

Endoscopic management of multiple broken scalpel blades in the gastrointestinal tract: a case report

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Abstract

The entry of multiple broken scalpel blades into the gastrointestinal tract with involvement of the stomach, ileum, and colon is rare; no such cases have been reported to date. Whether management of multiple sharp foreign bodies is more effective by endoscopy or surgery remains controversial in clinical practice. We herein describe a 23-year-old man with depression who was admitted to our department 36 hours after swallowing multiple scalpel blades. The patient reported abdominal pain and bloody vomit. A radiograph revealed irregular blade-shaped foreign bodies in the abdomen, and computed tomography confirmed foreign bodies in the stomach, mid-distal segment of the ileum, proximal segment of the ascending colon, liver area of the transverse colon, and lumen of the sigmoid colon. Surgery was immediately suggested as the first-choice treatment, but endoscopy was instead performed after a thorough multidisciplinary discussion. All broken scalpel blades were successfully removed with combined gastroscopy and colonoscopy, and the patient's postoperative recovery was uneventful. This case demonstrates the vital importance of multidisciplinary management and endoscopy as an appropriate treatment approach even for multiple sharp foreign bodies in patients without perforation or peritonitis.

Keywords

Foreign body, gastrointestinal tract, endoscopy, surgery, scalpel blades, case report

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Introduction

Foreign bodies in the digestive system in adults are commonly encountered and are sometimes deliberately swallowed by mentally impaired individuals, criminals, and drug dealers.¹ The types of foreign bodies

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are complex, but multiple sharp foreign bodies are rare.² Whether endoscopy or emergency surgery has greater advantages in removing multiple sharp foreign bodies is clinically controversial.³ Improper or delayed management of such cases can lead to serious complications, including gastrointestinal bleeding, perforation, internal fistulas, or widespread infection. Few studies to date have focused on the treatment of a large number of sharp foreign bodies retained in the gastrointestinal tract. We herein report a case involving a patient with aggravated depression who swallowed multiple scalpel blades. The blades were successfully removed by gastroscopy and colonoscopy after a thorough multidisciplinary discussion. The purpose of this case report is assist doctors who encounter similar situations in clinical practice.

Case report

A 23-year-old man swallowed several scalpel blades after dinner and was admitted to the hospital 36 hours later. The patient had a medical history of depression, but his medication had recently been discontinued for personal reasons. The patient reported

that he had swallowed a pack of paper-packaged surgical scalpel blades purchased from a medical supply store. He subsequently developed abdominal pain accompanied by one episode of bloody vomiting and three episodes of melena. His vital signs were stable with a slightly elevated heart rate of 101 beats/minute. Superficial cuts were found on the tongue. A relatively white conjunctiva was obvious, and no injection marks were found on his limbs. His breathing was steady, his abdomen was soft, and his bowel sounds were active. Slight tenderness was found in his upper abdominal area without muscle tension. Anorectal examination revealed no contact with any foreign body, but tarry stools were visible on the gloved finger. A radiograph revealed multiple broken blade-shaped dense shadows dispersed in the gastrointestinal tract (Figure 1). Computed tomography confirmed foreign bodies in the stomach cavity, mid-distal segment of the ileum, proximal segment of the ascending colon, liver area of the transverse colon, and lumen of the sigmoid colon (Figure 2).

Experienced surgeons proposed emergency surgery to remove the foreign body fragments and warned of potentially disastrous consequences if the operation was

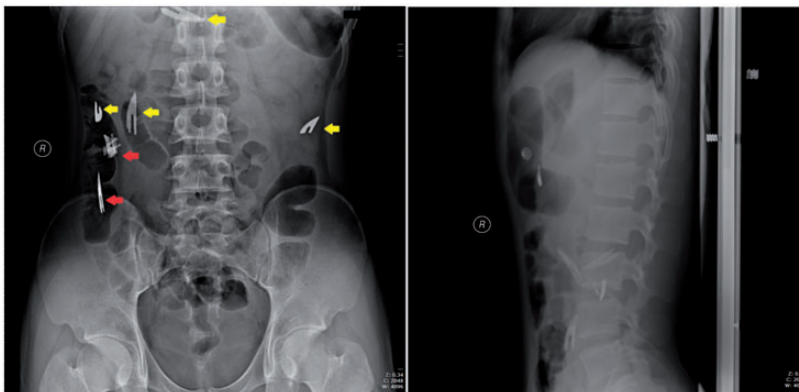


Figure 1. Multiple broken blade-shaped dense shadows dispersed in the gastrointestinal tract. Yellow arrow: single sharp foreign body. Red arrow: overlapping foreign bodies.

