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Gastrointestinal Perforation by Ingested Foreign Bodies: Experience at A Surgical Department in Tunisia

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Abstract

Background Management of gastrointestinal perforation by ingested foreign bodies remains a topical subject following technological progress. This work aims to analyze, the epidemiological features, the management in a Tunisian surgical department and to access the most realistic and beneficial management of gastrointestinal perforation by ingested foreign bodies in a low-income country, where there is a paucity of information regarding this subject

Methods This is a retrospective review of 24 patients with gastrointestinal perforation by ingested foreign bodies treated in the General Surgery department of Jendouba Hospital in Tunisia from January 2010 to December 2019.

Results 24 patients with gastrointestinal tract perforation by an ingested foreign body were managed at our surgical ward. The mean age of patients was 56.58 years with extreme ranging 25-72 years with a male to female ratio 2/1. Three patients (12.5%) had psychiatric disorder, one had myasthenia (4.1%), two patients were alcoholics (8.33%), three patients were toothless (12.5%) and two (8.33%) patients were veiled. According to ASA classification, 6 (25%) patients were ASA I, 15 (62.5%) patients ASA II, 3 (12.5%) ASA III. The mean duration of symptoms was 2.16 days and ranges from 1 to 7 days. All patients (100%) presented to the emergency department with acute abdominal pain. Sixteen patients (66.66%) had a fever, twelve (50%) had vomiting and four (16.66%) had a sub-occlusive syndrome. All patients had performed abdominal x-ray. The foreign bodies were objectified in only six cases (25%). CT scan was performed in 16 (66.66%) patients and the location of ingested foreign bodies was obtained in 9 patients preoperatively (37.5%) and in 4 patients (16.66%) after proofreading. All the 24 patients underwent surgery and they were operated during their initial hospital stay. The most common site of perforation was the terminal ileum (62,5%) followed by the duodenum (12, 5%). Enterectomy was the procedure of choice in 20 patients (16 underwent an enterostomy and 4 patients underwent an enteroanastomosis) and four patients had a simple suture. The foreign body was found in all patients. Two patients developed postoperative complications: one case of intraabdominal abscess and one patient had a wound dehiscence . The median length of hospital stay following surgery was 4.08 days (range 2-7 days). The mortality rate was 4.16 %. All patients managed with enterostomy, had their stoma closed after 3-5 months.

Conclusion Open Surgery still remains a management with satisfactory morbidity, mortality and length of hospital stay. However, we estimate that for low/middle-income countries, investing in laparoscopy, for these cases, would be more realistic and more beneficial allowing improving more the outcomes. For this fact, promoting radiologic diagnosis is highly recommended in order to increase prospective identification of the foreign body location and perforation site, allowing a safe laparoscopic approach.

Background

Ingestion of foreign bodies usually occurs in young children or in elderly (1,2). However, it is not exceptional in adults (1,3,4). Ingested foreign bodies passed without complications in 80-90% of cases (3,5–7). Occasionally, they may lead to serious problems, such as obstruction, perforation or bleeding of gastro intestinal tract (8). The gastrointestinal perforation by a foreign body is rare, but it represents a significant health problem causing a high degree of financial burden and high morbidity and mortality (9). The positive diagnosis is rarely established in preoperatively, as most patients had no recollection of ingesting a foreign body (2,6). Abdominal x-rays can objectify metal objects and bones (4,10,11), but CT scan is the modality of choice to make positive diagnosis and lesions topography (1). Treatment approach is usually surgical but it is not standardized and it depends on clinical findings, type and location of the foreign body (4,12,13). Delay in diagnosis and/or intervention worsens the prognosis.

The purpose of our study was to conduct a retrospective analysis of patients treated in our establishment for perforation of the gastrointestinal tract by an ingested foreign body, where there is not endoscopic surgical department.

Study design and setting

The study design was based on a descriptive and retrospective analysis. It included patients operated for intestinal perforation secondary to ingested foreign bodies at the “General surgery department of Jendouba hospital” (located in North-West Tunisia), from January 2010 to December 2019. The “General surgery department of Jendouba hospital” is a tertiary care and teaching department attached to the Faculty of Medicine of Tunis. It is the referral general surgery department of the region serving over 500.000 people. It is a 35 bed-capacity unit.

