

A Rare Case of a Gastrointestinal Foreign Body of Unusual Localization

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Abstract

Background: Foreign body (FB) and food impaction are some of the most common gastrointestinal complaints seen in the emergency department. **Case Report:** A 30-year-old man presented to the clinic with epigastric pain. His wife suspected that he may have inadvertently swallowed a wooden toothpick, which had been left in a glass of soda he drank yesterday. Fibrogastroduodenoscopy was done, but no FB was seen. The patient was kept in the clinic for observation for 24 hours. A week later, due to pain of the same type, he was rehospitalized in the same clinic. The patient was diagnosed with intercostal neuralgia, prescribed appropriate medication, and discharged from the hospital. Three months later, the patient developed a fever with chills, pain in the epigastric region and diarrhea. He was hospitalized again in the same clinic. Based on laboratory and abdominal CT findings, acute pancreatitis was diagnosed. He was discharged from the clinic in a few days. Later an MRI examination was performed. The diagnosis was the same. Since the patient's condition remained critical, he decided to apply to the First University Clinic on his own. A detailed anamnesis was collected. Previous imaging studies were analyzed in detail. Attention was drawn to the presence of a completely insignificant white spot in the parapancreatic tissue, which, after converting the image from the axial to the sagittal section, took on a toothpick-like appearance. The endoscopic examination revealed that the toothpick had completely passed out of the lumen. Open surgery was performed. Two years have passed since the operation. The patient is practically healthy. **Conclusion:** Our case of complication and location of a FB is rare, which makes it difficult from both

diagnostic and therapeutic points of view. Our experience once again shows how important the interaction of a multidisciplinary team is, as well as the correct sequence of examinations and detailed analysis of data.

Keywords

Foreign Body, Duodenum, Toothpick

1. Introduction

Foreign body (FB) and food impaction are among the most common gastrointestinal complaints encountered in the emergency department. Foreign bodies tend to pass spontaneously without intervention. However, there are rare cases of unusually developing events and unusual localization of FB. Ingestion of true foreign bodies (*i.e.* nonfood objects) occurs more frequently in children than in adults. In adults, esophageal food bolus impaction is a much more common problem with an estimated annual incidence of 13/100,000 people. True foreign body ingestion in adults, either intentional or unintentional, appears more often in the elderly population; in patients with psychiatric disorders developmental delay, or alcohol intoxication; and in prisoners seeking secondary gain. The passage through the duodenum depends on the diameter as well as the length of the ingested foreign body. Foreign bodies longer than 6 cm and with a diameter of more than 2.5 cm make the duodenal passage difficult [1] [2].

Among the many rare localizations of foreign bodies in the gastrointestinal tract and outside it, our case described below is distinguished by its rarity. The objective of the paper is to describe the importance of a detailed medical history, the correct interpretation of the studies conducted in such complex cases, and the role of communication both between the patient and the doctor, and between doctors of different specialties.

2. Case Report

A 30-year-old man with no significant medical history presented to the emergency department with epigastric pain. According to his wife, she suspected that he may have inadvertently swallowed a wooden toothpick, which had been left in a glass of soda he drank yesterday. However, the patient did not experience any immediate symptoms during or after drinking the soda. The patient began to experience pain in the epigastric region in the morning.

Fibrogastroduodenoscopy was done, but no FB was seen. The patient was kept in the clinic for observation for 24 hours. During this period pain disappeared and did not recur. As a result, he was discharged from the clinic.

Two days later, the patient again experienced pain and discomfort in the epigastric region, which intensified with deep inhalation and bending down (probably due to the penetration of a foreign body into the surrounding tissues). A week

later, due to severe, persistent pain of the same type, he was rehospitalized in the same clinic, where he was consulted by a surgeon. This time, surgical pathology was again ruled out. The patient experienced increased pain with movement, especially when bending down and to the side. As it turned out later, this was caused by a foreign body located in the retroperitoneal region, but at that time it was interpreted as neuralgia. So, the patient was diagnosed with intercostal neuralgia by a neurologist, prescribed appropriate medication (Non-steroidal anti-inflammatory drugs (NSAIDs)), and discharged from the hospital.

