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Colonic perforation as a complication of ventriculoperitoneal shunt: a case report

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Abstract Late perforation after ventriculoperitoneal (VP) shunting is extremely rare. Colonic perforation is uncommon and represents 0.1%–0.7% of abdominal complications. Colonic perforation can challenge diagnostic and therapeutic decisions, and there are no clear guidelines on the management of this problem. We present a 34-year-old woman who was admitted for a 1-week history of sensation of a foreign body through the anus at the time of bowel movements. She had previously undergone a VP derivation for hydrocephalus secondary to neurocysticercosis. Plain abdominal radiographs demonstrated the shunt within the colonic lumen and through the descending and sigmoid colon. The shunt was exteriorized in the cervical area and a laparotomy was performed with a primary two-layer closure of the colonic perforation. The patient received antibiotic therapy for 2 weeks with good outcome. Percutaneous and endoscopic approaches have been reported in patients with no abdominal signs. Prompt recognition of this complication is critical to avoid high mortality rates.

Key words Ventriculoperitoneal shunt • Abdominal complications • Colonic perforation • Therapeutic options

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Introduction

Ventriculoperitoneal (VP) shunt surgery has become the standard management for hydrocephalus [1, 2]. Since the beginning of the twentieth century, the use of the peritoneal cavity as an absorptive surface for shunted cerebrospinal fluid has led to the development of abdominal complications secondary to VP shunts [1–14]. These complications occur in approximately 10%–30% of cases [1, 5]. Abdominal complications include: peritoneal pseudocyst, intestinal volvulus, pseudotumor of the mesentery, inguinal hernia, and migration of the catheter through the vagina [15], scrotum, umbilicus, and intestinal tract. Colonic perforation is uncommon and represents 0.1%–0.7% of abdominal complications [2, 3]. Colonic perforation can potentially create diagnostic and therapeutic indecision, and there are no clear guidelines on the management of this problem. The aim of this report is to present a case treated by abdominal surgery and a literature review to discuss the best way to deal with this complication.

Case report

A 34-year-old woman with a 2-year diagnosis of neurocysticercosis characterized by seizures and hydrocephalus underwent VP derivation in October 2001. After malfunction, a new VP shunt was placed on the contralateral side 1 year later. She was referred to our hospital with a 1-week history of a foreign body sensation through the anus during bowel movements, with spontaneous retraction.

During the initial evaluation she was asymptomatic, with neurological integrity and without abdominal signs. Plain abdominal radiographs showed the distal part of the catheter within the colonic lumen and through the descend-

ing and sigmoid colon and upper third of the rectum; there was no free air in abdominal cavity (Fig. 1). Colonoscopy showed the catheter located within the colon, with the penetration site in the descending colon, approximately 60 cm proximal to the anal verge (Fig. 2). Laboratory testing revealed a hemoglobin level of 12 g/100 ml and a white blood cell count of 8000 mm⁻³. The Neurosurgery Department decided to exteriorize the catheters in the cervical area. The cerebrospinal fluid (CSF) was turbid and contained 80 polymorphonuclear leucocytes/mm³, 10 lymphocytes/mm³, 10 red blood cells/mm³, 29 mg/dl glucose, and 15 mg/dl protein. Gram's stain showed the presence of gram-positive and gram-negative cocci.

Laparotomy confirmed that the catheter had perforated the descending colon. Around the point of perforation there was abundant chronic fibrous tissue. The catheter was removed through the anus, the fibrous tissue was excised and a primary two-layer closure of the colonic perforation was performed. The postoperative course was uneventful, peristalsis was completely established on day 2, the abdomen was soft, and a normal diet was tolerated by the