Study population, data collection and analysis

All records of patients who were hospitalized for intestinal perforation were reviewed. Only files of patients with definitive diagnosis of intestinal perforation secondary to ingested foreign bodies were included. The positive diagnosis was based on radiography or surgery. Data of these patients were obtained from surgical ward, patient’s charts and operation registry books. Exclusion criteria were missing data (information), patients who have not been operated and patients under the age of 16. Two cases were excluded. Data were collected using a data collection tool including: Age, gender, ASA, comorbidities, previous abdominal surgery, complementary exams, operative and non-operative treatment, the emergency status of the procedure, the utilization of an anastomosis, 30-day post-operative complications and 30-day mortality. Statistical analysis were performed using the SPSS Statistical package for Windows version 20.

Results

During the period of the study, 26 patients with gastrointestinal tract perforation by an ingested foreign body were managed at our surgical ward. Twenty-four patients were included in this study (data retrieval rate of 92.3%). The mean age of patients was 56.58 years with extreme ranging 25-72 years. The highest

incidence was in the age group of 51-70 years with 15 (62.5%) patients. There were 16 (66.66%) males and 8 (33.33%) females with a male to female ratio 2/1. Four patients (16.66%) had socioeconomic difficulties: one homeless man, one patient lives in a retirement home and two prisoners. Three patients (12.5%) had psychiatric disorder, one had myasthenia (4.1%), two patients were alcoholics (8.33%), three patients were toothless (12.5%), two (8.33%) patients were veiled, one patient was a tailor (4.16%) and another (4.16%) worked as a shoemaker. According to ASA classification, 6 (25%) patients were ASA I, 15 (62.5%) patients ASA II, 3 (12.5%) ASA III. The mean duration of symptoms was 2.16 days and ranges from 1 to 7 days. All patients (100%) presented to the emergency department with acute abdominal pain. Sixteen patients (66.66%) had a fever, twelve (50%) had vomiting and four (16.66%) had a sub-occlusive syndrome. A definitive history of foreign body ingestion was obtained preoperatively in only four patients (16.66%): plastic fragments (prisoner), needles (tailor, veiled) and metal rods (prisoner). All patients had performed abdominal x-ray. The foreign bodies were objectified in only six cases (25%). CT scan was performed in 16 (66.66%) patients and the location of ingested foreign bodies was obtained in 9 patients preoperatively (37.5%) and in 4 patients (16.66%) after proofreading. None of our patients was managed non-operatively. All the 24 patients underwent surgery and they were operated during their initial hospital stay. During surgery, twelve patients (50%) had localized peritonitis, 7 patients (29.16%) had generalized peritonitis, 4 patients (16.66%) had intraabdominal abscesses and one patient (4.16%) had a collection in the hernia sac with a necrosis of the small intestine. The most common site of perforation was the terminal ileum (62,5%) followed by the duodenum (12, 5%). One patient had a perforation in the stomach (metal rods), one patient had a perforation in the cecum (chicken bone) and two patients had a jejunum perforation. The surgical procedure was chosen according to intraoperatively features. Enterectomy was the procedure of choice in 20 (83.33%) patients (16 underwent an enterostomy and 4 patients underwent an enteroanastomosis) and four patients had a simple suture. The foreign body was found in all patients. Table1 shows the foreign bodies nature. Two patients developed postoperative complications: one case of intraabdominal abscess and one patient had a wound dehiscence . The median length of hospital stay following surgery was 4.08 days (range 2-7 days). There were 1 death and the mortality rate was 4.16 %. All patients managed with enterostomy, had their stoma closed after 3-5 months.

