a great interest in removing foreign bodies by means of the flexible endoscope.

Case no. 1

The patient D.A., male, 27 years old, admitted to Poiana Mare Psychiatric Hospital with diagnosis of schizophrenia, oligophrenia of 1st degree is hospitalized in the surgical emergency clinic of Craiova FO 15674 of 28.05.2009 with diffuse abdominal pain, nausea, low-grade fever and vomiting. The symptoms had started two days earlier. His vital signs were: blood pressure 120/80 mmHg, pulse rate 90 beats/min, respiration rate 18/min., body temperature 37.5°C.

Upon physical examination, a distended and diffusely tender abdomen with right lower abdomen rebound was revealed, and laboratory results were as follows: white blood cells (WBC) 10,200/mm³, blood urea nitrogen 58 mg%, blood sugar 98 mg%, Na⁺ 139 mEq/l, K⁺ 3.9 mEq/l, serum creatinine 1.1mg%, Hg=11.9 g/dl, urinalysis: a lot of mucus, 3-4 leucocytes, some epithelial cells.

Plain abdominal radiography showed mechanical obstruction, as well as many foreign objects in the upper abdominal and left flank (Fig. 1).

With the diagnosis of acute peritonitis CO 287/28.05.2009, laparotomy was performed under general anesthesia on the day that the patient was admitted.

Intraoperative findings revealed diffuse fibro-purulent peritonitis with adhesions between small bowels, and at about 35 cm from the Bauchin valve the presence of barbed wire perforated the ileum at the antemesenteric site.

The patient was treated after adhesiolysis with cuneiform resection of the perforated distal ileum and extraction of the barbed wire. Exploration of the stomach and small bowel revealed multiple foreign bodies: 5 lighters, 6 plastic soda bottle caps (Fig. 2). We performed gastrotomy and enterotomy for the extraction of the foreign bodies, peritoneal drainage.

Postoperative evolution was good, without incidents. He was discharged after 9 days postoperatively.

The patient returns to the County Emergency Hospital Craiova 13 months later with intestinal obstruction phenomena by ingestion of mineral water bottle stoppers.

Surgical exploration discovered terminal ileum obstruction by three stoppers of mineral water. We practiced enterectomy with extraction of the foreign bodies, peritoneal lavage, and drainage. Postoperative evolution was favorable.

Case no. 2

The patient P.M., female, 48 years old, FO 23657 of 15.03.2007, was admitted in the Second Surgical Clinic of the Emergency Hospital of Craiova with diffuse abdominal pain, vomiting, chills, fever. On admission, her physical examination was unremarkable, normal skin colour, except for lower abdominal tenderness with slight signs of peritoneal irritation.

Digital rectal examination revealed a normal rectal wall and a sensitive Douglas bag bottom. Vaginal tact revealed a closed cervix, with no blood loss and uterine fibromatosis.



Figure 1. Plain abdominal X-ray reveals air-fluid levels in the upper abdomen, the presence of numerous foreign bodies in the projection area of the stomach and small intestine



Figure 2. Multiple foreign bodies (lighters, soda caps, wire) removed by gastrotomy and enterotomy

The emergent laboratory tests revealed Hb=12.7 g/dl, L=8700/mm³, glycaemia=103 mg%, urea=37 mg%, serum creatinine=0.86 mg%, urinalysis: mucus, 5-6 leucocytes, epithelial cells.

Plain abdominal radiography: normal (see Fig. 3). Chest X-ray: no active pleural-pulmonary lesions (Fig. 3).

Based on the patient's history, clinical examination and laboratory findings the initial diagnosis was acute peritonitis. The patient underwent an exploratory laparotomy. Intraoperative findings revealed diffuse fibro-purulent peritonitis. Gallbladder, liver, pancreas, appendix were normal visually and palpation-wise. Upon surgical exploration of the small bowel, at about 120 cm from the duodeno-jejunal angle, there was a perforation of the jejunum at the antemesenteric site, produced by a wire with a length of 3 cm (Fig. 4).

The patient was treated with cuneiform resection of the perforated jejunum and extraction of the foreign body (wire).



