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Intrahepatic Migration of an Ingested Fish Bone Following Presumed Duodenal Perforation: A Case Report

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Abstract

Fish bone ingestion rarely causes gastrointestinal perforation with migration into adjacent organs. Hepatic abscess secondary to fish bone migration is an uncommon but potentially serious complication. This case highlights the diagnostic value of computed tomography (CT), the possibility of a previous contained and sealed perforation, and the role of laparoscopic source control.

A 72-year-old woman presented with right-sided abdominal pain, nausea, and fever. CT revealed a 4-cm linear foreign body within hepatic segment V, adjacent to the gallbladder bed, with associated hepatic and subcapsular collections and inflammatory changes in the second portion of the duodenum, findings suggestive of a contained duodenal perforation. On admission, she was clinically stable, afebrile, and had no signs of peritonitis; therefore, initial management with intravenous antibiotics was undertaken. However, serial CT demonstrated progressive collections despite antimicrobial therapy, while percutaneous drainage was technically unfeasible. After three weeks of antibiotic therapy, persistent collections and increasing perihepatic fluid prompted surgery. Cholecystectomy was performed to provide adequate exposure of the gallbladder bed and facilitate safe removal of the foreign body. The approximately 4-cm fish bone was subsequently removed laparoscopically without hepatic resection. Recovery was uneventful, with complete clinical resolution and no residual focal hepatic lesion on follow-up ultrasonography.

A linear hyperdense structure within or adjacent to an atypical hepatic collection should raise suspicion of a migrated fish bone, even in the absence of recalled ingestion or overt peritonitis. The absence of an identifiable defect at surgery does not exclude previous transmural penetration, as a small perforation may become contained and subsequently sealed by local inflammatory adhesions. In the present case, progression of collections despite antimicrobial therapy, a retained foreign body, and the lack of a feasible percutaneous drainage route supported surgical source control.

A migrated fish bone should be considered in patients with atypical hepatic collections and a linear hyperdense structure on CT. A presumed previous contained and sealed gastrointestinal perforation may be present despite the absence of an active defect at surgery. When conservative management fails, laparoscopic foreign body extraction may provide effective source control in anatomically suitable cases.

Categories: General Surgery
Keywords: duodenal perforation, fish bone, hepatic abscess, laparoscopic surgery , surgical source control, swallowed foreign body

Introduction

Foreign body ingestion is common, and the great majority of ingested objects pass spontaneously through the gastrointestinal tract without complications. However, sharp foreign bodies, particularly fish bones, may perforate the gastrointestinal wall. Clinical manifestations range from a contained perforation, in which local inflammatory or omental adhesions limit peritoneal contamination, with inflammatory mass or abscess formation, to free perforation with generalized peritonitis. Less commonly, the foreign body may migrate into adjacent organs and cause organ-specific complications [1,2].

Enterohepatic migration refers to the extraluminal passage of an ingested foreign body from the gastrointestinal tract into the liver. This may occur following penetration of the stomach or duodenum, which are anatomically adjacent to the liver. In rare circumstances, a sharp foreign body may become embedded in the hepatic parenchyma and be associated with localized inflammation or hepatic abscess formation [3-5]. A small perforation may subsequently seal through the surrounding inflammatory reaction, explaining the absence of pneumoperitoneum, generalized peritonitis, or an identifiable gastrointestinal defect at surgery.

Hepatic abscess secondary to fish bone migration is an exceptionally rare complication, as reflected by the predominance of isolated case reports and small case series in the literature. Grayson et al. [3] identified 52

reported cases of liver abscess secondary to enterohepatic fish bone migration, while Chong et al. [4] reviewed 88 cases of liver abscess secondary to penetration of the alimentary tract by ingested foreign bodies. More recently, Li et al. [6] reviewed 127 cases of fish bone migration to rare extraintestinal sites, including 22 cases of hepatic abscess. These figures represent selected published cases rather than population-based estimates but illustrate the rarity of this condition.

