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When traditions become dangerous: Intestinal perforation from unusual foreign body—Case report and short literature review

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ABSTRACT

Gastrointestinal perforation (GI) is a common cause of acute abdomen in the emergency department that needs a prompt surgery intervention. Nowadays, CT examinations represent the method of choice to image patients with acute abdominal pain in emergency. GI perforations by foreign bodies ingested is rare and only < 1% of ingested foreign bodies are believed to cause perforation of GI. MDCT is to be considered the best imaging method for identifying foreign bodies, the perforation site and the surgical treatment to be planned reliably. We presente a case of 70-year-old lady presented to our Emergency Department with acute abdominal pain.

1. Introduction

Gastrointestinal (GI) perforation is a common cause of acute abdomen in the emergency department that needs a prompt surgery intervention [1]. As the surgical approach has recently trended towards laparoscopic rather than open repair, prospective identification of the site of perforation on CT imaging has become an essential part of the preoperative evaluation [2]. It can determine the site and cause of perforation with an accuracy of 86% [3].

Main sites of GI tract perforation are stomach, duodenum, small bowel (Jejunal and ileal), appendix, large bowel and rectum [1]. Major etiologies of GI perforations are peptic ulcer disease, diverticulitis, neoplasms, inflammatory bowel disease (IBD), bowel ischemia and rarely foreign body ingestion [4]. The overall mortality from large bowel perforation has been reported between 16.9% and 19.6%, emphasizing the importance of making an accurate and timely diagnosis [5].

Perforation of gastrointestinal tract by ingested foreign body is rare but remains an important life-threatening condition, and the outcomes are poorer when the diagnosis is delayed [6]. Here we report a case of a 72 y.o. lady with acute abdominal pain from sigmoid perforation by accidental ingestion of a foreign body together with food.

2. Case report

A 70-year-old lady with clinical history of diverticulitis, presented to our Emergency Department with acute abdominal pain and surgical suspicion of free abdominal air.

Due to the critical clinical condition, the computer tomography (CT) with contrast-agents was performed. Abdomen and pelvis CT scan before and after i.v. injection of contrast medium was achieved and showed the typical findings of a sigmoid colon diverticulitis (segmental thickening and enhancement of bowel wall) but complicated by a wall perforation with the evidence of multiple extra-peritoneal gaseous-fluid collection containing a linear hyperdense object to refer to a foreign body. Multiplanar and Volume Rendering reconstructions allowed the evidence of a small sharply object (approximately 20 x 5 mm axial diameters) that the patient was unaware to have ingested (Fig. 1 A–D). Surgery confirmed the sigmoid perforation and the ingested object found in the extraluminal inhomogeneous collection was a date nut tip (Fig. 2 A–B).

3. Discussion

Gastrointestinal (GI) perforation is a common cause of acute abdomen in the emergency department that necessitates a prompt surgery intervention. CT imaging has become a fondamental part of the

