

CASE SERIES OPEN ACCESS

From Harmless to Harmful: A Case Series of Hepatic Abscess Induced by Gut Microbiota Due to Fish Bone

Muhammad Nadeem Ahmad¹ | Muhammad Rafay¹ | Muhammad Ahmed¹ | Mallick Muhammad Zohaib Uddin¹  | Saba Akram² | Naila Nadeem¹ | Wasim Memon¹ | Kamran Fazal¹ | Faheemullah Khan³ | Uffan Zafar¹

¹Radiology Department, Aga Khan University Hospital, Karachi, Pakistan | ²Department of Pathology and Laboratory Medicine, The Aga Khan University, Karachi, Pakistan | ³Diagnostic Institute, Cleveland Clinic, Cleveland, Ohio, USA

Correspondence: Faheemullah Khan (khanf7@ccf.org)

Received: 25 September 2024 | **Revised:** 22 November 2024 | **Accepted:** 29 November 2024

Funding: The authors received no specific funding for this work.

Keywords: abscess | fishbone | foreign body | microbiota | radiology

ABSTRACT

Accidental ingestion of fish bones can lead to serious complications, such as gastrointestinal perforation and hepatic abscesses. This case series presents three instances where fish bone ingestion led to secondary GI tract perforation and the development of hepatic abscesses. It also emphasizes the importance of prompt diagnosis and intervention to prevent serious consequences.

1 | Introduction

Accidental foreign body ingestion with food is a frequent occurrence, with most cases passing without complications within one week [1]. It is reported that approximately 1% of ingested foreign bodies can lead to gastrointestinal (GI) perforation [2]. Factors that increase the likelihood of complications like GI perforation, abscess formation, or obstruction include shape of the ingested object (sharp, pointy edges), or the location in the GI tract, for example, sites of angulation or narrowing [3]. One such source of GI perforation and eventual hepatic abscess formation is the ingestion of a fish bone [4, 5].

In this case series, we describe three cases of fish bone ingestion with secondary perforation of the GI tract, followed by entero-hepatic migration of the foreign body. This case series illustrates the difficulty of diagnosis and emphasizes the need for attention to this rare but serious condition.

2 | Case 1

2.1 | Case History/Examination

A 16-year-old boy with fever and upper abdominal pain for 5 days was admitted to our hospital with a history of accidental ingestion of fish bone 1 week before. Upon admission, the patient was oriented and exhibited a blood pressure of 120/78 mmHg, heart rate of 82 beats per min, temperature of 37°C, respiratory rate of 19 breaths per min, and oxygen saturation of 98% on room air. Over the past 5 days, the patient reported dull pain in the epigastric region and intermittent low-grade fever. There were no episodes of vomiting or diarrhea. Physical examination revealed a soft and non-tender abdomen, suggesting no acute distress or underlying pathology. Initial laboratory workup was done, and it showed an elevation of inflammatory biomarker (C-reactive protein of 38 mg/dL), normal WBC count, and normal levels of serum amylase and lipase.

2.2 | Radiological Investigations

Abdominal ultrasound showed a linear hyperechoic foreign body traversing the duodenum and causing subhepatic collection (see Figure 1). Unenhanced abdominal computed tomography was performed, which showed a dense foreign body traversing the lateral duodenal wall with a small subhepatic collection (see Figure 2).

2.3 | Outcome and Follow-Up

He underwent upper gastrointestinal endoscopy but no foreign body was found. Follow-up ultrasound was performed after 10 days which showed redemonstration of fish bone with interval resolution of subhepatic collection. The patient was reassessed after 5 days on ultrasound, which showed no definitive foreign body. No antibiotic coverage was done during this period. The patient was discharged. Another follow-up ultrasound 2 weeks later also showed no recurrence of the collection.

3 | Case 2

3.1 | Case History/Examination

A 40-year-old male presented to the emergency department with abdominal pain for the past 2 days. There were no specific symptoms apart from pain. Upon admission, the patient was oriented and presented with a blood pressure of 120/70 mmHg, a heart rate of 78 beats per minute, and was Afebrile. The respiratory rate was 18 breaths per minute, and oxygen saturation was measured 98% on room air. Over the past 2 days, the patient reported experiencing upper abdominal pain along with a low-grade fever. On physical examination, the abdomen appeared bloated with notable hardness in the epigastric and umbilical regions accompanied by tenderness; gut sounds were audible. Initial laboratory tests revealed leukocytosis, with a predominance of neutrophils and elevated inflammatory markers (WBCs = $22 \times 10^9/L$, neutrophils = 86%, and C-reactive protein = 52 mg/dL), while serum total bilirubin and alkaline phosphatase levels were within the normal range. Blood cultures were sent, and it appears negative.