Diagnosis may be challenging because patients often do not recall the ingestion event and may present with nonspecific symptoms. Computed tomography (CT) is the principal imaging modality, particularly when a linear hyperdense foreign body is identified within or adjacent to a hepatic collection [3,5,6]. Management must be individualized according to the patient's clinical condition, the location of the foreign body, and the presence of complications. Antimicrobial therapy may be appropriate in selected stable patients; however, definitive source control, including removal of the foreign body and drainage of associated collections when feasible, should be considered when conservative treatment fails [3,4]. No standardized management strategy exists because of the rarity and anatomical heterogeneity of these cases.

This case report describes presumed duodenal penetration by an ingested fish bone, followed by migration into hepatic segment V and formation of persistent hepatic collections. It highlights the diagnostic value of CT, the possibility of a previous perforation that became contained and sealed despite the absence of an active defect at surgery, and the role of laparoscopic foreign body extraction as definitive source control. This case report has been reported in accordance with the Surgical CAse REport (SCARE) 2023 guidelines [7].

Case Presentation

A 72-year-old woman who was functionally independent presented to the emergency department with a three-day history of right-sided abdominal pain, nausea, and fever, with a maximum recorded temperature of 38.5 °C. Her medical history was notable for arterial hypertension, type 2 diabetes mellitus, previous right breast cancer treated with surgery, chemotherapy, and radiotherapy 20 years earlier, and colonic diverticular disease. She had no history of abdominal surgery.

On admission, she was hemodynamically stable, with a blood pressure of 141/77 mmHg and a heart rate of 98 beats/minute. She was afebrile, eupneic on room air, and had an oxygen saturation of 95%. Abdominal examination revealed right-sided abdominal tenderness, predominantly in the right lower quadrant, with localized rebound tenderness but no guarding, rigidity, or signs of generalized peritonitis. The abdomen remained soft and depressible. No masses or organomegaly were identified.

Laboratory investigations on admission are summarized in Table *1*. They showed mild leukocytosis with neutrophilia and an elevated C-reactive protein concentration; renal function, liver biochemistry, hemoglobin, platelet count, and lipase were within their respective reference ranges.

Laboratory parameter	Result	Reference range
White blood cell count	12.8 × 10^3/μL	4.0–11.0 × 10^3/μL
Neutrophils	86%	40–75%
C-reactive protein	16 mg/L	<5 mg/L
Hemoglobin	13.5 g/dL	12.0–16.0 g/dL
Platelet count	213 × 10^3/μL	150–400 × 10^3/μL
Creatinine	0.93 mg/dL	0.60–1.20 mg/dL
Total bilirubin	0.58 mg/dL	0.3–1.2 mg/dL
Aspartate aminotransferase	14 U/L	<35 U/L
Alanine aminotransferase	16 U/L	<45 U/L
Lipase	20 U/L	13–60 U/L

TABLE 1: Laboratory results at initial presentation.

Reference ranges are those of the institutional laboratory.

Contrast-enhanced abdominal computed tomography (CT) revealed mild thickening of the second portion of the duodenum with adjacent fat stranding. In hepatic segment V, close to the gallbladder bed, a thin, linear,

pointed, hyperdense foreign body measuring approximately 40 mm was identified, surrounded by a hypodense halo and a small adjacent collection measuring approximately 14 mm. A subtle linear hypodense tract within the adjacent hepatic parenchyma suggested a penetrating trajectory from the duodenum toward the liver. A small subcapsular collection was also identified adjacent to the caudate lobe. The morphology and location of the foreign body, together with the associated inflammatory changes, raised suspicion of a migrated fish bone causing a contained duodenal perforation and hepatic abscess formation. No pneumoperitoneum or other intra-abdominal collections were identified. The patient did not recall recent fish consumption or accidental fish bone ingestion (Figures *1*, *2*).