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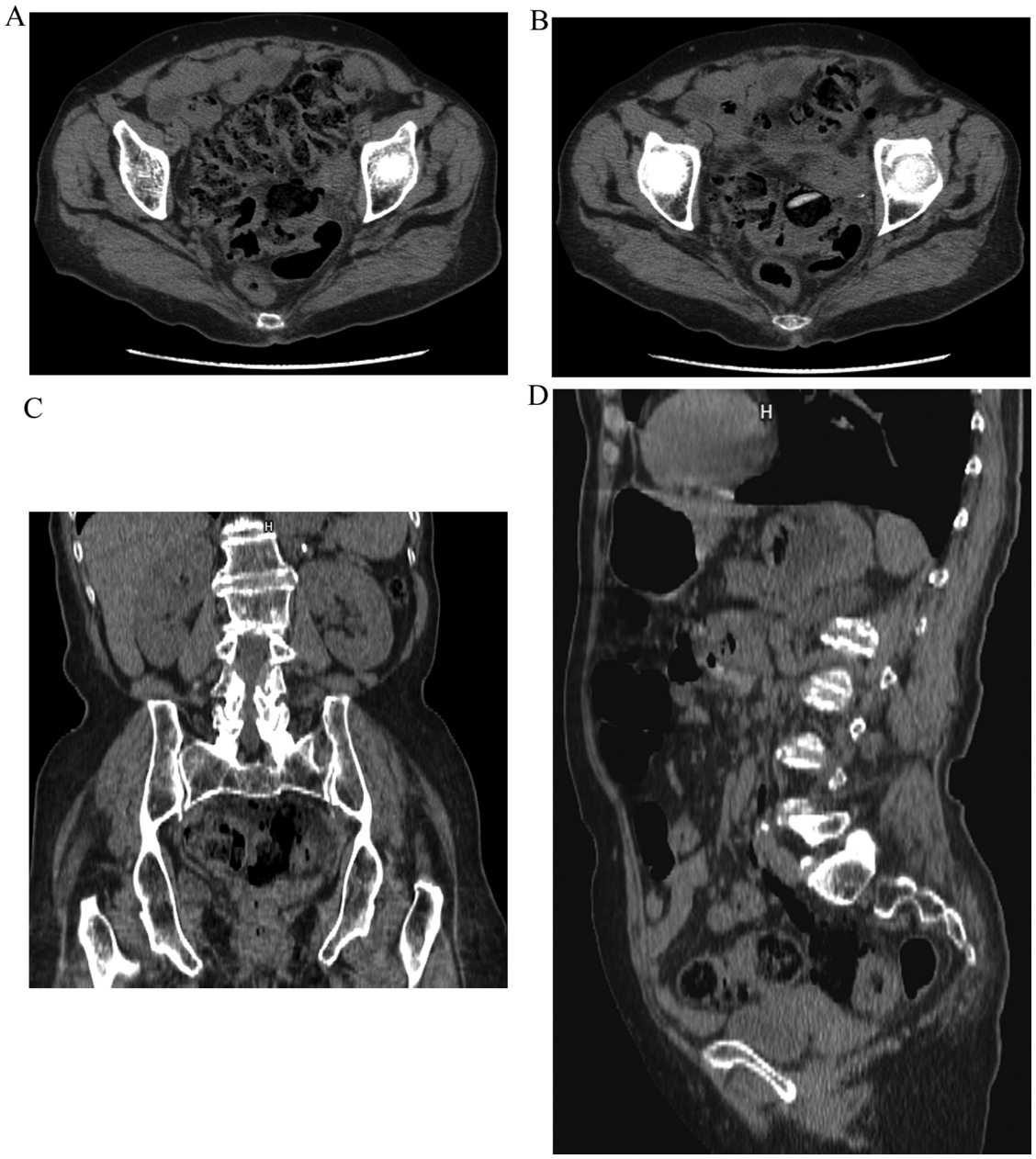

Fig. 1. MDCT Multiplanar reformation (MPR). Axial (A, B), coronal (C), sagittal (D) show typical findings of a sigmoid colon diverticulitis complicated by a wall perforation with the evidence of an extraperitoneal gaseous fluid collection containing a linear hyperdense object (approximately 20 x 5 mm axial diameters) to refer to a foreign body.

preoperative evaluation and can determine site and cause of perforation with an accuracy of 86% [1].

Gastrointestinal (GI) tract perforations can occur due to various causes, and most of these perforations are emergency conditions that require early recognition and timely surgical treatment; the mainstay of treatment for bowel perforation is surgery [3]. Endoscopic and laparoscopic procedures are now being increasingly performed instead of conventional laparotomy [7]. CT is the most valuable imaging technique to identify presence, site (reported to range between 82% and 90% [3]) and cause of GI tract perforation [7]. Several studies demonstrated that direct and indirect CT findings of bowel perforation associated with free extraluminal air can been considered as the major imaging findings for the diagnosis of the GI tract perforation [8]. It can display extraluminal (intraperitoneal or retroperitoneal) air more sensitively than a plain radiography [3]. The main sites of GI tract perforation are: *stomach and duodenum*, the most frequent causes of gastric and duodenal perforations include peptic ulcer disease and ulcerated malignancies (adenocarcinoma, lymphoma) [1]. *Small bowel* (Jejunal and ileal) perforations are less frequently encountered than gastric and duodenal perforations (accounting for 0.4% of cases in one study with an incidence of 1 in 300–350,000) [9]. In developing nations, infection, especially typhoid and tuberculosis, rank among the most common etiologies, while in industrialized nations, closed-loop small bowel obstruction and tumor have been found to be the most common causes when trauma can be excluded [9]. Other etiologies include foreign bodies, diverticulosis, Crohn disease and primary ischemia as well as iatrogenic causes [9]. *Large bowel* causes of colonic perforation include diverticulitis, neoplasm, inflammatory bowel disease (IBD), foreign body ingestion, bowel ischemia, stercoral colitis, ischemic colitis, infections, non-neoplastic obstructive causes (Ogilvie's syndrome) iatrogenic causes as Bevacizumab, colonoscopy, CT colonography and anastomotic leak [5]. The overall mortality from large bowel perforation

