Radiology Case Reports 13 (2018) 1159–1162

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journal homepage: www.elsevier.com/locate/radcr

Case Report

A ventriculoperitoneal shunt incidentally found in the stomach

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ARTICLE INFO

Article history:
Received 29 May 2018
Revised 19 July 2018
Accepted 3 August 2018
Available online 13 September 2018

Keywords:
Bowel perforation
Hydrocephalus
Ventriculoperitoneal shunt
VP complications

ABSTRACT

We report a case of a ventriculoperitoneal shunt incidentally found within the stomach while the patient was undergoing a percutaneous endoscopic gastrostomy (PEG) tube placement. Among the complications of ventriculoperitoneal shunt placement, bowel perforation is rare a complication found in 0.01%-0.07% of cases, and typically occurs in premature infants and neonates [1]. To date, less than 100 such cases have been recorded of which only a few have appeared in the radiological literature. Here we discuss the current literature, the radiological features, clinical presentations and the management.

Introduction

The placement of a ventriculoperitoneal shunt is the most common procedure to treat communicating and noncommunicating hydrocephalus. Several complications may arise, including shunt obstruction, kinking, breaks, infection, overshunting with accompanying subdural hematoma formation and abdominal complications. Among the various complications 25% are abdominal including cerebrospinal fluid (CSF) pseudocyst, omento-mesentery infiltration, abdominal abscess, and rarely bowel perforation. The sigmoid and transverse colons are the most common sites of perforation followed by the stomach. Bowel perforation is asymptomatic in almost 50% of cases; however, this complication has a mortality rate of 15% [2]. Therefore, early recognition and awareness play a crucial role. We present a case of a 72-year-old male undergoing a PEG tube placement who was incidentally found to have a ventriculoperitoneal (VP) shunt ending in the fundus of the stomach.

Case report

A 72-year-old male with a past medical history of cerebral aneurysm clipping in 2011 status post VP shunt placement, seizures, transfusion dependent anemia and recent diagnosis of West Nile encephalitis presented to the emergency department for failure to thrive and was subsequently admitted for management of fever of unknown origin. Gastroenterology was consulted for PEG tube placement for low PO uptake.

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https://doi.org/10.1016/j.radcr.2018.08.004

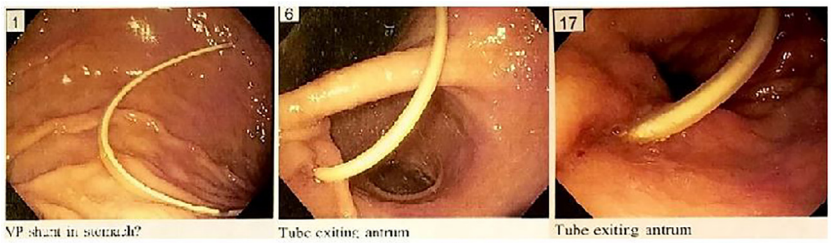

Fig. 1 – Endoscopy. Visualized ventriculoperitoneal (VP) shunt entering at the antrum and ending in the fundus.

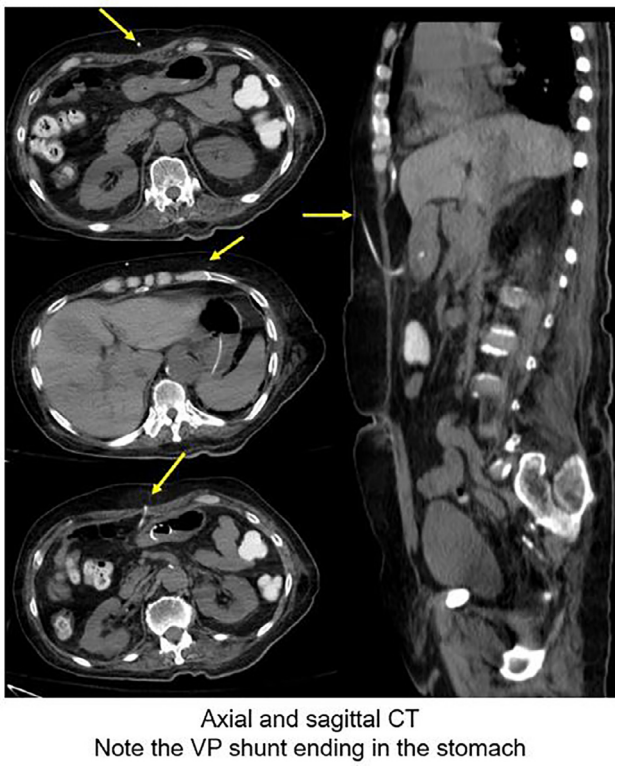

Fig. 2 – Axial and sagittal CT. Note the ventriculoperitoneal (VP) shunt ending in the stomach.

