Case Report
Volume 10:7, 2020
DOI: 10.37421/jccr.2020.10.1364

Clinical Case Reports

ISSN: 2165-7920 **Open Access**

Ventriculoperitoneal Shunt Device Migration: A Case Report of a Rare Cause of Abdominal Pain

Julia Stephens* and Jack Neppl

Department of Medicine, AU/UGA Medical Partnership, Athens, Clarke County, Georgia, USA

Abstract

Introduction: Ventriculoperitoneal (VP) placement is the most common procedure performed by neurosurgeons with a high range of reported complication rates with a mean complication rate of 23.8%. Such complications included shunt failure, infection, shunt migration, pneumocephalus, and subdural hematoma. A small portion of the catheter migrations can lead to abdominal pain by penetrating walls of the viscera or the peritoneal wall. Because 15% of these cases result in death, recognizing and treating this complication quickly is essential.

Case presentation: A 56-year-old Caucasian male with a history of hydrocephalus treated with multiple VP shunt placements presented to the ED in a community setting three times over the course of two months with RLQ pain.

Clinical course: The patient continued to have severe abdominal pain despite multiple visits to the ED and an inpatient stay for treatment of suspected colitis. Referral to general surgery allowed for definitive diagnosis where a diagnostic colonoscopy showed the distal portion of a VP shunt was penetrating the wall of the cecum. Subsequent laparoscopy was performed to remove multiple disconnected VP shunts with closure of the cecotomy with two endoclips, which resulted in rapid improvement of the patient's pain.

Conclusion: When considering the differential diagnosis for abdominal pain in a patient with a VP shunt, it is necessary to recognize distal shunt migration as an uncommon but serious cause of the pain. Bowel perforation is a complication of VP shunt placement that occurs in 0.1-0.7% of patients, with 15% of these resulting in death.

Keywords: Ventriculoperitoneal shunt • Atypical abdominal pain • Shunt migration • Shunt complications

Introduction

The VP shunt procedure is a type of cerebrospinal fluid shunt device that was developed in 1908 by Kausche and has become the most common procedure performed by neurosurgeons. This procedure is designed to treat hydrocephalus by connecting a proximal catheter placed in a ventricle to a distal catheter placed in the peritoneum that allows excess cerebrospinal fluid to flow into the peritoneum. It is associated with a variety of complications, which occur in an average of 23.8% of cases. A very small portion of these complications is distal shunt migration with gastrointestinal perforation [1,2].

Case Presentation

A 56-year-old Caucasian male with a history of depression and hydrocephalus treated with ventriculoperitoneal shunting requiring multiple revisions presented with a 2-month history of right lower quadrant abdominal pain. His first point of medical contact for this pain was the emergency department the morning after he first developed the pain. This pain began without any known trigger. He described the pain as a constant dull ache that was 8 out of 10 in intensity with no associated fever, chills, nausea, vomiting, diarrhea, constipation, melena, or dysuria. He had never had episodes of abdominal pain in the past. There is no use of illicit drugs or tobacco. Family history was negative for neurological or gastrointestinal disease. Initial work up was significant for elevated WBC of 10.7 with a relative neutrophilia of 81.5% and a CT of the abdomen showing diffuse inflammatory changes to the colon, greater in the right. Additional presenting vitals and lab values are included in Tables 1 and 2 respectively. There were no barriers to care, such as access, financial, or cultural.

The ED physician consulted the patient's neurosurgeon, and they agreed to admit and to treat him with antibiotics due to the suspicion of infectious colitis that could lead to a CNS shunt infection. WBC at discharge had decreased from

Table 1. Patient's vitals on presentation.