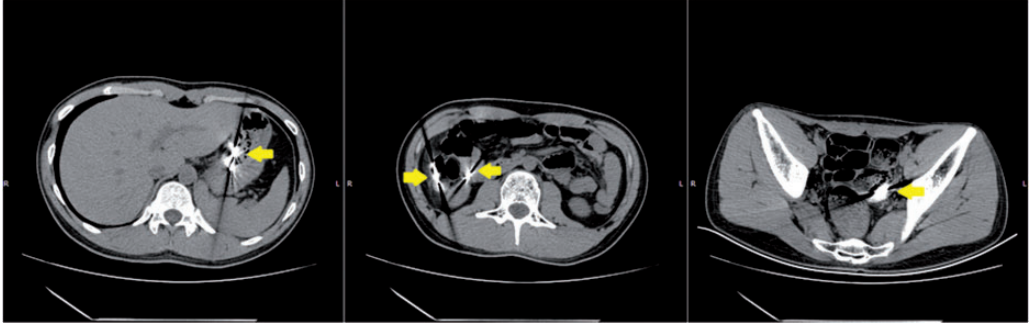


Figure 2. Foreign bodies (yellow arrow) were confirmed in the stomach cavity, mid-distal segment of the ileum, proximal segment of the ascending colon, liver area of the transverse colon, and lumen of the sigmoid colon.

postponed. However, a multidisciplinary team composed of medical practitioners from gastroenterology, anesthesiology, psychiatry, radiography, and gastrointestinal surgery agreed that the patient was currently physically and emotionally stable. No further complications such as gastrointestinal hemorrhage or perforation occurred during hospitalization. Hence, there was no apparent indication for emergency surgery at that time, and the team agreed that laparotomy might not be the optimal first-choice treatment. Natural discharge of the foreign bodies was expected to increase the patient's risk because the rectal and anal canal mucosa or sphincter muscles were prone to damage upon defecation. The treatment regimen was to wait and observe whether the fragments in the ileum migrated to the colon; this would be the optimal time window for endoscopy.

Nineteen hours after admission, another radiograph indicated the optimal time window (Figure 3). Gastroscopy and colonoscopy were performed immediately. Gastroscopy revealed a broken blade in the fundus of the stomach after repeated washing (Figure 4), and the blade was successfully removed with large foreign body forceps. Colonoscopy showed that the intestinal preparations were insufficient (Figure 5). Further imaging showed that

broken scalpel blades were retained in the ascending, descending, and sigmoid colon. They were carefully removed with large foreign body forceps aided by a transparent cap. Reobservation of the colonic mucosa with colonoscopy showed scattered congestion and erosion. Finally, all broken fragments were removed without secondary injury. The fragments were confirmed to comprise five No. 24 scalpel blades. Immediate radiographic examination upon anesthetic recovery verified that no metal foreign body had been left in the gastrointestinal tract (Figure 6). The patient resumed intake of a liquid diet 48 hours after endoscopy and was uneventfully discharged 24 hours later.

Discussion

Foreign bodies incarcerated near important organs and large blood vessels are considered high-risk. This is especially true of sharp, corrosive, or magnetic foreign bodies because they may cause serious complications.⁴ A current focus of research is whether endoscopy can be used to remove multiple high-risk foreign bodies scattered throughout the digestive tract, as reported in the present case.⁵ Discussions of the advantages of endoscopy over surgery have become increasingly prominent.

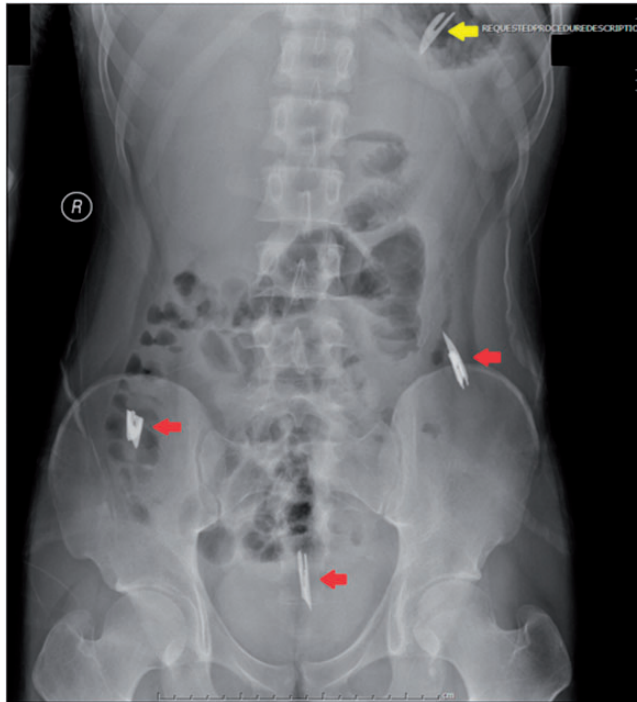


Figure 3. Blade fragments were now scattered in the stomach cavity and colon, both of which were appropriate sites for endoscopic removal.

