



ANAL EXTRUSION OF VENTRICULOPERITONEAL SHUNT: A REPORT OF TWO CASES AND REVIEW OF LITERATURE

Neurosurgery

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ABSTRACT

We report two cases of gastrointestinal perforation by ventriculoperitoneal (VP) shunts and review the literature on the topic. The time interval between shunt surgery and detection of bowel perforation is minimum in infants and increases with age. Sigmoid and transverse colon followed by stomach are the most frequent sites of gastrointestinal perforations by VP shunts.

KEYWORDS

Anal Protrusion, Hydrocephalus, Tubercular Meningitis, Ventriculoperitoneal Shunt

INTRODUCTION

The diversion of cerebrospinal fluid (CSF) for hydrocephalus is an established surgical practice, after its feasibility was demonstrated in the early 1900s.[1] Various valve assemblies have been devised and we use valve-regulated ventriculoperitoneal (VP) shunt with a slit at the lower end.[2] Many abdominal complications have been described, which include fibrous encasement of the peritoneal tip, blocking or kinking of the distal tube, slipping out through the surgical wound, or migration of the shunt or its components into the various abdominal cavities.[2] Other complications are infection, CSF fistula, paralytic ileus in the immediate postoperative period, failure of peritoneal absorption of the diverted CSF, perforation of the bowel by the abdominal tube, development of hydrocele, appearance of a peritoneal cyst, and spontaneous extrusion of the tube through the umbilicus.[3,4] We highlight an unusual complication of this procedure, with two of our cases developing spontaneous extrusion of the lower end of the tube through the anal opening. The possible predisposing factors for this complication are discussed.

CASE REPORTS

Case 1

A 2-year-old girl had undergone the left -sided medium-pressure ventriculoperitoneal (MPVP) shunt (Chhabra-slit-in-spring silicone shunt) procedure 7 months back for tubercular meningitis with hydrocephalus. Rest of his stay in the hospital was uneventful and he was discharged from the hospital on antitubercular drugs. He presented to us with complaints of protrusion of a white tube per anus on defecation for the past 3 days with a clear fluid dripping from it [Figure 1]. On examination, the child was found to be afebrile, alert, no neck rigidity, and soft abdomen. Rectal examination revealed that there was a white tube coming from beyond the reach of finger. Ultrasonography of the abdomen showed normal results. An abdominal X-ray showed peritoneal end of shunt [Figure 2]. The child was operated and shunt was cut at abdominal surface through a small incision. First the anal protruding end is gently pulled which confirmed as distal end of shunt. Antibiotics were started empirically, and the child was closely monitored. Proximal tube was exteriorized till CSF is sterile. After that, removal of ventricular end of left mpvp shunt was done and right mpvp shunt done. Rest of his stay in the hospital was uneventful. The child was discharged on the 8th postoperative day.

Case 2

A 3-year-old boy, who underwent the VP shunt 8 months ago for congenital hydrocephalus, presented to us with 1-day history of per

anal extrusion of shunt tubing, with clear discharge [Figures [Figures 3 and and 4]. Rest of the clinical and laboratory examination revealed normal results. Under local anesthesia, incision was made over the right clavicular region, and the shunt tubing was cut and divided. The proximal end was taken out as external drainage, whereas the distal end was gently taken out per rectally. Once his CSF profile showed normal levels, shunt revision was done and the child was discharged on the 7th postoperative day in satisfactory condition.



