



A rare case of retained metallic foreign body in liver: case report and review of literature

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Introduction and importance: Foreign bodies in the liver are uncommon but can lead to severe conditions like liver abscess and sepsis. They typically enter through direct penetration, migration from the gastrointestinal tract, or through the blood. Common foreign objects include metal pins, or sewing needles swallowed accidentally.

Case presentation: A 25-year-old male presented to our OPD with pain over the right abdomen with a prior history of projectile injury causing laceration over the right anterior abdomen with primary suturing. On radiological investigation, a retained foreign body was revealed. The metallic foreign body was embedded in the liver for 5 months. Removal of the foreign body was performed without any complications.

Clinical discussion: Intrahepatic foreign bodies (FBs) in the liver can result from penetrating injuries, iatrogenic causes, or ingestion, particularly in children. Clinical presentations vary, and complications such as abscess formation may occur. Diagnosis involves imaging modalities like X-rays, ultrasonography, and computed tomography (CT) scans. The presented case highlights the importance of meticulous follow-up, as chronic pain manifested despite conservative management. The management of intrahepatic FBs depends on factors like size, location, and symptoms, with conservative approaches for stable patients. Surgical removal remains the mainstay of the treatment. Long-term monitoring is crucial to detect potential complications, and imaging studies play a key role in regular follow-up.

Conclusion: Hepatic foreign bodies are rare, and symptoms vary based on size, type, and location, ranging from asymptomatic to complications such as abscess formation. Surgical removal is the main treatment, but in cases of noncomplicated hepatic foreign bodies, close follow-up is necessary.

Keywords: case report, foreign body complications, hepatic injury, literature review, liver injury, metallic foreign body, retained foreign body

Introduction

Foreign body (FB) retained inside the body is not an uncommon presentation in surgical emergencies. But FBs in the liver are usually rare and often present with dreadful conditions like liver abscess and sepsis. FBs can reach the liver through three mechanisms: direct penetration through the abdominal or

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HIGHLIGHTS

- The case reports a metallic foreign body retained in the liver for 5 months, highlighting the importance of continuous monitoring post-injury.
- While commonly associated with children like metal pins or sewing needles swallowed accidentally, the case and literature review highlight that intrahepatic foreign bodies can also occur in adults, often due to penetrating injuries.
- Literature suggests that foreign bodies may result from intentional ingestion due to psychological conditions, emphasizing the need for a holistic understanding of patient history.
- Clinical manifestations vary widely based on factors such as size and location, ranging from asymptomatic cases to complications like abscess formation.
- Surgical removal remains the mainstay of the treatment. Long-term monitoring is crucial to detect potential complications, and imaging studies play a key role in regular follow-up.

thoracic wall, migration from the gastrointestinal tract, and blood^[1]. Common FBs in the liver are fish bone, metal pins, sewing needles or other objects often swallowed accidentally,

