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An unusual case of duodenal perforation caused by a blister pack: A case report and literature review

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ABSTRACT

INTRODUCTION: Ingestion of foreign bodies is a relatively common clinical problem. Blister packs have been known to be a causative agent of gastrointestinal perforation. We report a rare case of duodenal perforation caused by a blister pack, which was complicated by retroperitoneal abscess and having a poor outcome.

PRESENTATION OF CASE: A 72 year-old man with a history of dementia presented to the emergency department with a 2-day history of backache. Upon radiological findings, perforated peptic ulcer was suspected. However, emergency laparotomy revealed a blister pack protruding from the posterior wall of the third portion of the duodenum. It was complicated by a widespread retroperitoneal abscess. After removal of the foreign body, the perforation was treated with primary suture repair and an omental patch. However, the patient died two days after operation due to sepsis.

DISCUSSION: According to a literature review, the ileum is the most common site of perforation caused by blister packs. To our knowledge, duodenal perforations have not been documented to date. Curative treatment often involves emergent surgery. However, duodenal perforation in the third portion may lead to retroperitoneal abscess, which can result in severe sepsis and have a poor outcome. As there is no consensus about an ideal surgical approach, retroperitoneal abscess is one of the clinical challenges for surgeons. Even with prompt management, duodenal perforation may become fatal.

CONCLUSION: Unnoticed ingestion of blister packs can cause duodenal perforation. Although prompt management is necessary, duodenal perforation, especially in the third portion, may be potentially fatal.

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1. Introduction

Ingestion of foreign bodies is a relatively common clinical problem. Most of these ingested foreign bodies pass through the gastrointestinal tract uneventfully; however, in a small proportion of cases (<1%) complications such as perforation occur [1]. Blister packs have been known to be a causative agent of gastrointestinal perforation. While the esophagus and small bowel are the most commonly involved sites, duodenal perforations have not been documented to date. Here, we report a rare case of duodenal perforation caused by a blister pack, which was complicated by widespread retroperitoneal abscess and had a poor outcome. The aim of this report is to demonstrate its unusual presentation and difficulty in management, followed by literature review.

2. Presentation of case

A 72-year-old man with a history of dementia, insulin-dependent diabetes mellitus and chronic renal failure on hemodialysis presented to the emergency department with a 2-day history of backache. Two days ago, he experienced a sudden backache during hemodialysis. The symptom got worse and a high-grade fever emerged. His vital signs on presentation were as follows: blood pressure, 90/50 mm Hg; heart rate, 90 beats per minute; and body temperature, 38.5°C. Physical examination showed mild back pain and epigastric tenderness without sign of irritation. Laboratory tests showed pH of 7.282, base excess of -6.1 mmol/L, lactate of 49.1 mg/dL, white blood cell count of 12,000/mm³ and C-reactive protein level of 42.6 mg/dL. Plain radiography of the abdomen showed free intraperitoneal air under the right diaphragm (Fig. 1A). A contrast-enhanced abdominal computed tomography (CT) scan revealed widespread pneumoretroperitoneum (Fig. 1B). Mottled air density and blurred periduodenal fat planes with streaky soft tissue stranding were observed around the third portion of the duodenum. With these findings, a preliminary diagnosis of duodenum perforation with retroperitoneal abscess was made and an emergency laparotomy

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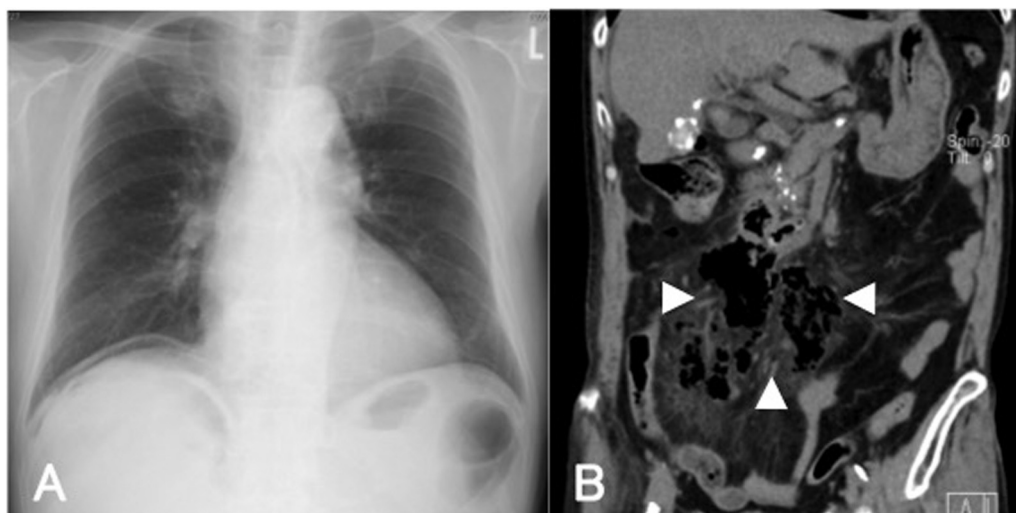


