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Case Report

Severance of a Ventriculoperitoneal Shunt Catheter Implanted Between the Cerebral Ventricle and Peritoneal Cavity, Resulting in Protrusion From the Anus

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One rare complication of a ventriculoperitoneal (VP) shunt is perforation of the gastrointestinal tract by the catheter. We report a case in which the catheter severed spontaneously inside the peritoneal cavity, creating a communication between the intestinal tract and the peritoneal cavity. The patient was a 41-year-old man who presented with a VP shunt catheter protruding from the anus. Computed tomography showed that the VP shunt catheter, which had been put in place 25 years earlier, had severed spontaneously. The distal end had then perforated and entered the intestinal tract. The patient was hospitalized and emergency surgery was performed to repair the intestinal tract perforation caused by the end of the VP shunt catheter. Laparotomy revealed that the catheter had perforated the sigmoid colon. The VP shunt catheter was removed, and the perforation in the intestinal tract was closed by suturing. The patient was discharged on postoperative day 20.

Key words: Ventriculoperitoneal shunt catheter – VP shunt – Perforation – Colon, complication

Creation of a ventriculoperitoneal (VP) shunt is one of the most commonly applied approaches for the treatment of hydrocephalus. Gastrointestinal tract perforation caused by the VP shunt catheter is an extremely rare complication of this procedure. The prevalence of this complication after VP shunt catheter implantation is ≤0.1%, whereas the mortality rate with this complication is reportedly around 15%.[1–3] We report a case of perforation of the intestinal tract by a severed VP shunt catheter, with subsequent protrusion of the distal portion of the catheter from the anus.

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Case Report

The patient was a 41-year-old man who presented with a VP shunt catheter protruding from the anus. He was hospitalized on an emergency basis with a diagnosis of gastrointestinal tract perforation by a VP shunt catheter. At 16 years old, the patient had undergone craniotomy for resection of a pineal tumor, and 2 months later a left VP shunt catheter had been installed because of complications of hydrocephalus. At 39 years old, a new VP shunt had been created on the right side because of failure of the existing left shunt as a result of occlusion. The patient came to the hospital in April 2010 because of sudden protrusion of the VP shunt from the anus, and was immediately hospitalized. Computed tomography (CT) showed that the left VP shunt catheter, which had been put in place at age 16 years, had severed spontaneously, and the distal end had perforated and entered the intestinal tract (Fig. 1). At the time of hospitalization, the patient's abdomen was flat and soft. He reported no tenderness or signs of peritoneal irritation, and his vital signs were stable. Blood biochemistry showed a white blood cell count of 4800/μL and a C-reactive protein level of 2.40 mg/dL, indicating a mildly elevated inflammatory response. No other abnormalities were noted. Abdominal X-ray confirmed the presence of the new VP shunt catheter, but not the old one. Contrast-enhanced abdominal CT and construction of a 3-dimensional (3D) model revealed that the old VP shunt catheter, which had not been seen on imaging, had perforated the sigmoid colon (Fig. 2). On the basis of these tests and examination findings, emergency surgery was performed with a diagnosis of gastrointestinal tract perforation. At the time of laparotomy, no ascites was found, and examination of the peritoneal cavity revealed that the sigmoid colon had been perforated by the VP shunt catheter (Figs. 3 and 4). Intraoperative colonoscopic examination confirmed the perforation (Fig. 5). The old, left VP shunt catheter was removed, the margin of the perforation was resected, and the hole was closed using Albert-Lembert sutures. A drain was inserted into the rectovesical excavation and the wound was closed in 2 layers, completing surgery. Postoperative course was uneventful, and the patient was discharged on postoperative day 20.