Table 1**Summary of foreign body cases in the liver over the last decade.**

S. N	Study	Title	Foreign body	Presenting complaint	Diagnosis	Management	Remarks
1	Zhou <i>et al.</i> , 2022 ^[8]	A case of a foreign body in the digestive tract puncturing into the liver	Fish bone	Epigastric Pain	CT and gastroscopy	Laparoscopic removal of foreign body	3 cm fish bone could be seen entering the stomach wall. The other end was punctured into the liver.
2	Lie <i>et al.</i> , 2022 ^[9]	Transmural perforation by fish bone from stomach to liver	Fish bone	Epigastric abdominal pain associated with nausea	Abdominal CT scan revealed a radiodense linear foreign body measuring 3 cm, extending transmurally through the lesser curvature of the stomach and penetrating the liver capsule	Oesophagogastroduodenoscopy was performed and a fish bone penetrating the stomach wall was found. Clipping was performed after fish bone removal. Empiric intravenous antibiotic (tazobactam 4 g/8 h) was prescribed before and after the oesophagogastroduodenoscopy.	—
3	Jenkins <i>et al.</i> , 2021 ^[10]	Thoracoabdominal crossbow bolt injury	Cross bow	Diaphoretic and presented with class II/III haemorrhagic Shock in emergency	FAST Scan	Trauma laprotomy with median sternotomy or left lateral thoracotomy	Crossbolt entered the abdomen through the central tendon and penetrating liver parenchyma segment IVa,VII
4	Tsuruya <i>et al.</i> , 2020 ^[11]	Successful combination of endoscopic and laparoscopic removal of multiple ingested needles: A case report	Multiple sewing needle	Epigastric discomfort	CT revealed one needle stuck in the left liver lobe through the stomach wall, another in the third portion of the duodenum, three needles in the ascending colon, and two were in the transverse colon	Endoscopic and laproscopic removal of foreign bodies	—
5	Eastment <i>et al.</i> , 2020 ^[12]	Novel approach to a hepatic foreign body using a \$5.50 magnet	5 × 5 mm metal shard pierced epigastrium at high speed	Abdominal pain	Abdominal CT demonstrated a metallic FB deep within segment III of the liver with an associated laceration extending to the anterior capsular margin	Endoscopic retrieval using magnet-based endoscopes.	Novel TPPM (telescopic pick-up pen magnet) method used for removal of the FB.
6	Luo <i>et al.</i> , 2020 ^[13]	Hepatic abscess resulted from a toothpick piercing the gastric wall into the liver	Toothpick piercing the gastric wall into the liver	Intermittent epigastric pain	Abdominal CT and three-dimensional reconstruction showed a hyperdense linear foreign body in the stomach body piercing into the liver directly	Endoscopic retrieval of the foreign body and empirical antibiotic therapy	—
7	Chen <i>et al.</i> , 2019 ^[14]	Laparoscopic management of enterohepatic migrated fish bone mimicking liver neoplasm: A case report and literature review	Fish bone	Vague epigastric discomfort for 2 months	Abdominal CT and upper gastrointestinal endoscopy	-laparoscopic removal of FB. -Ultrasound guided excision of the mass (in segment 3) was performed. -Dissecting the specimen revealed a fish bone measuring 1.7 cm in length.	—
9	Saunsbury <i>et al.</i> , 2019 ^[15]	Needle in a haystack: hepatic abscesses secondary to inadvertent ingestion of a foreign body	Toothpick	Fevers and epigastric pain	CT demonstrated connecting hepatic abscesses, and a 2.4 cm high attenuation linear density projecting from the stomach into the liver	Laparoscopic removal of FB	—
10	Lemaître <i>et al.</i> , 2018 ^[16]	En route to the liver: an fish bone's unexpected journey	Fish bone	Profound fatigue for 1 month, with chills and fu-like symptoms	Abdominal CT scan showed a 9 × 8.5-cm left liver abscess, with an aeric image and a	-Percutaneous abscess drainage and antibiotics -laparoscopic removal of fish bone	—