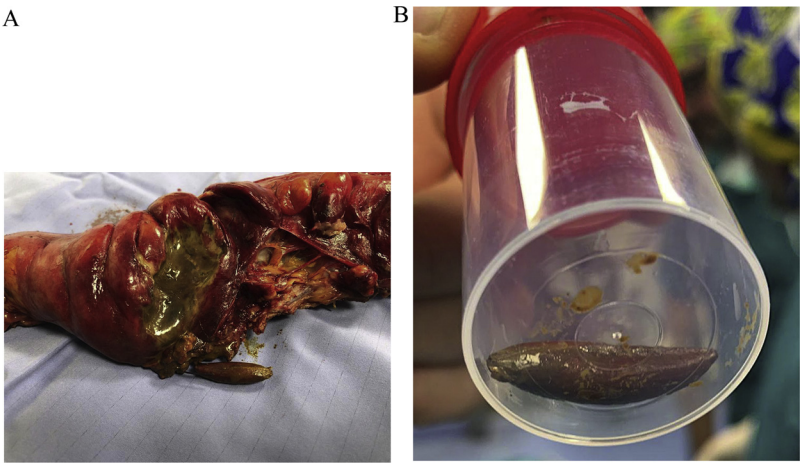

Fig. 2. (A, B) Surgery images confirm the sigmoid perforation and the ingested object found in the extraluminal inhomogeneous collection was a date nut tip.

has been reported between 16.9% and 19.6% [5].

GI perforations by foreign bodies ingested is rare and only < 1% of ingested foreign bodies are believed to cause perforation of the gastrointestinal tract [6].

A variety of foreign bodies are ingested unintentionally during rapid eating, particularly by persons with reduced palate sensitivity [6]. Young children, elderly and mentally challenged people are usually at a higher risk [6]. Ingested foreign bodies may perforate anywhere along the GI tract but are more often reported to lodge in the hypopharynx or upper oesophagus, or to impact at areas of narrowing from pre-existing strictures or sites of anatomic angulation in the duodenal loop, duodenojejunal junction, ileocaecal valve and appendix [6]. The most common locations of the lower GI tract perforations are: the ileo-caecal and rectosigmoid regions, as in our case. Clinical presentation is variable [10]. When perforation of the bowel has occurred, patients generally present signs of localized peritonitis [11]. The most common ingested foreign objects are chicken bone and bone fragments, dentures, toothpicks and cocktail sticks, (the last two objects tend to migrate into any of the adjacent organs leading to fistulation and abscess formation) [6].

Usually, such subtle foreign bodies are either inherently non-opaque or insufficiently opaque to be visible on radiographs, while most patients will have no recollection of ingesting a foreign body [12].

Radiological Emergency Planning provides, the Plain radiography that is commonly the initial imaging examination, but Multidetector CT (MDCT) is generally chosen as the next imaging test and is the modality of choice [6]. In order to identify site and cause of a GI perforation a CT scan of the abdomen and pelvis before and after i.v. administration of contrast medium should be preferred over a simple CT scan without medium contrast injection because it aids in detecting the indirect signs of bowel perforation emphasizing on wall alterations [3]. Enteric contrast is usually not needed, infact in the emergent setting, the study should not be delayed trying to administer enteric contrast, moreover the use of oral contrast during CT because it can make more difficult to detect a radiopaque foreign body [10].

The diagnosis of GI tract perforation is based on the direct CT findings, such as discontinuity of the bowel wall and the presence of extraluminal air and on the indirect CT findings, such as bowel wall thickening, fat stranding, abnormal bowel wall enhancement, abscess and an inflammatory mass adjacent to the bowel [3].