The patient's general condition improved somewhat after that treatment. The intensity of the pain decreased, although the dull local pain remained constant.

A month after the incident, the pain was accompanied by a three-day fever (T-38°C - 39°C), but there was no hospitalization. The fever went away on its own.

Three months later, the patient again developed fever with chills, increased pain intensity in the epigastric region and diarrhea. He was hospitalized again in the same clinic. He had leukocytosis ($15.8 \times 10^9/L$), elevated CRP (135 mg/l) and lipase (205 U/l). Based on laboratory and abdominal CT findings, acute pancreatitis was diagnosed. After conservative treatment, he was discharged from the clinic in a few days in an improved condition. Treatment was carried out mainly with infusions of crystalloid solutions, painkillers (NSAIDs), proton pump inhibitors (PPI), antibiotic therapy (combined penicillins).

It is noteworthy that during all this time, attention was never drawn to the possible presence of a FB.

The patient continued diagnostic studies on an outpatient basis. An MRI of the abdominal cavity with contrast was performed in one of the clinics. Conclusion: "The tail of the pancreas is swollen peri- and retropancreatically, the fatty tissue at the level of the body and partially the tail is markedly swollen and imbibed, against which an irregularly contoured infiltrative mass is visible. These changes are consistent with inflammatory changes in the pancreas and parapancratic space." This time, too, attention was not focused on the FB.



Figure 1. Computed tomography of the abdominal cavity, axial section. Soft tissue window, infiltrative changes are visible in the left retroperitoneal space, against which a high-density FB is visible, outlined by a red ring.

Since the patient's condition remained critical, he decided to apply to the First University Clinic of the Tbilisi State Medical University on his own after 4 months from the incident. He complained of constant, periodically stabbing pain in the epigastric region, periodic high fever of 38°C - 39°C, weakness, and weight loss. Laboratory tests revealed leukocytosis ($17.2 \times 10^9/L$), elevated CRP (210 mg/l), moderate anemia (HGB-110 g/L). After a detailed anamnesis, it was noted that the patient's health problems began with a FB that probably entered the digestive tract several months ago. Previous imaging studies were analyzed in detail. Radiologists were asked to search for a FB in the area of inflammatory changes, after which attention was drawn to the presence of a completely insignificant white spot in the parapancreatic tissue, which, after converting the image from the axial to the sagittal section, took on a toothpick-like appearance (**Figure 1**). The actual size of the sticks (6 cm) was compared with the size of the object in the image, which also turned out to be 6 cm. A previously performed MRI was re-evaluated. The MRI also verified a FB (**Figure 2**). For the final verification of the diagnosis, a repeated contrast-enhanced CT scan of the abdominal cavity was performed in our clinic and the presence of a FB-a toothpick-was finally determined in the retroperitoneal area adjacent to the duodenum (**Figure 3**). CT scan conclusion: "A 6 cm thin FB of slightly increased density is visible in the distal part of the lower horizontal branch of the duodenum to the left of the spinal column. At this level, the duodenum is swollen, the adjacent retroperitoneal fatty tissue is infiltrated. A small fluid exudate is detected near the left lateral groove." Due to the rather difficult location of the FB for surgical access and the opinion expressed about the presence of a certain part of the FB in the intestinal lumen, in order to avoid surgical intervention and the associated risks, an attempt was made to remove the FB using an enteroscope. The endoscopic examination revealed that the toothpick had completely passed out of the lumen and a perforated hole was observed, from which the retroperitoneal parapancreatic tissue was constantly infected with the contents of the duodenum, which led to the presence of a clinical and radiological picture of persistent pancreatitis (**Figure 4**).

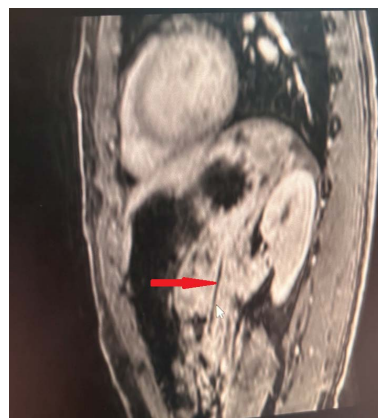


Figure 2. Abdominal MRI, sagittal section. On the projection of the duodenum and retroperitoneal adipose tissue, a straight, linear shadow of toothpick is determined.

