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A Case of Metallic Foreign Body in a Dog's Liver

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Summary

Foreign body migration into the liver is an extremely rare but potentially life-threatening condition. This case report describes the clinical presentation, diagnosis, surgical treatment and outcome of a metallic foreign body that migrated into the liver of a four-year-old German Shepherd Dog. The patient was initially presented with nonspecific clinical signs, including anorexia, lethargy and weight loss and had a temporary response to antibiotic therapy. Radiographic imaging revealed a metallic object in the cranial abdomen. Following stabilization, surgical removal via laparotomy was performed and the foreign body was extracted from the left lateral hepatic lobe without complications. Despite initial postoperative improvement, the patient died suddenly on the third postoperative day. Due to the owner's refusal of a necropsy, the cause of death could not be determined. This case highlights the diagnostic challenges associated with migrating foreign bodies and emphasizes the critical importance of postoperative monitoring.

Zusammenfassung

Ein metallischer Fremdkörper in der Leber eines Hundes: Fallbericht

Das Eindringen eines Fremdkörpers in die Leber ist eine äußerst seltene, jedoch potenziell lebensbedrohliche Erkrankung. Dieser Fallbericht beschreibt die klinische Präsentation, Diagnose, chirurgische Behandlung und den Verlauf bei einem vierjährigen Deutschen Schäferhund, in dessen Leber ein metallischer Fremdkörper eingewandert war. Der Patient zeigte zunächst unspezifische klinische Symptome wie Anorexie, Lethargie und Gewichtsverlust. Unter antibiotischer Therapie ergab sich eine vorübergehende Besserung. Die radiologische Bildgebung zeigte einen metallischen Fremdkörper, der im kranialen Abdomen lokalisiert war. Nach Stabilisierung des Patienten wurde eine chirurgische Entfernung des Fremdkörpers mittels Laparotomie durchgeführt, wobei dieser komplikationslos aus dem linken lateralen Leberlappen entfernt werden konnte. Trotz anfänglicher postoperativer Besserung verstarb der Patient plötzlich am dritten Tag nach der Operation. Aufgrund der Ablehnung einer Obduktion durch den Besitzer konnte die genaue Todesursache nicht festgestellt werden. Dieser Fall verdeutlicht die diagnostischen Herausforderungen im Zusammenhang mit migrierenden Fremdkörpern und unterstreicht die entscheidende Bedeutung der postoperativen Überwachung.

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■ Introduction

Foreign bodies are frequently encountered in the gastrointestinal (GI) tract of dogs, including items such as balls, bone fragments, toys and stones (Mahajan et al. 2012; Grand 2019; Duval et al. 2020). In humans, most ingested foreign bodies are naturally expelled from the gastrointestinal system without causing any pathological processes, as occurs in approximately 99 % of cases (Chintamani et al. 2003; Choi et al. 2010; Hoff et al. 2021; Rhodes et al. 2024). Although gastrointestinal perforations caused by foreign bodies are rare, they can lead to significant complications. Moreover, the lack of a clear history regarding the time of foreign body ingestion often complicates clinical management (Chiang et al. 2006).

Clinical signs associated with foreign bodies vary depending on the anatomical region affected and the presence of secondary complications such as abscess formation (Duval et al. 2020). Migrating foreign bodies typically consist of materials such as grass awns, wooden splinters, needles and toothpicks and they may migrate to anatomical regions including the eyes, spine, urinary system and abdominal or thoracic organs, causing diverse clinical symptoms (Choi et al. 2010). Migration of foreign bodies to the liver has been documented in humans and animals (Chintamani et al. 2003; Chiang et al. 2006; Karamarkovic et al. 2007; Choi et al. 2010; Grand 2019; Hoff et al. 2021; Gigola et al. 2022; Subasinghe et al. 2022; Yan et al. 2022; Rhodes et al. 2024). However, there are relatively few cases in veterinary medicine and the clinical manifestations and treatment strategies associated with hepatic foreign bodies may vary (Choi et al. 2010; Grand 2019).

In human medicine, both medical and surgical approaches have been described for the management of hepatic foreign bodies (Gigola et al. 2022). In contrast, the veterinary literature provides limited information on the diagnosis and treatment of such cases. The present case report presents the diagnosis and surgical removal of a metallic foreign body that had migrated to the liver of a dog.

