CASE REPORT

Small intestine perforation due to accidental press-through package ingestion in an elderly patient with Lewy body dementia and recurrent cardiopulmonary arrest

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SUMMARY

An octogenarian with Lewy body dementia presented to our hospital in cardiac arrest and was successfully resuscitated. Although he had abdominal pain the previous day, small bowel wall oedema and ascites were the only abnormalities noted on abdominal CT. Despite treatment with catecholamines and antimicrobials, he died of recurrent cardiopulmonary arrest later the same day. An autopsy showed that the patient's death was the result of a small bowel perforation caused by accidental ingestion of a press-through package (PTP). Precautions regarding PTP use and improved packaging design are necessary to prevent PTP ingestion, especially in elderly patients with dementia.

BACKGROUND

Press-through packages (PTPs) are commonly used to dispense drugs and have been increasingly reported in cases of ingested foreign bodies.¹ Most swallowed foreign bodies pass through the gastrointestinal (GI) tract spontaneously, but serious complications can occur.²⁻³ We report an autopsy case of panperitonitis due to perforation of the small intestine by inadvertent PTP ingestion in an elderly man with Lewy body dementia (LBD), who suffered a cardiopulmonary arrest twice in 1 day. Considering our ageing society, the frequency of accidental ingestion of PTPs is expected to increase. This case highlights the importance of following precautions and improving PTP design to avoid accidental ingestion of PTPs, especially in patients with dementia.

CASE PRESENTATION

The patient was an octogenarian with dementia (Mini-Mental State Examination score of 18). He was diagnosed with LBD because of recurrent visual hallucinations, parkinsonism and an abnormal (low uptake) metaiodobenzylguanidine myocardial scintigraphy scan. He was treated with donepezil hydrochloride and levodopa, and he continued to live alone without assistance.

The day before arriving at our hospital, the patient had presented to a clinic, with abdominal pain, and was prescribed omeprazole. The next day, his abdominal pain was unimproved, so he called a taxi to bring him to the hospital. The patient became unconscious during the taxi ride. He was in cardiopulmonary arrest on arrival at our hospital

and received cardiopulmonary resuscitation with endotracheal intubation. We were successful in achieving resuscitation.

Physical examination on admission showed the following: height 164 cm, weight 64.2 kg (body mass index 23.9 kg/m²), blood pressure 85/55 mm Hg, regular pulse at 104 bpm and temperature 38.6°C. His conjunctivae were not anaemic. His neck, chest and abdominal examination were normal. His extremities were cold. He had no lymphadenopathy. His laboratory tests were as follows: white cell count (WCCs) 4480/μL, haemoglobin concentration 15.4 g/dL, lactate dehydrogenase 311 IU/μL, aspartate aminotransferase 70 IU/L, creatine kinase (CK) 736 IU/L, CK-MB 5.6%, troponin I 0.15 ng/mL, blood urea nitrogen 39 mg/dL, creatinine 2.1 mg/dL, potassium 5.2 mEq/L, C reactive protein 5.55 mg/dL and brain natriuretic peptide 575.2 mg/dL. The results of other routine haematological and biochemical tests were not significant. Arterial blood gas analysis during inhalation of O₂ (FiO₂ 0.8) showed the following: pH 7.30, PaCO₂ 41 mm Hg, PaO₂ 217 mm Hg, HCO₃⁻ 20.2 mmol/L and base excess -5.9 mmol/L.

The ECG after resuscitation revealed sinus tachycardia and complete right bundle branch block. Chest and abdominal X-rays (sitting position) were normal. Transthoracic echocardiography showed normal left ventricular size and systolic function. No regional wall motion abnormalities were identified. No abnormal findings were detected by abdominal ultrasound. There was no acute lesion on head CT. Helical CT of the chest, abdomen and pelvis displayed bilateral lower-lung-field consolidation with air bronchograms, small bowel wall oedema and ascites (figure 1). We did not use contrast agents because of reduced renal function.

Catecholamines were administered because of hypotension. Antimicrobial medications were initiated because of the possibility of bacterial pneumonia and intra-abdominal infection. However, the patient developed another cardiopulmonary arrest later the same day, from which he could not be resuscitated. Autopsy revealed foul-smelling muddy ascites, perforation (approximately 12 mm diameter) of the small intestine and a levodopa tablet wrapped in PTP (approximately 15 mm×15 mm) in the small intestine. The police ruled out a criminal cause. Since the bowel surrounding the perforation was normal and the perforation was approximately

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Figure 1 Chest and abdominal CT scans revealed bilateral lower-lung-field consolidation with air bronchograms (arrowhead) and small bowel wall oedema (arrow).

the same size as the PTP, we postulated that the patient died of panperitonitis due to perforation of the small intestine by inadvertent PTP ingestion (figure 2). Additionally, a brain autopsy showed scattered Lewy bodies and neuronal loss, consistent with the premorbid diagnosis of LBD.