				spontaneously hyperdense foreign body 35 mm inside.		
11	Mateus <i>et al.</i> , 2018 ^[17]	Hepatic Abscess Induced by Fish Bone Migration: Two Case Reports	Fish bone	Case 1: Abdominal pain for 3 day Case 2: Weakness, chills, myalgias	Case 1: Abdominal CT showing hyperdense linear foreign body Case 2: Abdominal CT scan showed a peripherally enhancing multi-loculated lesion in segment IVb measuring 5.7 × 5.3 × 4.5 cm consistent with hepatic abscess, surrounding a hyperdense linear foreign body—a fish bone	Case 1: Patient didn't improve on antibiotic therapy and percutaneous abscess drainage. Laparotomy was then performed, the abscess was drained and a 5 cm long fish bone was removed from the hepatic left lobe, then segmentectomy II and III was carried out. Case 2: Using CT guidance, the hepatic abscess was drained percutaneously. Piperacillin/tazobactam and metronidazole was given to the patient. The fish bone was not removed.
12	Pathirana <i>et al.</i> , 2016 ^[18]	A foreign body in liver mimicking an intrahepatic cholangiocarcinoma	Fish bone about 3.5 cm in length	Vague episodic right upper abdominal pain and loss of appetite	CECT	Radiologists suggested the possibility of cholangiocarcinoma for which left lobectomy and lymphode clearance was planned which was later abandoned after retrieval of FB intraoperatively.
13	Fuertes <i>et al.</i> , 2016 ^[19]	Liver abscess secondary to duodenal perforation by fish bone: Report of a case	Fish bone	Abdominal pain located in epigastrium and right hypochondrium	CT scan revealed the abscess was secondary to a fish bone perforating the duodenum and inlaid in the liver	The fish bone was surgically extracted from the hepatic lobe with hemostasia and a duodenal suture with epiploplastia was performed. Antibiotic was added to the treatment.
14	Tan <i>et al.</i> , 2016 ^[20]	Laparoscopic Removal of Intrahepatic Foreign Body: A Novel Technique for Management of an Unusual Cause of Liver Abscess--Fish Bone Migration	Fish bone	Both patient presented with 2-week history of right upper quadrant pain, fever, chills, and rigors.	USG, CT	Both patients underwent percutaneous drainage of liver abscesses with control of sepsis, followed by laparoscopic removal of intrahepatic fish bones.
15	Pop <i>et al.</i> , 2016 ^[21]	Chronic impalement- Case report of a knitting needle 33 years' ascension	Knitting needle inserted 33 years ago for self-induced abortion	-Hemoptysis, dyspnoea, fatigability and weight loss—33 years ago she self-induced abortion using a knitting needle without extraction of the foreign body	On CT there was an 18 cm metallic foreign body extending from right liver lobe (segment V and VIII), transdiaphragmatic, to the right upper lobe	Right posterolateral thoracotomy, wedge resection of right lower lobe of lung and diaphragmatic mesh suture with infradiaphragmatic drainage
16	Guerra <i>et al.</i> , 2015 ^[22]	Swallowed chicken bone migration into the liver	Chicken bone	Abdominal pain, vomiting and a 1-week history of intermittent low-grade fever.	CECT showing a 2-cm linear, radiopaque structure in the fourth segment of the liver	The patient was treated nonoperatively and observed on a course of antibiotics to which she responded favourably
17	Martel <i>et al.</i> , 2015 ^[23]	Liver perforation following foreign body ingestion: an important clinical lesson	Ingestion of a pen	Epigastric discomfort	Endocopy and a CT demonstrating the pen lying with its tip within the left lobe of the liver.	The pen was removed by laparotomy
18	Xiao <i>et al.</i> , 2015 ^[24]	Laparoscopic Extraction of a Hepatic Fish Bone Mimicking a Liver Mass After Gastric Perforation	Fish bone	Three episodes of upper abdominal pain over a period of a year	Abdominal CT scan showing the presence of a 3.09 × 2.89 × 2.5 cm mass in the left liver lobe. Gastroscopy revealed a firm inflammatory lesion of size 1.09 × 1.0 cm in the gastric antrum at the lesser curvature.	Explorative laparoscopy and removal of FB.
19	Devasi <i>et al.</i> , 2014 ^[25]	Foreign body in liver: sewing needle	Sewing needle	Abdominal pain for 3 days	Abdominal X-ray and ultrasonography revealing an hyperechoic needle traversing the liver parenchyma	Exploratory laparotomy

CECT, contrast-enhanced computed tomography; CT, computed tomography; FAST, focused assessment with sonography for trauma; FB, foreign body.

passing through the stomach and migrating to the liver eventually (Table 1)^[2]. Rapid diagnosis and prompt removal can decrease significant morbidity and mortality due to liver abscess. Here, we present a rare case in which a metallic foreign body was embedded in the liver and successfully removed after 5 months using SCARE 2023 guidelines^[3].