■ Case Presentation

A four-year-old, 26 kg, intact male German Shepherd dog was presented to our clinic with a three-day history of anorexia, lethargy, difficulty in defecation and weight loss of approximately 6 kg from the onset of clinical symptoms. According to the anamnesis from the owner, the dog had exhibited similar clinical signs approximately 20 days earlier and was treated at another veterinary clinic with an antibiotic containing amoxicillin and clavulanic acid (Synulox®, 12.5 mg/kg twice daily orally, Zoetis, Parsippany, New Jersey, USA) for 7 days. Although the clinical signs temporarily resolved

during therapy, they recurred shortly after discontinuation of the treatment.

On physical examination, the dog exhibited an elevated body temperature (39.5 °C), abdominal guarding and moderate dehydration of an estimated 5–8 %. A complete blood count revealed leucocytosis ($34.38 \times 10^3/\mu\text{l}$; reference range: $6.0\text{--}17.0 \times 10^3/\mu\text{l}$), lymphocytosis ($5.89 \times 10^3/\mu\text{l}$; reference range: $1.0\text{--}4.8 \times 10^3/\mu\text{l}$) and monocytosis ($1.75 \times 10^3/\mu\text{l}$; reference range: $0.15\text{--}1.35 \times 10^3/\mu\text{l}$), indicative of an active infection. In addition, there were reductions in erythrocyte count ($3.65 \times 10^6/\mu\text{l}$; reference range: $5.5\text{--}8.5 \times 10^6/\mu\text{l}$), haemoglobin concentration (7.5 g/dl; reference range: 12–18 g/dl) and haematocrit (22.46 %; reference range: 37–55 %). Serum biochemistry demonstrated elevated levels of AST (61 U/l; reference range: 10–50 U/l), ALT (146 U/l; reference range: 10–100 U/l) and a markedly increased ALP (1400 U/l; reference range: 20–150 U/l). Blood gas analysis revealed hypokalaemia (2.8 mmol/l; reference range: 3.5–5.5 mmol/l).

Based on these findings, we performed ventro-dorsal (V/D) and right latero-lateral (L/L) abdominal radiographs, which revealed a radiopaque structure in the cranial abdominal region, raising suspicion of a foreign body (Fig. 1). Taking the clinical, laboratory and imaging findings into consideration, we established a diagnosis of a foreign body within the hepatic parenchyma, potentially associated with abscess formation.

Considering the initial condition of the patient, a 24-hour course of medical treatment was administered to stabilize the patient prior to surgery, which included intravenous fluid therapy (0.9 % NaCl, Polifarma, Turkey; Potassium Chloride Supplementation, Galen, Turkey), antibiotic treatment (Cefazolin Sodium, Ilespor, Turkey), analgesia (Butorphanol, Butomidor, VetViva Richter GmbH, Austria) and vitamin complex supplementation (Berovit B12, Ceva, France), after which the operation was performed. Under general anaesthesia (Domitor [Medetomidine Hydrochloride], Orion Corporation, Finland; Ketazol [Ketamine Hydrochloride], Pfizer Inc., USA and Isoflurane USP [Isoflurane USP], Baxter Healthcare Corporation, USA), a median laparotomy was performed to remove the foreign body. During the procedure, a metallic foreign object was identified in the left lateral lobe of the liver, with one end embedded in the hepatic parenchyma and the other entangled within the omentum (Fig. 2). The object was carefully extracted from the surrounding tissues. No active haemorrhage or abscess formation was observed in the liver. The homogeneity of the liver parenchyma was normal, the size and consistency of the lobes were within normal limits and no macroscopic pathological condition was present. Neither pathological findings were observed in the other abdominal organs, nor was there any evidence of perforation in any part of the intestines or stomach. The abdominal cavity was irrigated with sterile saline and the incision closed by routine surgical procedures.