Fig. 1 Plain abdominal radiography demonstrated the shunt within the colon lumen

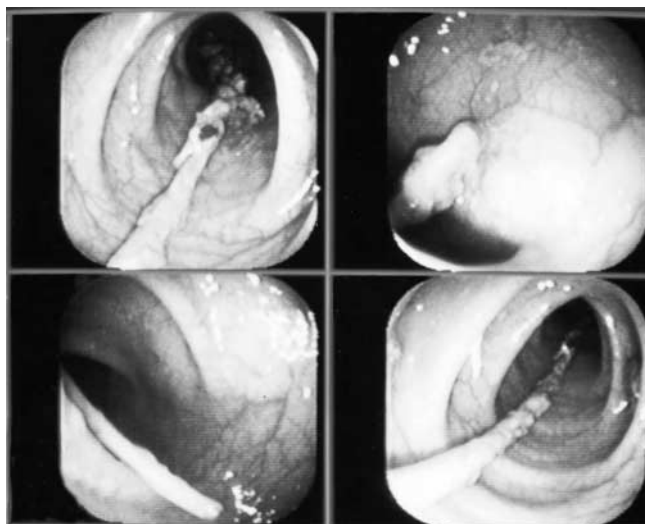


Fig. 2 Colonoscopy showed the shunt within the colon and revealed the place of penetration in the descending colon

patient on day 3. CSF culture developed *Escherichia coli*, *Pseudomonas aeruginosa*, and *Enterobacter faecium* sensitive to amikacin and ticarcillin-clavulanate. Therefore, a two-week course of antibiotic therapy was administered. The Neurosurgery Department removed the two shunts systems. A tolerance test indicated no signs of increased intracranial pressure, so the patient did not require a new VP derivation. She was discharged after 14 days of hospitalization with a good outcome.

Discussion

Late perforation for VP shunt is extremely rare [2, 4, 5, 11, 12]. Of the first two cases reported by Wilson and Bertran in 1996 [16], one patient died. Abu-Dalu et al. [4] reported 3 pediatric cases: 1 of them underwent laparotomy and 2 shunts were removed percutaneously with good results. The authors concluded that the perforation was gradual and nonacute and that laparotomy was unnecessary when there is no clinical evidence of peritoneal irritation. Snow et al. [3] reviewed 32 cases presented in the literature and reported a 15% mortality. Ramani [6] described an unusual complication in which the peritoneal end of the catheter slipped through the scrotum, and Wani et al. [7] presented one case of protrusion through the umbilicus.

Agha et al. [17] reviewed 350 VP derivations with emphasis on the imaging methods. These authors divided the abdominal complications in: occlusive/mechanical (15%), infectious (5%), cyst formation (1%–2%), catheter migrations (0.2%–0.5%), visceral perforation (0.2%–0.3%), and ascites/metastases (0.3%). Most of these patients are asymptomatic and diagnosis is not always elementary; in patients in whom the catheter is found protruding from the

anus, the diagnosis is obvious. The diagnosis should be suspected in cases with shunt infection by gram-negative bacilli, pneumocephalus, prolonged unexplained diarrhea with sterile cultures, and abdominal pain [3, 4, 13].

Sharma et al. [18] reported a 2-year-old child managed by endoscopic removal of the catheter using a pediatric flexible colonoscope, with previous disconnection of the cranial end. Optimal management of patients with bowel perforations due to shunt catheter must be individualized according to the clinical conditions of the patient [3]. If the patient presents with a normal abdominal examination, and no documented intraabdominal abnormality (pseudocyst), then percutaneous or endoscopic removal of the shunt with exteriorization for drainage of CSF is appropriate. The fibrous tissue surrounding the perforation does not lead to spillage of bowel contents. Abdominal surgery must be performed when the fistulous tract does not close spontaneously after percutaneous or endoscopic removal, in the presence of an abscess, or if intraluminal inflammatory disease, intraluminal neoplasm, or severe peritonitis exists.

Our patient underwent laparotomy with a good outcome, but many cases reported in the literature have good results by removing the catheter by percutaneous or endoscopic approach instead of by laparotomy. The fibrous reaction tissue avoids spillage of the bowel contents. In patients with no abdominal signs this last recommendation should be followed with maintenance of patient under close observation. The mortality of generalized sepsis or of gram-negative ventriculitis secondary to bowel perforation by a shunt is high. Prompt recognition of this complication is critical.

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