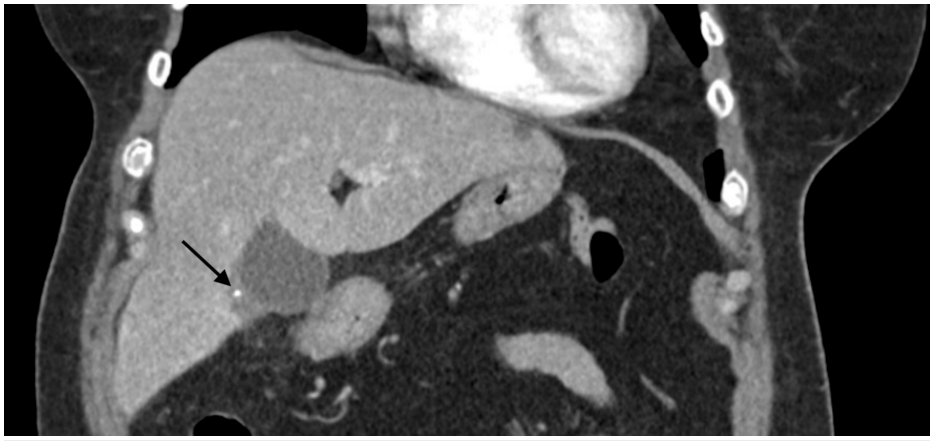


FIGURE 1: Initial contrast-enhanced CT showing the linear foreign body (arrow) within hepatic segment V, adjacent to the gallbladder bed, with the associated hepatic collection and inflammatory changes of the second portion of the duodenum, suggestive of a contained duodenal perforation (coronal plane).



FIGURE 2: Initial contrast-enhanced CT showing the linear foreign body (arrow) within hepatic segment V, adjacent to the gallbladder bed, with the associated hepatic collection and inflammatory changes of the second portion of the duodenum, suggestive of a contained duodenal perforation (axial plane).

The patient was admitted to the general surgery department for conservative management with intravenous piperacillin-tazobactam. She remained clinically stable, with no fever or signs of peritonitis. After one week of antibiotic therapy, C-reactive protein (CRP) had decreased to 14 mg/L and the white blood cell count to $11.3 \times 10^3/\mu L$. Repeat CT nevertheless demonstrated progression of the intra-abdominal inflammatory

process. The collection adjacent to the foreign body in hepatic segment V had increased to 27 × 25 mm, compared with 14 mm on the initial CT, while the preexisting subcapsular collection adjacent to the caudate lobe had increased to 23 mm in thickness and extended approximately 60 mm longitudinally. Despite these radiological findings, there was no pneumoperitoneum or retroperitoneal air, and the patient had no clinical signs of peritonitis. The case was discussed with the interventional radiology team; however, percutaneous drainage was considered technically unfeasible (Figures *3*, *4*).