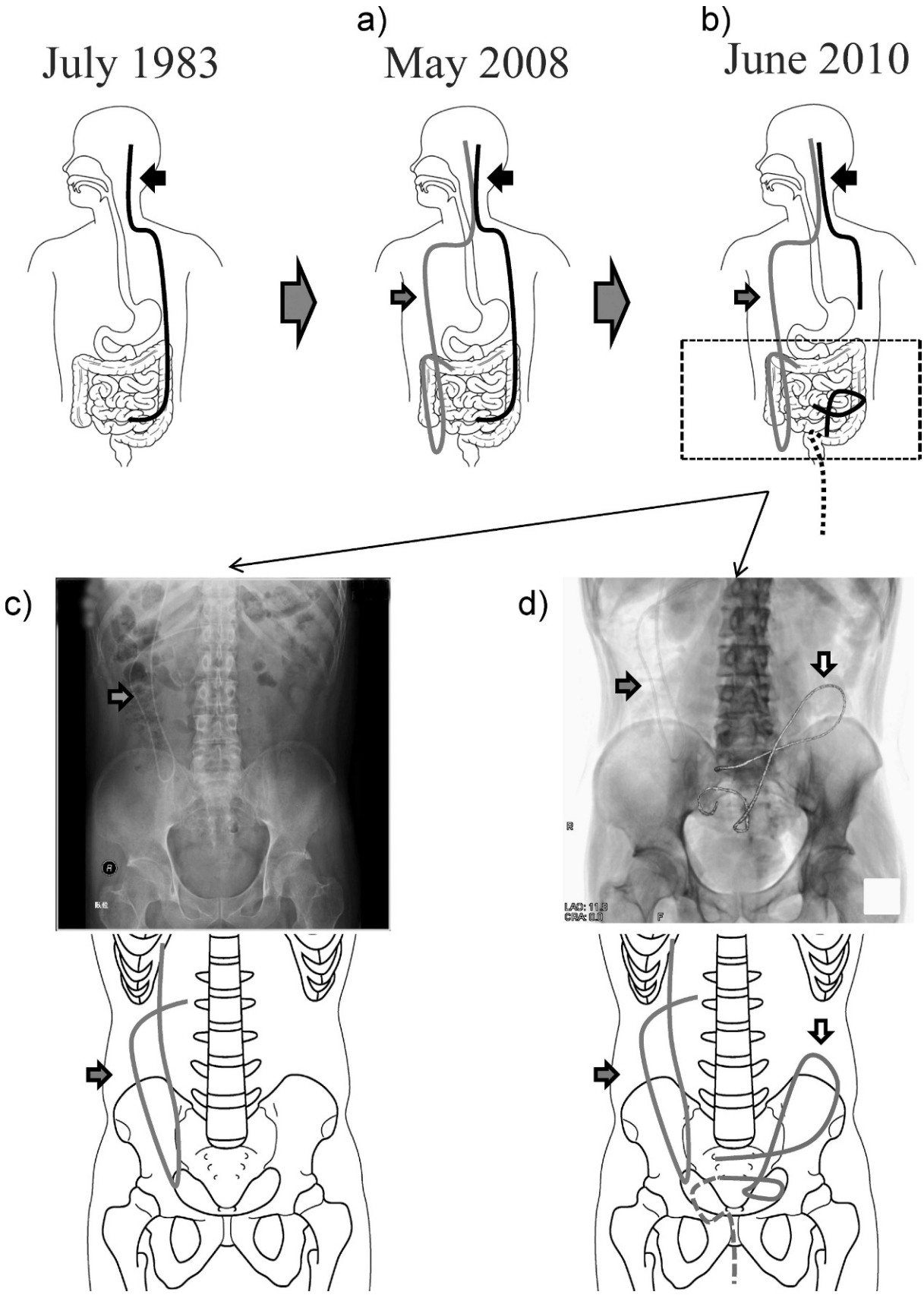
Discussion

In 1966, Wilson and Bertan[4] first reported perforation of the bowel by a VP shunt catheter. As of 2009, the literature includes ~50 reports of bowel perforation caused by a VP shunt catheter. Those cases include 32 patients in whom the catheter protruded from the anus.[2–9]

Bowel perforation caused by a VP shunt catheter has been surmised to occur by the following scenario. The area surrounding the catheter is covered by fibrous tissue, the catheter becomes immobilized in the peritoneal cavity, and as a result of continuous friction (mechanical wear), it causes perforation.[10] In our reported case, X-rays failed to confirm the presence of the VP shunt catheter that had caused the perforation, but CT detected the catheter. CT is useful for diagnosis[2]; we constructed a 3D model based on the CT results. In addition, we found that the 3D model was very useful in that it showed that the proximal end of the severed VP shunt catheter remained in the peritoneal cavity.

Decisions on the treatment approach for cases of gastrointestinal tract perforation caused by a VP shunt catheter are based on symptoms and examination findings. If no peritonitis or intraabdominal abscess is evident, removing the catheter percutaneously may be appropriate. On the other hand, if there are findings of peritonitis and/or intraabdominal abscess, removal of the catheter by laparotomy is preferable. In the case of percutaneous removal, careful follow-up of the patient is needed after the removal, as some reports have described intestinal perforation and manifestation of peritonitis as a complication.[11,12]

The present case is extremely rare, with the distal end of the VP shunt catheter perforating the intestinal tract whereas the proximal portion of the catheter underwent spontaneous severance and remained in the peritoneal cavity. A PUBMED search of the literature using five key words (ventriculo, peritoneal, shunt, colon, and perforation) yielded a report of only 1 case.[13] Our reported case thus represents only the second such case. However, in the first reported case, absolutely no symptoms were experienced at the time when the VP shunt catheter protruded from the anus, and the catheter was removed endoscopically. The following day, that patient developed signs of peritoneal irritation, and an artificial anus was constructed.[10] Our patient showed no symptoms of peritonitis, and contrast-enhanced abdominal CT showed no evidence of an intraabdominal abscess. However, because the VP shunt catheter could not be removed percutaneously, we decided to remove the catheter by laparotomy. The results with this approach were good, with an uneventful postoperative recovery that was free of complications such as peritonitis, and the patient was able to be safely discharged.



