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Early postoperative colonic ventriculoperitoneal shunt migration with trans-anal protrusion: A unique case report

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ABSTRACT

INTRODUCTION AND IMPORTANCE: Colonic ventriculoperitoneal shunt (VPS) migration with trans-anal protrusion remains uncommon. Patients may be asymptomatic, and diagnosis may only be made on visualization of the prolapsed catheter from the anus. This unique case of early post-operative trans-anal shunt protrusion highlight the possibility of this rare complication specially when shunt revision accompanies bowel surgery.

CASE PRESENTATION: The authors present a case of early postoperative colonic shunt migration in a thirteen-year-old female with who underwent Malone Antegrade Continence Enema (MACE) with concomitant revision of the distal part of the peritoneal catheter. She presented two weeks post operatively with shunt catheter protruding from the anus. This was noticed by her carer and she was asymptomatic on her presentation.

CLINICAL DISCUSSION: Delayed post-operative shunt related bowel perforation and trans-anal shunt protrusion is an uncommon complication after ventriculoperitoneal shunting. Most cases present months after surgery and majority are asymptomatic on presentation. The exact pathophysiology is not established, and mechanisms have been proposed. Early post-operative trans-anal shunt protrusion is rare and suggests inadvertent occult bowel injury especially when shunt placement or revision accompanies extensive bowel surgery.

CONCLUSION: The authors recommended shunt imaging within the first two to three weeks after shunt revision in patient who undergo concomitant bowel surgery with risk of inadvertent bowel injury to identify early colonic migration and avoid its potentially fatal sequelae.

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1. Introduction

Ventriculoperitoneal shunt is still the most common surgical intervention for hydrocephalus. It is known for complications including infection, recurrent obstruction, pseudocyst formation, injury to viscera and over or under-drainage. The presence of these complications often necessitates shunt revision [1]. A less common complication is shunt migration. This has been described within the literature to occur in various locations including intracranially, the subgalea, thorax, breast, intravascularly, bowel and genitourinary [2].

Migration into the gastrointestinal tract represents a serious complication, with a mortality rate between 15–18%, which is greater in patients who have also developed Central nervous system or abdominal infection, with a mortality rate of up to 22% and 33%, respectively [3–5]. Although the majority of cases present with localizing symptoms or features of sepsis, a proportion of cases may otherwise present asymptotically. Spontaneous bowel perforation accompanied by trans-anal protrusion is known to occur, however, it has not been described in early post-operative setting after concomitant bowel surgery. This case highlights this rare incidence. This case report has been reported in line with the SCARE Criteria [6].

2. Presentation of case

A thirteen-year-old female presented to our service with asymptomatic transanal distal catheter protrusion [Fig. 1] following routine MACE wash. She had VPS at the age of two months for progressive hydrocephalus following repair of myelomeningocele. She

Abbreviations: CSF, cerebrospinal fluid; MACE, Malone Antegrade Continence Enema; VPS, ventriculoperitoneal shunt.

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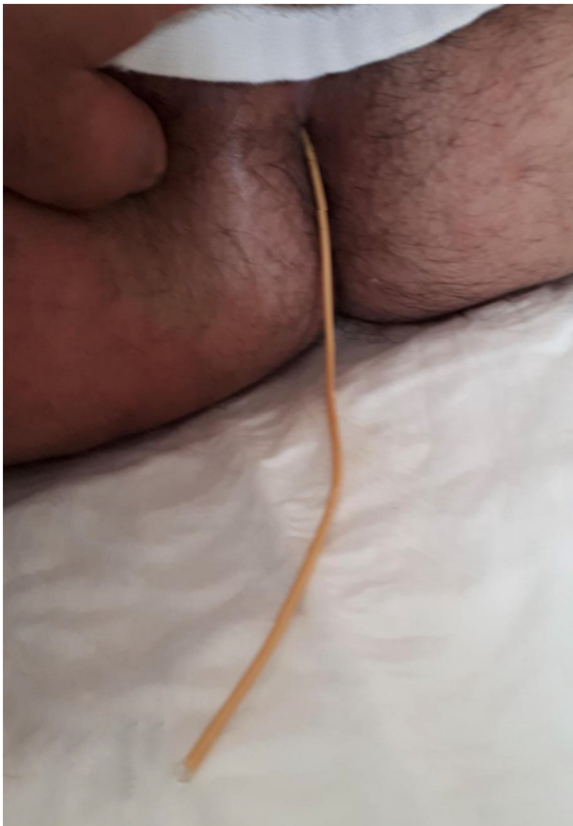


Fig. 1. Photograph demonstrating protruding distal shunt tube from the anus with CSF at the catheter tip.

also had multiple bowel surgeries for bowel obstruction. She didn't have any significant family history and was on regular medications apart from Laxatives.