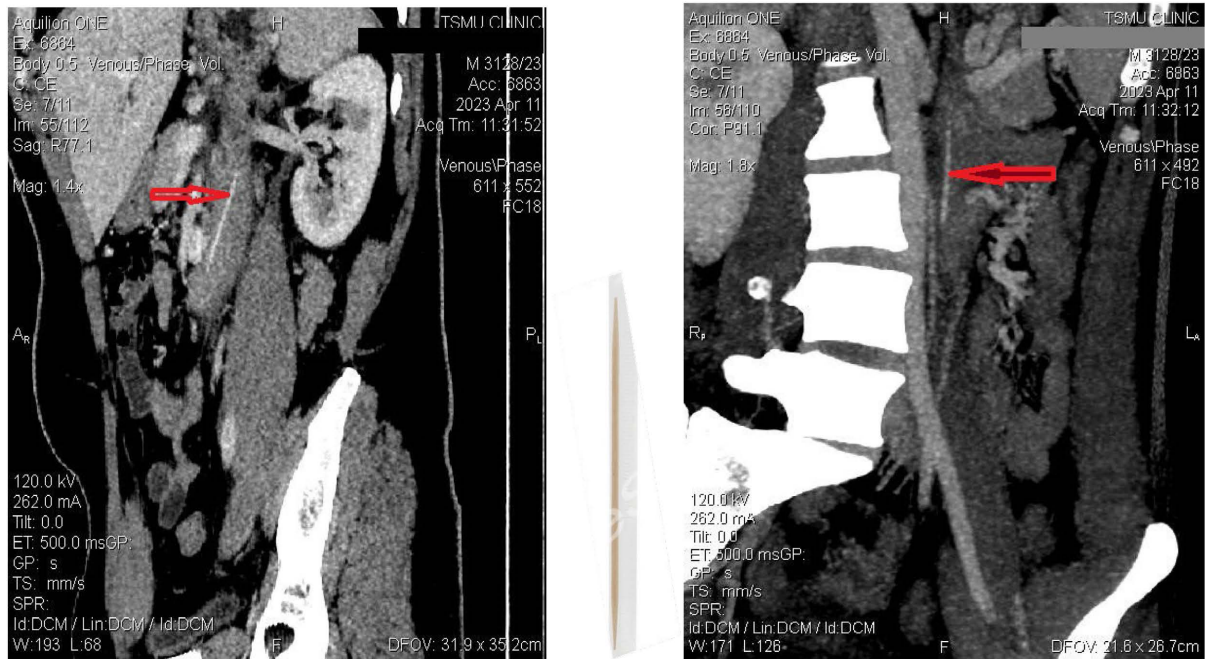


Figure 3. Abdominal computed tomography. A) sagittal reconstruction; B) toothpick; C) oblique coronal reconstruction. The arrow shows a high-density FB-a toothpick.



Figure 4. Endoscopic examination. In the third part of the duodenum a perforation hole is visible, through which a toothpick penetrated the retroperitoneal space.

Due to the inability to remove the FB through a minimally invasive approach, open surgery was performed after proper preparation. A midline laparotomy was performed and the retroperitoneal space was accessed from the right side using the Cattell-Braasch maneuver. After this, a foreign body was found near the duodenum, in the place indicated on the CT scan. The abdominal cavity was washed and drained with two drains. One drain was placed in the retroperitoneal space and the second in the pelvic area. No intraoperative and/or postoperative compli-

cations occurred. The patient was discharged from the clinic on the 5th day after the operation. Two years have passed since the operation. The patient is practically healthy.

Summarizing the described case, it is necessary to emphasize that the final and, most importantly, correct diagnosis was made 4 months after the incident.

