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Ventriculoperitoneal Shunt Migration through the Anus in a Child: Case Report and Management Algorithm

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Authors' contributions

This work was carried out in collaboration among all authors. Author BABA as the primary author put together this work and did the entire write up of this manuscript. Authors KAM and GAR did a thorough review of the facts and edited the entire manuscript. Author CSJDM put together the details of the child's presentation from the case notes. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Aims: Ventriculoperitoneal (VP) shunt placement is one of the commonest procedures undertaken by neurosurgeons to manage patients with hydrocephalus. Although shunt migration through bowel and exteriorization per anus is rare, it's associated with about 15% mortality.
Presentation of Case: We present a six year old boy with shunt migration through the bowel and exteriorization per anus.
Discussion: The risk factors as well as management algorithm of such cases are discussed in this manuscript.
Conclusion: Although this presentation is rare, early recognition and intervention is key. It is important to stratify patients as symptomatic or asymptomatic and manage them accordingly.

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Keywords: Ventriculoperitoneal shunt; hydrocephalus; shunt migration; bowel perforation; anus; complications.

1. INTRODUCTION

Patients with hydrocephalus need cerebrospinal fluid diversion in order to normalize their intracranial pressure and its attendant adverse effects on the brain.

Ventriculoperitoneal (VP) shunt placement is one of the commonest procedures undertaken by neurosurgeons to manage patients with hydrocephalus. Shunt placement has its own fair share of complications; some common while others are rare. Some of the common complications include obstruction and infection of shunt. Pseudocyst which is late complication of VP shunt may present as abdominal pain and a palpable mass. Subdural hematoma formation may occur with over-shunting in cases of low pressure hydrocephalus. Bowel perforation is however a rare complication of VP shunts.

We report of a case of ventriculoperitoneal (VP) shunt migration through the anus in a six year old boy. The risk factors of shunt migration as well as algorithm for management of bowel perforation are also discussed.

2. PRESENTATION OF CASE

A six year old boy presented to emergency room (ER) of the Cape Coast Teaching Hospital with a history of protrusion of the distal catheter of his VP shunt through the anus. He had a VP shunt inserted a year ago on account of congenital hydrocephalus and had been apparently well until a year later when he was brought to the ER because of protrusion of the distal catheter at the anal orifice leaking clear fluid. Child was asymptomatic with no signs of peritonitis or any intracranial infection. Mother denied any fever, vomiting, headache, irritability, altered consciousness, abdominal pain, constipation or diarrhea. Child however lacked appetite. On examination, he appeared generally malnourished with brownish silky hair, lean and disinterested in his environment. He was not pale, anicteric, afebrile (temperature: 36 degree Celcius), hydration was satisfactory. He weighed 14 kg and head circumference was 53 cm. Abdomen was flat, transverse surgical scar on the right upper quadrant, soft, non-tender, no organomegaly, no palpable masses, bowel sounds present and normal. He was conscious and alert with normal power and tone in all limbs.

By the time he was seen at the ER distal catheter was no longer visible at the anal orifice. In order to confirm its position plain abdominal X rays (AP and lateral) were ordered.

This revealed the radio-opaque ventriculo-peritoneal shunt devise following the curve of the large bowel with the distal end within the abdomen. Fig. 1 and Fig. 2 show the anteroposterior and lateral views of the x rays.

A decision was taken to explore the abdomen. Intra-operatively the catheter had perforated the large bowel at the hepatic flexure, descended into the caecum and coiled up on itself through the ascending, transverse and descending colon to the sigmoid. The distal end of the catheter at the level of the sigmoid was then adhered to a portion of the ileal wall.

The catheter was separated at the cranial end; the penetrating part of the shunt was cut. Adhesion between sigmoid and ileal walls were freed gently and the peritoneal ends of the catheter removed. The cranial end was also removed after samples were taken for cerebrospinal fluid cultures although CSF was gin clear macroscopically.

