CASE REPORT

Transanal protrusion of ventriculoperitoneal shunt reflecting asymptomatic perforation of the large bowel

Nicholas Russell Plummer,¹ Ajay Tokala,² Ravindra S Date^{1,3}

¹Department of Upper GI Surgery, Lancashire Teaching Hospitals NHS Foundation Trust, Preston, Lancashire, UK

²Department of Radiology, Lancashire Teaching Hospitals NHS Foundation Trust, Preston, Lancashire, UK

³Department of Medicine, University of Manchester, Manchester, UK

Correspondence to
Dr Nicholas Russell Plummer,
nickplummer@cantab.net

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SUMMARY

Perforation into the gastrointestinal tract is a rare complication of ventriculoperitoneal shunt insertion.

We present a case of transanal protrusion of the shunt catheter in an otherwise asymptomatic patient, with only transient signs of shunt failure some 2 months prior to presentation, and discuss treatment options to rationalise our decision to treat with laparotomy and preservation of the shunt.

BACKGROUND

Ventriculoperitoneal (VP) shunting is increasingly being used to treat a number of conditions causing hydrocephalus, with a corresponding rise in shunt complications presenting to hospital. General surgical teams may be the first point of contact with patients experiencing complications when these occur intra-abdominally, and are often unfamiliar with the signs of shunt failure or malfunction. Knowledge of the potential complications of VP shunting, and correlation between abdominal and neurosurgical signs, is essential in appropriately assessing and treating this group of patients.

CASE PRESENTATION

A 25-year-old woman with cerebral palsy requiring a VP shunt since birth, complicated by multiple revisions in addition to fungal ventriculitis and a parietal *Escherichia coli* abscess, presented to her local emergency department after her parents noticed a swelling at the site of a previous external ventricular drain (EVD). As she was otherwise asymptomatic for shunt failure with no deterioration in neurological function, the patient was discharged home once shunt integrity was confirmed on plain chest and abdominal X-ray, and her parents described a sudden resolution of the swelling, returning to its normal concave shape after approximately 2 weeks.

Two months later, her father discovered a thin tube emerging from her anus. As she was otherwise well he cut the tip off and delivered this to her general practitioner, where it was confirmed to be the distal end of her shunt catheter, and admission was arranged to the neurosurgical unit, by which point the cut catheter tip had retracted into her rectum. The patient was clinically unchanged from her baseline, with no signs of meningism or peritonitis.

INVESTIGATIONS

CT of the abdomen/pelvis was performed under general anaesthesia (figure 1). This showed the VP shunt entering the mid/proximal sigmoid colon, from where it followed a tortuous path, looping into the descending colon, then back into the sigmoid, before coming to rest in the collapsed distal sigmoid.

TREATMENT

The patient underwent immediate laparotomy via a midline incision, and the shunt catheter was visualised within the sigmoid colon (figure 2). At the point of entry the shunt was encased in multiple dense adhesions between the catheter and sigmoid wall, so the shunt was divided close to the point of entry, adhesions divided and the distal cut end gently retrieved from the bowel. The edges of the perforation were freshened and closed in two layers; as the patient's omentum was underdeveloped, local mesocolic fat was used to cover the closure. The shunt was placed lateral to the caecum, and the abdomen washed out with saline lavage.

OUTCOME AND FOLLOW-UP

The patient recovered quickly from her laparotomy, and has returned to baseline neurological function. Cerebrospinal fluid culture taken from the proximal end of the cut catheter at the time of laparotomy grew *Propionibacterium acnes*, a common human gastrointestinal commensal;¹ broad-spectrum antibiotics were given at the time of laparotomy, and she will be followed up routinely by the neurosurgical team.

DISCUSSION

Shunt malfunction is common, with up to 70–80% of patients requiring revision; however, abdominal complications are rarer, with bowel perforation occurring in less than 0.7% of patients.^{2–3} Other hollow intra-abdominal viscera are also at risk, with perforation of the bladder⁴ and fallopian tubes⁵ also reported. Transanal protrusion of the shunt catheter can be the only sign of bowel perforation,⁶ although oral protrusion has been documented⁷ and silent penetration, in the absence of abdominal or neurological clinical signs, is not uncommon in such cases.⁸ We suspect that the initial swelling at the EVD site, a recognised early sign of shunt failure in this patient, represented impairment of shunt function on contact with the wall of the

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Figure 1 Coronal oblique CT reconstruction (left) showing shunt catheter entering the proximal sigmoid colon before looping into the descending colon; and sagittal MIP CT reconstruction (right) demonstrating shunt catheter entering the peritoneal cavity, looping intra-abdominally, then entering the sigmoid colon. MIP, maximum intensity projection.

sigmoid colon, with sustained pressure causing localised necrosis and perforation, reflected in sudden resolution.

Perforation is thought to occur secondary to fibrosis around the distal end of the catheter adhering to the colonic wall, as was seen on laparotomy in this case, resulting in a chronic inflammatory response, pressure ulceration and eventual perforation.⁹ Foreign-body type allergic reaction to the tubing material¹⁰ and occult catheter tip infection⁵ has been implicated in cases, but is less likely in this situation. The optimal approach to repair the perforation is unclear, and needs to be tailored to the patient. Laparotomy with or without shunt removal has been

successful.¹¹ However, percutaneous¹² and endoscopic¹³ approaches have also been used in patients with no signs of peritonism, and laparoscopic procedures can be employed in cases where the shunt can be removed.¹⁴

Given the patient's history of a past laparotomy for adhesiolysis, and multiple shunt revisions, the safest approach in this case was thought to be via laparotomy, allowing preservation of the shunt at the same time as direct repair of the colonic wall. Colonic perforations in unprepared bowel normally require resection and stoma formation; this was felt not to be an option in this case given the patient's neurological condition, so laparotomy offered the best chance of achieving successful primary repair. Similarly, the risk of serious intra-abdominal or ascending neurological infection from colonic organisms required cleansing of the shunt catheter and abdominal washout, both of which could be achieved safely and thoroughly via laparotomy.

Figure 2 Intraoperative photograph of ventriculoperitoneal shunt (arrow) inside the mobilised large bowel. The shunt spontaneously retracted from the bowel before the site of perforation could be photographed. Note the absence of omentum.

Learning points

- ▶ No tube is safe! A high index of suspicion for perforation of the abdominal viscera must be present in patients with free-floating abdominal tubes when they present with tube complications.
- ▶ Asymptomatic bowel perforation by ventriculoperitoneal shunts may be reflected purely by signs of transient shunt blockage, with rapid and complete resolution without intervention.
- ▶ Primary closure of the bowel is a suitable and effective treatment option where omental patch is not a feasibility and resection undesirable. Treatment should be tailored to the individual patient depending on the clinical need and premorbid condition.

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Competing interests None.

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