3. Discussion

FB and food impaction are one of the most common gastrointestinal complaints seen in the emergency department. The majority of FB ingestions occur in the pediatric population. Most ingested FBs (80% - 90%) pass spontaneously. However, approximately 10% - 20% of cases of FB ingestion require endoscopic removal, while less than 1% will need surgery for FB extraction or to treat complications. 97% of the cases of failed endoscopic removal are due to FB incarceration > 24 h [1]-[9]. Perforation of the digestive tract by ingested FBs is rare, with <1% of ingested FBs perforating the bowel. Fishbones are the most commonly ingested objects and the most common cause of FB perforation of the gastrointestinal tract. Potential sites for blocking include the cricopharyngeus muscle or upper sphincter, aortic arch, left main stem bronchus, gastroesophageal junction or lower sphincter, pylorus, duodenal sweep, ileocecal valve, and anus. The terminal ileum is the most common site of perforation, followed by duodenal C-loop. FBs and food impactions in the esophagus have the highest incidence of complications with the complication rate directly proportional to the dwell time in the esophagus. Patients with previous GI tract surgery or congenital gut malformations are at increased risk [5] [9]-[11].

The majority of FB ingestions occur in the pediatric population, with a peak incidence between the ages of 6 months and 6 years. In adults, true FB ingestion (*i.e.*, nonfood objects) occurs more commonly in those with psychiatric disorders, developmental delay, alcohol intoxication, and in incarcerated individuals seeking secondary gain via release to a medical facility. Edentulous adults are also at greater risk of ingesting FBs, including an obstructing food bolus or their dental prosthesis. Patients presenting with food bolus impaction often have underlying esophageal pathology directly causing the impaction [9] [12] [13].

According to Hong K. H. and colleagues, the most common type of foreign object was a fish bone (32.5%), followed by drugs (20.1%), shells (9.8%), meat (7.7%), metal (7.2%), and animal bones (6.2%). Others included stones, plastic, dental prosthetics, teeth, beans, and a toothbrush. The median size of the FBs was 26.2 ± 16.7 (range: 3 - 140) mm [14].

For communicative adults, history of ingestion including timing, type of ingested FB and onset of symptoms is usually reliable. In mentally impaired adults and in cases of intentional FB ingestion for secondary gain (e.g. by prisoners), a medical evaluation can be difficult. Patients with esophageal FBs, particularly impacted food boluses, are almost always symptomatic and can specify the onset of symptoms and localize discomfort exactly. However, the area of discomfort often

does not correlate with the site of impaction. Esophageal FBs result in symptoms such as dysphagia, odynophagia, or retrosternal pain; sore throat, FB sensation, retching, and vomiting are also very common. Respiratory symptoms include choking, stridor, or dyspnea and can result from aspiration of saliva or from tracheal compression by the FB. Hypersalivation and inability to swallow any liquids are suspicious for complete esophageal obstruction. When the FB has passed the esophagus, the majority of patients remain asymptomatic but a sensation of FB, with dysphagia, can persist for several hours and thus can mimic a persisting FB impaction. Physical examination is mandatory to detect ingestion-related complications such as small-bowel obstruction. Symptoms indicating perforation include fever, tachycardia, peritonitis, subcutaneous crepitus, and swelling of the neck or chest. Lung examination should be performed to assess the presence of wheezing or aspiration [1]-[4] [7] [9] [15]-[17].

Generally, identification and radiographic localization are the initial preferred steps in the management of FBs. Biplane radiographs are useful for confirming ingested materials and complications, such as free air and lung aspirates, prior to attempts at endoscopic extraction. Routine neck AP X-rays could not detect FBs in two-thirds of patients, and radiopaque material was found in only 38% of patients. Although no small bony, thin metal, or plastic materials were detected on routine radiologic examinations, failure to locate an object on X-rays does not preclude its presence. In these cases, CT scan, with a sensitivity from 90% to 100% and a specificity of 93.7% to 100%, is significantly superior to radiography. CT not only provides better anatomic information, but can also detect other complications such as abscess formation, mediastinitis, or aortic/tracheal fistulas [2] [5] [9] [17]-[20].