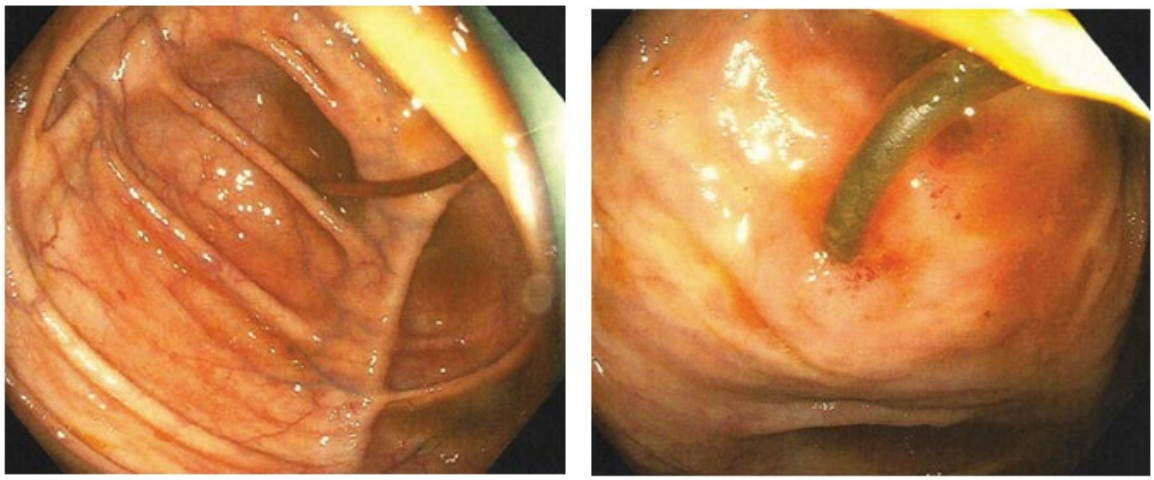
Temperature	97.2°F (36.2°C)
BP	116/85
Pulse	80 beats per minute
RR	23 breaths per minute
SpO_2	94%

Table 2. Patient's laboratory values on presentation.

Variables	Patient's Value	Reference Range
WBC	10,700/μL	4,000-11,000/μL
PMN	81.5%	
Hemoglobin	14.3 g/dL	13.5-17.5 g/dL
MCV	85.1 fL	80-100 fL
Platelets	252,000/μL	150,000-450,000/μL
Sodium	142 mmol/L	135-140 mmol/L
BUN	14 mg/dL	8-20 mg/dL
Cr	1.03 mg/dL	0.84-1.21 mg/dL
Albumin	4.1 g/dL	3.5-5.5 g/dL
ALT	15 U/L	17-63 U/L
AST	12 U/L	15-41 U/L
ALP	109 U/L	32-91 U/L
Lipase	6 U/L	0-160 U/L

***Address for Correspondence:** Stephens J, Department of Medicine, AU/UGA Medical Partnership, Athens, Clarke County, Georgia, USA, Tel: 706-713-2637; E-mail: julstephens@augusta.edu*

Received 15 June 2020; **Accepted** 27 June 2020; **Published** 04 July 2020



A B

Figure 1. (A and B) Distal portion of ventriculo-peritoneal shunt penetrating colon wall.

10.7 to 5.9. After this admission, he had two additional ED visits for continued abdominal pain, which led to a referral to general surgery for further work up. Previous imaging suggestive of colitis leads the general surgeon to proceed with diagnostic colonoscopy. During this procedure, the distal end of a VP catheter was visualized in the lumen of the cecum and perforation of the wall of the cecum was confirmed (Figure 1). Laparoscopic removal of the shunt and closure were recommended. The patient was referred to a general surgeon who is proficient in laparoscopy. Informed consent was performed, and the patient agreed to proceed. No optimization was required above the standard of care routinely performed prior to laparoscopy. The procedure was performed without complications and was well tolerated. The patient had immediate relief of his pain upon awakening, expressing his extreme gratitude for the recommendation for colonoscopy and subsequent treatment with surgery. He presented for a follow-up in the out-patient clinic and had no complications by 30 days. Written informed consent was obtained at this time for publication of this case report and accompanying images

Discussion

This case report was limited by the rarity of this type of shunt complication. The complication rate of VP shunt placement is 23.8%, with a majority of these complications occurring within the first twelve months following placement of the shunt. The complication rate drops from 21.3% during the first year to 2.5% by year three. Although there are a wide variety of complications associated with VP shunt placement, CNS shunt infection occurs most frequently at 6.1% [1]. Other reported complications include subdural hematomas, shunt obstruction leading to acutely elevated intracranial pressure, valve malfunction, shunt fracture, disconnection in shunts with multiple components, excessive CSF drainage leading to CSF ascites, and distal shunt migration that can lead to visceral perforation [3]. Shunt disconnections occur in 10% of cases, with increasing risk as one move more distal [4]. Of these disconnections, 40.9% of these causing shunt failure that could lead to acute elevated intracranial pressure [5]. Because a disconnection does not necessarily equate to shunt failure, it is crucial to determine functionality by either temporary ligation or by shuntogram [6]. A result of functionality testing determines whether a disconnection will be treated conservatively or aggressively. Disconnections are particularly common in children after ten years have passed since placement due to stretching of the shunt during growth and during movement, particularly around the neck where there is a higher range of motion [5]. Other causes of disconnections include fracturing of the plastic components and surgeon error.

