Rare disease

Liver abscess caused by toothpick and treated by laparoscopic left hepatic resection: case report and literature review

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Summary

Hepatic abscesses caused by ingested foreign bodies have been reported in the medical literature but represent very uncommon events. Extra-luminal migration of sawing needles and pins is the most common cause of perforation of the gastrointestinal tract associated with liver infections. Other non-metallic sharp objects such as animal bones and toothpicks have been described but are less frequent. The authors present a case of a 45-year-old woman who suffered from sepsis and a liver abscess because of the migration of a toothpick that lodged in the left hepatic lobe. Review of the literature on the pathogenesis and clinical management of liver abscesses caused by ingested foreign is presented.

BACKGROUND

Foreign body ingestion is not an uncommon problem and it is encountered more frequently by paediatricians and psychiatrists. The first case of hepatic abscess because of gastrointestinal tract (GIT) perforation by a foreign body was published by Lambert in 1898.¹ Since then, several other patients have been diagnosed with liver abscesses because of the translocation of sharp metallic objects. The most frequent foreign bodies associated with liver abscesses are needles, nails, fish and chicken bones and more rarely by toothpicks.

Most of the times, ingestion of blunt foreign bodies is inconsequential unless mechanical obstruction or chemical irritation of the gastrointestinal mucosa occurs. Hepatic abscesses because of the perforation of the GIT are relatively uncommon and very often represent a diagnostic and therapeutic challenge as patients usually are unaware of the ingested foreign body and their symptoms are usually non-specific and remote. In addition, it is quite difficult to detect foreign bodies when they are not visible on regular abdominal films. Therefore, a high clinical suspicion is necessary for the correct diagnosis.

CASE PRESENTATION

A 45-year-old woman was admitted from the emergency department in a secondary medical centre for recurrent episodes of epigastric pain associated with fever (38.9°C), nausea, vomiting and hypotension. The day before her admission she presented to her family physician with the chief complaint of progressive asthenia for several months, nocturnal diaphoresis, progressive weight loss and anorexia. Her medical history was remarkable for obesity, gastroesophageal reflux disease, hypercholesterolaemia, asthma and type II diabetes mellitus. The patient did not have any previous surgical interventions except for endometrial ablation and she denied any previous

traumas or endoscopic retrograde cholangiography. Her physical examination was within the normal limits. Her family physician ordered routine blood work and an abdominal ultrasound. The day after, she was brought to the local emergency department by a family member who found her confused, diaphoretic and unable to ambulate without assistance.

INVESTIGATIONS

In emergency department the patient was resuscitated and she was started on parenteral broad-spectrum antibiotic for suspected intra-abdominal infection. Rapid assessment by the emergency department physicians revealed a distressed woman who was hypotensive,

Figure 1 Abdominal US demonstrating a linear echogenic foreign body in the left lobe of liver (arrow).

diaphoretic, tachycardic and confabulating. Hematological panel revealed normal values except for elevated white blood count $25\,000 \times 10^9$ per litre (normal range: 4.5–11) and abnormal liver function tests with aspartate aminotransferases of 456 U/l (normal range: 15–41), alanine aminotransferase of 654 U/l (normal range: 14–54) and alkaline phosphatase of 345 U/l (normal range: 32–92). Blood and urine cultures were obtained in addition to chest and abdominal radiograms that were not contributory.

An urgent abdominal ultrasound revealed a normal gallbladder and intrahepatic and extrahepatic bile ducts with the exception of an area measuring 4 cm in maximum diameter in the left hepatic lobe suggestive for an abscess. The abscess had an elongated shape with a linear echogenic structure in its centre that measured 4.1 cm in length and a few millimetres in width (figure 1). A few hours after her presentation in the emergency department, the patient developed respiratory distress and she was admitted to the intensive care unit where she was treated for multiorgan failure (MOF) because of sepsis and her blood cultures resulted positive for polymicrobial infection (*Klebsiella*, *Escherichia coli*, *Streptococcus* and *Enterococcus*). The patient was treated with parenteral antibiotics (ampicillin, cefurozime and metronidazole) for several weeks and was discharged home in stable conditions with a follow-up appointment at a tertiary medical centre for surgical opinion for suspected intrahepatic-infected foreign body. A contrast computerised abdominal tomography was obtained (figure 2) and confirmed the presence of an elongated structure across the left lateral hepatic segments with almost complete resolution of the abscess cavity.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis for intrahepatic foreign bodies includes:

- Medical devices used for diagnostic, surgical interventions or endoscopic therapies
- Foreign bodies from previous traumas

Figure 2 Contrast-enhanced CT scan of the abdomen demonstrating high-attenuation structure (arrow) in the left lobe of liver.

- Ingested foreign bodies:
 - Metallic or plastic objects such as needles or nails
 - Organic objects such as animal bones (fish and chicken)
 - Wood objects such as toothpick or some vegetables

TREATMENT

The patient was scheduled for an elective exploratory laparoscopy and possible extraction of her foreign body. At the time of surgery, she was found to have inflammation and adhesions between the omentum and the gallbladder. A laparoscopic cholecystectomy was performed. There were no obvious signs of perforation of the GIT. A laparoscopic intraoperative US confirmed the presence of a hyper-echoic elongated structure in segment 2 and segment 3. Laparoscopic hand-assisted left lateral segmental resection was performed. Inspection of the surgical specimen revealed the presence of a hard object similar to a toothpick measuring 4.5 cm in length. Final pathological diagnosis confirmed that the foreign body was made by wood and substantiated our suspicion that the patient suffered from a hepatic abscess due to an ingested toothpick that migrated from the GIT into the liver parenchyma (figure 3).