Table 1
Nature of foreign bodies

All patients, n = 24		
Foreign Body	**Frequency**	**Percentages (%)**
Bones	6	25
Toothpicks	5	20,83
Fish bone	2	8,33
Needle	4	16,66
Plastic fragments	3	12,5
Metal rods	2	8,33
Wooden fragment	1	4,16
Hay	1	4,16

Discussion

Foreign body's ingestion is not exceptional and usually goes unnoticed. The foreign object is excreted naturally within a week, nevertheless, the evolution can be complicated (6). Perforation of the gastrointestinal tract is the most harmful evolution, affecting almost 1% of cases. However, when ingested object is sharp, the perforation rate can be as high as 15%-35% (6, 7). Foreign bodies' kind that caused the majority of gastro-intestinal perforation are fish bones, chicken bones and toothpicks (3, 14). Patients with palate-reduced sensitivity, psychiatric history, the drug abusers, the alcoholics and toothless are usually at a higher risk (2). Furthermore, ingested foreign bodies may still occur as part of autolysis or as a work accident at carpenters and dressmakers (15). Besides, among Muslims, the risk of accidentally swallowing needles is more common in veiled women and we report two cases in this study. Foreign bodies' perforations of the gastro intestinal tract have been reported in all segments, although it tends to occur at angulating regions (7, 16). The terminal ileum is the most common region where perforations occur (6), this observation corroborate with our findings. Semiology is rich but non-specific, and patients relate the ingestion incident exceptionally, which can lead to diagnosis delay (17). Abdominal pain is the most common symptom, however, symptoms range from mild to life threatening and the clinical presentations may mimic diverse surgical emergency. Overall, symptoms depends mostly on anatomical lesion (5). The use of abdominal X-ray in the diagnosis of non-metallic foreign body's perforation is usually unreliable (2). Indeed, in our study, we detected a foreign body with plain radiography in 6 (25%) out of 24 patients, and there were only radiopaque subjects. Furthermore, the presence of free gas under the diaphragm is uncommon because the intestinal wall's perforation is usually progressive allowing to the lesion site to be covered by fibrin, omentum, or adjacent loops of bowel (6, 15). The mainstay of preoperative diagnosis is CT scan, it allows to identify the foreign body, its location and lesions' topography with accuracy ranged between 82% and 90% (1, 18). The diagnosis of gastrointestinal tract

perforation is based on the direct CT findings, such as discontinuity of the bowel wall and the presence of extraluminal air, and on the indirect CT features, such as bowel wall thickening, abnormal bowel wall enhancement, abscess and an inflammatory mass adjacent to the bowel (18, 19). A three-dimensional reconstruction with CT increases the sensitivity of the detection modality and a careful interpretation by an experienced practitioner of CT scans can, also, improve the detection. Indeed, in our study CT scans reinterpretation had allows diagnosis in 4 (16.66%) patients. Removing foreign bodies and repairing tissue damage are the two main treatment objects. Armed resuscitation is mandatory and the standard management of foreign body ingestion induced bowel perforation is emergency surgery (1, 7, 18). Strategies for the removal of a foreign body include laparotomy as well as laparoscopic, endoscopic, or percutaneous interventional radiological approaches (20–22). Some cases even report a conservative management, but, it was never the management aim (23). We should always keep in mind that delayed complications, such as the migration of the foreign body into an adjacent organ, could occur (7). Therefore, removal of the foreign body is critical (20). Strategies for the perforation may require trimming of the margins and suture, segmentectomy and end-to-end anastomosis or segmentectomy and stoma. During the operation, a thorough lesion assessment is essential and if the object is opaque, a fluoroscopy in the operating room is strongly recommended. Indeed, for the prisoner who ingested metal rods, we risked to forget a rod, which was revealed with the fluoroscopy. In addition, patient who ingested pieces of plastic, the intestinal resection had to be widened because the intraoperative exploration revealed multifocal lesions. Overall, treatment is usually chosen according the perforation site and clinical manifestations. In our series, all foreign bodies were successfully removed during open surgeries. All patients recovered well, except for one patient who died after 7 days from severe sepsis. Nowadays, Endoscopic and laparoscopic procedures are being increasingly performed instead of conventional laparotomy (1). However, The literature review showed that foreign bodies were removed by surgery (laparotomy or laparoscopic approach) in 70.5% of patients, and by endoscopy in 11.4% patients (20). Endoscopic surgery depend on clinical condition, type and size of the foreign body, the presence of sharp edges, the anatomical location, operator experience and availability of technical equipment (4, 13). In addition, endoscopic removal can only be attempted if the object has not completely migrated through the gastrointestinal wall and it is contraindicated if there is evidence of perforation (4, 11).