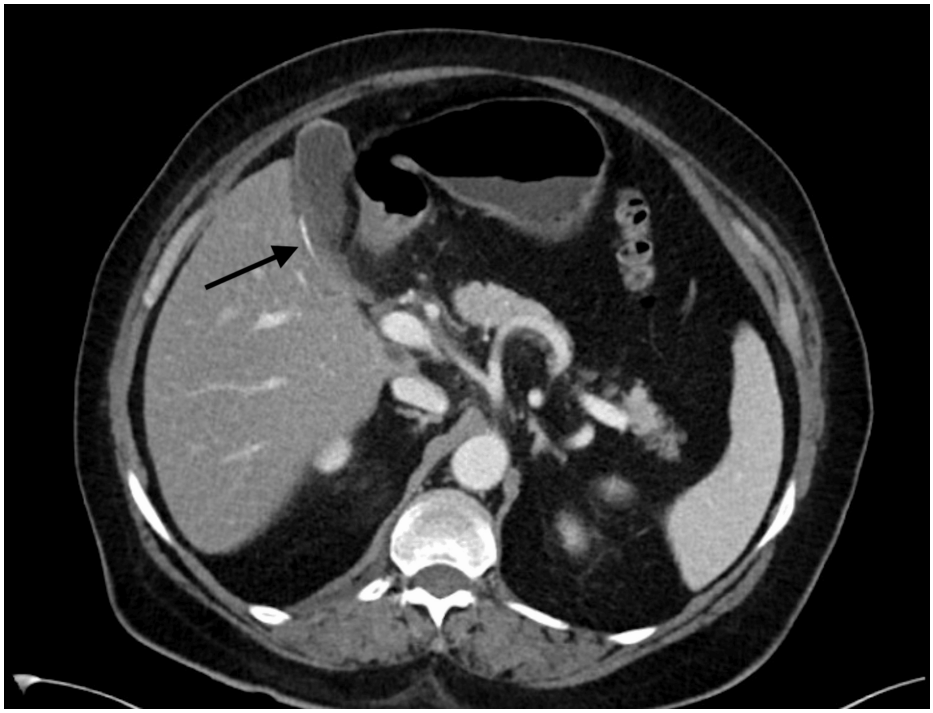


FIGURE 3: Repeat contrast-enhanced CT demonstrating persistence of the linear foreign body (arrow) adjacent to the gallbladder.

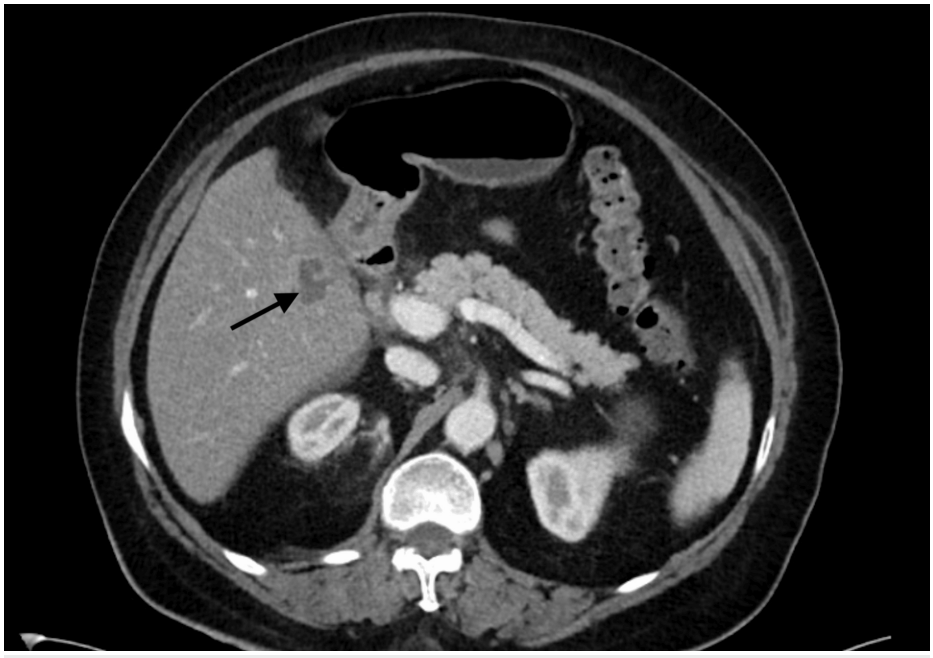


FIGURE 4: Repeat contrast-enhanced CT demonstrating progression of the collection (arrow) adjacent to the fish bone in hepatic segment V.

Although the initial CT findings raised suspicion of a contained duodenal perforation, there was no pneumoperitoneum, diffuse peritonitis, or hemodynamic instability. Given the patient's clinical stability, absence of fever, small localized collections, and initial improvement in inflammatory parameters, a nonoperative approach with intravenous antibiotic therapy and close clinical, laboratory, and radiological surveillance was selected. Surgical management was to be reconsidered in the event of clinical deterioration or evidence of failure of conservative treatment. On Day 21, CRP was 13 mg/L and the white blood cell count was $10.5 \times 10^3/\mu L$. Repeat CT demonstrated persistence of both collections, without a significant reduction in size, and an increase in perihepatic fluid, particularly along the superior subdiaphragmatic surface and adjacent to the inferior hepatic region. This radiological progression, together with the retained intrahepatic foreign body and the lack of a feasible percutaneous drainage route, indicated failure of conservative management and prompted surgical source control. The risks and potential benefits of the procedure were discussed with the patient, and informed consent was obtained.