Figure 3. Simple abdominal radiography in patients with small bowel perforation caused by a wire. We notice the presence of air-fluid levels centro-abdominally

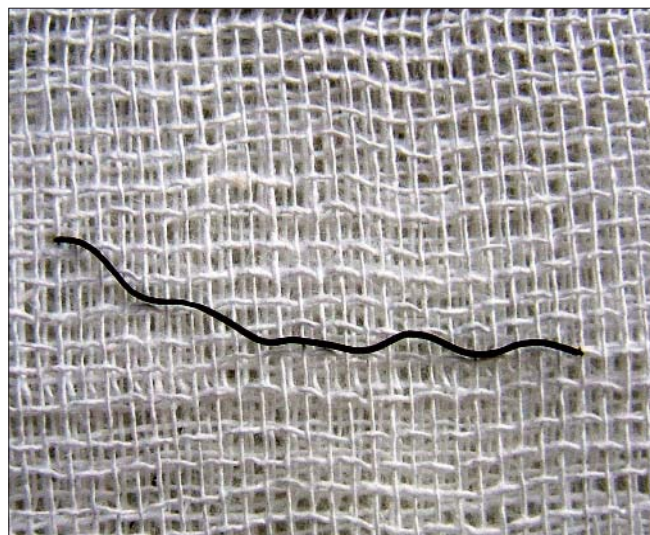


Figure 4. Swallowed foreign body, causing the perforation of the small intestine was represented by a wire

Postoperative evolution was good. The patient was discharged after 7 days postoperatively.

Case no. 3

The patient S.M., 52 years old, female, FO 38785 of 23.11.2009 was admitted in the Emergency Hospital of Craiova Second Surgical Clinic for perianal pain, low-grade fever.

On physical examination an area of tender erythematous swelling over the left perianal region at 5 o'clock position, and fluctuance were detected. On digital rectal examination, there was left lateral wall tenderness, and no fistula tract was felt.

Based on the clinical examination, the initial diagnosis was of perianal abscess. Tear drop incision was made over the perianal swelling. There was a 4 cm chicken bone found inside the abscess cavity, impinging from the rectal wall (Fig. 5).

Postoperatively, the patient was specifically asked about history of chicken bone ingestion. She recalled having ingested a chicken bone around one month before admission.

Postoperative recovery was smooth and the patient was discharged, with daily dressing and packing as outpatient.

Case no. 4

The patient T.N., 64 years old is hospitalized on 03/22/2010, FO 3423, for iliac fossa abdominal pain predominantly on the left side, low-grade fever, anorexia. The objective clinical examination revealed a patient with good general condition, pale skin, and abdominal pain in the lower abdomen with muscular defence in the left iliac fossa. Digital rectal examination showed sensitive Douglas bag bottom. Plain abdominal radiography was normal. Abdominal ultrasound: liver, stomach, gallbladder, pancreas with normal ultrasound appearance.

Biology: Hb = 11.7 g / dl, Ht = 39%, L = 11,200/mm³,



Figure 5. Foreign body causing the left ischio-rectal abscess was represented by a chicken bone. Chicken bone length was 4.5 cm

glucose 89 mg%, urea = 47mg%, creatinine = 1.1 mg%, alanine aminotransferase ALAT = 21ui/l, aspartate aminotransferase ASAT = 17ui/l, amylase 32 UW, TQ = 100%, INR = 1.23.

The preoperative diagnosis was of acute peritonitis probably by perforated colic diverticulitis. He underwent emergency surgical intervention CO 334 22/03/2010 and a sigmoid colon tumour was found, as well as perforation of the sigmoid colon lumen by the presence of two toothpicks (Fig. 6), sigmoid false membrane, localized peritonitis, liver, stomach, duodenum, small intestine, pancreas with normal visual and tangible aspect. Sigmoid colectomy was performed with end-to-end colo-recto anastomosis. Histopathologic examination revealed moderately differentiated adenocarcinoma. Evolution was favorable postoperatively, the patient was discharged after 8 days, surgically cured.

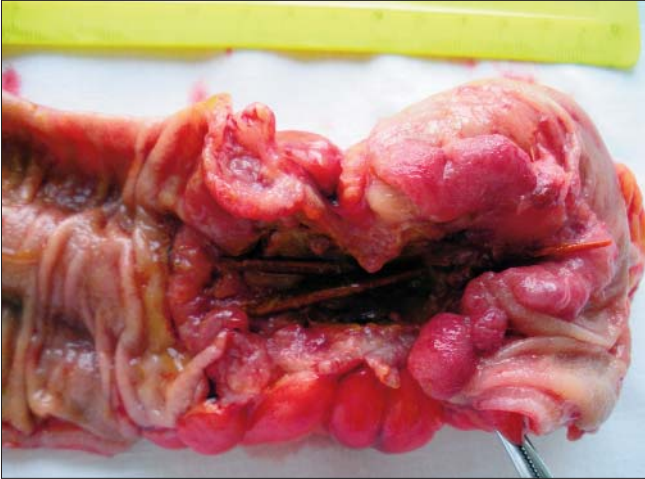


Figure 6. Sigmoid tumor is observed that was perforated by two toothpicks is observed. Sigmoid perforation occurred in the tumor stenosis. Histological examination revealed moderately differentiated adenocarcinoma