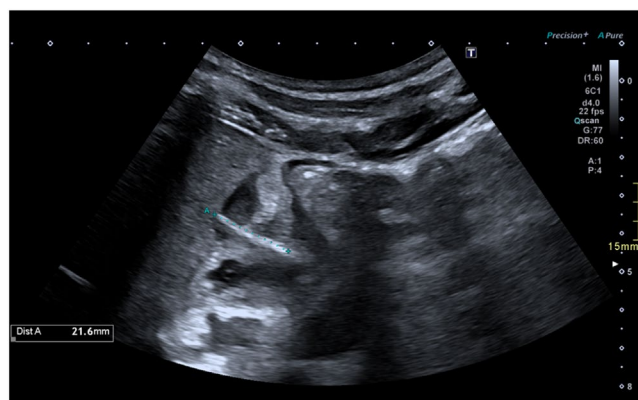


FIGURE 1 | Ultrasonography image showing fish bone (blue caliper) measuring 21.6 mm.

3.2 | Radiological Investigations

An ultrasound of the upper abdomen demonstrated a streak of free fluid in the perisplenic and perihepatic regions. A subsequent enhanced computed tomography of the abdomen showed a linear hyperdensity adjacent to the lesser curvature of the stomach, located outside the gastric lumen, suggesting a perforating foreign body. There was associated gastric wall edema and thickening, primarily at the lesser curvature, along with a small volume of loculated perigastric fluid (see Figure 3).

3.3 | Outcome and Follow-Up

The patient was initially treated with intravenous antibiotics. A barium swallow study with nonionic contrast showed no evidence of contrast leakage from the stomach. However, the patient developed recurrent abdominal pain and fever. A follow-up CT scan of the abdomen revealed the continued presence of the fishbone adjacent to the lesser curvature of the stomach. The scan also showed an increase in gastric wall thickening and inflammatory changes along the lesser curvature and gastrohepatic ligament, accompanied by small air pockets. These findings suggested the development of gastric outlet obstruction because of abnormal thickening and inflammation.

Furthermore, there was interval development of small, low-attenuation areas with peripherally enhancing walls, indicating abscess formation. The abscess was drained under image guidance, and the patient was discharged on oral antibiotics, including metronidazole and cefixime.

Thereafter, the patient was lost to follow-up.

4 | Case 3

4.1 | Case History/Examination

A 65-year-old male presented to the emergency department with a 10-day history of abdominal pain, intermittent low-grade fever, and drowsiness. Upon general physical examination, the patient was febrile, and vital signs were within normal limits. The abdomen appeared bloated with hardness and tenderness in the epigastric and umbilical regions, accompanied by audible gut sounds. Initial laboratory workup revealed elevated inflammatory markers (TLC $15.2 \times 10^9/L$) and deranged liver function tests (total bilirubin 2 mg/dL with predominantly raised direct bilirubin 1.3 mg/dL). Blood cultures were obtained, and the results returned negative.

4.2 | Radiological Investigations

A contrast-enhanced computed tomography of the abdomen showed a large, ill-defined hypodense lesion in the right hepatic lobe with internal necrosis, multifocal air specks, peripheral enhancement, and surrounding hyperemia. These findings were suggestive of a hepatic abscess. A linear hyperdensity was noted within the lesion, adjacent to its inferior margin near the duodenum, raising suspicion of trans bowel migration of a foreign body, possibly a fish bone (see Figure 4).



FIGURE 2 | Unenhanced computed tomography images. Axial (a) and coronal (b) images of computed tomography showed a linear hyperdense structure, fish bone (red arrow) traversing the lateral wall of the duodenum with a small subhepatic collection not shown in this image.



FIGURE 3 | Enhanced computed tomography images. Axial (a) and coronal (b) images of computed tomography showed a linear hyperdense fish bone (red arrow) adjacent to the lesser curvature of the stomach, located outside the gastric lumen.