In conclusion, the role of endoscopic surgery is very limited in the management of foreign bodies' gastrointestinal perforation contrasting with a high cost. On the other side, surgery is correlated with satisfactory morbidity, mortality and length of hospital stay according to our results, which are consistent with the literature. Therefore, we estimate that for low/middle-income countries, investing in laparoscopy, for these cases, would be more realistic and more beneficial, and for this fact, promoting radiologic diagnosis is highly recommended in order to increase prospective identification of the foreign body location and perforation site, allowing a safe laparoscopic approach.

Abbreviations

ASA: American Society of Anaesthesiologists physical status classification

SPSS: Statistical Package for the Social Sciences

CT: Computed tomography

Declarations

Ethics approval and consent to participate: An ethical approval was obtained from the Jendouba Regional Hospital Medical Ethics Committee N° JH03Y21. We confirm that all methods were performed in accordance with the ethical guidelines of the 1975 Declaration of Helsinki.

Consent to participate: A written informed consent to participate was obtained from all subjects.

Consent for publication: A written informed consent for the publication of personal/clinical data has been obtained from each patient**.**

Availability of Data and materials: There are no additional data available to share with the readers. The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interest: The authors declare that they have no conflicts of interest

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Authors' contributions: AM contributed to the work conception, MME and SS collected data, JR, AO and MAM analyzed clinicopathological data and KA wrote the manuscript. The final version of manuscript was read and approved by all authors.

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References

1. Simonetti I, Puglia M, Tarotto L, Palumbo F, Esposito F, Sciuto A, *et al.* When traditions become dangerous: Intestinal perforation from unusual foreign body—Case report and short literature review. Eur J Radiol Open. 2019 Jan 1;6:152–5.
2. Kuzmich S, Burke CJ, Harvey CJ, Kuzmich T, Andrews J, Reading N, *et al. Perforation of gastrointestinal tract by poorly conspicuous ingested foreign bodies: radiological diagnosis. Br J Radiol [Internet]. 2015 Jun [cited 2021 Jan 4];88(1050). Available from*: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4628459/
3. Lim DR, Kuk JC, Kim T, Shin EJ. *Surgery for intra-abdominal abscess due to intestinal perforation caused by toothpick ingestion. Medicine (Baltimore) [Internet]. 2019 Sep 6 [cited 2020 Dec 31];98(36). Available from*: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6739002/
4. Erbil B, Karaca MA, Aslaner MA, İbrahimov Z, Kunt MM, Akpinar E, *et al.* Emergency admissions due to swallowed foreign bodies in adults. World J Gastroenterol WJG. 2013 *Oct* 14;19*(*38*)*:6447–52.