Discussion

In studies by Jakson, only half of the patients were children (6), while in those of Bakara and Bikhazi (7), 83% of patients with ingestion of foreign body in upper digestive tract were children. The study in Hong Kong conducted by Nandi and Ong (8) showed that 14.3% of patients with foreign body ingestion were children. The most common foreign body ingested was fish bone (86.3%) and a Hong Kong study regarding bone intake revealed its presence in 84% of cases. In the studies by Jakson (6) there was a big difference in outcome: 32.2% were bones, 35.9% consisted of coins and safety pins. In studies of Clerf (9) conducted on 537 cases, 27.4% of ingested foreign bodies were bones and 28.7% were represented by coins and safety pins. Differences regarding the ingestion of foreign bodies are related to cultural habitat and eating habits of the population.

Fundamental psychiatric conditions such as schizophrenia, depression, self-mutilation, masochism, and suicide attempts are favorable conditions for foreign body ingestion. The most common reasons for prisoners' transfer in a hospital or a psychiatric unit are attempts to escape from prison by ingestion of metallic foreign bodies (10-12). Ingestion of repeated foreign bodies, although a fairly common problem in pediatrics, is relatively rare in adults and is found mainly in individuals with psychiatric disorders such as bipolar disorder, depression, or post-traumatic stress disorder. Described ingested objects include fish bones, needles, razor blades, and pins (13,14). In most cases, these objects pass spontaneously with no clinical sequelae.

Accidentally ingested foreign corpora for the most part pass through the gastrointestinal tract without any consequence (15). Impaction or foreign bodies may occur in areas of anatomical narrowing (cricopharyngeal ring, lower esophageal sphincter, pylorus, duodenal sweep, ileocecal valve and anus) or physiological angles (curvature of the duodenum) or areas with pathological stricture, in patients with previous bowel

pathology (Crohn's disease, intestinal stricture) (10,13,16-18). The most common loci of perforation are the lower esophagus and terminal ileum (16,17). Digestive hemorrhage occurs when an injury occurs on the gastrointestinal mucosa (12). Foreign bodies larger than 2-2.5 cm in diameter do not fall through the pyloric canal and foreign bodies with a length of 6-10 cm or greater do not progress through the curvature of the duodenum (10,16).

The most common foreign bodies that cause perforation of the gastrointestinal tract are dentures, chicken bones, fish bones and toothpicks. A small percentage of these bodies swallowed can cause gastrointestinal tract perforation, which can occur at any level from mouth to anus (3,18). In the cases presented to us, intestinal perforation occurred in 2 cases: by wire in one case and in the other by two swallowed toothpicks that caused the perforation of a tumor that proved to be sigmoid adenocarcinoma.

Diagnostic problems imposed by the ingestion of foreign bodies

Intestinal perforations by foreign bodies are rarely diagnosed preoperatively because clinical symptoms are non-specific and mimic other surgical conditions such as appendicitis or diverticulosis as colonic perforation (19). High risk of perforation is found at extreme ages, in patients with dentures (20) in patients with a history of colic pathology, or sick alcoholics or psychiatric patients (21,22).

The risk of perforation is related to the length and shape of the object ingested (23). Over-nutrition, exaggerated appetites (bulimia) are predisposing factors for fast ingestion of chicken bones when eating. The average time from ingestion of foreign body to perforation is 10.4 days (20). Most perforations occur in the straits and the angles of the gastrointestinal tract (24). The most common sites of perforation are represented by distal ileum (1,22,25-27), the caecum and the left colon (20,26), although an increased incidence of perforation has been reported in association with Meckel's diverticulum, the appendix, and diverticular disease (2,25,28).

The diagnosis was established during laparotomy in more than 90% of cases (1,20,26,27). All cases had abdominal contamination and 66.7% had diffuse peritonitis (20).

