

Enterocutaneous fistula and internal hernia: unusual complications of peritoneal catheter migration into the ileum in a patient with ventriculoperitoneal shunt

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The aim of the present study was to report the treatment of an unusual association of ventriculoperitoneal shunt (VPS). Although a commonly performed paediatric neurosurgical procedure, a VPS is associated with several complications. There are reports on gut perforation by the peritoneal catheter, but an enterocutaneous fistula is very rare. Only two have been previously reported in literature. We report, here, the first case seen in Nigeria involving a 3-year old boy, at our teaching hospital setting, with a history of a fall 18 months after VPS; this was followed by purulent, and, later, faeculent discharge from the right subcoastal region and abdominal wound. He underwent detailed neurological examination. Preoperative evaluation with a fistulogram (as a barium meal and follow-through because the superficial opening was not clearly visible to allow direct injection of contrast) showed a connection between the intestine and the skin over the shunt tunnel. He underwent a laparotomy with thorough antiseptic irrigation and repositioning of the VPS in peritoneal cavity. Postoperatively, the faeculent discharge from the upper anterior abdominal wall ceased.

Introduction

Ventriculoperitoneal shunt (VPS) is one of the standard treatments for hydrocephalus in industrialized, as well as developing, countries [1]. Abdominal complications occur in as many as 10–30% of the cases; bowel perforation, though, is uncommon, occurring only in 0.1–1.0% cases [2].

We report, here, a case of a paediatric postmeningitic hydrocephalus complicated by an enterocutaneous fistula, resulting from ileal perforation by the peritoneal end of a functioning VPS. We described the presentation, evaluation and treatment of our index patient and also compared our case with the other two previously reported cases in the literature. Finally, we also described the possible mechanism of enterocutaneous fistula development in this case and highlighted the importance of interdisciplinary approach to its treatment.

Case report

A 3-year old right-handed, kindergarten-going boy, who lived with his parents at Uromi in Edo State of Nigeria, presented with a septic right upper abdominal wound following a fall at his school a month before presentation. He fell from a class bench, thus hitting his right lower coastal margin against the bench on his way down. This wound subsequently developed into a discharging sinus. There was no history of fever, vomiting, abdominal pain, convulsions or loss of consciousness. The mother had commenced treatment with oral cefuroxime before presentation.

He was discharged home in 2 weeks. There was complete resolution after 6 months. We conclude that there should be a high index of suspicion of an enterocutaneous fistula, although very rare, when faecal discharge is noticed following a VPS and should necessitate a fistulogram. Effective surgical treatment of the intraluminal migration and other possible complications, should involve a multidisciplinary team. *Ann Pediatr Surg* 12:115–118 © 2016 Annals of Pediatric Surgery.

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He had had a right frontal VPS carried out on our service 30 months earlier for postmeningitic, communicating hydrocephalus at the age of 7 months. Intraoperative findings then included clear and colourless cerebrospinal fluid (CSF) under intense pressure. He maintained normal cognitive and psychomotor development after shunting.

He had no other intercurrent medical or surgical illnesses.

General examination revealed a well-nourished boy, who was afebrile, not pale or jaundiced. He had normal vital signs.