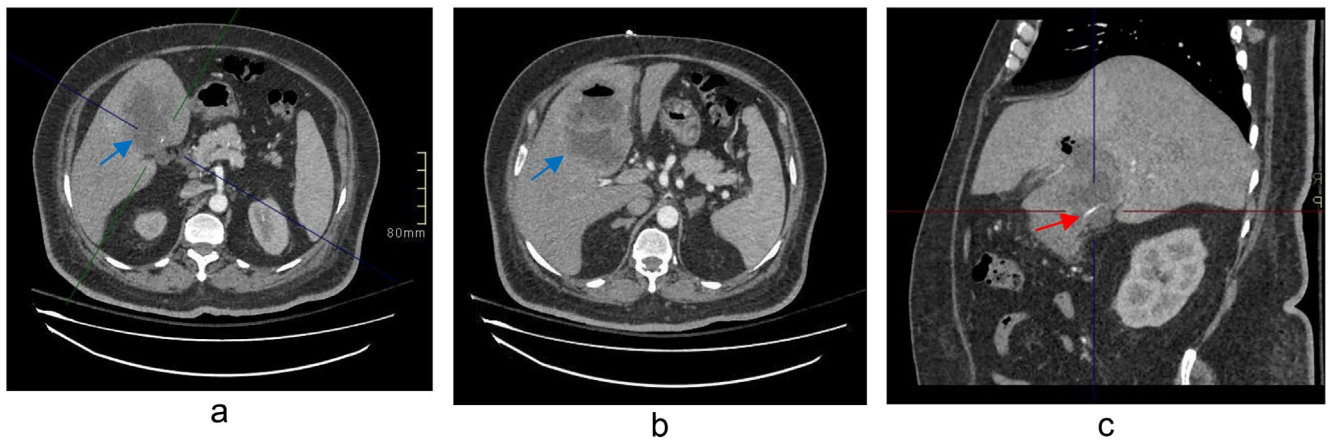


FIGURE 4 | Enhanced computed tomography images. Axial (a, b) and sagittal (c) images showed a large, ill-defined hypodense lesion (blue arrow) in the right lobe of liver along with a linear hyperdense structure, fish bone (red arrow).

4.3 | Outcome and Follow-Up

A pigtail drain was placed for abscess drainage, and a pus culture grew *Streptococcus milleri* which was sensitive to penicillins, tetracycline, and fluoroquinolones and resistant to erythromycin. The patient was started on broad-spectrum antibiotics. Follow-up ultrasounds after 1, 2, and 4 months showed no residual abscess with non-visualization of the foreign body.

5 | Discussion

Liver abscess resulting from an ingested foreign body is very uncommon. Most ingested foreign bodies pass through the gastrointestinal tract without causing any problems within a week, and only about 1% result in perforation [6]. The stomach and duodenum are the most frequently affected sites for gastrointestinal perforation [7, 8]. In earlier cases of abscess formation due

to fish bone ingestion, most patients did not report a history of ingesting fish bones. Ultrasound and a high clinical suspicion are the primary methods for diagnosing these rare cases of migrating foreign bodies [7, 9, 10]. A migrating foreign body might remain asymptomatic for an extended period and may only be detected when there are signs of infection or abscess formation, as seen in our three cases [7, 10]. The lack of history of foreign body ingestion often results in a delayed presentation for these patients. Routine laboratory tests are typically nonspecific as seen in our three cases. Plain radiography is only effective in detecting radiopaque foreign bodies [11]. While abdominal ultrasound can assist in diagnosis, a CT scan has a sensitivity of 100% and specificity of 91% in the diagnostic evaluation of ingested foreign bodies [12].

Our third case highlights a rare instance where a fish bone caused a liver abscess. Upon aspiration, *S. milleri* was isolated which was sensitive to penicillins, tetracyclines, and fluoroquinolones and was resistant to erythromycin. The *S. milleri* is commonly present in the normal flora of the gastrointestinal tract and sometimes can cause opportunistic infection leading to abscess formation. Therefore, drainage followed by culture and sensitivity is needed for proper antibacterial therapy. The patient's successful treatment involved pus drainage and targeted antibiotic therapy, resulting in full recovery. The treatment of hepatic abscesses is still a subject of debate, with approaches varying from antibiotic therapy and percutaneous drainage to surgical intervention [13]. As seen in our first case, conservative treatment was done and only two reported cases of liver abscesses resulting from foreign body perforation have been successfully managed with conservative treatment [10, 14].

