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Rare ventriculoperitoneal shunt complication: Sigmoid colon perforation and anal extrusion

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ABSTRACT

The installation of a ventricular-peritoneal (VP) shunt is a very commonly utilized surgical treatment for hydrocephalus. The literature has described the caudal end of a ventriculoperitoneal (VP) shunt migrating to a variety of locations and with migration, shunt function may be reduced. This is a report on one of the rarest complications of VP shunts: Perforation of the sigmoid colon and anal extrusion.

Keywords: Ventriculoperitoneal shunt, complications, gut perforation, laparoscopic assisted

1. INTRODUCTION

One of the most frequent procedures performed by pediatric neurosurgeons is the implantation of a VP shunt as a surgical treatment for hydrocephalus (Bober et al., 2016; Tan et al., 2014; Zhao et al., 2015). Pediatric patients frequently experience shunt difficulties; it's estimated that one-third of shunts need revision in the first postoperative year and that more than half of shunts fail by the second year (Bober et al., 2016).

The VP shunt's abdominal problems include malfunction, infection, CSF loculation and cyst formation, migration of the shunt within or beyond the peritoneal cavity, perforation of a viscus, or obstruction of bowel owing to adhesions (Handa et al., 2007). Perforation of the sigmoid and anal extrusion of the shunt is rarely reported in the literature (Adeloye, 1997; Miserocchi et al., 1984; Digray et al., 2000). Herein, we present a condition of anal extrusion of a VP shunt in a 2-year-old boy with congenital hydrocephalus.

2. REPORT

A 2-years-old male was admitted with a history of low-grade fever, restlessness and abdominal pain. Medical history revealed a VP shunt operation. He had undergone VP shunt insertion 18 months before for congenital hydrocephalus. The parents noted the presence of the shunt passing through the anus.

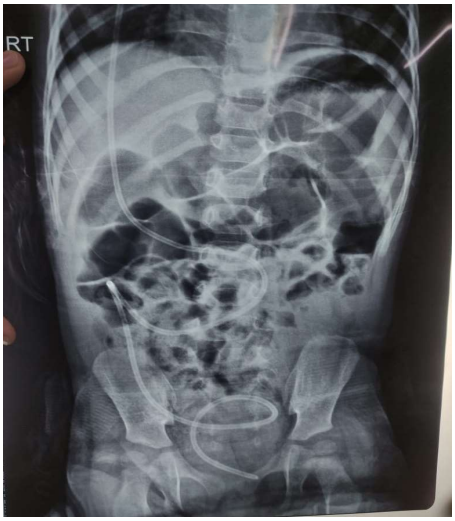

Figure 1 Plain x-ray showing the catheter

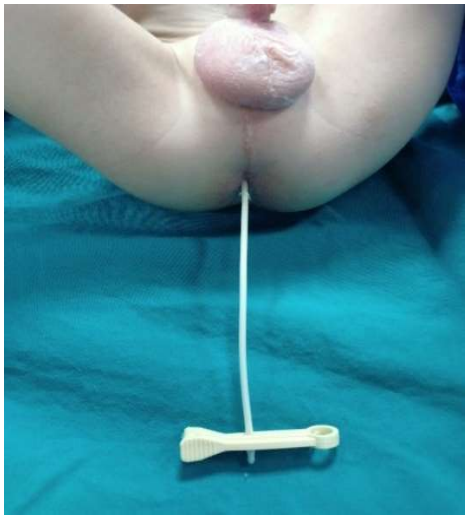

Figure 2 Anal extrusion of the VP shunt

General examination showed no signs of meningitis and shunt tap from shunt chamber showed CSF to be clear with normal cytology. The patient was put on broad-spectrum antibiotic therapy (meropenem) and scheduled for operative intervention next day. In operation, the caudal end of the distal shunt catheter was identified and carefully pulled through the anal sphincter (Figure 2). The distal shunt was approached by an incision on the chest wall and was cut and the proximal part of the cut end was connected to a collecting bag. The distal part was pulled from the anus.

