Polish Annals of Medicine

Journal homepage: https://www.paom.pl

Case report

Protrusion of ventriculoperitoneal shunt catheter tip through anus with silence abdomen

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ARTICLE INFO

Article history
Received 12 May 2020
Accepted 2 October 2020
Available online 7 June 2021

Keywords
Hydrocephalus
Silent bowel perforation
Trans-anal protrusion
Ventriculoperitoneal shunt complication

Doi
https://doi.org/10.29089/2020.20.00158

ABSTRACT

Introduction: Ventriculoperitoneal shunt (VPS) is most commonly performed surgical treatment for hydrocephalus by draining excessive cerebrospinal fluid (CSF) in ventricles to peritoneal cavity. Despite significant improvement in shunt procedure and being a relatively simple procedure, shunt complications remain common.

Aim: The aim of this paper is to report a case of perforated bowel presented with silence abdomen following VPS insertion.

Case study: We report a case of protrusion of distal VPS catheter through anus with silent abdomen, managed successfully with minimal intervention. Patient, 11-months-old male infant, diagnosed with congenital communicating hydrocephalus and VPS placement was done at 6 months of life, presented with tip of VPS protruding from anus after 4 months of VPS insertion. Patient was scheduled for removal of VPS, where shunt was disconnected through superficial abdominal incision, distal portion removed through anus without resistance. Postoperative patient recovers well without abdominal complication.

Results and discussion: Perforation of bowel by distal peritoneal catheter is rare and only accounts for 0.1%–0.7% of complication. The exact pathogenesis for spontaneous bowel perforation is unclear. Management of bowel perforation secondary to VPS is highly individualized, mainly depending on its clinical symptoms and signs.

Conclusions: Although bowel perforation following VPS insertion is rare, it carries high mortality up to 15% especially if unrecognized and delayed in treatment. Early detection and appropriate management are key in reducing VPS related morbidity and mortality.

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1. INTRODUCTION

Hydrocephalus is a common brain disorder due to imbalance between production and absorption of cerebrospinal fluid (CSF) leading to excessive accumulation CSF within ventricles or subarachnoid space, resulting in ventricular dilatation.[1] Ventriculoperitoneal shunt (VPS) is most commonly performed surgical treatment for hydrocephalus by draining excessive CSF in ventricles to peritoneal cavity.[2] Despite significant improvement in shunt procedure and being a relatively simple procedure, shunt complications remain common,[3] especially in children. A study by Yvonne W et al. demonstrated a higher rate of shunt complications in children compared to adult at 5 years (48% vs. 27%, $P < 0.0001$).[4] Among common complications include infection, obstruction, disconnection, CSF pseudocyst formation and migration. We report an infant presented to us with protrusion of distal VPS catheter through anus with silent abdomen, managed successfully with minimal intervention.

2. AIM

The aim of this paper is to report a case of perforated bowel presented with silence abdomen following VPS insertion.

3. CASE STUDY

Patient, 11-months-old male infant, initially presented with progressively increasing head circumference since birth, subsequently diagnosed with congenital communicating hydrocephalus. VPS placement was done at 6 months of life, distal tip inserted into peritoneal cavity and placed in pelvis via paraumbilical mini-laparotomy. Mother noted tip of VPS protruding from anus after 4 months of VPS insertion, associated with clear CSF from anus, which required manual reduction each time after defecation (Figure 1). However, mother did not bring to seek medical treatment for that issue.