DISCUSSION

Most ingested foreign bodies pass through the GI tract, without serious complications.²⁻³ Perforation of the GI tract by ingested foreign bodies is rare, occurring in less than 1% of patients.⁴ However, PTPs are increasingly seen in cases of foreign body ingestion,¹ and might be associated with an increased risk of GI perforation.

PTPs are commonly used to enclose drugs. They are made of two sheets: a dome sheet of preformed polyvinyl chloride or polystyrene, and a rupturable aluminium sheet, which is attached to the first sheet. The dome is pressed externally to push out a tablet or capsule, which is why these dispensers are called PTPs. The sharp edges of PTPs can cause perforation of the intestine.

Abdominal CT is superior to plain radiographs in demonstrating free air.⁵⁻⁶ Nonetheless, free air is found in only 46% to 56% of patients with small bowel perforation.⁷⁻⁹ Small intestine perforation is often difficult to diagnose, and CT findings of ascites and small bowel wall oedema are helpful clues.⁹⁻¹² Moreover, it is important to realise that a PTP cannot always be identified on CT, as in this case.¹³⁻¹⁴

The WCC count during the second cardiopulmonary arrest had decreased from 4480/ μ L to 2950/ μ L. A normal WCC count does not always exclude the possibility of sepsis. One should consider repeating the WCC count to determine

whether it is falling, which can be an indication of a severe underlying infection.

At brain autopsy, the patient was confirmed to have LBD, which is well known to be associated with autonomic dysfunction. Furthermore, Iwasaki *et al*¹⁵ previously reported a patient with LBD who had recurrent cardiopulmonary arrest as well as marked autonomic failure. This report suggested that autonomic dysfunction may have contributed to our patient's recurrent cardiopulmonary arrest. In addition, haemoglobin concentration was normal in spite of performing blood tests several times, and there were no findings indicating clinically significant GI bleeding. However, it was also suggested that GI perforation may have been one of the factors inducing recurrent cardiopulmonary arrest.

It has also been reported that 77% of patients with LBD have at least one form of neurocardiovascular instability, such as orthostatic hypotension, carotid sinus hypersensitivity or vasovagal syncope.¹⁶ An asystolic response to carotid sinus massage is particularly common, occurring in 41% of patients with LBD.¹⁶ Patients with LBD are more likely to have cardioinhibitory carotid sinus hypersensitivity (CICSH), defined as at least 3 s of asystole with or without an associated vasodepressor response.¹⁷ Given the high prevalence of CICSH in LBD, it is possible that acetylcholinesterase inhibitors exaggerate the bradyarrhythmic response.

Learning points

- ▶ Accidental ingestion of press-through packages (PTPs) should be included in the differential diagnosis of abdominal pain, especially in elderly patients with dementia.
- ▶ Since free air and PTPs may not be visible on CT, small intestine perforation after accidental PTP swallowing is difficult to diagnose. CT findings of ascites accumulation and small bowel wall oedema may provide clues to the diagnosis.
- ▶ Patients with Lewy body dementia (LBD) are more likely to have cardioinhibitory carotid sinus hypersensitivity, and acetylcholinesterase inhibitors are likely to exaggerate the bradyarrhythmic response. Vagal stimulation might trigger cardiac arrest, particularly in patients with LBD treated with acetylcholinesterase inhibitors.
- ▶ Encouraging medication administration by family members is an important safety measure, especially in demented patients. PTPs should not be cut into single-dose size pieces and the widespread use of one-dose drug packaging papers is recommended.

Figure 2 The autopsy showed a small intestine perforation (arrow) and a levodopa tablet wrapped in a press-through package in the small intestine (arrowhead).

In conclusion, we report a case of panperitonitis, diagnosed at autopsy, which was caused by perforation of the small bowel by accidental ingestion of a PTP. Small intestine perforation should be included in the differential diagnosis when a patient presents with abdominal pain, and when abdominal CT shows small bowel wall oedema and ascites. Considering our ageing society and the growing number of demented patients, the frequency of accidental ingestion of foreign bodies is expected to increase. To reduce the possibility of accidental ingestion, we recommend that PTPs not be cut into single-dose size pieces and encourage the widespread use of one-dose drug packaging papers. Encouraging family members to become involved in the medication administration of patients with dementia is also important. Furthermore, manufacturing efforts are strongly recommended to improve the design of PTPs to help avoid accidental ingestion.

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