Another difficulty is that the presence of free gas under the diaphragm is almost never seen in FB perforation of the gastrointestinal tract. Because the perforation is caused by impaction and progressive erosion of the FB through the intestinal wall, the site of perforation becomes covered by fibrin, omentum, or adjacent loops of bowel. This limits the passage of large amounts of intraluminal air into the peritoneal cavity. Free intraperitoneal air is therefore a poor radiologic sign. The region of perforation can be identified on CT scan as a thickened intestinal segment, localized pneumoperitoneum, regional fatty infiltration, or associated intestinal obstruction [2].

FBs that seem to be dangerous because of their shape and size should be effectively removed. There are many options available, including endoscopy, laparoscopy, and laparo-endoscopic removal of FBs. The procedure of choice is endoscopic removal and is fruitful in the majority of patients. Successful removal from endoscopy is highly successful in children and in patients with a short duration of ingestion. Once FB ingestion is diagnosed, the physician must decide whether intervention is necessary, what degree of urgency is merited, and what the optimal modality of intervention might be. The timing of endoscopic intervention is dictated by the perceived risks of aspiration and/or perforation. Patients with sharp

objects and disk batteries lodged in the esophagus require urgent endoscopic intervention. Urgent intervention is likewise needed for FBs, such as food impactions, causing obstruction and the inability to manage secretions. Those without evidence of high-grade obstruction, or acute distress, can be handled less urgently as spontaneous passage may occur. However, no foreign object or food bolus impaction should be allowed to remain in the esophagus beyond 24-h after presentation. For adults presenting with possible food impaction, medical management can be attempted; however, endoscopy is often required. Complications are usually related to the location of the object and the time since ingestion. Esophageal FBs can cause mucosal wall edema and weakening, which increases the risk of bleeding and perforation. For this reason, esophageal FBs should be removed as quickly as possible [5]-[7] [21].

If the battery is within the esophagus at the time of presentation, prompt endoscopy is required since damage can occur as early as 2 hours of ingestion. Ingestion of an individual magnet can usually be managed at home. However, if several magnets or co-ingestion of a magnet and other metal occurs, then prompt intervention is required. Neodymium and other high powered earth magnets are most concerning and have the power to attract each other through several layers of the bowel wall. Immediate endoscopy should be performed in these instances. Patients may be required to go to the operating room if they are presenting with signs of obstruction, peritonitis, or perforation. Glucagon and diazepam should not be used in the pediatric population since it can induce vomiting and lead to aspiration [7] [22].

The American Society for the Gastrointestinal Endoscopy Committee recommends an otolaryngology consultation for foreign bodies suspected to be at the level of the cricopharyngeal muscle or above. There is a variable success with the use of glucagon to relieve food impaction. Diazepam has been used concurrently with glucagon in some instances. This form of management is safe, with relatively few adverse effects. Glucagon has been shown to decrease the tone at the lower esophageal sphincter. This mechanism, which helps relieve food impaction, can also induce vomiting, which could potentially lead to perforation and distal obstruction. A study showed that the use of glucagon successfully relieved one-third of food impaction and suggested that the cost of initial medical management with glucagon was significantly lower than initial treatment with endoscopy. The older the patient and the earlier they present to the emergency department are independent predictors of a FB being present on endoscopy. It is thought that perhaps older patients have decreased esophageal motility, therefore, decreasing the probability of a FB being able to dislodge spontaneously [7] [21] [23].

Complications and their severity are usually related to the object ingested, its location, and the amount of time that has passed since the ingestion. One of the main concerns with a FB or food impaction in the esophagus is the pressure placed on the mucosal walls and the resulting edema. This causes weakening of the esophageal walls increasing the risk of bleeding and perforation. Button batteries,

which are not chemically inert, impacted in the esophagus can cause severe tissue damage and burns caused by the build-up of sodium hydroxide. Fistulization into major blood vessels can occur, resulting in severe, even fatal hemorrhage. Damage can begin to develop as early as 2 hours after ingestion. Complications from the ingestion of magnets usually occur if numerous magnets or a magnet with additional metallic objects were ingested. The magnets can cause an attraction to one another through several layers of the bowel wall. This can lead to obstruction, volvulus, and fistula formation. Tissue necrosis and perforation can occur, leading to peritonitis. Deep pressure ulcerations can occur within the first 8 - 24 hours following ingestion [6] [7] [21] [22] [24].