5. PASSALI D, GREGORI D, LORENZONI G, COCCA S, LOGLISCI M, PASSALI FM, *et al.* Foreign body injuries in children: a review. Acta Otorhinolaryngol Ital. 2015 *Oct;*35*(4)*:265–71.
6. Goh BKP, Chow PKH, Quah H-M, Ong H-S, Eu K-W, Ooi LLPJ, *et al.* Perforation of the Gastrointestinal Tract Secondary to Ingestion of Foreign Bodies. World J Surg. 2006 *Mar;*30*(3)*:372–7.
7. Cho M-K, Lee M-S, Han H-Y, Woo SH. Fish bone migration to the urinary bladder after rectosigmoid colon perforation. World J Gastroenterol WJG. 2014 *Jun* 14;20*(22)*:7075–8.
8. Emir S, Özkan Z, Altınsoy HB, Yazar FM, Sözen S, Bali İ. Ingested bone fragment in the bowel: Two cases and a review of the literature. World J Clin Cases WJCC. 2013 *Oct* 16;1*(7)*:212–6.
9. Geraci G, Sciume' C, Di Carlo G, Picciurro A, Modica G. Retrospective analysis of management of ingested foreign bodies and food impactions in emergency endoscopic setting in adults. BMC Emerg Med. 2016 Nov 4;16*(1)*:42.
10. Ikenberry SO, Jue TL, Anderson MA, Appalaneni V, Banerjee S, Ben-Menachem T, *et al.* Management of ingested foreign bodies and food impactions. Gastrointest Endosc. 2011 *Jun;*73*(6)*:1085–91.
11. Telford JJ. Management of ingested foreign bodies. Can J Gastroenterol J Can Gastroenterol. 2005 *Oct;*19*(10)*:599–601.
12. Ambe P, Weber SA, Schauer M, Knoefel WT. Swallowed foreign bodies in adults. Dtsch Arzteblatt Int. 2012 *Dec;*109*(50)*:869–75.
13. Eisen GM, Baron TH, Dominitz JA, Faigel DO, Goldstein JL, Johanson JF, *et al.* Guideline for the management of ingested foreign bodies. Gastrointest Endosc. 2002 *Jun;*55*(7)*:802–6.
14. Steinbach C, Stockmann M, Jara M, Bednarsch J, Lock JF. Accidentally ingested toothpicks causing severe gastrointestinal injury: a practical guideline for diagnosis and therapy based on 136 case reports. World J Surg. 2014 *Feb;*38*(2)*:371–7.
15. Pinero Madrona A, Fernández Hernández JA, Carrasco Prats M, Riquelme Riquelme J, Parrila Paricio P. Intestinal perforation by foreign bodies. Eur J Surg Acta Chir. 2000 *Apr;*166*(4)*:307–9.
16. Lin X-K, Wu D-Z, Lin X-F, Zheng N. Intestinal perforation secondary to ingested foreign bodies: a single-center experience with 38 cases. Pediatr Surg Int. 2017 *May;*33*(5)*:605–8.
17. Song J, Yang W, Zhu Y, Fang Y, Qiu J, Qiu J, *et al.* Ingested a fish bone-induced ileal perforation: A case report. Medicine (Baltimore). 2020 *Apr;*99*(15)*:e19508.
18. Kim SH, Shin SS, Jeong YY, Heo SH, Kim JW, Kang HK. Gastrointestinal Tract Perforation: MDCT Findings according to the Perforation Sites. Korean J Radiol. 2009;10*(1)*:63.
19. Brofman N, Atri M, Hanson JM, Grinblat L, Chughtai T, Brenneman F. Evaluation of bowel and mesenteric blunt trauma with multidetector CT. Radiogr Rev Publ Radiol Soc N Am Inc. 2006 *Aug;*26*(4)*:1119–31.
20. Chong L-W, Sun C-K, Wu C-C, Sun C-K. Successful treatment of liver abscess secondary to foreign body penetration of the alimentary tract: A case report and literature review. World J Gastroenterol WJG. 2014 *Apr* 7;20*(13)*:3703–11.

21. Riani EB, Tancredi I, Sempoux C, Hubert C, Goffette P, Gigots J-F. From interventional radiology to laparoscopic liver resection as complementary strategies in the treatment of hepatic abscess caused by ingested foreign bodies. Hepatogastroenterology. 2012 *Apr;*59*(*114*)*:558–60.
22. Glick WA, Simo KA, Swan RZ, Sindram D, Iannitti DA, Martinie JB. Pyogenic hepatic abscess secondary to endolumenal perforation of an ingested foreign body. J Gastrointest Surg Off J Soc Surg Aliment Tract. 2012 *Apr;*16*(*4*)*:885–7.
23. Avcu S, Ünal Ö, Özen Ö, Bora A, Dülger AC. A swallowed sewing needle migrating to the liver. North Am J Med Sci. 2009 *Sep;*1*(*4*)*:193–5.
24. Sarici IS, Topuz O, Sevim Y, Sarigoz T, Ertan T, Karabıyık O, *et al.* Endoscopic Management of Colonic Perforation due to Ingestion of a Wooden Toothpick. Am J Case Rep. 2017 Jan 20;18:72–5.

