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CASE REPORT

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Silent bowel perforation and transanal prolapse of a ventriculoperitoneal shunt

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Abstract A 2-year-old hydrocephalic child presenting with ventriculitis following intestinal perforation by a ventriculoperitoneal (VP) shunt is reported. The peritoneal end of the shunt had extruded through the anus without causing any abdominal signs. Removal of the shunt, external ventriculostomy, and antibiotics were effective treatment.

Key words Bowel perforation · Hydrocephalus · External ventriculostomy · Ventriculitis · Ventriculoperitoneal shunt

Introduction

Bowel perforation by a ventriculoperitoneal (VP) shunt is a rare but serious complication. Most of these patients present with abdominal signs and/or intracranial sepsis [9, 11, 12]. In some cases the distal shunt may prolapse through the anus, making the diagnosis very obvious [3, 7, 8, 11, 12]. Prompt institution of antibiotic therapy, external ventriculostomy, and removal of the shunt are the recommended treatment [8, 9, 12, 13].

Case report

A 2-year-old female presented with vomiting, refusal to take feeds, neck stiffness, and irritability for 2 days. The patient had undergone a VP shunt for congenital hydrocephalus 4 months previously and had been seen in the follow-up clinic with a normally-functioning shunt 3 weeks prior to the onset of symptoms. One day after the onset of symptoms the parents noticed protrusion of the shunt tube through the anus after defecation, but denied any abdominal complaints. A private practitioner who saw the child ligated the tube when he noticed clear fluid dribbling through the protruding tip. This, however, led to deterioration of the child's condition. On examination, she was febrile with mild dehydration. The anterior fontanelle was full and tense. Neck stiffness was associated with brisk tendon reflexes but without any focal neurological deficit. The abdominal examination was normal. The ligated peritoneal end of the shunt was seen protruding through the anus (Fig. 1). On digital rectal examination, the catheter was freely mobile in the rectum and its entry point appeared to be beyond the reach of the finger.

Investigations revealed marked polymorphonuclear leucocytosis. A blood culture was sterile. Abdominal X-ray and ultrasound (US) examinations did not suggest any evidence of peritonitis/pneumoperitoneum. Cranial US revealed hydrocephalus with severe ventriculitis. Computed tomography (CT) of the head could not be done. Cerebrospinal fluid (CSF) biochemistry and cultures showed exudative ventriculitis due to mixed coliform

Fig. 1 Photograph of VP shunt prolapsed through anus

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organisms with predominance of *Escherichia coli*. The patient was put on intravenous ceftriaxone; the distal catheter was removed by pulling the protruding end through the anus and the ventricular catheter by an incision over the scalp. An external ventriculostomy was made by inserting a new ventricular catheter and shunt chamber. Repeated CSF analyses were carried out until they were near normal, when a shunt revision was done. The patient was doing well 3 months postoperatively.

Discussion

Uncommon complications of VP shunts include CSF pseudocyst/loculations, bowel and scrotal perforations, spontaneous extrusion of the catheter, and intestinal obstructions [1, 2, 10]. Bowel perforations are serious complications, and may carry a mortality of 15% [13]. The mechanism of perforation by the peritoneal catheter has not been fully explained. It is possible that when the tip of the catheter has been in contact with the bowel wall for a period it will adhere to and then erode it [8]. Stiff and sharp-tipped catheters may perforate the bowel even without fixation [1, 7]. Furthermore, the thin bowel wall in children may be a contributing factor since the majority of patients with such bowel perforations are reported in this age group [1–5, 7, 8, 12, 13]. Most of these patients present with intracranial sepsis (ventriculitis, meningoencephalitis, subdural abscess) because of the ascending infection with gram-negative fecal flora [9, 11, 12]. Abdominal signs due to peritonitis are either present initially or may develop later on, but not in all patients [11].

In some patients the shunt catheter has come out through the anus after perforating the bowel, making the diagnosis obvious [3, 7–9, 12], as in our case. Rarely, symptoms mimicking acute gastro-enteritis are present before the rectal extrusion of the shunt catheter [8]. Cases also have been reported where bowel perforations remained silent until they were detected on "shuntograms" done for malfunctioning shunts [4]. Plain X-ray films of the abdomen and skull may sometimes suggest colonic perforation by the presence of air in the peritoneal cavity or ventricular system [3]. CT of the head is the best investigation, and may show intracranial collections of pus requiring urgent drainage [12].

There are three cardinal principles in treating shunt-related colonic perforations: removal of the shunt; intravenous antibiotics; and external ventriculostomy until the CSF is biochemically near-normal and sterile on culture. However, in cases of inadequate response intraventricular antibiotics may be added [8, 9, 11]. The method of shunt removal depends upon the clinical condition of the patient. If the abdominal examination does not indicate peritonitis and/or pus collection, percutaneous removal of the catheter has been advocated by many authors [7, 11, 13] since no complication has occurred by this approach. In the presence of shunt protrusion from the anus, the peritoneal catheter can be removed by pulling it through the anus [8, 12] as was done in our case. The peranal approach seems practical as it eliminates the possible risk of peritoneal and shunt-track contamination [12]. It is believed that the perforation site seals off due to the presence of a chronic fibrous sheath around the shunt track, requiring no surgical intervention [1, 8, 11–13]. If the catheter is lying in the peritoneal cavity or high in the bowel lumen, endoscopy may be used to retrieve it [5, 6].

In summary, bowel perforations complicating a VP shunt are a rare but serious problem. Any patient with a VP shunt with features of an acute abdomen, gastroenteritis, gram-negative shunt infection, and/or shunt malfunction should be viewed with a high degree of clinical suspicion to rule out bowel perforation. A prompt and aggressive protocol of management is emphasized.

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