OUTCOME AND FOLLOW-UP

The patient tolerated the procedure well and her post-operative course was uneventful. At 6 months from her surgery, the patient continues to feel well and she denies the recurrence of any of her pre-operative symptoms.

Figure 3 Macroscopic picture of the surgical specimen. Hepatic segment two and three were sectioned in the operative room and the foreign body was extracted from the liver parenchyma. The object appeared to be made of wood and resembled a full-size toothpick. Surgical pathology inspection confirmed the clinical diagnosis.

DISCUSSION

Perforation of the GIT caused by ingested foreign bodies occurs in less than 1% of cases.^{1–3} Usually, GIT perforation is caused by objects with sharp ends, such as sewing needles, dental plates, fish and chicken bones.⁴ The most common sites of perforation are the stomach and duodenum.^{1,2} There are only 46 cases of reported foreign bodies that penetrated the GIT wall and migrated into the liver causing the formation of abscess cavities.⁵ Most of the times, the left hemiliver was the location where the ingested object lodged after migrating from the intestinal lumen.^{2,5}

In general, patients rarely recall the episode of the ingestion^{6,7} and the migrating foreign body may remain silent until they cause abscesses or systemic infections like the patient who presented to our medical attention.⁸ Most patients have non-specific symptoms and the diagnosis can be very challenging especially when the foreign body is not detectable by abdominal radiograms. Only in rare circumstances patients develop clinical signs typical of hepatic abscess such as recurrent fevers, abdominal pain and jaundice.¹ Detection of foreign bodies can be challenging and many of them may go undetected, causing chronic inflammation, allergies and recurrent infections. Plain radiographic tests are of limited assistance because many foreign bodies are not radiopaque or are too small to be seen.⁸ Ultrasonography (US) and CT are the preferred techniques when there is clinical suspicion for this rare diagnosis and MRI is usually contraindicated when metallic objects cannot be completely ruled out. For the majority of cases, these objects are hyperechoic on ultrasonography and have high density characteristics on CT.^{9,10}

The review of the literature revealed that there are only 17 cases of reported hepatic abscesses caused by migration of an ingested toothpick (table 1). To the best of our knowledge, this is the first case of a patient who had an intraoperative ultrasound and laparoscopic hepatic resection for a hepatic toothpick causing sepsis and MOF.

Early diagnosis and removal of the foreign body is crucial to prevent serious complications. Strategies for

removal of a hepatic foreign body include endoscopy, laparoscopy and open surgery.⁹ Most of the patients reported in the literature were treated with a laparotomy that is very effective but also invasive. With recent advances of endoscopic instruments, transluminal therapies can be performed via the gastrointestinal tract when there is a sinus tract between the liver abscess and the intestine but this procedure can be technically demanding.¹¹ When a foreign body is predominantly extrahepatic, laparoscopic surgery may be adequate for removal of the object without the need for hepatic dissection.^{9,12}

In conclusion, we report a very rare case of a patient who underwent a minimally invasive hepatic resection for the migration of an ingested toothpick that caused a hepatic abscess and sepsis. Toothpick injury of the gastrointestinal tract is often associated with considerable morbidity. For the majority of cases, US and CT scans are the most sensitive imaging tests for localisation of suspected foreign bodies in solid organs, and early diagnosis and extraction are essential to decrease the risk of serious complications.

Learning points

- Transluminal migration of ingested foreign bodies is a very rare condition.
- Most of the ingested foreign bodies that perforate the gastrointestinal tract have sharp edges.
- The stomach and duodenum are the most common locations of perforation.
- Lodgement of foreign-ingested bodies in the liver parenchyma is an extremely rare condition.
- Diagnosis of intrahepatic foreign bodies can be difficult if the objects are not radio-opaque or are small.
- Ultrasound and computerised tomography are the most sensitive radiological modalities for confirmation of suspected clinical cases.
- Excision of the foreign body is indicated in symptomatic patients as they can be associated with severe complications.

Table 1 Summary of all published case reports of patients affected by migration of ingested toothpicks in the liver with the subsequent formation of a liver abscess

Year	Author	Site of penetration	Liver abscess location
1955	Griffiths ¹³	Duodenum	Right lobe
1981	Rafizadeh ¹⁴	Duodenum	Left lobe
1984	Bloch ¹⁵	Stomach or Duodenum	Left lobe
1986	Penderson ¹⁶	Stomach	Left lobe
1990	Allimant ¹⁷	Stomach	Left lobe
1997	Tsui ¹⁸	Duodenum	Right lobe
1999	Drnovsek ¹⁹	Duodenum	Both
1999	Guglielminetti ²⁰	Stomach	Left lobe
2000	Cheung ²¹	Stomach	Left lobe
2003	Kanazawa ⁶	Stomach	Left lobe
2003	Bilimoria ²²	Sigmoid colon	Right lobe
2006	Chiang ²³	Duodenum	Right lobe
2007	Katsinelos ²⁴	Stomach	Left lobe
2007	Binek ²⁵	Unknown	Right lobe
2009	Liu ²⁶	Unknown	Left lobe
2009	Liu ²⁶	Duodenum	Right lobe
2011	Glick ²⁷	Duodenum	Left Lobe

Competing interests None.

Patient consent Obtained.

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Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Abu-Wasel B, Eltawil KM, Keough V, Molinari M. Liver abscess caused by toothpick and treated by laparoscopic left hepatic resection: case report and literature review. *BMJ Case Reports* 2012;10.1136/bcr-2012-006408, Published XXX

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