Laparoscopy revealed dense adhesions of the greater omentum to the gallbladder and adjacent inferior hepatic surface over segment V. Duodenohepatic adhesions were also present. Following careful adhesiolysis, no duodenal defect, active leakage, or gross intra-abdominal contamination was identified. These findings were considered consistent with a contained and likely sealed duodenal perforation; therefore, no primary repair or other duodenal intervention was performed. Cholecystectomy was undertaken to expose the gallbladder bed and facilitate access to the foreign body. During separation of the adhesions, the tip of the foreign body became visible, while most of the approximately 4-cm fish bone remained embedded within hepatic segment V. The fish bone was extracted laparoscopically. The intrahepatic abscesses were not visualized intraoperatively and were therefore not drained. As no drainable collection, active leakage, or gross contamination was identified, no lavage, microbiological sampling, or drain placement was performed. Pathological examination of the retrieved specimen confirmed a fish bone (Figure *5*).



FIGURE 5: Macroscopic appearance of the approximately 4-cm fish bone (arrow) after laparoscopic extraction.

A 5-mL syringe is shown alongside the specimen to provide a size reference.

The postoperative course was uneventful, and the patient was discharged on the third postoperative day. At the first outpatient follow-up, one week after surgery, she was clinically well, with complete resolution of her abdominal symptoms and no fever. Physical examination was unremarkable. Follow-up abdominal ultrasonography showed resolution of all collections, with no biliary dilatation or residual focal hepatic lesion. Histopathological examination of the gallbladder revealed chronic cholecystitis with cholesterolosis. The patient recovered uneventfully and was subsequently discharged from surgical follow-up.

Discussion

A retained fish bone embedded in the hepatic parenchyma with associated abscess formation is an exceptionally rare complication of gastrointestinal foreign-body ingestion. The present case is noteworthy for the combination of CT findings suggestive of a contained duodenal perforation, a 4-cm fish bone predominantly embedded in segment V, progressive hepatic and subcapsular collections despite antimicrobial therapy, and definitive laparoscopic extraction. Although most ingested foreign bodies pass spontaneously through the gastrointestinal tract, sharp objects such as fish bones may perforate the gastrointestinal wall and become associated with adjacent-organ complications, including hepatic infection [1-5].

The presumed route in this patient was from the second portion of the duodenum toward the adjacent liver. This interpretation was based on the initial CT, which showed duodenal wall thickening and adjacent inflammatory changes together with a linear foreign body and a subtle tract within segment V. Although no active duodenal defect or leak was identified at surgery, dense duodenohepatic adhesions were present. Taken together, these findings were considered most consistent with previous duodenal wall penetration by the fish bone, resulting in a contained perforation that had subsequently sealed by the time of laparoscopy. Duodenal penetration by an ingested fish bone with subsequent hepatic abscess formation has previously been reported, including cases in which the gastrointestinal defect was not demonstrable at surgery [8,9]. A small perforation may become sealed by inflammatory adhesions, explaining the absence of pneumoperitoneum or generalized peritonitis [1,5,8].

The anatomical distribution of reported cases provides further context. In Chong et al.'s review of 88 patients with hepatic abscess secondary to gastrointestinal foreign-body penetration, the left hepatic lobe was involved in 65.9% of cases, compared with 29.5% involving the right lobe [4]. Similarly, Grayson et al. [3] found that more than two-thirds of reported fish bone-related hepatic abscesses involved the left hepatic lobe, attributed to the close anatomical relationship between the stomach and left liver. Our case instead involved segment V adjacent to the gallbladder bed, with imaging findings suggestive of a contained duodenal perforation. Although less frequent, right-sided hepatic involvement has been documented, including cases associated with duodenal penetration [3,4,9]. Recent reports further support the anatomical plausibility of this relationship, including a case of a fish bone extending from the duodenum into segment V and another involving a contained duodenal perforation with pyogenic liver abscess formation [10,11].