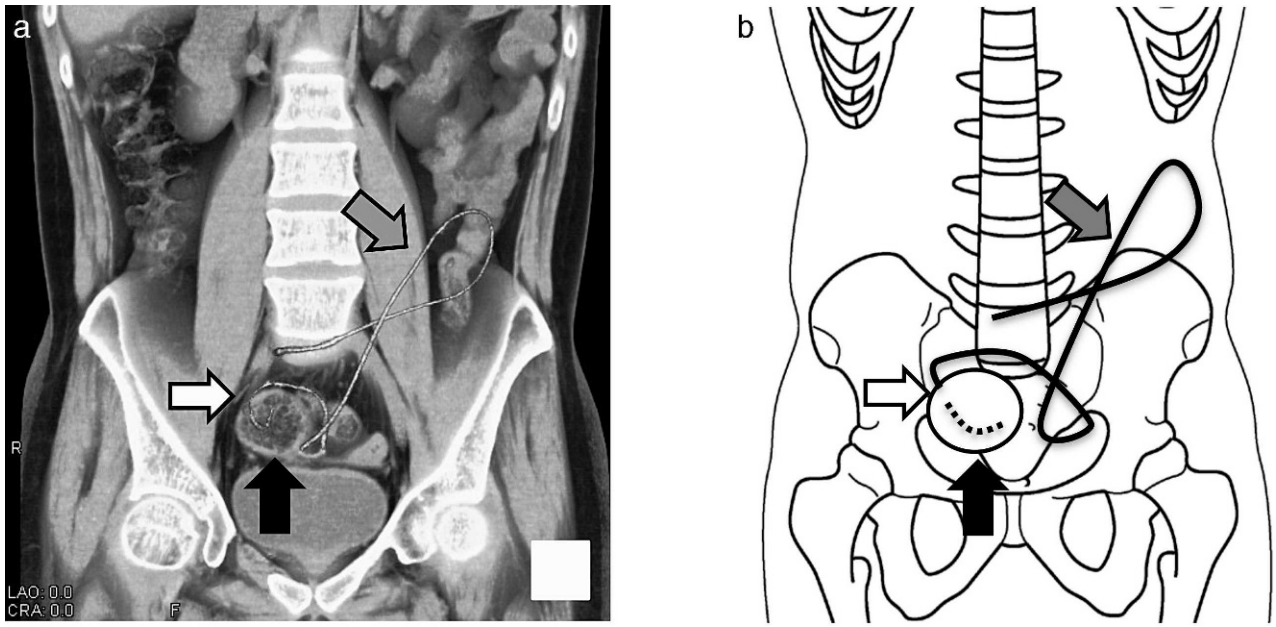


Fig. 2 (a) A 3D model constructed from contrast-enhanced abdominal CT. (a,b) The VP shunt catheter (gray ↑) that perforated the lumen of the sigmoid colon (black ↑) and the site of perforation (white ↑) are seen.

In summary, we encountered a patient in whom a VP shunt catheter perforated the intestinal tract, creating a communication between the intestinal tract and the peritoneal cavity, which placed the patient at very great risk. This can be considered a complication that, although rare, deserves full caution on the part of the physician.