Clinical presentation includes peritonitis, abdominal abscess formation (2), perineal and scrotal abscess (29), enterobladder fistulas, bowel obstructions and gastrointestinal bleeding (2). The preoperative diagnosis was frequently surgical acute abdomen of unknown cause (20). Patients with perforation of the stomach, duodenum and large intestine were rather feverish, with chronic symptoms, normal WBC and often asymptomatic, or had been diagnosed with abdominal or intraperitoneal abscess, compared with patients with perforations at jejunum and ileum level through the foreign body swallowed, (2). The patient presented to us was transferred from Poiana Mare Psychiatric Hospital (where he was hospitalized with a diagnosis of schizophrenia, oligophrenia of 1st degree) and was operated on with emergency status under the suspicion of acute peritonitis.

Paraclinical useful imaging of foreign body ingestion

Although imaging findings can be nonspecific, the identification of a chicken bone with an associated mass or extra luminal collection of gas in patients with clinical sign of peritonitis, mechanical bowel obstruction, or pneumo-peritonem strongly suggests the diagnosis (24,30).

If the foreign body is radiopac is radiopaque it is sufficient to scan one side of the neck, chest or abdomen to locate the object. X-rays can be used later targeted. Plain radiography is helpful in locating metallic foreign body, but it is not useful in locating other foreign bodies such as chicken or fish bones. The presence of pneumomediastinum suggests a serious complication such as esophageal perforation. It was found that contrast radiography of the esophagus is not reliable for the detection or exclusion of foreign bodies in the esophagus. In certain circumstances, contrast studies are contraindicated (31).

In situations when the object is below the diaphragm, further radiographies are unnecessary (in the absence of gastrointestinal abnormalities, such as operated pyloric stenosis). If the foreign body is radiolucent, the location can be inferred from effects (e.g. airway compression) seen on simple radiographs. When a foreign body is suspected, based on clinical symptoms, endoscopic visualization has the advantage of endoscopic removal, which can be most effective in therapeutic conduct. Examination of upper digestive tract with flexible endoscope is considered a highly accurate diagnostic test (31). CT or MRI is indicated only if there is suspicion of complications (e.g. perforation).

The issue of in rectum foreign bodies

Intentional or unintentional insertion of rectal foreign bodies is quite rare and often poses problems for the clinician.

Foreign corpora causing perforation most frequently are represented by toothpicks, pins, wires and bones of animals, the latter being responsible for 46% of perforations (32). In impaction of the foreign body in the anal canal, the patient experiences severe anal pain, suggesting a fissure, but if the patient accuses pulsating pain it is more likely that it will develop sepsis. The patient may have a para-anal abscess and increased urinary frequency, dysuria secondary to irritation of the prostate and bladder base (33).

Literature review revealed several case reports on perianal abscess or fistula-in-ano associated with fish bone ingestion (34). Although it is rare for ingested fish bones to cause peri-anal sepsis, such a condition should be suspected when a patient with recent history of foreign body ingestion presents with peri-anal sepsis. In 1975, Moreira and colleagues (29) have reported a patient with ingestion of chicken bone impacted in the lateral rectal wall which caused a peri-rectal abscess spread to the scrotum and anterior abdominal wall. In the case presented by us, the chicken bone that perforated the left side wall of the rectum caused a left perianal abscess.

Problems of treatment induced by the ingestion of foreign bodies

Treatment depends on patient age and symptoms, the nature and type of foreign body and anatomical location especially if impacted. The management may consist in conservative or interventional methods, endoscopic, laparoscopic or open surgery. Complications that may arise with nonsurgical modalities include perforation, migration in the liver and pancreas (35,36), pancreatitis, gastric varices development, splenic artery pseudoaneurysm, (37), or even aspect that is indistinguishable from locally advanced pancreatic carcinoma (38). In these cases, laparoscopy (39) or exploratory laparotomy is usually required. Exploratory laparotomy is quite risky especially for psychiatric patients who had a history of ingestion of multiple foreign bodies, with multiple previous surgeries (39).

Blunt objects such as coins can impact the esophagus resulting in partial or complete obstruction. Endoscopic removal will be attempted in all cases, as a prolonged standing can lead to necrosis, perforation or fistula formation (10,16). A prospective in vivo study conducted by Faigel and collaborators demonstrated that the removal of foreign bodies was more effective by technique of basket or forceps technique (40). If the object passed into the stomach and the stump is less than 2 cm in diameter, it is preferable to adopt a conservative course of treatment with weekly radiographic follow. If the object remains in the stomach, blunt endoscopic removal in 1-2 months is indicated to facilitate any opportunity for spontaneous passage (12,16,40,41). Blaho and collaborators have also recommended a waiting period of 3-4 weeks to allow for passage before attempting endoscopic removal (12). Zuloaga and collaborators suggests that the waiting period be 2 months (41).