Fig. 1. Preoperative radiological findings.

(A) Radiography showed free intraperitoneal air under the right diaphragm.
 (B) CT revealed widespread pneumoretroperitoneum (arrow heads).

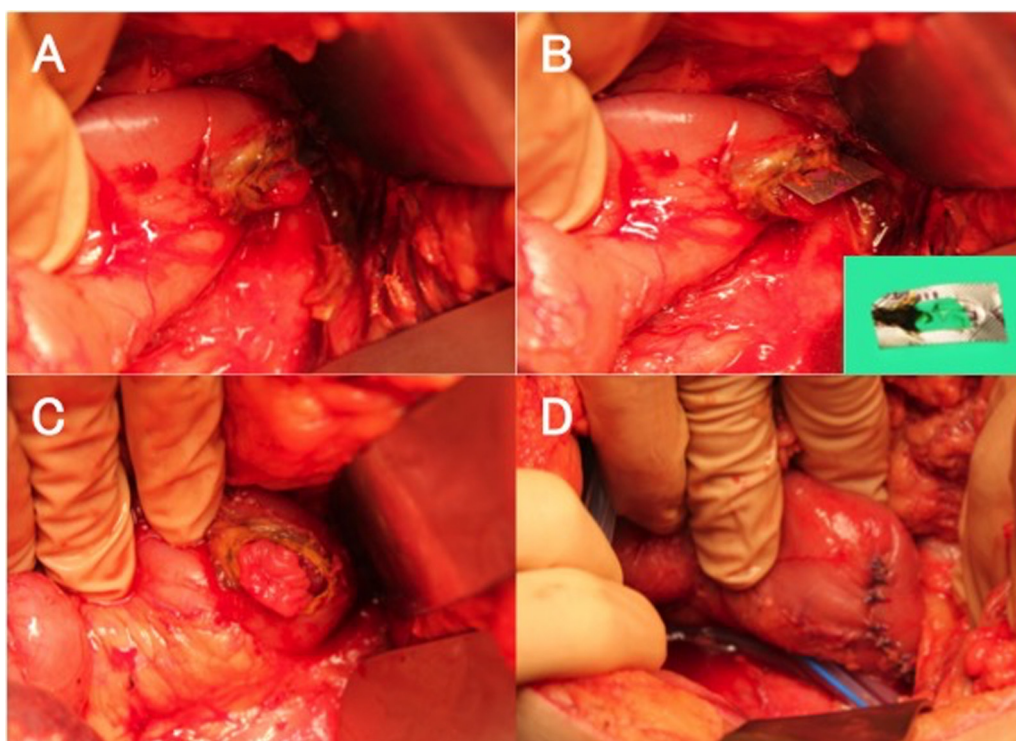


Fig. 2. Intraoperative findings.

(A) A perforation was detected at the posterior wall of the third portion of duodenum.
 (B) A 25 mm × 15 mm blister pack was protruding from the lumen.
 (C) After foreign body removal, 3-cm laceration was observed.
 (D) Primary suture repair was performed, followed by omental patch and peritoneal lavage.

was performed. At this time, a duodenal ulcer was suspected as the underlying cause. After Kocher's maneuver, a massive foul-smelling abscess was observed in the retroperitoneal cavity. A perforation site was found in the third portion of duodenum. Inside the lumen, a foreign body was confirmed. A 25 mm × 15 mm blister pack was protruding from the posterior wall, resulting in a 3-cm laceration. After removal, a primary two-layer suture repair and omental patch were performed, followed by peritoneal lavage. Two abdominal drains were placed at retroperitoneal cavity nearby the suture site. Intraoperative findings are summarized in Fig. 2.