Case presentation

A 25-year-old previously healthy male presented to our OPD with a chief complaint of pain over the right upper abdomen for 5 months. The patient had an alleged history of metallic projectile injury causing lacerations of the right anterior abdomen during metal work in a factory 5 months ago. Initially, the wound was managed with primary suturing at a low-resource primary health centre without any imaging. Five months later, the patient presented at a tertiary centre with complaints of pain in the right upper abdomen. The pain was present over the right upper abdomen and was intermittent and stabbing in nature, lasting only a few seconds, non-radiating, and self-resolving with no aggravating or relieving factors. The patient was afebrile and anicteric, without any complaints of per rectal bleed, melena, or generalized itching. Bladder and bowel habits were normal. There were no comorbidities and no history of previous surgeries in the past.

Upon examination of the abdomen, all findings appeared normal. However, a radiopaque, linear FB was detected in the region of the liver during X-ray imaging (Fig. 1). Subsequent ultrasonography revealed a hyperechoic linear structure with reverberation in the left lobe or quadrate lobe of the liver. Further investigation through contrast-enhanced computed tomography (CECT) of the abdomen unveiled a metallic FB measuring $\sim 7 \times 12 \times 16$ mm located in segment II of the liver (Fig. 2).



Figure 1. X-Ray showing a radiopaque linear foreign body in the liver.

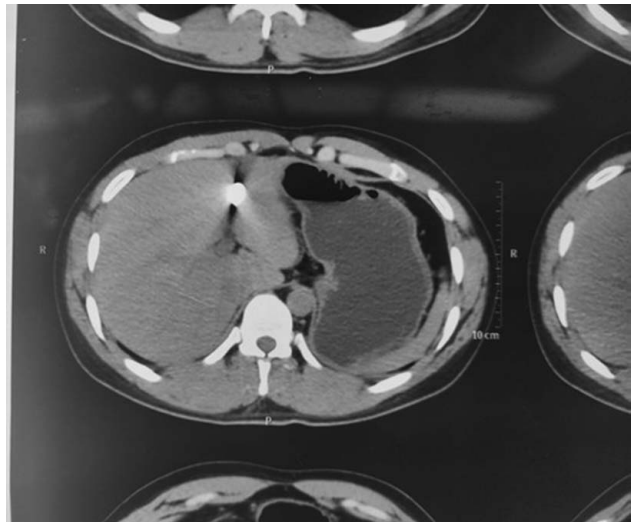


Figure 2. Contrast Enhanced Computed Tomography (CECT) of the abdomen showing a metallic foreign body measuring approximately $7 \times 12 \times 16$ mm located in segment II of the liver

All laboratory parameters, including Liver Function Test, Renal Function Test, and Complete Blood Count were within normal limits. Considering the risk of potential complications, particularly abscess formation, we opted for surgical intervention. This course of action involved the immediate removal of the FB to mitigate any future risks. An exploratory laparotomy was performed with a Kocher's incision. The abdomen was opened in layers, and the falciform ligament was ligated and divided. The FB in liver segment II was located using imaging results, and it was extracted with artery forceps. Haemostatic suture catgut 2-0 was applied to a raw area that measured 0.5 cm by 0.5 cm. The abdomen was then closed in layers. A metallic FB, measuring ~ 1.5 cm in diameter and located 1 cm deep from the liver's surface, was successfully removed. Subsequent follow-up visits showed positive outcomes, indicating a good recovery (Fig. 3).

Discussion

In this case report, we present a rare occurrence of a metallic FB in the liver and a literature review of similar cases. FB in the liver are uncommon, and their presence can cause a variety of symptoms depending on the size, type, and location of FB. The literature review unveiled that the majority of cases involving FBs in the liver, such as needles or fish bones, occurred due to their penetration through the gastrointestinal wall, as shown in Table 1. Conversely, instances of metallic FBs in the liver are rare and typically due to penetrating injuries like accidents or gunshot wounds^[2]. FBs can also be iatrogenic, introduced during previous surgeries or invasive interventions^[2]. While some literature reviews suggest that FBs in the liver are common in children, it has also been reported in adults that FB reaches the liver through the penetration of the stomach, duodenum, or colon^[5]. In the paediatric population, ingestion of FBs is common, with children inadvertently swallowing objects that can ultimately make their way into the liver. Literature also revealed that these FBs can also be due to accidental ingestion or intentional ingestion due to underlying psychological conditions^[6,7].