Figure 3 The distal part of the VP shunt was cut and retrieved through the anus

CSF cultures, cell count, glucose and proteins were normal and broad-spectrum antibiotic (meropenem) was continued. Recovery period was uneventful with normal temperature and culture of cerebrospinal fluid showed no growth. An abdominal ultrasound showed no complications. Two weeks later, the distal VP shunt was reinserted into the peritoneum under laparoscopic guidance. Intraperitoneal adhesions were handled laparoscopically. The child recovered completely and was back to his baseline condition for a follow up period of 6 months.

3. DISCUSSION

Many patients experience complications after having VP shunts (Wani et al., 2002) and each patient is likely to require two to three surgeries for shunt revision during childhood (Eser et al., 2006). Failure of the shunt can result from migration, disconnection, or obstruction. Another common consequence is an infection of the shunt (Blount & Haines, 1996). Several abdominal complications were also reported, which are usually attributed to excess catheter length left in the abdomen to decrease the need for shunt revision as the child grows. Up to date, there is no consensus for the standard length of the catheter that should be left in the abdomen (Cockrell et al., 2020). Abdominal complications include acute abdomen (Reynolds et al., 1983), perforation of the bowel (Schulhof et al., 1975), or peritonitis (Tchirkow & Verhagen, 1979), which can be due to viscus perforation. Some cases develop intestinal obstruction (Hlavin et al., 1990), inguinal hernia (Grosfeld & Cooney, 1974), ascites (Agha et al., 1983), CSF-enteric fistula, inflammatory pseudotumor of the mesentery (Keen & Weitzner, 1973), omental cyst (Redman & Serbert, 1978), intrahepatic abscess

(Peterfy & Atri, 1990), perforation of the bladder (Grosfeld et al., 1974), pseudocyst (Bryant et al., 1998), umbilical fistula (Antunes & Ribaro, 1975), ureteric obstruction (Clarke et al., 1983), or volvulus (Sakoda et al., 1971).

A frequent consequence is bowel perforation. Intestinal peristalsis, the continuous water hammer effect of the CSF's pulsation, the weak intestine muscles in myelomeningocele and occasional increases in intra-abdominal pressure were all proposed as explanations for the migration of the VP shunt's distal end. The existence of a hernial sac may increase the risk of the VP shunt migrating into the scrotum. The risk also increases with the patient's age, sex and the stiffness and length of the catheter (Chugh et al., 2018). Perforation of the bowel by catheter tubing has also been attributed to silicone allergy, in which patients the catheter tip may perforate the gut and pass through the abdominal wall (Shah et al., 2016). There are several approaches for the surgical management of cases with migrating distal shunt through the anus: 1- Mini laparotomy and revision of peritoneal part of shunt, 2- formal exploratory laparotomy and repair of bowel perforation in selected cases having peritonitis, 3- shunt removal and external ventricular drainage, antibiotics, followed by VPS or VA shunt, 4- flexible pediatric colonoscope can be used for localization of enterotomy site and removal of shunt (Ghritlaharey et al., 2007).

In our case, we had no need for colonoscopy as the distal catheter was already protruding through the anus. We started by making an incision on the chest wall just over the distal shunt to approach it subcutaneously just before it inters the peritoneal cavity and we cut it from the system and pulled it out through the anus. Drainage was assured by connecting the proximal end to a collection bag. After 2 weeks, the catheter was reinserted into the peritoneal cavity using laparoscopic guidance.

4. CONCLUSION

Bowel perforation and protrusion of the VP shunt through the anus is rarely reported in the literature. With rapid intervention, the condition can be treated with no further complications.

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Author Contributions

Dr H Hassan: Diagnosed the patient and performed surgery, compiled the case report, collected data from literature and approved the manuscript.
Dr Almetaher: Helped in writing the case report
Dr E Elhalaby: Helped in writing the case report
Dr A Nofal: Helped in the final revision
Dr H Elhady: Helped in writing the case report.

Informed consent

Written & Oral informed consent was obtained from the family of the case study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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