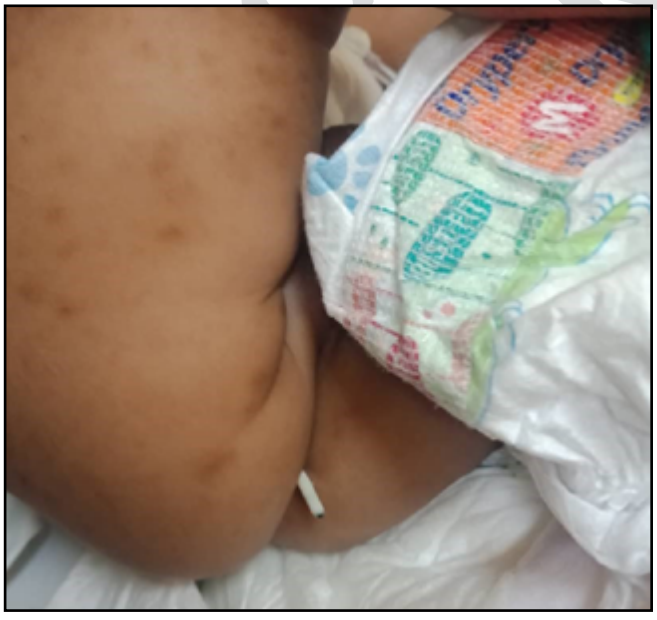

Figure 1. Transanal protrusion of distal tip of VP shunt.

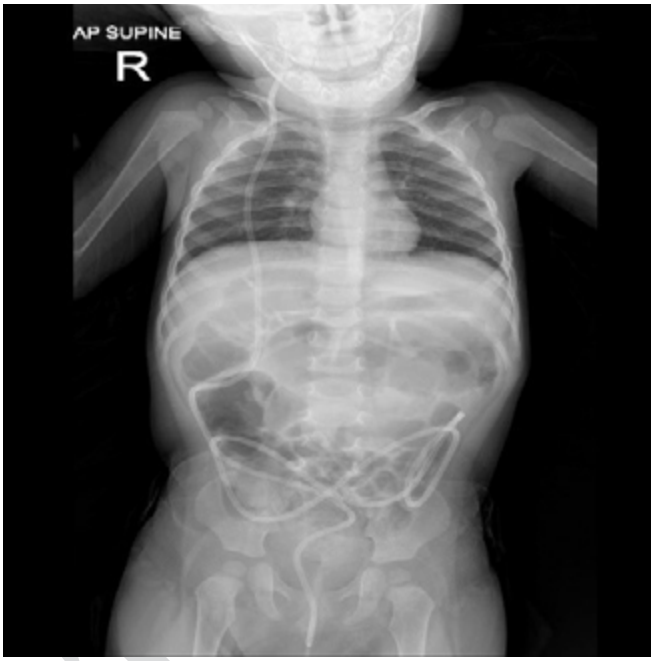

Figure 2. Abdominal X-ray showing the distal peritoneal catheter protruding through the rectum and anus.

He presented a month later with 2 days history of vomiting, reduce oral intake and less active. No fever, fitting or irritability, bowel output was normal. Clinically, he was dehydrated and tachycardic, anterior fontanelle was not tense. Examination of shunt showed compressible reservoir with no delayed in filling, no evidence of pseudomeningocele. Abdomen was soft, not distended and non-tender with no sign of peritonitis. Shunt tract was examined and no sign of inflammation.

Shunt series radiograph showed no fracture of shunt, but distal peritoneal catheter protruding through anus (Figure 2). CT scan of brain showed no worsening of hydrocephalus compared to previous study. CT scan of abdomen revealed anal extrusion of VPS with sealed colonic perforation at mid descending colon. No focal surrounding free air or pneumoperitoneum. No abnormal wall enhancement or thickening in this region. No focal collection was seen (Figure 3). White cell count was 14×10^9 cells/L, CSF biochemistry obtained from shunt tap suggestive of infection by the evidence of raise white count 640 cells/mm^3, protein 2.04 g/L and glucose 3 mmol/L. CSF culture grew Methicillin-resistant coagulase negative staphylococci (MRCoNS).