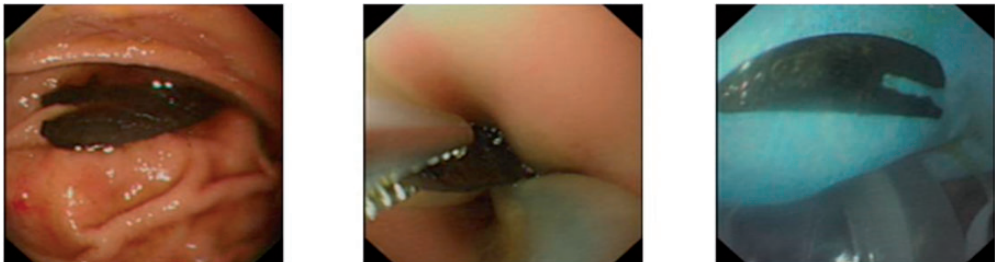


Figure 4. A broken scalpel blade with coffee ground-like substance attached to it was found after consecutive washings of the gastric fundus, and the blade was removed by forceps.

However, relevant case reports, large-scale studies of clinical case series, and high-level evidence are lacking.⁶

The treatment choices in this case caused controversy among experienced surgeons, some of whom believed that emergency surgery should have been performed without hesitation. According to many surgeons'

occupational "instinct," the initial treatment plan should be surgical exploration, especially when multiple broken blade-shaped foreign bodies have been dispersed throughout the digestive tract for a long period. The complication rate is positively correlated with the retention time and increases by two and seven times after

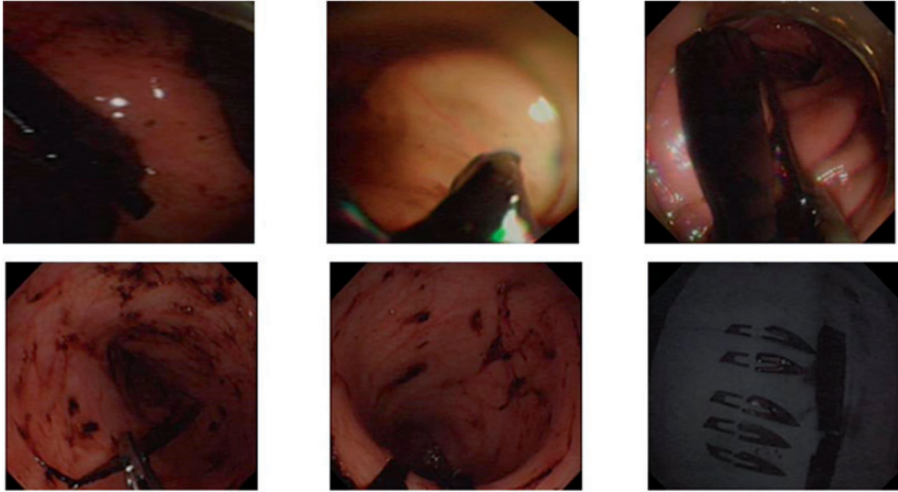


Figure 5. Several broken scalpel fragments were found after repeated washing. A transparent cap was applied, and all fragments were removed without secondary injury to the mucosa by the forceps.



Figure 6. A radiograph verified that no metal foreign body had been left in the gastrointestinal tract.

24 and 72 hours, respectively.⁷ The incidence of perforation caused by sharp foreign bodies is as high as 15% to 35%.⁸ In contrast to fishbones and iron wires, blades have both piercing and cutting effects on soft tissue, and they had been retained for more than 36 hours in the present case. Therefore, the recommendation for a timely surgical operation was justified.

Surgery alone is also associated with practical problems. Comprehensive exploration unquestionably requires a large incision, which can cause major trauma and possibly lead to aggravation of postoperative depression along with extreme behavior,⁹ hindering postoperative recovery. In addition, it is difficult for surgeons to control their hand strength through pushing and squeezing to move the foreign fragments, assuming multiple incisions in the gastrointestinal tract to remove the foreign bodies is commonly the last choice. A lack of hand strength control inevitably causes secondary damage to the digestive tract by the edges of the scalpels. Once these injuries and possible perforations have insidiously formed in the duodenum or lower rectum, they are difficult to find but require timely repair, and some require complex surgical techniques. Moreover, the broken fragments are very thin and tend to overlap, making accurate counting almost impossible. These practical obstacles hinder the operation and make the procedure challenging. Surgery was therefore not recommended as the first-choice treatment in the present case.