Of all ingested foreign objects described here, toothpicks and cocktail sticks have the greatest propensity for migrating into any of the adjacent organs leading to fistulation and abscess formation. Depending on the type of wood it happens to be made of, a toothpick can be difficult to perceive on CT, particularly when oral or intravenous contrast is used. When doubt exists, a repeat non-contrast CT study will improve the diagnostic confidence. As with fish bones, careful inspection using multiplanar and, if necessary (to persuade the surgeon), three-dimensional reconstructions will often be useful. Luckily, certain wooden sticks are quite radiodense allowing for an easy discovery. Successful attempts have been made to use ultrasound for detecting ingested toothpicks, but CT remains the mainstay of the diagnosis [25] [26].

The literature describes various rare localizations of FBs of the GI tract and complications.

Reports of fishbone-induced perforation of appendicitis are extremely unusual, despite there being a few reports of fishbone found in the appendix in the East Asian surgical literature [27] [28]. In one case intraoperatively the appendix was found to be in a retrocecal position and was strongly adherent to the caecum secondary to inflammation. Upon separation of the adhesions, there was a small perforation seen in the mid portion of the appendix with a FB measuring about 1 cm in length protruding from the mucosa. The FB was gently removed with a laparoscopic grasper and was noted to resemble a fishbone upon close inspection [11].

In the other case. Endoscopy showed edematous pylorus, and entering the bulb there was a 2 cm polypoid mass with rugal fold-like surface resembling stomach mucosal folds and ulcerative lesions in proximal duodenum. Biopsy was made from duodenal lesions. Upper GI series showed an oval lucent shadow (filling defect) in the duodenal bulb, close to the outlet of pylorus suggestive of Brunner's gland hyperplasia/adenoma. Abdominal CT scan with contrast showed entrapment of contrast in the stomach and duodenum at the level of second lumbar vertebra suggestive of a soft tissue mass or nonopaque particle. Biopsy of the bulb area was reported as adenocarcinoma. Whipple's operation was performed. Gross and microscopic pathology of the whole resected specimen was positive only for an ulcerative area in proximal bulb and interestingly an impacted peach kernel was found beside it. Review of the previous pathology showed regenerative glands

with no tumor. The past history of the patient was positive for eating a peach, with sudden swallowing after bending to buckle his shoes four years ago. No kernel passing occurred in his stool [29].

In another case on gastroscopy, a mass eminence was observed in the anterior wall of the gastric antrum near the pylorus, with a central lacuna and soft surrounding texture. Biopsy forceps were extended to reveal a large amount of purulent secretions. The patient immediately underwent emergency surgery after confessing the risk. Local adhesion around the gastric antrum was seen during the operation. Apart from the package, a 3 cm fishbone could be seen entering the stomach wall. The other end was punctured into the liver with local bleeding [8].

4. Conclusion

Along with the above and other rare cases, our case of complication and location of a FB is rare, which makes it difficult from both diagnostic and therapeutic points of view. Despite this, our case demonstrates some of the problems of modern medicine, among which are inattentive and incomplete collection of medical history and clinical data, and insufficient communication between doctors of different specialties. These shortcomings can lead to delayed diagnosis and, in some cases, to misdiagnosis. As our case showed, insufficient communication between different specialists initially led to only a focus on the inflammatory changes in the parapancreatic tissue identified in the initial imaging studies, and only after a multidisciplinary discussion of the details of the anamnesis and clinical data was the goal of detecting a FB identified, which was successfully achieved. Our experience once again shows how important the interaction of a multidisciplinary team is, which is the key to the correct interpretation of the anamnesis, as well as the correct sequence of examinations and detailed analysis of data in case of unclear causes of abdominal pain and poor general condition of the patient.

Informed Consent

The patient has provided informed consent.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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