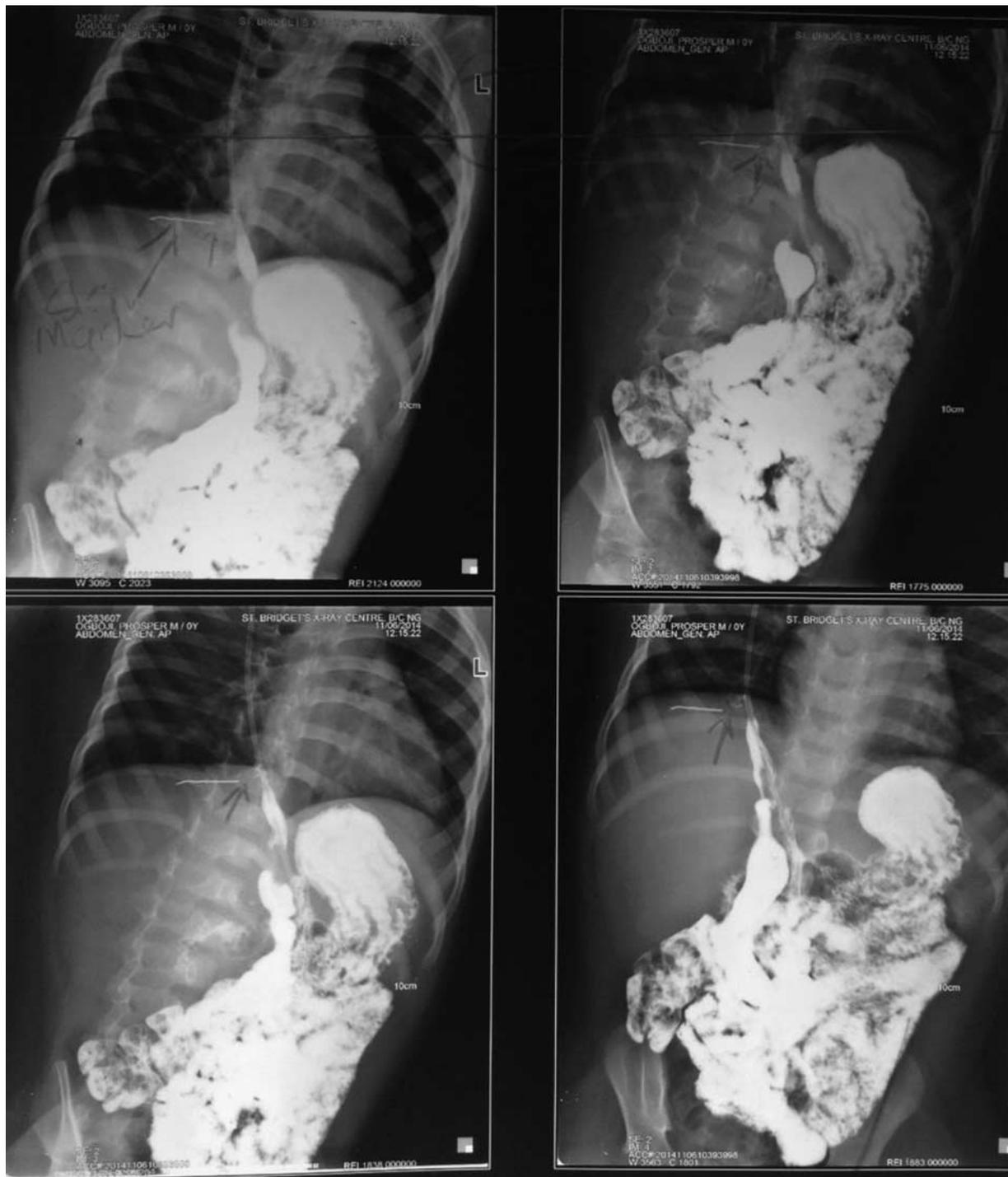
Neurologic examination revealed normal mental state, cranial nerves and meninges. He had mildly spastic extremities. The shunt valve emptied (when pressure was applied with a finger) and refilled normally and there was no hyperaemia or induration along the shunt tract. The cranial and abdominal operative scars showed good healing.

The abdomen was full and moved with respiration. There was purulent discharge from two 0.2 by 0.2 cm right upper abdominal (along the right costal margin) wounds, which had surrounding hyperpigmented skin.

Cardiovascular and respiratory examinations were normal.

A clinical diagnosis of a septic right upper abdominal wound was made. A wound swab was sent for microbiological examination. He was then placed on oral erythromycin 150 mg every 8 h for 2 weeks; oral cefuroxime 125 mg every 12 h was also continued. On

Fig. 1



Fistulogram, done as a barium meal and follow through, showing the fistulous connection between the ileum and the skin along the tunnel of the ventriculoperitoneal shunt which courses towards the peritoneal cavity along the right sternal border. The arrow demonstrates the superficial openings of the fistula. Note also the internal hernia.

representation, 2 weeks later, the sinus was discharging faeces, thus necessitating hospital admission.

Complete blood counts and serum electrolytes, urea and creatinine were within normal limits.

Abdominal ultrasonography normal did not locate the VPS within the peritoneal cavity.

The wound swab yielded *Escherichia coli*.