Retrospective review of preoperative CT revealed a linear opacity in the duodenal lumen (Fig. 3). The patient may have ingested the blister pack unknowingly. For infection control, intravenous broad-spectrum carbapenem antibiotics were used. The blood culture was positive for *Klebsiella planticola*. The abdominal pus culture was positive for *Klebsiella planticola*, *Streptococcus agalactiae*, and *Enterococcus faecalis*. As hypotension had prolonged, intravenous catecholamine administration was started. Continuous hemodialysis was also started after operation due to progressive acidosis and hyperkalemia. Fluid removal was impossible because

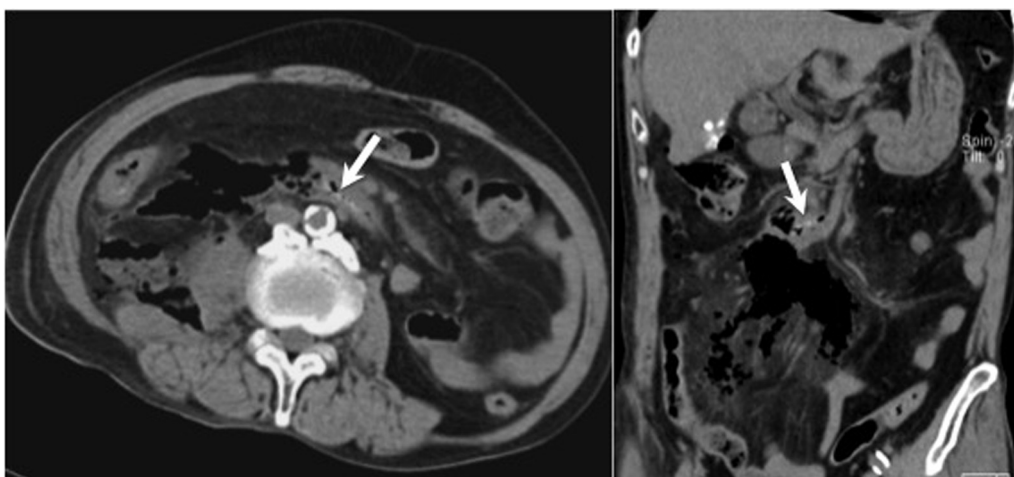


Fig. 3. Review of preoperative CT. A dense linear opacity could be recognized in the axial and coronal plane (arrow).

Table 1
Reported cases of gastrointestinal perforation caused by blister packs.

No.	Reference	Year	Age	Sex	Chief complaint	Location	Diagnostic modality	Management	Mortality
1	Crowley and Bretzke [4]	1988	68	F	Abdominal pain	Ileum	Laparotomy	Laparotomy	Yes
2	Sato et al. [5]	1992	50	F	Abdominal pain	Ileum	Laparotomy	Laparotomy	No
3	Norstein et al. [6]	1995	68	M	Abdominal pain	Ileum	Laparotomy	Laparotomy	No
4	Fulford and Tooley [7]	1996	80	M	Abdominal pain	Ileum	Laparotomy	Laparotomy	Yes
5	Lurton et al. [8]	1996	63	M	Abdominal pain	Stomach	Laparotomy	Laparotomy	No
6	Kansal and Agrawal [9]	2000	65	M	Abdominal pain	Ileum	Laparotomy	Laparotomy	No
7	Gupta et al. [10]	2002	84	M	Chest pain	Esophagus	Endoscopy	Endoscopic removal	Yes
8	Gupta et al. [11]	2002	58	F	Abdominal pain	Ileum	Laparotomy	Laparotomy	No
9	Ishikura et al. [12]	2003	85	F	Abdominal pain	Ileum	Laparotomy	Laparotomy	–
10	Fierens et al. [13]	2007	75	F	Abdominal pain	Ileum	Laparotomy	Laparotomy	No
11	Domen et al. [2]	2011	90	F	Abdominal pain	Ileum	Laparotomy	Laparotomy	No
12	Purnak et al. [14]	2011	73	F	Vomiting	Esophagus	Endoscopy	Endoscopic removal	No
13	Orry et al. [15]	2014	57	F	Abdominal pain	Ileum	CT	Laparotomy	No
14	Orry et al. [15]	2014	90	M	Abdominal pain	Ileum	CT	Laparotomy	No
15	Coulier et al. [3]	2014	84	F	Abdominal pain	Ileum	CT	Laparotomy	No
16	Coulier et al. [3]	2014	85	M	Chest pain	Esophagus	CT	Palliative care	Yes
17	Our case	2015	72	M	Abdominal pain	Duodenum	Laparotomy	Laparotomy	Yes

of hypotension. However, the acidosis continued to deteriorate while all the attempts. The patient died two days after operation due to multiple organ failure.