Figure 3. Approximately 1.5 cm metallic foreign body removed from the liver.

As per our literature review (Table 1), Clinical presentation can widely vary depending on factors such as the size and location of FBs and complications like abscess formation^[26]. Most of the cases present with vague epigastric pain^[8,9,11–15] and some present with right upper quadrant pain^[18–20] which was mostly mild at presentation, but some may have life-threatening presentation as seen in the case of Jenkins et al.^[10] that presented with haemorrhagic shock^[8]. Unsterile FBs often present with high-grade fever associated with chills and rigour as a consequence of hepatic abscess^[16,17,20]. In our patient, although the initial injury was managed conservatively, the delayed manifestation of symptoms as chronic pain underscores the importance of meticulous follow-up and potential complications of the FB. The chronic irritation and localized tissue reaction could have contributed to persistent, intermittent pain experienced by the patient. Few literatures revealed that clinical symptoms are varied and, in some cases, can remain asymptomatic for a long time^[27], but a small number can develop abdominal pain, fever, liver dysfunction, and jaundice. While in some cases, as a complication of retained FB, patients can present with hepatic abscess^[26].

Radiology is important in diagnosis through modalities including plain X-rays, ultrasonography, and CT. Although a simple X-ray can readily detect FBs, a CT scan is often required for precise localization within the body. Therefore, it is the preferred diagnostic imaging modality for identifying retained FBs^[28,1]. In the case we present, the diagnosis was evident on abdominal X-rays, which are still commonly used despite their low sensitivity^[2,29]. USG revealed the hyperechoic linear

structure with reverberation identified in the quadrate lobe. CECT further provided detailed anatomical localization within liver segment II, aiding in surgical planning and retrieval procedures.

The management of intrahepatic FBs depends upon their size, location, risk of migration, and severity of symptoms^[30]. Conservative management may be considered for asymptomatic patients with stable FBs, but case monitoring is necessary to detect potential complications. Non-removal of FBs has an unacceptably low success rate of only 9.5%^[31]. Surgical interventions: laparotomy and laparoscopy are often required when complications arise or if conservative management fails to alleviate symptoms^[14,32]. In our patient, given the size and location of the body, we preferred a medial laparotomy approach for better access. The decision regarding surgical intervention versus conservative treatment for FBs in the liver depends on several factors, including size, type, and location of the FBs, as well as clinical presentation^[33]. Larger or sharp FBs, particularly if located in critical areas, may need surgical removal to mitigate risks of tissue damage or complications like abscess formation^[33]. In our case, surgical intervention was prompted by the patient's symptomatic presentation, notably complaints of persistent pain in the right upper abdomen, coupled with the presence of a large metallic FB lodged between the liver lobes. This aligns with established criteria where symptomatic cases with larger FBs often necessitate surgical management to alleviate symptoms and mitigate potential complications. The decision for surgery was further supported by the risk of tissue damage or abscess formation associated with the size and location of the FB, highlighting the importance of prompt intervention in such cases^[34]. Minimally invasive techniques, such as laparoscopic or interventional radiology procedures, can also be utilised for FB extraction when appropriate^[34]. Long-term follow-up is essential for patients with retained FBs in the liver to monitor for potential complications such as infection, abscess formation, or long-term effects on liver function. Regular monitoring through imaging studies is necessary.

Conclusion

Hepatic FBs are extremely rare, and symptoms can vary widely depending on the size, type and site of FBs, with presentation from asymptomatic to complications like abscess formation. Conservative management, such as the use of antibiotics or percutaneous drainage, has very few successful outcomes. That is why surgical exploration and prompt removal of the FB remain the mainstay of treatment.

Ethical approval

Not applicable. Our institution doesn't require ethical approval for reporting individual case report or case series.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

M.Y., S.D., N.A.S. wrote the original manuscript, and reviewed, and edited the original manuscript. B.D., S.D., J.K.S., L.K., D.K.D., S.Y. and B.G. reviewed and edited the original manuscript.

Conflicts of interest disclosure

The authors have no conflicts of interest to declare.

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All the required information is within the manuscript itself.

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