She underwent a laparotomy, adhesiolysis followed by MACE and under direct vision replacement of the peritoneal distal catheter two weeks prior to her presentation with post-operative abdominal x-ray showing satisfactory peritoneal shunt placement. The protruded shunt with clear cerebrospinal fluid (CSF) egress was only noticed by her carer following bowel irrigation through the MACE.

On her presentation, X-ray shunt series was obtained that didn't show any shunt disconnection. Subsequent contrast CT abdomen and pelvis confirmed colonic migration of the distal catheter with an entry point identified in the transverse colon [Fig. 2A–C]. No significant abdominal collection or evidence of abdominal infection was identified. CSF analysis did not show evidence of infection.

She proceeded to emergency removal of the distal catheter in a distal fashion followed by shunt externalization. This was well tolerated without any abdominal complications. After two weeks of antibiotics (Ceftriaxone 500 mg IV q12 h) and serial negative CSF microscopy, she underwent ventriculoatrial shunting given her multiple previous abdominal surgeries to minimize the risk of further complications. Her surgeries were performed by a senior paediatric gastrointestinal surgery and a senior paediatric neurosurgeon. Despite early post-operative complications, patient and her family were satisfied with her outcome and both were willing to report her case for learning purpose. She was followed up 4 weeks post her procedure and remained clinically well.

3. Discussion

Peritoneal catheter related bowel perforation has been previously described in the literature, with the most common sites of perforation being the colon followed by the stomach and small bowel [7,8]. Spontaneous bowel perforation by a peritoneal catheter is thought to represent up to 0.1–.07% of cases post ventriculoperitoneal shunt insertion [3]. The majority of patients with shunt-related bowel perforation present symptomatically. A retrospective review by Harischandra et al. showed that of 139 patients with shunt migration into their bowel, 74% of cases presented with abdominal symptoms and 21.5% with central nervous system symptoms [2].

The duration between shunt insertion and detection of bowel perforation is lowest in the paediatric population and increases with age, with a mean duration of 4.86 months and 24.8 months overall [9].

Trans-anal protrusion of the peritoneal catheter is not uncommon. A review of 94 cases of gastrointestinal perforation conducted by Hai et al. revealed that the 55 cases (58.5%) presented with anal shunt protrusion [7]. Furthermore, of the 139 patients in Harischandra et al. follow-up review, 55 (39.5%) cases presented with anal protrusion of their shunt catheter. Interestingly, 46 (84%) of these cases were asymptomatic, as was the situation in our case [2]. A postulated mechanism for this silent migration is that after penetration through the bowel wall, there may be fibrosis around this site creating a seal, so that there is no bowel contents or air entering the peritoneal cavity [9]. This may explain the lack of abdominal symptoms or radiological findings, including the absence of pneumoperitoneum on x-ray [10]. The prolonged duration between shunt insertion and bowel perforation, as well as the number of asymptomatic cases, suggests that this is a chronic process.

The exact pathophysiological mechanism of bowel perforation has not been well established; however, mechanisms have been proposed. Bowel perforation is more common amongst the paediatric population, and as aforementioned, the duration of occurrence post shunt insertion is the shortest in this group. It has been hypothesized that the paediatric cohort have a weakened bowel wall with stronger peristalsis compared to the elderly population. This may increase the risk of spontaneous perforation [10]. Alternatively, a fibrotic scar causing encasing of the distal catheter tubing to the bowel wall has been observed intra-operatively, and so a foreign body reaction causing adhesion of the catheter to the bowel wall has been suggested [11,12]. Repeated irritation of the bowel wall, along with continuous pulsations of CSF causing a water-hammer effect, may eventually lead to ulceration and perforation [13]. Indeed, in the current case presented, the distal catheter was placed into the peritoneum under direct vision during the MACE procedure, thus direct colon trauma felt unlikely. It is hypothesized that iatrogenic injury to a weakened bowel serosal layer following the extensive adhesiolysis preceded shunt migration.

4. Conclusion

Although peritoneal catheter related spontaneous bowel perforation has been described in the literature, bowel perforation occurring sub-acutely in the post-operative setting for an abdominal procedure is rare. The majority of spontaneous bowel perforations occur months after shunt placement. Hence, the short duration that occurred in our case makes the aforementioned