Author Contributions

Muhammad Nadeem Ahmad: conceptualization, data curation, supervision, visualization, writing – review and editing. **Muhammad Rafay:** conceptualization, data curation, investigation, writing – original draft. **Muhammad Ahmed:** conceptualization, data curation, writing – original draft. **Mallick Muhammad Zohaib Uddin:** conceptualization, data curation, investigation, writing – original draft, writing – review and editing. **Saba Akram:** conceptualization, data curation, methodology, writing – original draft, writing – review and editing. **Naila Nadeem:** conceptualization, project administration, supervision, writing – review and editing. **Wasim Memon:** conceptualization, methodology, supervision, writing – review and editing. **Kamran Fazal:** conceptualization, methodology, supervision, writing – review and editing. **Faheemullah Khan:** conceptualization, resources, writing – review and editing. **Uffan Zafar:** conceptualization, data curation, investigation, methodology, project administration, supervision, visualization, writing – review and editing.

Disclosure

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

Ethics Statement

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association.

Consent

Written informed consent was obtained from the patients to publish the case series.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data is available from corresponding author on request.

References

1. M. C. DE, A. Kurchin, and J. R. Hinshaw, "Gastrointestinal Foreign Bodies," *American Journal of Surgery* 142, no. 3 (1981): 335–337, [https://doi.org/10.1016/0002-9610\(81\)90342-1](https://doi.org/10.1016/0002-9610(81)90342-1).
2. M. Maleki and W. E. Evans, "Foreign-Body Perforation of the Intestinal Tract. Report of 12 Cases and Review of the Literature," *Archives of Surgery* 101, no. 4 (1970): 475–477, <https://doi.org/10.1001/archsurg.1970.01340280027008>.
3. F. M. Ziter, Jr., "Intestinal Perforation in Adults Due to Ingested Opaque Foreign Bodies," *American Journal of Gastroenterology* 66, no. 4 (1976): 382–385.
4. N. Grayson, H. Shanti, and A. G. Patel, "Liver Abscess Secondary to Fishbone Ingestion: Case Report and Review of the Literature," *Journal of Surgical Case Reports* 2022, no. 2 (2022): rjac026.
5. S. Hernández-Villafranca, S. Qian-Zhang, D. García-Olmo, and P. Villarejo-Campos, "Liver Abscess Due to a Fish Bone Injury: A Case Report and Review of the Literature," *Cirugia y Cirujanos* 88 (2020): 1–4.
6. G. C. Nicolodi, C. R. Trippia, M. F. Caboclo, et al., "Intestinal Perforation by an Ingested Foreign Body," *Radiologia Brasileira* 49, no. 5 (2016): 295–299.
7. S. A. Santos, S. C. Alberto, E. Cruz, et al., "Hepatic Abscess Induced by Foreign Body: Case Report and Literature Review," *World Journal of Gastroenterology* 13 (2007): 1466–1470.
8. S. V. Chintamani, P. Lubhana, R. Durkhere, and S. Bhandari, "Liver Abscess Secondary to a Broken Needle Migration—A Case Report," *BMC Surgery* 3 (2003): 8.
9. Y. C. Cheung, S. H. Ng, C. F. Tan, K. K. Ng, and Y. L. Wan, "Hepatic Inflammatory Mass Secondary to Toothpick Perforation of the Stomach: Triphasic CT Appearances," *Clinical Imaging* 24 (2000): 93–95.
10. C. T. Ng, A. Htoo, and S. Y. Tan, "Fish Bone-Induced Hepatic Abscess: Medical Treatment," *Singapore Medical Journal* 52 (2011): e56–e58.
11. J. H. Ngan, P. J. Fok, E. C. Lai, F. J. Branicki, and J. O. Wong, "A Prospective Study on Fish Bone Ingestion: Experience of 358 Patients," *Annals of Surgery* 211, no. 4 (1990): 459–462.
12. E. M. De Lucas, P. Sádaba, P. L. García-Barón, et al., "Value of Helical Computed Tomography in the Management of Upper Esophageal Foreign Bodies," *Acta Radiologica* 45, no. 4 (2004): 369–374.
13. T. Bekki, N. Fujikuni, K. Tanabe, H. Amano, T. Noriyuki, and M. Nakahara, "Liver Abscess Caused by Fish Bone Perforation of Stomach Wall Treated by Laparoscopic Surgery: A Case Report," *Surgical Case Reports* 5, no. 1 (2019): 79, <https://doi.org/10.1186/s40792-019-0639-0>.
14. A. Peixoto, R. Goncalves, and G. Macedo, "Liver Abscess Associated Sepsis Caused by Fish Bone Ingestion," *GE Portuguese Journal of Gastroenterology* 23 (2016): 322–323.