Diagnosis may be challenging because ingestion is often unrecognized. In Chong et al.'s review, only 5% of patients reported a history of foreign-body ingestion, while abdominal pain and fever were the most common presenting symptoms [4]. In our patient, the clinical presentation was similarly nonspecific: right-sided abdominal pain with right lower-quadrant tenderness did not provide a clear anatomical clue to the hepatic lesion. CT is the principal imaging modality for identifying a retained fish bone and defining its relationship with surrounding structures [2,3,6]. In Grayson et al.'s review, CT was diagnostic in 47 of the 52 reported cases in which axial imaging was available [3]. Features that should raise suspicion include an unusual hepatic abscess location, adjacent gastrointestinal wall thickening, a linear hyperdense structure within or near the collection, and failure to respond to conventional treatment [3,5]. In our patient, the initial CT provided a particularly important diagnostic clue by demonstrating the fish bone itself and a subtle linear tract within the hepatic parenchyma.

No standardized management strategy has been established for fish bone-related hepatic abscess, and treatment depends on the patient's clinical condition, the location of the foreign body, the characteristics of the associated collections, and the feasibility of achieving source control [3,4,6]. In the review by Chong et al., 70.5% of patients underwent surgery, while image-guided drainage was performed in 20.5%; only six patients (6.8%) were treated with antibiotics alone [4]. Percutaneous transhepatic removal of the fish bone has also been described as a feasible alternative to surgery in selected patients, particularly when the foreign body can be accessed through an established drainage tract [12].

The initial conservative approach in our patient was reasonable because she remained clinically stable, with no fever, pneumoperitoneum, retroperitoneal air, or clinical evidence of peritonitis. CRP and white blood cell count improved slightly from 16 mg/L and 12.8 × 10^3/μL at admission to 14 mg/L and 11.3 × 10^3/μL on Day 7, and to 13 mg/L and 10.5 × 10^3/μL on Day 21. These clinical and laboratory findings supported continued antimicrobial treatment and close surveillance despite the Day 7 CT progression. Percutaneous drainage was considered but was technically unfeasible. At three weeks, persistence of the collections and increasing perihepatic fluid in the presence of a retained foreign body indicated that adequate source control could not be obtained conservatively or by a percutaneous approach. The clinical, laboratory, and radiological evolution during conservative management is summarized in Table *2*.

Time point	White blood cell count	C-reactive protein	CT findings
Initial presentation	12.8 × 10³/μL	16 mg/L	40-mm foreign body in segment V, with a 14-mm adjacent collection and small subcapsular collection.
Day 7	11.3 × 10³/μL	14 mg/L	Enlargement of the segment V collection (27 × 25 mm) and subcapsular collection (23 × 60 mm); no free air.
Day 21	10.5 × 10³/μL	13 mg/L	Persistent collections and increased perihepatic fluid.

TABLE 2: Timeline of laboratory and radiological findings.

A retained fish bone is particularly relevant in this setting because antimicrobial therapy cannot remove the underlying mechanical source of infection. Masoodi et al. [9] described a recurrent liver abscess associated with a fish bone that had migrated from the duodenum to the right hepatic lobe; despite antibiotics and percutaneous drainage, definitive resolution required surgical removal of the foreign body. Similarly, Pham et al. [13] reported persistence of a fish bone-related liver abscess despite antibiotic therapy for several weeks, with resolution after surgical extraction. These reports support the concept that a retained sharp foreign body may act as a persistent nidus and should be considered when a presumed pyogenic liver abscess fails to resolve with appropriate antimicrobial and drainage therapy. Nevertheless, successful conservative management with the foreign body left in situ has also been reported [14], indicating that immediate surgery is not necessarily mandatory in every clinically stable patient. Rather, the progression of the infection and the feasibility of achieving source control should guide management.

The operative findings provided an anatomical explanation for the localized inflammatory process. Dense adhesions of the greater omentum to the gallbladder and adjacent inferior hepatic surface over segment V, as well as duodenohepatic adhesions, were present. During careful adhesiolysis, the tip of the fish bone was seen; most of the approximately 4-cm bone remained embedded within segment V. No duodenal perforation was visualized, so the proposed gastrointestinal origin remains an interpretation based on the combined imaging, anatomical, and operative findings. Similar relationships between retained fish bones, the gallbladder, and adjacent hepatic parenchyma have been described [14].