Endoscopy is a well-developed and reliable procedure for the removal of various types of upper gastrointestinal foreign bodies.¹⁰ Existing practice guidelines for upper gastrointestinal foreign bodies clearly indicate that the timing of endoscopy as well as the size, shape, content, and anatomic location of the ingested object(s) must be taken into consideration.¹¹ Generally, toxic and sharp pointed objects

require emergency endoscopy whereas blunt-shaped objects or objects of >6 cm in length are best managed with urgent endoscopy. The timing of endoscopy for colonic foreign bodies can be analogously deduced to a large extent, although the currently available supporting evidence originates mainly from case-related experience. Compared with the esophagus, the larger cavity of the colon allows for easier endoscopic manipulation, whereas the small intestine is beyond the reach of the colonoscope; as a result, we expected the scalpel blade in the terminal ileum to pass further distally in the gastrointestinal tract. However, caution is needed when managing patients with multiple sharp pointed foreign bodies because of the greater risk of perforation with respect to bowel angulation, including the splenic flexure and rectosigmoid regions. Furthermore, the anal canal mucosa and underlying sphincter muscles are prone to injury by the foreign bodies during defecation. These risks strongly indicate the urgent need for endoscopy instead of a watch-and-wait strategy. Endoscopy is applied in a majority of cases when a colonic foreign body, usually a short and blunt object, can be passed naturally through the remaining colorectal segment. Regardless of which option is used (endoscopy or watch-and-wait), biplane radiographs should be obtained once or twice a day to trace the passage of the foreign body.¹² Notably, a foreign body of wood, glass, or plastic composition may not be readily visible. Multislice computed tomography with modified parameters, including but not limited to volume reconstruction and maximal intensity projection for three-dimensional reconstruction, is accurate and instructive for the evaluation of foreign body-related perforation, penetration, and adherence to adjacent organs.¹³

With the introduction of painless anesthesia technology, patients can now be sedated and comfortable. This is vital for

the removal of multiple foreign bodies scattered throughout the gastrointestinal tract, which demands time and effort from endoscopic clinicians.¹⁴ Intravenous anesthesia is associated with significantly lower incidences of coughing, nausea, and retching.¹⁵ Advanced endoscopic hardware and abundant alternative instruments including biopsy forceps, foreign body forceps (e.g., mouse-tooth forceps, alligator-jaws forceps), snares, stone-capturing baskets, macula guide wires, and balloon techniques have ingeniously resolved the contradiction between the widely various types of foreign bodies and the limited types of instruments.¹⁶ Protective equipment, such as outer sleeves, protective covers, and transparent caps, can be used when removing sharp foreign objects.¹⁷ Placing the transparent cap on the front end of the endoscope can lead to a clearer view, minimizing risks.¹⁸ In our case, the scalpel blades were thin and hollow in the middle, making them easier to grasp with the alligator-jaw forceps, and the presence of a transparent cap as an auxiliary further enhanced the safety of the procedure.

Ben-Menachem et al.¹⁹ indicated that in principle, all patients with upper gastrointestinal foreign bodies who tolerate endoscopic procedures without complications are suitable for initial endoscopic examination. This conclusion has a certain generality and can be moderately extended to patients with foreign bodies in the colorectal and anal regions. In contrast, surgery is the first-choice treatment only when the patient has an absolute contraindication to endoscopy.²⁰ More importantly, surgery should be the focus in the multidisciplinary team process. When preparing for surgery, an endoscopic exploration in a hybrid operation room is recommended. In the present case, the surgeons participated in the entire endoscopic operation and were ready for conversion to surgery if needed.

Although endoscopy is the first-choice treatment for foreign body removal, it is associated with several problems and demands accurate evaluation of the patient's general condition, as does surgery. Laxatives or enemas should be cautiously administered for bowel preparation. In the present case, food residue and feces caused interference with the endoscopic procedure, and the endoscopist was thus required to exercise great patience and skill. Considering that the scalpel fragments were dispersed in this case, careful flushing and observation by endoscopy were required to minimize the risk of missing any foreign bodies. After removal of multiple foreign bodies, the gastrointestinal mucosa was checked carefully to rule out delayed bleeding or perforation. Finally, a re-examination by radiography or computed tomography was immediately performed to reveal any remaining foreign bodies.

Conclusion

Few reports have described complex and difficult clinical cases of multiple sharp foreign bodies dispersed in the gastrointestinal tract, and none heretofore have reported on deliberately ingested blade fragments. Based on the present case, joint endoscopy is considered safe and effective for managing high-risk foreign bodies after multidisciplinary team assessment of the patient's condition and should be the first-choice treatment. A multidisciplinary treatment regimen increases the safety and scientificity of the clinical practice for difficult cases and is recommended without question.

Ethics

This study was approved by the Ethics Committee of Tongji Hospital Affiliated to Huazhong University of Science and Technology. The patient provided written consent for publication of this report.


Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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