Child was placed on intravenous antibiotics covering enterococcus and gram negative anaerobes while awaiting CSF culture results. He was monitored until post-operative day twelve and subsequently discharged when there were no signs of raised intracranial pressure or infection.

Child was shunt independent at six weeks post-operative review.

3. DISCUSSION

Ventriculoperitoneal Shunt placement is a common procedure done for diversion of CSF in patients with hydrocephalus. The most common complication of VP shunt is mechanical blockage [1].

The abdominal complication of VP shunt is reported to be about 25% and the incidence of bowel perforation with distal catheter at the anus is 0.1-0.7% [2,3]. The mortality associated with bowel perforation is as high as 15% [4].

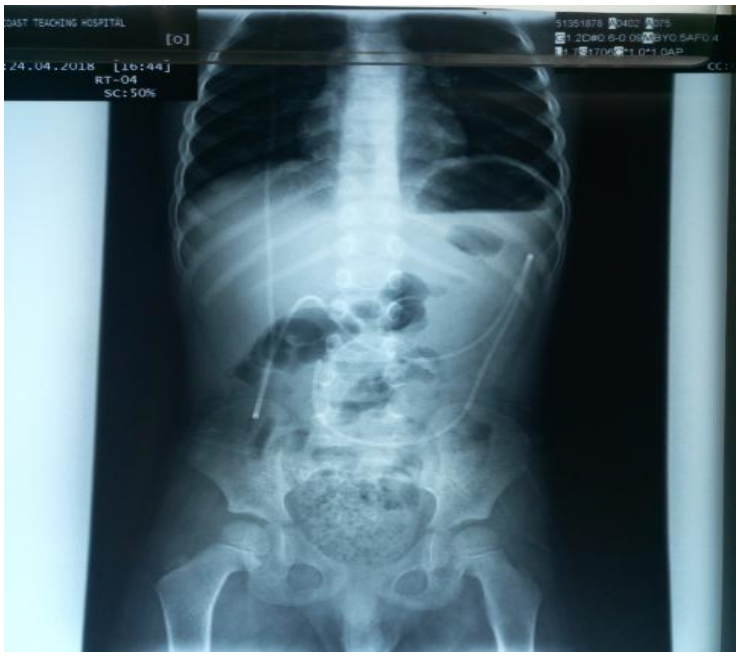

Fig. 1. Plain abdominal X-ray (AP view) showing radio-opaque VP shunt traversing large bowel lumen