Endoscopic removal of sharp objects such as shaving blades, clamps, needles that are enclaved in the esophagus will be removed immediately (10,16). If the objects submit in the stomach or duodenum, endoscopic removal attempts should be made immediately, because the risk of perforation of the ileo-cecal valve is approximately 35% (10,16,17). If the pointed object goes beyond the duodenum, the patient will be monitored daily through radiographies and will remain under close observation. Surgery will be necessary if the object is no longer progressing radiographically after 72 hours. Emergency laparotomy is required if the patient develops clinical signs of acute peritonitis (10,16).

Batteries require emergency endoscopic removal if they are retained in the esophagus due to risk of electrical burns, lightning and necrosis that may lead to subsequent perforation (10,16). Once the battery has passed into the stomach, removal is indicated only if the battery remains in the stomach over 48 hours, or if the battery diameter measures more than 2 cm (16). Once they pass the duodeno-jejunal flexure, 85.4% of these batteries are removed in 72 hours. 2 radiographies a week are considered sufficient follow-up methods (16). Therapy with laxatives and antacids has not proved effective, although

gastric lavage has been described as a facilitator of removal (42). Murshid and colleagues described the successful extraction of a needle from the terminal ileum, in a female patient, aged 17, after failed endoscopic removal (17).

Body packers (i.e., patients who have ingested wrapped packages of drugs to avoid detection during transport) are at risk of death if the packets rupture. Such patients should be hospitalized and whole-bowel irrigation considered, surgery is reserved for those cases where there are signs of obstruction or rupture of narcotic substance (10,16).

In intestinal perforation treatment usually involves bowel resection but the most common treatment was suture perforation (26).

Surgeons are showing interest in natural orifice surgery because of its minimally invasive nature. The new paradigm shift of using a natural orifice, as opposed to the abdominal wall, as a conduit for entry into the abdomen has resulted in novel solutions to solving difficult surgical problems. Repetitive foreign body ingestion continues to be one of those challenging dilemmas. Ingested objects that cannot be retrieved endoscopically must be removed by laparoscopy or laparotomy. Surgical removal, however, becomes more difficult with each subsequent operation.

While endoscopic removal is feasible in most cases of foreign body ingestion in which spontaneous passage is not successful or possible, surgical exploration is occasionally necessary. Although laparoscopic exploration and retrieval may be preferable in such circumstances, in patients with multiple prior abdominal surgeries, access to the peritoneal cavity may be difficult to obtain and may involve extensive adhesiolysis with its attendant risks of bowel injury and prolonged operative time and may be compromised by poor visualization and exposure, increasing the potential morbidity of the patient and the frustration of the surgeon. These difficulties are inherent during conventional laparotomy in this setting as well. As such, an innovative approach in these instances may minimize these risks to both the patient and surgeon. The development and application of natural orifice transluminal endoscopic surgery (NOTES) has generated substantial interest amongst surgeons, gastroenterologists, and the medical device industry. The feasibility of NOTES has been demonstrated in porcine models of the peroral transgastric endoscopic approach to the peritoneal cavity for the performance of cholecystectomy (43), gastrojejunostomy (44), splenectomy (45), oophorectomy and salpingectomy, (46) and tubal ligation. (47). More recently, NOTES appendectomies and laparoscopic-assisted NOTES cholecystectomies have been performed both via the transvaginal and transgastric route in humans. Substantial technical hurdles to be overcome include optimization of gastric/visceral closure, prevention of infection, development of endoscopic suturing and anastomotic devices, multi-tasking platforms, and adequate physician training.

Conclusions

1. Areas where perforations by foreign bodies occur more

frequently include the ileo-cecal and rectosigmoidian regions, because the intestinal lumen is narrowed at this level and the digestive tract is angulated in these sites.

2. Sites where impaction is most likely include zones with adhesions, areas containing a diverticular process, or surgical anastomoses.
3. Ingestion of sharp foreign bodies may cause perforation of the gastrointestinal tract, both high and low, and of the anal canal. High index of suspicion is needed in cases with history of foreign body ingestion presenting with ischio-rectal abscess, to aid diagnosis and prevent injury to the operating surgeon.
4. Because research on using NOTES on a larger scale is yet as developed as in the case of digestive endoscopy, or laparoscopy, it is necessary to rethink the clinical approach in the face of difficult clinical problems related to ingestion of foreign bodies and use currently available therapies. NOTES development can ease foreign body removal from the stomach, sigmoid colon or rectum.

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