Patient was scheduled for removal of VPS, where shunt was disconnected through superficial abdominal incision. Distal portion removed through anus without resistance, and proximal part removed together with reservoir. Omaya shunt was inserted at the same setting by neurosurgical team. Patient was kept nil per oral in initial postoperative period, later clear fluids and milk feeding was introduced

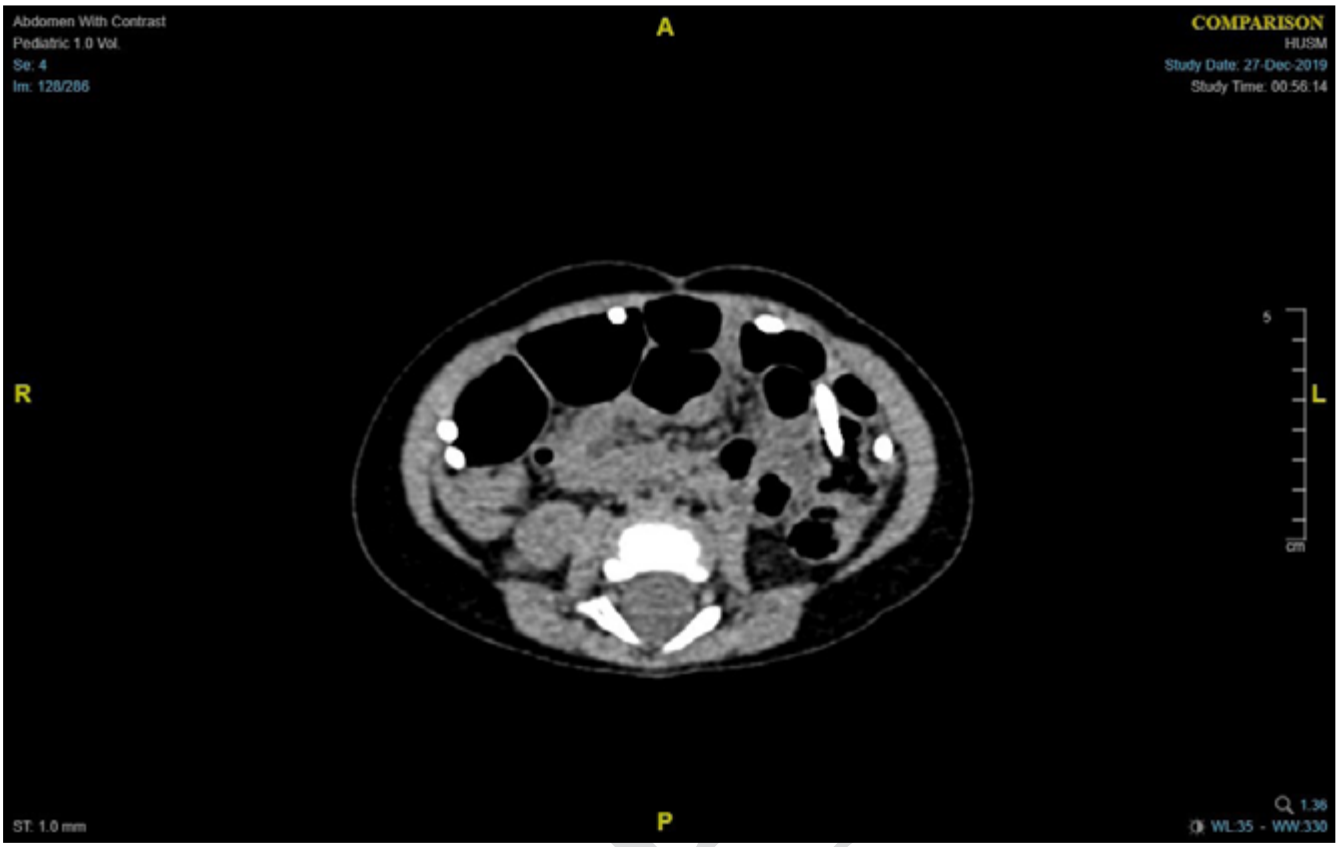

Figure 3. CT Abdomen showed the distal peritoneal catheter entering mid descending bowel.

without evidence of peritonitis. Patient subsequently discharged home after completed total duration of intravenous ceftriaxone for 2 weeks. Patient was followed up and receive regular tapping of omaya shunt for CSF drainage, subsequently he received a ventriculoatrial shunt 6 months later.