Surgeons must place sutures with an appropriate amount of tension. Knots with too little tension may cause unwanted movement while knots with too much tension can cause accelerated degradation of the shunt, causing it to fracture. Many shunt systems have multiple components, which are susceptible to detaching at valve sites. The unitized shunt system is an alternative to the multiple-component system but presents its own unique challenges [3]. Disconnected shunts located in the peritoneum can perforate a variety of viscera, with 27 published case reports describing perforations involving the colon, anus, stomach, bladder, pulmonary artery, scrotum, implantation of the breast, diaphragm, and liver [7,8]. Although the pathophysiology behind these phenomena is unknown, a proposed mechanism of colon perforation involves a local inflammation reaction adjacent to the gastrointestinal wall that allows transmural migration [6]. Symptomatic shunt migration must be investigated due to the risk of CNS infection due to retrograde movement of enteric bacteria through the catheter. Antibiotics are frequently given even if there is no evidence of catheter infection or meningitis due to the high mortality of CNS infection [8]. Abdominal symptoms, especially signs of peritonitis, can be treated with diagnostic laparascopy where shunt removal and bowel repair can be performed simultaneously.

Conclusion

In conclusion, when considering the differential diagnosis for abdominal pain in a patient with a VP shunt, it is necessary to recognize distal shunt migration as an uncommon but serious cause of the pain. Bowel perforation is a complication of VP shunt placement that occurs in 0.1-0.7% of patients, with 15% of these resulting in death. Future studies are needed to determine if elective removal of shunts is appropriate since the development of laparoscopy technique over open surgical technique.

References

1. Alexander E. Merkler, Judy Ch'ang, Whitney E. Parker and Santosh B. Murthy, et al. “The Rate of Complications after Ventriculoperitoneal Shunt Surgery.” *World Neurosurg* 98 (2017): 654-658.

2. Ana Rita Alves, Sofia Mendes, Sandra Lopes and Alexandre Monteiro, et al. “Endoscopic Management of Colonic Perforation due to Ventriculoperitoneal Shunt: Case Report and Literature Review.” *GE Port J Gastroenterol* 24 (2017): 232-236.

3. Brian W. Hanak, Robert H. Bonow, Carolyn A. Harris and Samuel R. Browd, et al. “Cerebrospinal Fluid Shunting Complications in Children.” *Pediatr Neurosurg* 52 (2017): 381-400.

4. Francois Aldrich and Pamela Harmann. “Disconnection as a Cause of Ventriculoperitoneal Shunt Malfunction in Multicomponent Shunt Systems.” *Pediatr Neurosurg* 16 (1990): 309-311.

5. Yun-Ho Lee, Eun Kyung Park, Dong-Seok Kim and Joong-Uhn Choi, et al. "What Should we do with a Discontinued Shunt?." *Childs Nerv Syst* 26 (2010): 791-796.

6. Hsiang-Ming Huang, Wen-Yuan Lee and Der-Cherng Chen. "Disconnected Subduroperitoneal Shunt Catheter Induces Silent Bowel Perforation: An Unusual Complication." *Int J Surg Case Rep* 2 (2011): 76-78.

7. Iannelli, Ania. "CSF Shunt Removal in Children with Hydrocephalus." *Acta Neurochir (Wien)* 147 (2005): 503-507.

8. Jasdeep S Sidhu, Amrendra Mandal, Paritosh Kafle and Baikuntha Chaulagai, et al. "Ventriculoperitoneal Shunt Migration inside the Gastric Lumen: A Rare Case Report." *Cureus* 11 (2019): 4453.

How to cite this article: Julia Stephens and Jack Neppl. "Ventriculoperitoneal Shunt Device Migration: A Case Report of a Rare Cause of Abdominal Pain." Clin Case Rep 10 (2020): 1364. DOI: 10.37421/jccr.2020.10.1364