Figure 1 Clinical Photograph Of Protruding Shunt Per Anal

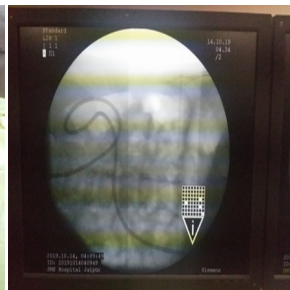


Figure 2 X Ray Abdomen



Figure 3 Clinical Photograph

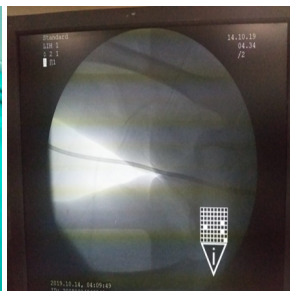


Figure 4 X Ray Abdomen

DISCUSSION

Perforation of bowel by VP shunts is rare and the incidence is only 0.1–0.7% of shunt surgery.[5] A search of the literature revealed a total of 94 patients.[6] Thirty-four male, 26 females while in 34 cases sex was not mentioned. More than half, i.e., 49, cases were reported in the age group of 0–10 years. Our both patients belonged to this group. The duration between VP shunt surgery and detection of bowel perforation was found to be minimum (mean, 4.86 months) in the 0–1 year age group, and it was found to increase with age, with an overall mean duration of 24.8 months [Table 1]

Table 1 Age Distribution And Mean Duration Of Bowel Perforation

Age (years)	<1	>1-10	>10-50	>50
Mean duration between shunt placement and bowel perforation(months)	4.86	22.3	36.9	35.2

The possible factors found to be responsible for this complication were thin bowel wall in children, sharp and stiff end of the VP shunt,[7,8] use of trocar by the operating surgeons,[9] chronic irritation by the shunt,[10] previous surgery, infection, and silicone allergy.[11] Congenital hydrocephalus ($n = 33$) was the most common diagnosis followed by infective etiology (10), cysts/tumors (5), normal pressure hydrocephalus (5), intracerebral hemorrhage (4), tubercular meningitis (3), and trauma (1), whereas in the remaining 33 cases, diagnosis was not mentioned.

We place abdominal end by 4-5 cms subcostal incision just lateral to the midline. Abdomen open in layers, peritoneum identified and opened. Shunt tube after placement is secured at the peritoneal entry site by pursestring suture, than incision closed in layers.

The total number of patients found to have anal protrusion of VP shunts was 55 (58.5%) [Table 2]. Similarly, nine cases (9.6%) of oral extrusion were seen.[2,12,13,14,15,16,17] Although, 7 (7.45%) patients had peritonitis and 12 (12.8%) had meningitis separately, 3 (3.2%) developed both.[9,18]

Table 2 Case Series On Shunt Protrusion And Management

Study	Patient no.	Age (0-15yrs)	Anal protrusion	Asymptomatic	CSF Culture+	meningitis	peritonitis	Removal through protruding orifice	Removal by laparotomy/laparoscopy
Sathy anarayana et al(20)	45	35	20	19	17	03	01	31	08
Hai et al(6)	94	55	55	37	09	15	10	0	30

The diagnosis was obvious in patients presenting with spontaneous extrusion of a whitish tube while defecating through which clear fluid dripped. Eight patients were subjected to a contrast study through distal shunt (shuntogram), which opacified the bowel confirming the diagnosis[5], whereas the computed-tomography (CT) scan of the abdomen showed the shunt in bowel lumen along with peritonitis, if present.[11,19,20] A CT scan of the head showing pneumocephalus in patients with VP shunts could clinch the diagnosis of bowel perforation when other causes were ruled out.[21] Patients with VP shunts who developed meningitis by "unusual pathogens" such as gram-negative and anaerobic organisms as confirmed by CSF examinations were suspected to have bowel perforation and were further investigated.[18] In patients with oral extrusion, upper gastrointestinal (GI) endoscopy helped localize the site of perforation.[7] Finally, in undiagnosed patients, an exploratory laparotomy was performed.[15,16]