4. RESULTS AND DISCUSSION

The mechanical complication of shunt migration occur in 1.4% patients who have undergone a VPS procedure.[5] It can migrate to different compartments such as gastrointestinal, genitourinary, abdominal wall, chest/thorax or migrate cranially to intracranial or subgaleal plane.[6] Perforation of bowel by distal peritoneal catheter is rare and only accounts for 0.1%–0.7% of complication.[7] Among the sites being involved, the most common being colon (56%), followed by stomach (28%) and the least common site is small intestine (16%).[6] Wilson and Bertrand reported the first case of VPS-related bowel perforation in 1966.[8] Until 2016, 139 patients with VPS migration into the bowel have been identified, and majority occurred in children (80.6%), more often than in adults (19.4%).[6]

The exact pathogenesis for spontaneous bowel perforation is unclear. Age standouts as the main risk factors for bowel perforation, due to weaker bowel wall and hyperperistaltic movement in pediatric. VPS is recognized as foreign body by immune system, and it can induce chronic irritative process when came into contact with bowel, leading to perforation. Brownlee et al. in his case report have described an encasing fibrotic scar anchoring the tubing to an area of the bowel and causing ulceration, and eventual perforation and he attributes this to silicone allergy.[9] Other predisposing factors include type of catheter used, one study had observed that catheter with greater friction force tends to be tangled with abdominal tissue or omentum leads to perforation of bowel.[10] The redundant length of VPS within peritoreal cavity might increase friction force with bowel thus leads to migration and perforation.

Protrusion of catheter tip through oral or anus indicates bowel perforation which is seen is our case, whether or not associated with abdominal symptoms such as pain, vomiting, peritonitis or prolonged diarrhea. However, some patients may just present with shunt dysfunction and meningitis without abdominal complaints.[6] Thus, any patients who previously undergone VPS surgery presented with meningitis or ventriculitis with positive culture of enteric organism should be workup thoroughly to look for possibility of bowel perforation. CT is helpful when a case of bowel perforation is suspected, it can detect presence of pneumoperitoneum, guide to locate perforation site, assess adjacent bowel status to suggest inflammation or wall thickening, as well as any collection surrounding perforation site.

Management of bowel perforation secondary to VPS is highly individualized, mainly depending on its clinical symptoms and signs. The first being rule out ascending meningitis or ventriculitis, CSF should be tapped and sent for biochemistry study and culture. Immediate externalization of shunt is

required immediately to maintain patency of CSF drainage as well as reduce risk of ascending infection.[11] In the absence of peritonitis or bowel obstruction, disconnect of VPS followed by removal through protrusion side blindly or with endoscopy guidance can be done. In chronic perforation, the opening is expected to seal spontaneously due to presence of fibrous sheath around tract.[12] However, if presence of peritonitis or bowel obstruction, laparotomy or laparoscopic approach is warranted, followed by bowel repair or bowel resection if needed. Bowel repair transanally after removal of distal shunt has also been reported.[13]

5. CONCLUSIONS

Although bowel perforation following VPS insertion is rare, it carries high mortality up to 15% especially if unrecognized and delayed in treatment.[14] Early detection and appropriate management are key in reducing VPS related morbidity and mortality. In our case, patient was fortunate not to have catastrophic complication such as septic shock from meningitis or peritonitis despite the 1 month delay in presentation to hospital after protrusion of VPS tip from anus.

Conflict of interest
None declared.

Funding
None declared.

Ethics
Consent has been acquired from parent to publish case details and images.

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