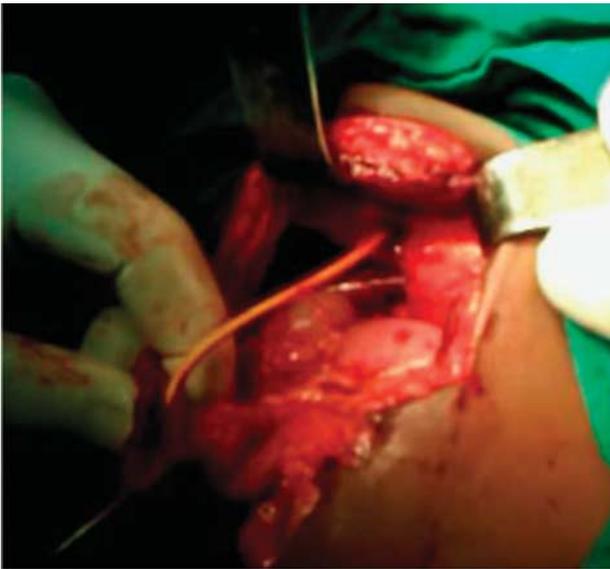
A fistulogram was carried out (as a barium meal and follow-through because the cutaneous opening of the tract could not be cannulated for direct contrast injection); it showed a fistulous connection between the intestine and the skin involving the shunt tunnel (Fig. 1). Barium was used because a water-soluble contrast, which is preferred, was unavailable at that time and intervention was expeditious. However, there no was spillage of contrast into the general

Fig. 2



Abdominal end of the ventriculoperitoneal shunt showing the Richter hernia of the ileum (held between thumb and index finger) through the peritoneal ostium of the catheter tunnel.

Fig. 3



Peritoneal catheter of the shunt within the lumen of the ileum.

peritoneal cavity because of tight sealage of the openings by fibrosis.

The main managing team was the neurosurgical unit. This was because the patient was referred back to the neurosurgical unit – who had carried out a VPS on him during infancy – when discharge was noticed along the course of the shunt. Recognizing this condition as a reported, though very rare, complication of VPS, the neurosurgical unit admitted the patient and co-ordinated with the multidisciplinary team.

The paediatric surgical unit was invited and the patient subsequently underwent a laparotomy. Intraoperative

findings included a 40 cm length of the distal peritoneal catheter of a VPS within the lumen of the ileum and an internal hernia of the antimesenteric border of the ileum via anterior abdominal wall tunnel; bowel perforation was walled off by using adhesives. The peritoneal catheter was retrieved, cleaned with povidone iodine solution and then methylated spirit was reperitonealized (Figs 2 and 3). Copious irrigation of the peritoneal cavity (and catheter) was carried out using warm saline impregnated with ceftriazone and gentamycin.

Patient made an uneventful recovery and was discharged home on the 15th postoperative day. He has remained well after 1 year.

Discussion

VPS as one of the CSF diversionary methods is a very cheap and rapid way of relieving intracranial pressure in hydrocephalic patients in developing countries. It, however, has numerous complications. Of the peritoneal complications, gut perforation [3–5] with or without subsequent peritoneal catheter extrusion through the mouth [6,7] or anus [8] has been previously reported. However, an enterocutaneous fistula complicating a functioning ventriculoperitoneal shunt without signs of CSF sepsis as reported here is very rare. Only two previously reported cases were found in the literature. Our case has similarities with the case of a 2-year-old boy reported from Kenya with a postinfectious hydrocephalus in terms of age and aetiology of the hydrocephalus [1]. However, in our patient, a clinical diagnosis of an enterocutaneous fistula in the setting of a single functioning ventriculoperitoneal shunt was made necessitating a fistulogram before any form of intervention as against their own case where a diagnosis was made on the finding of discharge of bilious fluid from the clavicular sinus. The other case reported in the literature is quite disparate from these two: a 39-year old male residing in the UK who had had 18 shunt revisions with three VPS catheters *in situ* in a background of a myelomeningocele and a T6 sensory level [2]. He had two discharging sinuses and a fistulogram could only be carried out on the sinus in his right hypochondrial region.

Our patient had a formal laparotomy during which an internal hernia was noted. A part of the antimesenteric border of the ileum was herniating into the anterior abdominal wall through the shunt tunnel (a Richter's hernia) and the perforation was noticed at the summit of the bowel wall with the peritoneal catheter within the lumen of the ileum. A probable explanation is that the fall he had at school most probably injured the bowel wall, the only visible evidence being a superficial abdominal injury, which was ignored initially. The bowel injury would then have healed with fibrosis adhering to the abdominal wall in the region of the shunt track under the superficial abdominal wound. Another explanation, or question rather, is, could the fall have worsened a missed subclinical bowel injury, which occurred during the performance of shunt during infancy?

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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