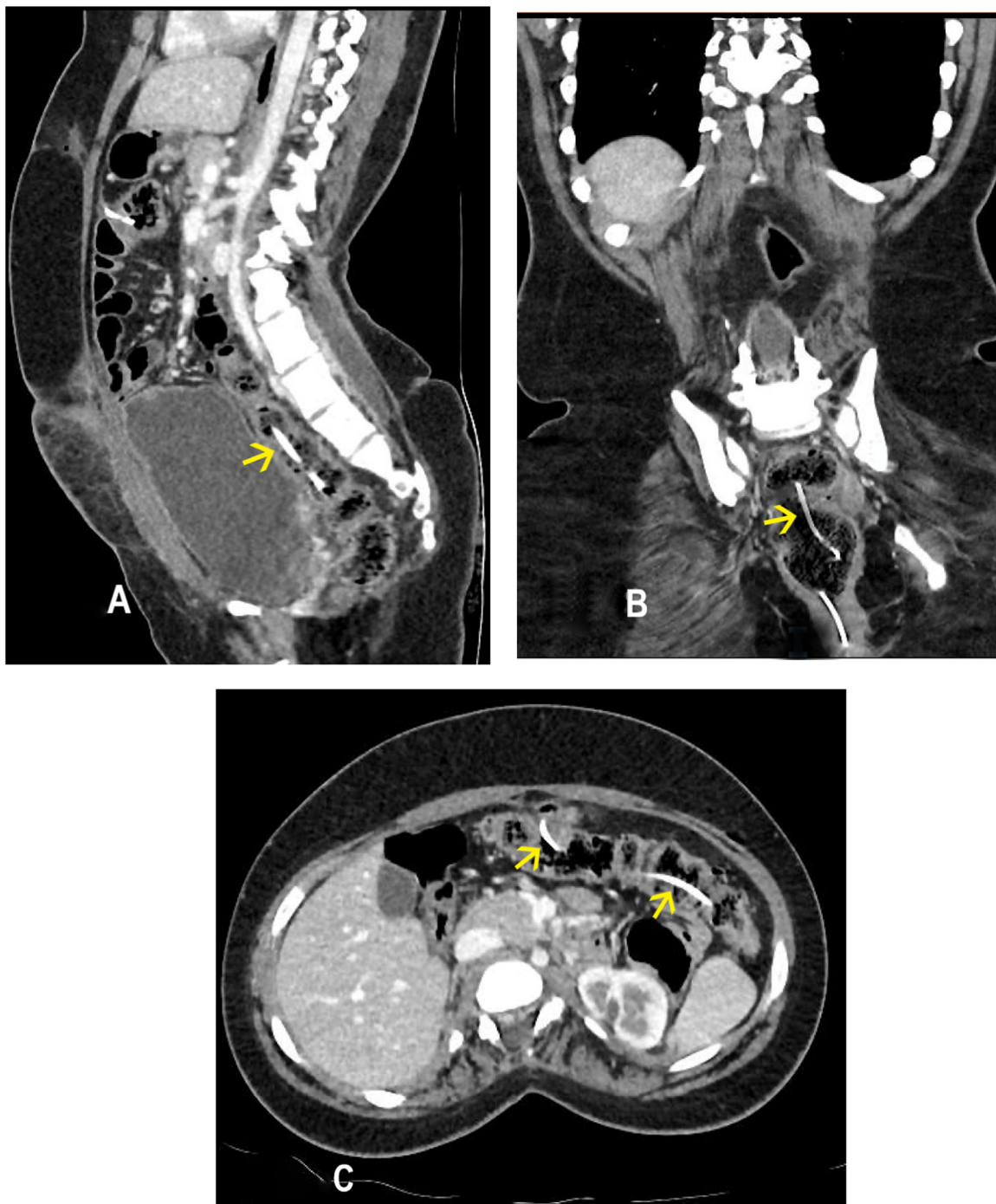


Fig. 2. A–C: Sagittal (A), Coronal (B) and Axial (C) CT abdomen demonstrating migration of the peritoneal catheter through the transverse colon, sigmoid colon and the anal canal (arrows).

pathophysiological processes unlikely, suggesting iatrogenic injury to the colon during the initial operation. Therefore, for patients with ventriculoperitoneal shunts who undergo abdominal surgery, the treating surgeon must be aware of the possibility of asymptomatic shunt migration.

The authors suggest that there may be a role for early follow up imaging specifically in this group to ensure that distal catheter remains in the peritoneal cavity. This is not currently common practice and given the rare nature of this presentations, the exact timing for imaging is not clear, although our case suggests that this may occur within the first two to three weeks following the procedure.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical approval

This case report is exempted from ethical approval as per our institution.

Consent

Written informed consent was obtained from the patient's guardian for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Ibrahem Alhendawy: Conceptualization, methodology, literature review and writing.

Tarundeep Dhaliwal: Literature review and editing.

Declan G. Siedler: Review and editing.

Bob Homapour: Supervision, final review and approval for submission.

Registration of research studies

Not applicable.

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The authors verify that this case report has not been published previously and is not under consideration for publication else-

where. The authors also verify that this publication is approved by all authors and by the responsible authorities at our institution, and if accepted, it will not be published elsewhere in the same form.

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