Of the 94 patients, the exact site of perforation in the gastrointestinal tract was mentioned in 49 (52.1%) patients. In six of the nine patients with oral extrusion of VP shunt, the site was localized to the stomach[7,12,13,14,15], whereas in two of the patients, it was the jejunum.[16] In rest of the cases without oral extrusion,[5,11,21,22,23,24,25] the sites of perforation in the bowel were as follows: cecum (2), ascending colon (1), transverse colon (6), splenic flexure (1), descending colon (5), sigmoid (7), rectum (4), and unknown sites in the colon (12).[19,26] The CSF cultures were positive in most of the cases.[5,22]

Bowel perforation in patients with VP shunt should be considered with gram-negative meningitis or abdominal symptoms. The optimum treatment of such a patient should be decided by the presence of features of sepsis, perforation peritonitis, or intraperitoneal abscess. In a patient with simple bowel perforation and no other complications, similar to our both the patients reported in this study, a formal exploratory laparotomy is not required. The shunt should be disconnected at abdominal wall and the lower end should be removed through the rectum by colonoscopy or sigmoidoscopy/proctoscopy or

by applying gentle traction on the protruding tube.[20] The distal end of VP shunt should not be pulled back into the peritoneal cavity to prevent contamination of the tract. External ventriculostomy should be established at least for 3 weeks and the patient should be put on broad-spectrum antibiotics to prevent infection of CSF.[7,9,20] After repeated CSF cultures are found to be sterile, the patient should undergo repeat VP shunt on the opposite or same side.[27] Patients with bowel perforation peritonitis should undergo exploratory laparotomy with removal of shunt, thorough lavage, and primary closure of the bowel wall.[5,9,15,21,25,26,28]

CONCLUSION

In symptomatic VP-shunted patients, suspicion of bowel perforation should be kept high, if they develop abdominal symptoms or gram-negative or anaerobic meningitis. The duration between shunt surgery and detection of perforation was found to be minimum in infants, and it was found to increase with age. Most of the patients presented with asymptomatic passage of a tube per anus. The treatment of these complications includes removal of the extruded shunt, control of infection, and an alternative CSF diversion procedure. Usually, the extruded end is not complicated by peritonitis or meningitis and it can be safely taken out from the migrated orifice. Once repeated CSF cultures came out to be sterile and the patient was found to be nontoxic, a revision surgery should be considered as early as possible.