Definitive treatment was achieved in our patient with foreign body extraction. Laparoscopic cholecystectomy allowed exposure of the gallbladder bed and facilitated safe extraction of the predominantly intrahepatic foreign body. The abscesses were intrahepatic and not visible laparoscopically; consequently, no drainage, lavage, microbiological sampling, or drain placement was performed. A limitation of this report is the absence of microbiological and histopathological characterization of the hepatic collections, as no drainable abscess cavity or resectable hepatic tissue was identified intraoperatively.

Laparoscopic treatment has been successfully reported for fish bone-related hepatic abscesses, although the approach depends on the location and accessibility of the foreign body [3,6]. Xia et al. [15] reported successful laparoscopic management of a fish bone-induced caudate lobe abscess, while other reports have described laparoscopic extraction of fish bones in close proximity to the gallbladder and hepatic parenchyma [12,16]. Our case supports the feasibility of laparoscopic source control when the foreign body can be safely localized and accessed.

An important clinical lesson is that clinical stability and modest improvement in inflammatory markers do not necessarily indicate resolution of a contained foreign-body-related infection. Our patient remained free of fever and overt peritonitis throughout the three-week conservative period, despite progressive or persistent collections on serial CT. The indication for surgery was therefore not hemodynamic deterioration but the combination of a persistent intrahepatic foreign body, persistent collections, increasing perihepatic fluid, and the technical impossibility of percutaneous drainage. Serial imaging was essential in showing that adequate source control had not been achieved.

This case also emphasizes that the absence of a history of fish bone ingestion should not reduce suspicion when imaging demonstrates an atypical hepatic collection containing a linear hyperdense structure. Because the ingestion event is frequently forgotten or unrecognized, the diagnosis may depend primarily on careful interpretation of cross-sectional imaging [2-6]. When a retained foreign body is identified, the clinical objective should shift from treatment of an apparently uncomplicated hepatic abscess to identification and, whenever feasible, elimination of the underlying source.

Overall, this case supports a stepwise approach to fish bone-related hepatic infection: recognition of the foreign body and its anatomical relationship on CT, antimicrobial therapy in clinically stable patients,

assessment of the feasibility of percutaneous drainage, and removal of the foreign body when infection persists or adequate source control cannot otherwise be achieved [3,4,6]. The main contribution of this case is the combination of CT findings suggestive of a contained duodenal perforation, an embedded fish bone in segment V, absence of fever or peritonitis during three weeks of conservative treatment despite persistent collections, technically unfeasible percutaneous drainage, and successful laparoscopic extraction.

Conclusions

Fish bone-related hepatic abscess is a rare but potentially serious consequence of gastrointestinal foreign-body perforation and adjacent hepatic involvement. A high index of suspicion is essential when an atypical hepatic collection is associated with a linear hyperdense structure on CT, even in the absence of recalled ingestion or overt peritonitis. Management should be individualized according to clinical stability and the feasibility of achieving source control. Conservative treatment may be appropriate initially in selected clinically stable patients, particularly when inflammatory markers improve; however, persistent collections and a retained foreign body, especially when percutaneous drainage is not feasible, should prompt consideration of foreign body removal. When anatomically feasible, a laparoscopic approach can provide effective source control.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Gonçalo Figueirôa, Luís Filipe Claro, Luísa Moniz, Rita Silva, Carlos Nascimento

Acquisition, analysis, or interpretation of data: Gonçalo Figueirôa

Drafting of the manuscript: Gonçalo Figueirôa, Luís Filipe Claro, Luísa Moniz

Critical review of the manuscript for important intellectual content: Gonçalo Figueirôa, Luís Filipe Claro, Luísa Moniz, Rita Silva, Carlos Nascimento

Supervision: Gonçalo Figueirôa, Luís Filipe Claro, Luísa Moniz, Rita Silva, Carlos Nascimento

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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