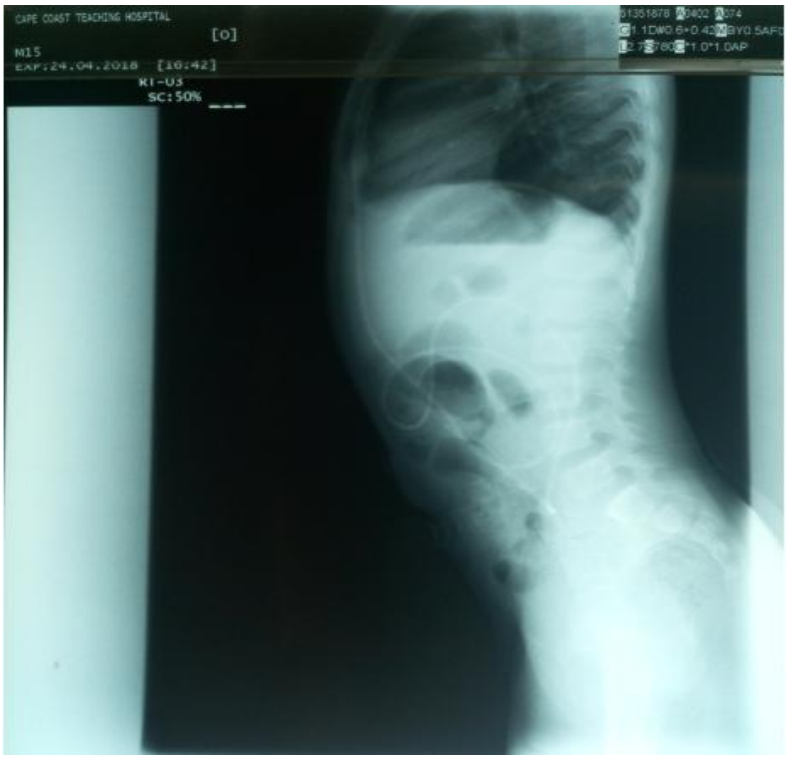

Fig. 2. Lateral view of plain abdominal X-ray

In a comprehensive review of literature published through 2016 by Srinivasan et al. involving 239 articles and 396 shunt migrations, the sites of migration were as follows; perforation of the

bowel in 139 patients; abdominal wall (57); scrotum (55); chest (32); intracranial (30); cardiac/intravascular (28); genitourinary (15); breast (13); subgaleal (12) and miscellaneous (15). There was also a 50% chance of shunt infection if the catheter was exposed to the external environment [5].

Öktem et al. suggested that the patent processus vaginalis in infants was responsible for shunt migration into the scrotum, hence, post-operative hydrocele or scrotal swelling in infants with VP shunts should be evaluated as a possible shunt migration [6].

The pathogenesis of bowel perforation has been attributed to mechanisms such as foreign body reaction, pressure necrosis of intestinal wall by the tube, and silicon tube allergy.

Anchoring of the distal end of the peritoneal tube to the peritoneum in children in a studied group has prevented shunt tube migration [7].

The adherence of the distal catheter tip to the serosa of the bowel, the continuous water hammering effect of CSF pulsations causes the bowel wall to be perforated and subsequent forward movement of the catheter within the bowel lumen by peristaltic action [8].

Poor nutritional status along with infection was suggested as a precipitating cause of intestinal perforation in two case reports by Teegala and Kota [9].

According to Jang et al intestinal perforation is common in children due to weak bowel musculature [10].

Our patient was found to be malnourished at presentation and we think the bowel perforation might be due to his malnutrition. Infection could not have been a cause of this shunt migration because our patient had no signs of peritonitis, meningitis or cerebral abscess. He could have been managed by endoscopic removal but it wasn't available in the facility and hence laparotomy was done to remove the catheter.

The management of cases of VP shunt migration into the bowel and subsequent externalization at the anus is a surgical emergency. Patients may be stratified into symptomatic and asymptomatic ones. It is important to identify whether there are peritoneal and/or intracranial signs of infection or obstruction. The dripping of clear CSF as narrated by our patient's mother indicated the shunt was still functioning. Also the absence of any signs of raised intracranial pressure and intracranial infection as well as signs of peritonitis clinically rule out shunt infection in our patient.

In patients who are asymptomatic and the distal catheter is still visible outside the anus the catheter can be removed via scalp incision and pulled gently from the anus without the need for laparotomy. If the distal catheter is not visible but still within the bowel lumen, endoscopic removal can be attempted. In cases where the catheter is within bowel lumen but endoscopy cannot advance due to adhesions, laparotomy followed by catheter removal should be undertaken. Catheter removal should be in the cranio-caudal direction in order not to introduce any bowel contaminants to the brain. It's unnecessary to rush for CSF diversion procedures in asymptomatic patients.