3. Discussion

Blister packs have been used worldwide for pharmaceuticals. They consist of a lid coated with heat-sealed material on an aluminum leaf and a dome of vinylchloride. Since they have a small square shape with sharp edges, they tend to get trapped within the digestive tract and have a potential risk of gastrointestinal and bowel perforation when swallowed unintentionally. Endoscopic retrieval is effective, when they are lodged in the upper gastrointestinal tract, but once they pass through into the distal intestine, spontaneous passage would be expected. Surgery is necessary only when a perforation or obstruction occurs [2]. As patients are frequently unaware of the ingestion and clinical presentations vary depending on the site of perforation and the extent of peritonitis, it is often challenging to make a precise diagnosis.

Although blister packs are known to present as a very dense linear opacity in a CT scan, the reliability is still limited [3]. In addition, the presence of free abdominal air and abscess formation may support the detection of perforation site. However, as seen in our case, retroperitoneal and intraperitoneal air could coexist. A part of mas-

sive retroperitoneal air might infiltrate through retroperitoneum into intraperitoneal cavity, emerging as free intraperitoneal air.

A literature search of the PubMed database between 1950 and 2015 retrieved fifteen cases of digestive tract perforation caused by unnoticed swallowing of blister packs (Table 1) [2–15]. Most of these patients were elderly. The blister pack was detected upon preoperative radiological investigation in only 4 of these cases, indicating the difficulty of preoperative diagnosis. While the ileum is the most commonly involved site, perforation in the esophagus and stomach have also been reported. To the best of our knowledge, this is the first case report describing a duodenal perforation caused by a blister pack. Once diagnosed, prompt treatment including removal of the causative agent or peritoneal lavage is necessary. Except for three cases of esophageal perforation, emergency laparotomy was performed in all patients. Among reported cases, the mortality in esophageal perforation was higher than in other sites. Although endoscopic retrieval is useful when the foreign body is trapped in the esophagus, complication with mediastinitis could result in high mortality. Similarly, retroperitoneal abscess caused by duodenal perforation could also be fatal.

The patient in our case had a poor outcome possibly due to the following reasons. First, retroperitoneal abscesses pose a clinical challenge for surgeons. In our case, the blister pack was protruded from the third portion of the duodenum to the retroperitoneal cavity, resulting in a widespread retroperitoneal abscess. Since the

patient ignored the symptoms for two days, the infection had progressed. Compared to peritoneal abscess, retroperitoneal abscess is more difficult to manage and there is no consensus on an ideal surgical approach. Although there were some reports describing a duodenal perforation caused by foreign bodies, there were only two cases involving the third portion: a case caused by a plastic toy ax treated by primary suture repair in laparotomy and another case caused by a lollipop stick treated by endoscopic removal and clipping [16,17]. In these cases, the treatment was successful because the perforation was as small as a pinhole without abscess formation. Since, blister packs are square-shaped with sharp edges, it may cause a wider laceration in the intestinal wall than other long pointed objects. Second, the patient was critically ill on admission. He met the diagnostic criteria of severe sepsis and septic shock because sepsis (including systemic inflammatory response syndrome and bacteremia), renal dysfunction and hypotension were coexisted. The mortality of severe sepsis and septic shock is now closer to 20–30% in many series [18]. In addition, hemodialysis-dependent renal failure would make the management difficult in the point of hemodynamic control and insulin-dependent diabetes mellitus would lower the tolerance to severe infection. Considering all these factors, we have to say that preoperative condition of the patient was too bad to overcome this crisis.

4. Conclusion

An unknowingly swallowed blister pack can lead to duodenal perforation. Despite prompt management, duodenal perforation, especially in the third portion can be potentially fatal.

Consent

Written informed consent was obtained from the patient's family for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal on request.

Ethical approval

This case report is not a research study.

Conflicts of interest

The authors declare no conflict of interest.