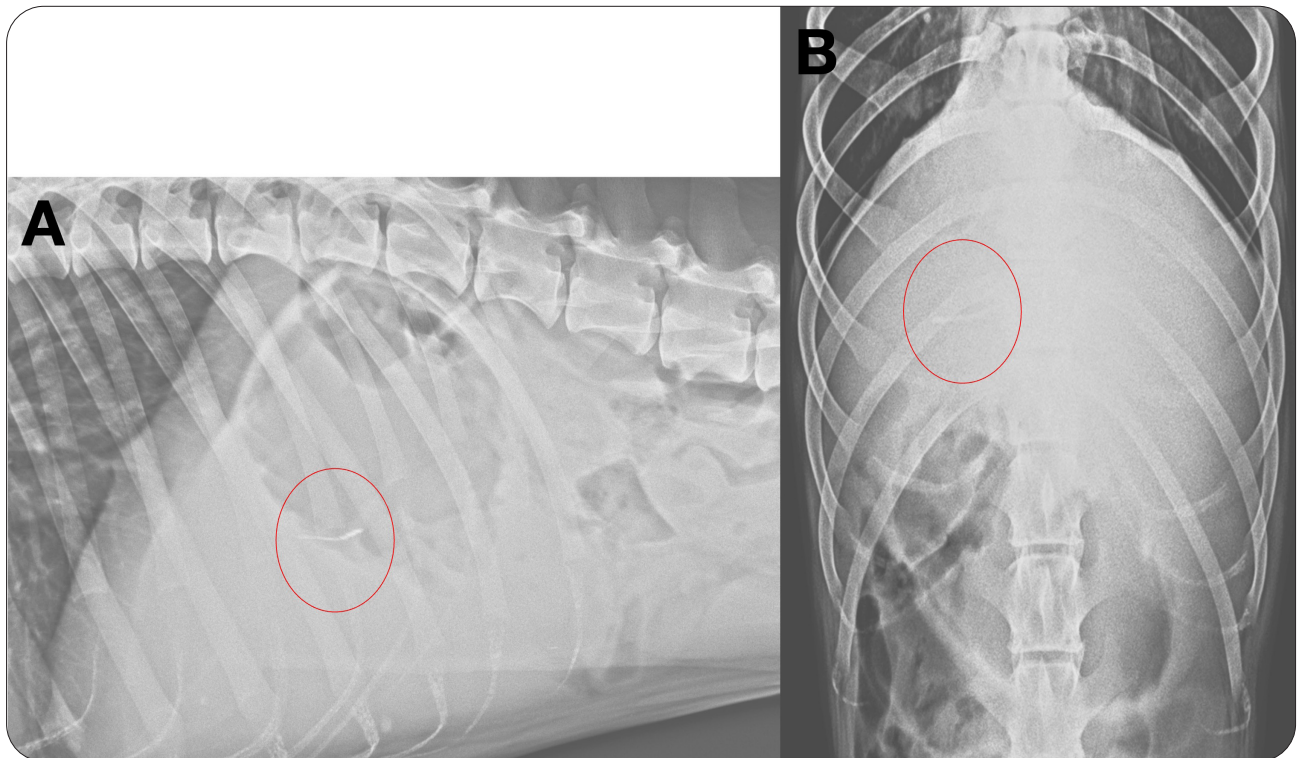


Fig. 1: A: Metallic foreign body seen on right latero-lateral (L/L) radiograph, B: Same object visualized on ventro-dorsal (V/D) radiograph / A: Metallischer Fremdkörper auf der rechts latero-lateralen (L/L) Röntgenaufnahme, B: Dasselbe Objekt auf der ventro-dorsalen (V/D) Röntgenaufnahme.