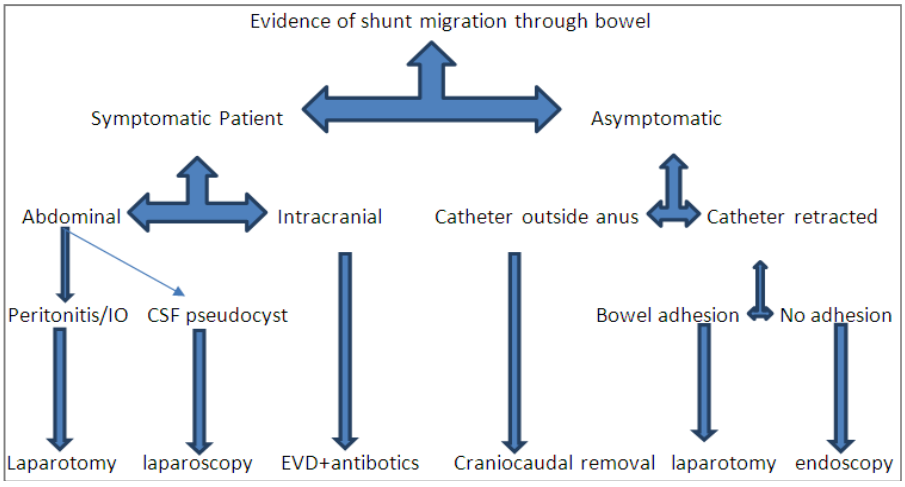

Chart 1. Algorithm for managing shunt migration through the bowel

For the symptomatic patient such as those with peritonitis, intestinal obstruction (IO); emergency laparotomy is required for removal of distal catheter. CSF pseudocyst in the abdomen could drained laparoscopically with or without shunt removal.

Where there is CNS infections such as meningitis, ventriculitis, cerebral abscess, exteriorization of the ventricular catheter is required with serial CSF cultures. Once infection has subsided a decision is taken based on whether patient is shunt dependent or not.

In both symptomatic and asymptomatic patients, antibiotic therapy must be initiated and should cover enterococcus, gram negative anaerobes while awaiting CSF culture results.

4. CONCLUSION

Although shunt migration with perforation of the bowel and subsequent exteriorization at the anal orifice is a rare complication of VP shunt placement, early recognition and intervention is needed to prevent the morbidity and mortality associated with this complication. It is important to stratify patients as symptomatic or asymptomatic and manage them accordingly.

CONSENT

As per international standard informed and written consent from child's mother has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Grewal SS, Jhawar SS, Gupta B, Bedi NK. Silent bowel perforation with per anal protrusion of ventriculoperitoneal shunt. CHRISMED Journal of Health and Research. 2014;1:113-5.
2. Ghritlaharey RK, Budhwani KS, Shrivastava DK, Gupta G, Kushwaha AS, Chanchlani R, et al. Trans-anal protrusion of ventriculo-peritoneal shunt catheter with silent bowel perforation: Report of ten cases in children. Pediatr Surg Int. 2007; 23:575-80. [PUBMED].
3. Yilmaz N, Krymaz N, Yilmaz C, Casken H, Yuca SA. Anal protrusion of ventriculo-peritoneal shunt catheter: Reports of two infants. J Pediatr Neurol. 2004;2:241-4.
4. Snow RB, Lavyne MH, Fraser RA. Colonic perforation by ventriculoperitoneal shunts. Surg Neurol. 1986;25:173-7. [PUBMED].
5. Srinivasan H, Chatterjee S, Sharma: A P105 Shunt migration in ventriculoperi-toneal shunting: A comprehensive review of literature Journal of Neurology, Neurosurgery & Psychiatry. 2019;90:e50.
6. Öktem IS, Akdemir H, Koç K, Menkü A, Tucer B, Selçuklu A. Migration of abdominal catheter of ventriculoperitoneal shunt into the scrotum. Acta Neurochir (Wien). 1998;140(2):167-170.
7. Azzam NI. An attempt to prevent the problem of shunt-tube migration. Childs Nerv Syst. 1988;4:50-1. [PUBMED].
8. Handa R, Kale R, Harjai MM. Unusual complication of ventriculoperitoneal shunt: Anal extrusion. MJAFI. 2007;63:82-4.
9. Teegala R, Kota LP. Unusual compli-cations of ventriculo peritoneal shunt surgery. J Neurosci Rural Pract. 2012;3: 361-4. [PUBMED] [Full text].
10. Jang HD, Kim MS, Lee NH, Kim SH. Anal extrusion of distal VP shunt catheter after double perforation of large intestine. J Korean Neurosurg Soc. 2007;47:232-4.

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