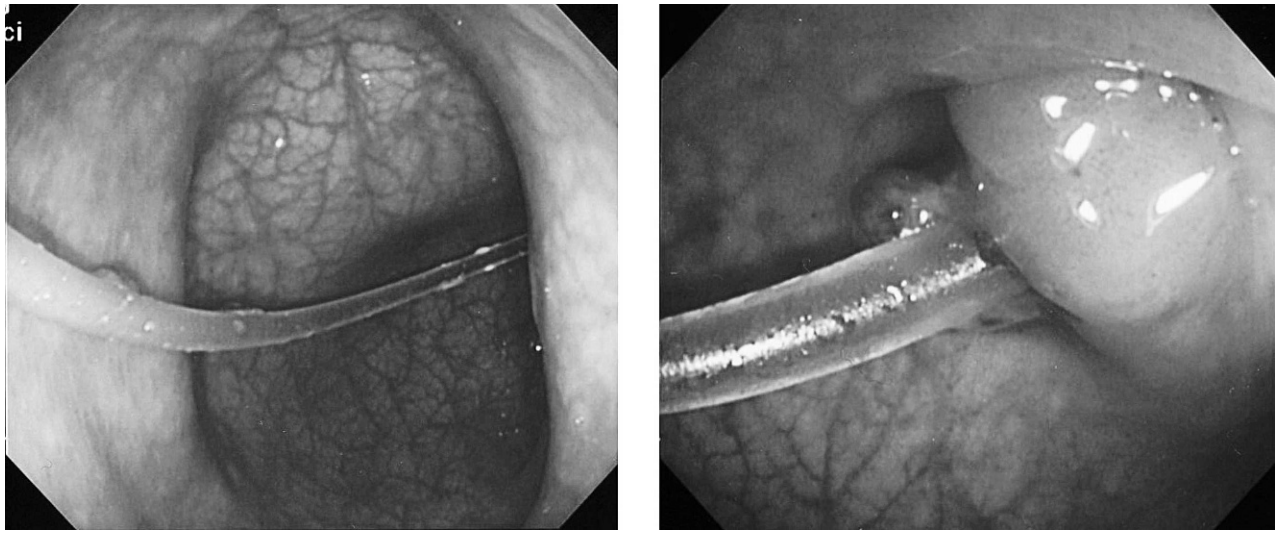


Fig. 3 Intraoperative colonoscopic photograph. The VP shunt catheter has perforated the lumen of the sigmoid colon.

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Fig. 1 (a) Status in May 2008. The line (black ↑) depicts the original VP shunt catheter installed in 1983. The line (gray ↑) depicts the new VP shunt catheter inserted in May 2008. (b) Status at the time of hospitalization in June 2010. (c) Plain X-rays of the abdomen in June 2010. The new VP shunt catheter (gray ↑) is able to be confirmed, but the old VP shunt catheter is not. (d) A 3D model constructed from CT images in June 2010. Both the severed old VP shunt catheter (white ↑) and new VP shunt catheter (gray ↑) are depicted.

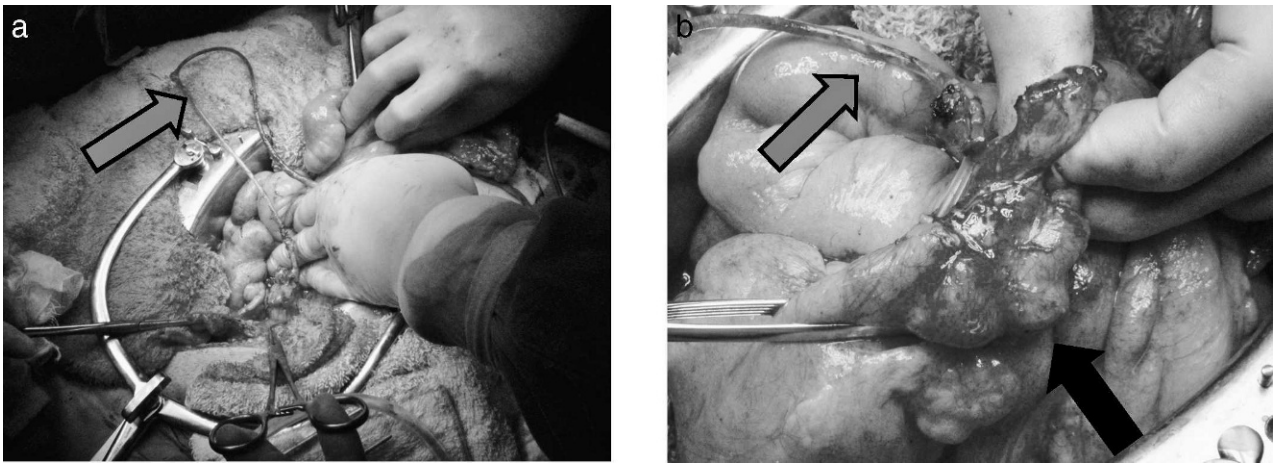

Fig. 4 Intraoperative photographs. (a) The VP shunt catheter is perforating the lumen of the sigmoid colon (gray ↑). (b) Close-up of the operative scene in a. The VP shunt catheter (gray ↑) has perforated the lumen of the sigmoid colon (black ↑).

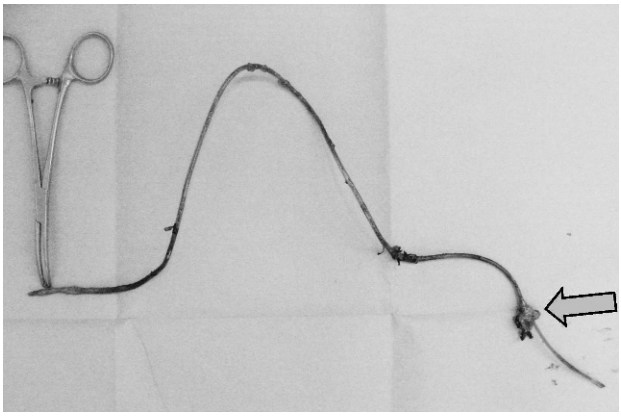

Fig. 5 The removed VP shunt catheter, with a portion of the bowel wall (gray ↑).

Acknowledgments

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