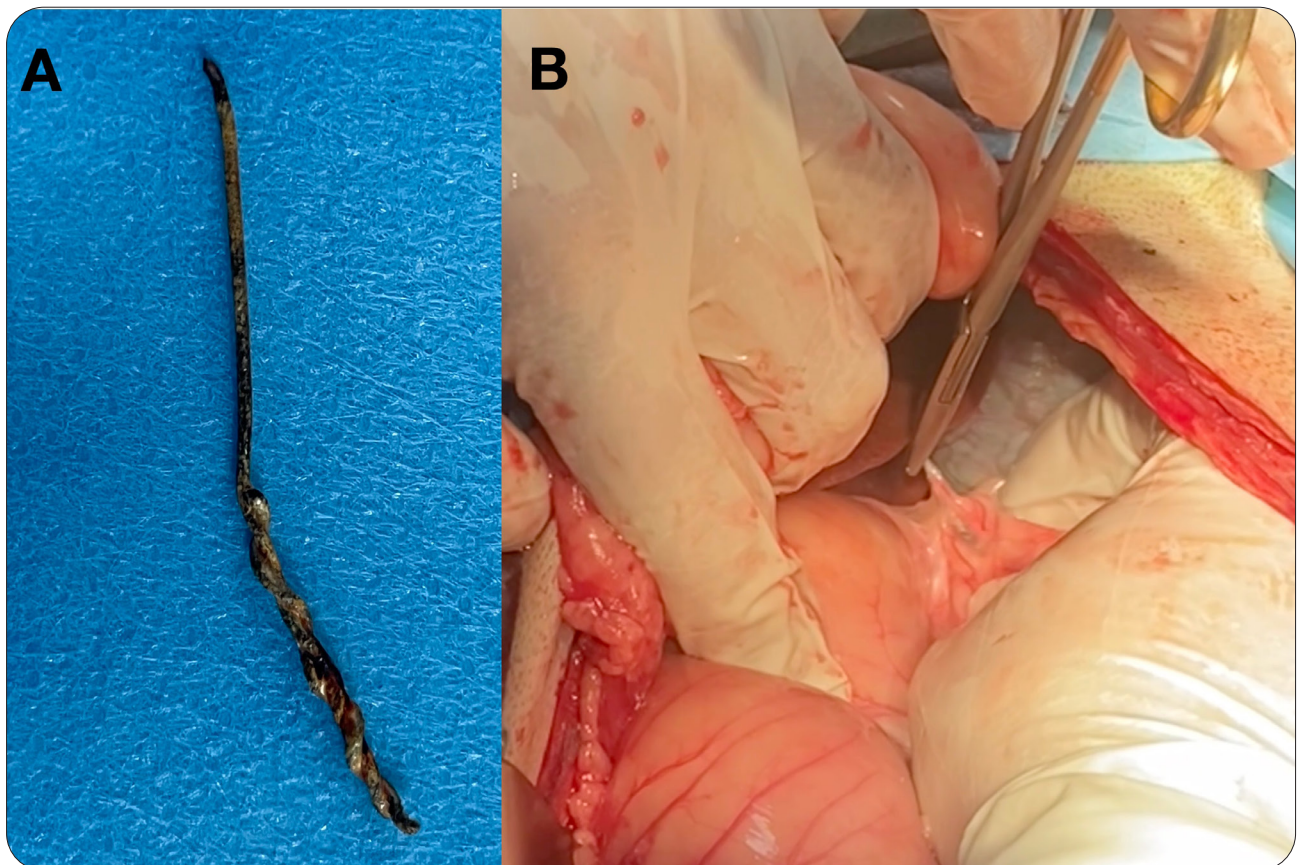


Fig. 2: A: Image of the foreign body following surgical removal, B: Intraoperative view of the foreign body before removal / A: Bild des metallischen Fremdkörpers nach der chirurgischen Entfernung, B: Intraoperative Ansicht des metallischen Fremdkörpers vor der Entfernung.

Despite clinical improvement during the first two days after surgery, the patient remained under clinical observation and continued to receive the preoperatively planned medical treatment. However, on the second day after the operation, the owner chose to discharge the dog from the clinic and subsequently brought the patient only for medication administration. On the fourth postoperative day, when the patient failed to return for treatment, the owner was contacted and reported that the dog had died. A postmortem examination was offered but declined by the owner, so the exact cause of death could not be determined. Due to the owner's refusal, no follow-up laboratory tests were performed during the postoperative period.

■ Discussion

Foreign body migration, particularly following gastrointestinal perforation, is a rare but potentially serious condition in human and veterinary medicine (Choi et al. 2010). While foreign body ingestion is relatively common in dogs, it is relatively uncommon, that foreign objects migrate beyond the gastrointestinal tract into visceral organs. In humans, the incidence of such migration is less than 1 % (Chintamani et al. 2003; Choi et al. 2010; Hoff et al. 2021; Rhodes et al. 2024). Foreign bodies prone to migration are typically linear and sharply pointed, with the most commonly reported materials including grass awns, toothpicks, bone fragments and surgical needles (Choi et al. 2010; Duval et al. 2020). There have been only few cases of the migration of penetrating metallic foreign bodies to the liver in animals (Choi et al. 2010; Grand 2019; Noda et al. 2022). The present case contributes to this limited body of literature, particularly due to the fatal outcome.

Foreign body migration is a complex process influenced by inflammation, peristaltic activity and fibrotic responses from surrounding tissues. Anatomical narrowing sites such as the stomach, ileum and ileocecal junction are common points of perforation (Coulier et al. 2004). Once perforation occurs, foreign bodies may migrate to various tissues, including the myocardium, thoracic and abdominal cavities, omentum, liver, spleen, retropharynx, gastrointestinal tract, vertebral canal and brainstem (Duval et al. 2020). The patient or owner may not be aware of the time of ingestion, as clinical signs may start significantly later (Chiang et al. 2006; Choi et al. 2010). In the present case, the foreign body is suspected to have reached the liver via a perforation in the stomach or duodenum. The owner stated that the patient may have ingested the foreign body at least six months prior to surgery, as they had moved out of a house where similar objects were present. This suggests a slowly progressing inflammatory migration process.