Figures



Figure 1

Foreign bodies that have perforated the stomach: Metal rods

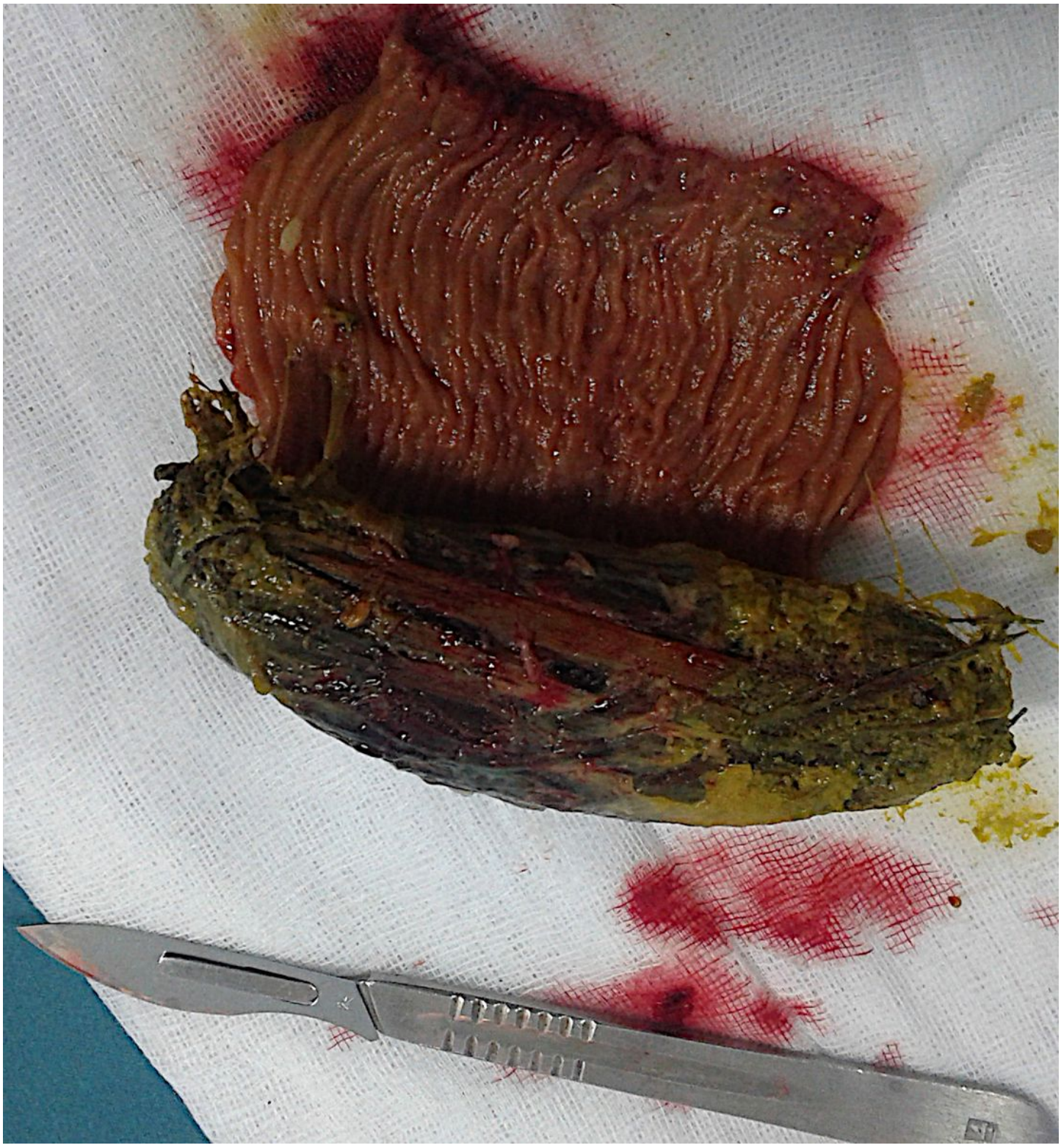


Figure 2

Foreign body that has perforated the small intestine: Hay