REFERENCES

1. Agha F, Amendola MA, Shirazi KK, Amendola BE, Chandler WF. Unusual abdominal complications of ventriculoperitoneal shunts. *Radiology*. 1983;146:323-6.
2. Ames RH. Ventriculo-peritoneal shunt: The management of hydrocephalus. *J Neurosurg*. 1967;27:525-9.
3. Adeloey A. Spontaneous extrusion of the abdominal tube through the umbilicus complicating peritoneal shunt for hydrocephalus. *J Neurosurg*. 1973;38:758-60.
4. Wani AA, Ramzan A, Wani MA. Protrusion of a peritoneal catheter through the umbilicus: An unusual complication of a ventriculoperitoneal shunt. *Pediatr Surg Int*. 2002;18:171-2.
5. Robert BS, Michael HL, Richard AR. Colonic perforation by ventriculoperitoneal shunt. *Surg Neurol*. 1986;25:173-7.
6. Hai A, Rab AZ, Ghani I, Huda MF, Quadir AQ. Perforation into gut by ventriculoperitoneal shunts: a report of two cases and review of the literature. *J Indian Assoc Pediatr Surg*. 2011;16:31-3.
7. Park CK, Wang KC, Seo JK, Cho BK. Transoral protrusion of a peritoneal catheter: A case report and literature review. *Childs Nerv Syst*. 2000;16:184-9.
8. Adeloey A. Protrusion of ventriculoperitoneal shunt through the anus: Report of two cases. *East Afr Med J*. 1997;74:337-9.
9. Nebi Y, Nejmi K, Cahide Y, Hüseyin Ç, Sevil AY. Anal protrusion of ventriculoperitoneal shunt catheter: Report of two infants. *J Pediatr Neurol*. 2004;2:241-4.
10. Jamjoom AB, Rawlinson JN, Kirkpatrick JN. Passage of tube per rectum: An unusual complication of a ventriculoperitoneal shunt. *Br J Clin Pract*. 1990;44:525-6.
11. John DB, Brodkey JS, Schaefer IK. Colonic perforation by ventriculoperitoneal shunt tubing: A case of suspected silicone allergy. *Surg Neurol*. 1998;49:21-4.
12. Berhouma M, Messerer M, Houissa S, Khaldi M. Transoral protrusion of a peritoneal catheter: A rare complication of VP shunts. *Pediatr Neurosurg*. 2008;44:169-71.
13. Jun M, Toshihiro M, Tomohiko K, Kazuo T. Peritoneal shunt tube migration into the stomach. *Neurol Med Chir (Tokyo)*. 2005;45:543-6.
14. Murali R, Ravikumar V. Transoral migration of peritoneal end of ventriculoperitoneal shunt: A case report of a rare complication and review of literature. *J Pediatr Neurosci*. 2008;3:166-8.
15. Mario AV, Luis A, Luis D, Rafael M, Luis J, José M. Gastric perforation due to ventriculo-peritoneal shunt. *Pediatr Neurosurg*. 1994;21:192-4.
16. Odeh TO. Jejunal perforation and peroral extrusion of a peritoneal shunt catheter. *Br J Neurosurg*. 2007;21:235-6.
17. Kothari PR, Shankar G, Kulkarni B. Extruded ventriculo-peritoneal shunt: An unusual complication. *J Indian Assoc Pediatr Surg*. 2006;11:255-6.
18. Abdel WMI. E.coli meningitis as an indicator of intestinal perforation by V-P shunt tube. *Neurosurg Rev*. 1998;21:194-7.
19. Hok-Nam L, Tze CT, Fung CC. Transanal protrusion of VP shunt. *Surg Pract*. 2006;12:93-6.
20. Sathyanaarayana S, Wylen EL, Baskaya MK, Nanda A. Spontaneous bowel perforation after ventriculoperitoneal shunt surgery: Case report and a review of 45 cases. *Surg Neurol*. 2000;54:388-96.
21. Shetty PG, Fatterpekar GM, Sahani DV, Shroff MM. Pneumocephalus secondary to colonic perforation by VP shunt catheter. *Br J Radiol*. 1999;72:704-5.
22. Ogasawara K, Kaneko U, Ishibashi T, Sakimura K. Abscess of the abdominal wall following penetration of the descending colon: A rare complication of a ventriculoperitoneal shunt. *No Shinkai Geka*. 1990;18:975-8.
23. Hornig GW, Shillito JJ. Intestinal perforation by peritoneal shunt tubing: Report of two cases. *Surg Neurol*. 1990;33:288-90.
24. Akcora B, Serarslan Y, Sangun O. Bowel perforation and transanal protrusion of a ventriculoperitoneal shunt catheter. *Pediatr Neurosurg*. 2006;42:129-31.
25. Martinez HM, Barrera RC, Villanueva SE, Zavala MJ. Colonic perforation as a complication of ventriculoperitoneal shunt: A case report. *Tech Coloproctol*. 2006;10:353-5.
26. Ghritlaharey RK, Budhwani KS, Shrivastava DK, Gupta G, Kushwaha AS, Chanchlani R, et al. Trans-anal protrusion of VP shunt catheter with silent bowel perforation: Report of ten cases in children. *Pediatr Surg Int*. 2007;23:575-80.
27. Nasib CD, Thappa DR, Mohit A, Yogeshwar M, Goswamy HL. Silent bowel perforation and transanal prolapse of a ventriculoperitoneal shunt. *Pediatr Surg Int*. 2000;16:94-5.
28. Schulhof LA, Worth RM, Kalsbeck JE. Bowel perforation due to peritoneal shunt: A report of seven cases and review of the literature. *Surg Neurol*. 1975;3:265-9.