Clinical symptoms are often nonspecific, typically presenting as anorexia, weight loss, lethargy, abdom-

inal pain and fever (Chintamani et al. 2003; Chiang et al. 2006; Karamarkovic et al. 2007; Choi et al. 2010; Grand 2019; Hoff et al. 2021; Gigola et al. 2022; Subasinghe et al. 2022; Yan et al. 2022; Rhodes et al. 2024). The lack of specificity complicates the diagnostic process, and the condition may be mistaken for other systemic diseases. In this case, the initial clinical signs were indicative of a systemic infection and the temporary response to antibiotic treatment masked the underlying pathology. A potential contributing factor to the fatal outcome was the delayed initiation of appropriate intervention due to the absence of specific clinical signs and the initial misdirection in the diagnostic approach.

Due to the nonspecific nature of the clinical presentation, the diagnosis of migrating foreign bodies often depends on imaging modalities such as radiography, ultrasonography and computed tomography. Radiography is particularly effective for detecting radiopaque objects but has lower sensitivity for wooden and plant-derived materials (Mayhew 2011; Brioschi et al. 2014; Grand 2019; Duval et al. 2020; Gigola et al. 2022). In the present case, the metallic composition of the foreign body facilitated its identification, as it was clearly visible on both radiographic evaluations. The literature confirms that the radiopacity of metallic foreign bodies greatly assists in an early diagnosis (Chintamani et al. 2003; Choi et al. 2010; Mahajan et al. 2012; Grand 2019; Duval et al. 2020). Ultrasonography and computed tomography were not performed throughout the study due to their abnormalities in dogs. Radiographic imaging played a crucial part in identifying the unavailability.

The management of hepatic foreign bodies varies considerably. In human medicine, while surgical removal is commonly performed, there are also reports of successful conservative medical management (Coulier et al. 2004; Chiang et al. 2006). In contrast, surgical intervention remains the primary approach in animals (Choi et al. 2010; Grand 2019; Noda et al. 2022). Surgical planning in parenchymal organs such as the liver requires particular caution due to the potential need for additional surgical interventions such as liver lobectomy, cholecystectomy, intestinal anastomosis or gastrotomy. In the present case, the superficial localization of the foreign body in the left lateral hepatic lobe, along with the absence of abscess formation or vascular involvement, facilitated the surgical procedure. However, the patient's sudden death on the third postoperative day raises concerns regarding possible microvascular injury, sepsis, peritonitis or thromboembolic events. Unfortunately, the owner's refusal to authorize necropsy means that the cause of death remains speculative.

Cases of hepatic foreign body migration have been reported in dogs (Choi et al. 2010; Grand 2019) and at least one case involved splenic migration (Mahajan et al. 2012). The dogs in these cases were all approximately four years old. A similar case has been reported

in a cat (Noda et al. 2022). Whereas in previously documented cases, patients survived, the fatal outcome in our case underlines the life-threatening nature of hepatic foreign bodies, even when surgical intervention is successful. Surgical removal remains the recommended treatment for hepatic foreign bodies. Although laparoscopic techniques are becoming increasingly popular, laparotomy remains a viable alternative in settings where laparoscopy is not available (Grand 2019).

The primary limitation of this report is the absence of a postmortem examination, which prevented a determination of the cause of death, as well as the insufficient postoperative monitoring. This situation also partially limited the scientific evaluation. Another limitation is the absence of microbiological culture, which was not performed due to the lack of obviously purulent material during surgery and a history of long-term antibiotic use that could have affected the results. Nevertheless, the case highlights the necessity of careful postoperative follow-up, as complications may arise even when clinical signs suggest surgical success. Such close

monitoring during the postoperative period would include laboratory tests and imaging techniques. In the present case, the patient could not be sufficiently monitored during the postoperative period. To understand this rare but serious condition, there is a need for further case reports with systematic documentation, advanced imaging methods and thorough postmortem analysis.

■ Conclusion

This case highlights the importance of considering migrating foreign bodies in the differential diagnosis of unexplained hepatic or abdominal metallic foreign body and surgical removal led initially to a favourable outcome. In general, early diagnosis, prompt surgical intervention and vigilant postoperative monitoring are essential to prevent severe complications associated with migrating foreign bodies.

Fazit für die Praxis:

Fremdkörpermigrationen in die Leber sind selten und zeigen meist unspezifische klinische Symptome, was eine Diagnosestellung erschwert. Beim Nachweis eines Fremdkörpers in der Leber sollten medizinische und chirurgische Maßnahmen zügig eingeleitet werden. Generell sind die frühe Diagnosestellung, eine rasche chirurgische Intervention und eine intensive postoperative Überwachung essenziell, um schwere Komplikationen frühzeitig zu erkennen und zu behandeln.

Conflict of interest

The authors declare no conflict of interest.

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