Author contribution

Si-Yuan Yao and Souichi Shiotsu performed the operation. Si-Yuan Yao and Yugo Matsui contributed to the manuscript writing and revision.

Guarantor

Si-Yuan Yao would be the guarantor.

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References

- [1] B.K. Goh, P.K. Chow, H.M. Quah, H.S. Ong, K.W. Eu, L.L. Ooi, et al., Perforation of the gastrointestinal tract secondary to ingestion of foreign bodies, *World J. Surg.* 30 (2006) 372–377.
- [2] H. Domen, M. Ohara, M. Noguchi, Y. Nakanishi, K. Komuro, N. Iwashiro, et al., Inadvertent ingestion of a press-through package causing perforation of the small intestine within an incisional hernia and panperitonitis, *Case Rep. Gastroenterol.* 5 (2011) 391–395.
- [3] B. Coulier, R. Rubay, S. Van den Broeck, A.R. Azar, P. Maldague, P. Mailleux, et al., Perforation of the gastrointestinal tract caused by inadvertent ingestion of blister pill packs: report of two cases diagnosed by MDCT with emphasis on maximal intensity and volume rendering reformations, *Abdom. Imaging* 39 (2014) 685–693.
- [4] L.V. Crowley, M.L. Bretzke, Bowel perforation from ingested unit dose blister-pak, *Am. J. Gastroenterol.* 83 (1988) 1011–1012.
- [5] H. Sato, T. Endo, K. Tajima, Y. Sanada, A rare case of perineal pain: intestinal perforation caused by a press-through package, *Anesth. Analg.* 75 (1992) 456–457.
- [6] J. Norstein, P. Krajci, A. Bergan, O. Geiran, Intestinal perforation after ingestion of a blister-wrapped tablet, *Lancet* 346 (1995) 1308.
- [7] S. Fulford, A.H. Tooley, Intestinal perforation after ingestion of a blister-wrapped tablet, *Lancet* 347 (1996) 128–129.
- [8] A. Lurton, J. Ntiruhungwa, H. Saillant, J. Surugue, Stomach perforation by a blister-wrapped capsule, *N. Engl. J. Med.* 335 (1996) 754.
- [9] G. Kansal, V. Agrawal, Intestinal perforation—a unique cause, *J. Indian Med. Assoc.* 98 (184) (2000) 6.
- [10] N.M. Gupta, V. Gupta, R. Gupta, V. Sudhakar, Esophageal perforation caused by a blister-wrapped tablet, *Asian Cardiovasc. Thorac. Ann.* 10 (2002) 87–88.
- [11] V. Gupta, S.R. Manikyam, R. Gupta, N.M. Gupta, Pelvic abscess after ingestion of blister-wrapped tablet, *Am. J. Gastroenterol.* 97 (2002) 2142–2143.
- [12] H. Ishikura, A. Sakata, Y. Sakaki, S. Kimura, T. Sumi, T. Ichimori, et al., Intestinal perforation due to ingestion of blister-wrapped tablet in a press-through package, *Am. J. Gastroenterol.* 98 (2003) 1665–1666.
- [13] K. Fierens, L. Van Outryve, M. Kint, Bowel perforation from ingested blister-pack, *Acta Chir. Belg.* 107 (2007) 564–565.
- [14] T. Purnak, E. Ozaslan, C. Efe, Concomitant oesophageal perforation and bleeding due to a tiny pill with its blister pack, *Age Ageing* 40 (2011) 645–646.
- [15] X. Ory, C. Balaj, S. Lecocq, A. Blum, M. Delvaux, D. Regent, et al., CT diagnosis of small bowel perforation by ingestion of a blister pack: two case reports, *Diagn. Interv. Imaging* 95 (2014) 101–103.
- [16] G. Hayek, G. D'Assignies, Images in clinical medicine. An unknowingly swallowed inedible toy, *N. Engl. J. Med.* 369 (2013) 2535.
- [17] E.A. Cho, H. Lee du, H.J. Hong, C.H. Park, S.Y. Park, H.S. Kim, et al., An unusual case of duodenal perforation caused by a lollipop stick: a case report, *Clin. Endosc.* 47 (2014) 188–191.
- [18] D.C. Angus, T. van der Poll, Severe sepsis and septic shock, *N. Engl. J. Med.* 369 (2013) 840–851.

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