Among the direct signs we analyze the *free intraperitoneal air sign and* it is a highly predictive finding of GI perforation [4]. A great amount of free intraperitoneal air is related to either a proximal GI perforation (stomach, duodenum) or an intraperitoneal colonic perforation [5]. Small bowel and appendiceal perforations tend to present with smaller amount of free air [1]. However, the amount of free air is not always linked to the precise site of perforation [5], but it is generally in close proximity to the site of perforation (90% of the time) [1]. While free air in the upper abdomen and around the liver can come from any site of the peritoneal cavity, in the pelvis it suggests a distal small bowel or colonic perforation [7]. Free intra-abdominal air is best seen using a bone window setting [1]. Although most GI perforations result in free intraperitoneal air, some sites of the GI may result in extraperitoneal air, particularly when the posterior wall of a retroperitoneal portion of bowel is involved (esophagus, second, third, and fourth parts of the duodenum, rectum, and ascending and descending colon) [1]. Small and localized foci of extra-luminal air are a highly predictive sign for the site of perforation [1]. Another direct sign is the *focal bowel wall discontinuity*, it has a high specificity as a sign of perforation [7], but it is only in 16–21 % of patients and is more often evident in upper GI perforations compared with the more distal ones [5].

Among the indirect signs we analyze the *bowel wall thickening*. Normal bowel wall is generally thin, measuring 1–2 mm when well distended or 2–3 mm when non-distended and thickness above 3 mm, particularly in a well-distended segment of bowel, is considered abnormal [1]. The bowel wall thickening alone is a nonspecific finding that can be the result of numerous entities, including inflammatory conditions, infections, and neoplasms [9]. Although segmental bowel wall thickening is only retrospectively manifest in 58% of surgically proven perforations, when visible, it led to the correct diagnosis of the site of perforation in 100% of patients [1]. Another important indirect sign is the fat stranding, it is a hazy or reticular pattern of increased attenuation in the mesenteric fat, which is most often a sign of underlying edema related to adjacent pathology [5]. In a retrospective review, localized fat stranding has been found to be 88% accurate in the retrospective detection of perforation, although is only 38% specific [1]. About our case of foreign body perforation it is important to point out that the foreign body does not produce abundant free extraluminal air [13]. Infact the passage of large amounts of extraluminal gas causes a gradual erosion of the intestinal wall, allowing time for the inflammatory reaction to be walled off [13]. Therefore, diffuse pneumoperitoneum is rare in the setting of perforation secondary to foreign body ingestion [5]. The most direct assessment for foreign body perforation on CT is identification of the foreign object in close proximity to extraluminal gas [5]. Other findings include localized wall thickening, fat stranding and abscess [9]. With acquisition of sufficiently thin axial sections and coronal and sagittal reformatted images, most foreign objects should be visible on CT [5]. Unfortunately, in the case of an accidental dietary ingestion, the patient will often not remember the incident and there can often be lag time of weeks to months between ingestion and development of symptoms [5].

We have not to forget that some entities that may mimic the appearance of intraperitoneal free air [1]. In the postoperative pneumoperitoneum: the air in open laparotomy remains up to 2 weeks and even beyond; while in Laparoscopic surgery air is usually goes within 2–3 days following the surgery but can persist beyond this on rare occasions [1]. In infectious such as emphysematous pyelonephritis and emphysematous cholecystitis [14]. Air may be introduced into the mesenteric and renal veins through central venous lines; this may be mistaken for foci of free intraperitoneal air [1]. Air from barotrauma, pneumothorax, and pneumomediastinum can dissect inferiorly between the abdominal wall and peritoneum [1].

4. Conclusion

As per local tradition, during the Season's Holidays there is the habitude to eat dry fruits and nuts, but the evidence of intestinal perforation related to their ingestion is very uncommon. In our case, the inflamed diverticular wall was easily perforated by the small sharply object that passed through the alimentary tract and the ileal-cecal valve because of its small dimensions. Previous studies have well established that MDCT plays an important role in the exam of patients with acute abdominal symptomatology, representing a good tool of choice. CT is to be considered the best imaging method for identifying foreign bodies with minimal radiopacity, allowing the exact location of the perforation site to be determined and the surgical treatment to be planned reliably. The imaging findings that suggest intestinal perforation are an intestinal segment with thickened walls, increased mesenteric fat density, and, less often, gas in the peritoneal cavity, usually restricted to the perforation site. In most cases, the patient does not report the possibility of ingestion of foreign matter, however, the diagnosis should be suspected in cases of acute abdomen of unknown cause in elderly patients and in denture wearers.

Author disclosure

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Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Human and animal rights

This article does not contain any studies with animals performed by any of the authors.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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