During the procedure another tube was found within the stomach (Fig. 1). The tube was initially thought to be a retained enteric tube; however, there were some difficulties in attempts to remove the tube. Further chart reviews revealed a previous VP shunt history. A new PEG tube was successfully placed, and a following CT abdomen and head confirmed the presence of a VP shunt terminating in the stomach fundus (Figs. 2 and 3). During hospitalization the patient was found to be anemic with GUIAC positive test requiring blood transfusions.

On physical exam patient was cachectic, nonverbal, and contracted. The patient gestured with his right hand indicating that he had pain in the left sided neck. He had a residual left hemiplegia due to prior cerebrovascular accident (CVA).

The patient's Omaya port of the VP shunt was palpable in the right frontal lobe. The shunt was palpable over the right clavicle.

The timing or facility were the VP shunt was placed was unknown. The patient was treated with antibiotics. Shunt removal was initially considered, however the patient was found to be clinically stable and his fever resolved with antibiotics, and therefore surgery was not offered.

There was no evidence of shunt malfunction, or of retrograde flow of stomach contents into the shunt. Evaluation of shunt function was somewhat limited due to the patient's nonverbal baseline physical exam; however, there was no evidence of hydrocephalus on head CT. The patient was febrile on admission, but his fever improved after Zosyn and Vancomycin and therefore his fever was attributed to his known urinary tract infection (UTI).

Discussion

Hydrocephalus was described back to the era of Hippocrates, Galen, and early and medieval Arabian physicians. Different techniques with varying degrees of success for the treatment of hydrocephalus existed until the invention of valve and silicone shunt in the 1960s. This led to a worldwide therapeutic breakthrough [3,4]. Cerebral shunt catheters are most commonly placed in the peritoneal cavity; however, other locations include the right atrium and pleural cavity.

Ventriculoperitoneal surgery cause multiple complications, from surgical related complications such as infection and bleeding, mechanical complications such as obstruction, kinking, breaks and migration, slit ventricle syndrome, overshunting with associated subdural hematoma formation and abdominal complications. Abdominal complications comprise 25% of VP surgery complications, and include intestinal volvulus, CSF-pseudocyst, infected fluid collection, abdominal abscess, and rarely bowel perforation[6,9].

Bowel perforation is a rare complication occurring in only 0.01%-0.07% of patients [5].

The colon is the most common site followed by the stomach. Most of the cases are asymptomatic. This is thought to be secondary to fibrous encasement of the catheter throughout its intraperitoneal course [8], which prevents the bowel contents from spilling into the peritoneal cavity and producing peritonitis. Possible symptoms related to bowel perfora-

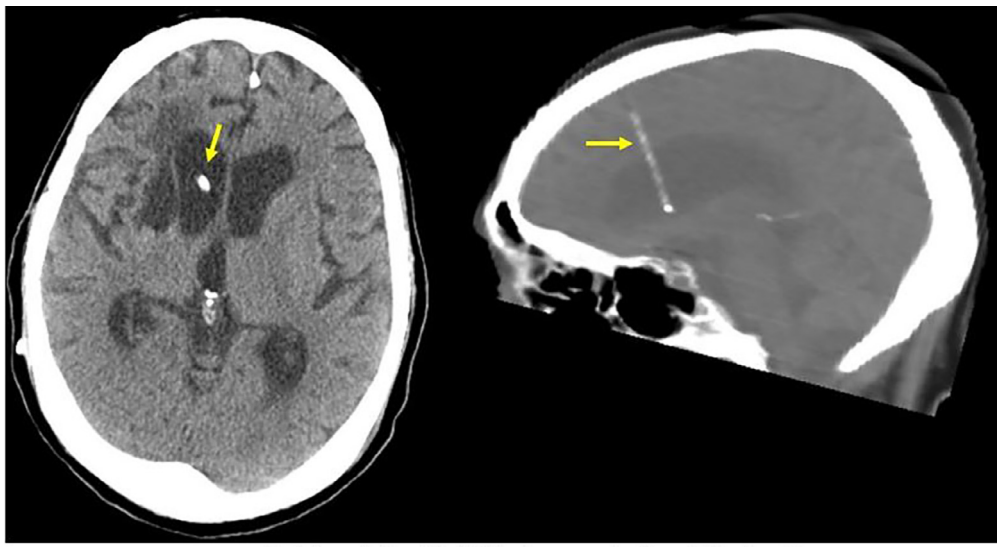

Fig. 3 – Axial and sagittal CT demonstrating ventriculoperitoneal (VP) shunt.

tion include abdominal pain, vomiting, diarrhea and bleeding. It is important to emphasize that although most cases are asymptomatic, the mortality rate may be as high as 15%.

Overall mortality is about 33% with shunts complicated by intra-abdominal infection and 22% with central nervous system infection, which can result in meningitis, encephalitis, or brain abscesses [10]. In 50% of cases CSF cultures are positive and the most common organism is *E. coli*. Therefore, any case of ventriculitis or meningitis from gastroenterological organism in a patient with a VP shunt should warrant evaluation of the bowel for perforation [7,12,13].

The pathophysiology of the bowel perforation is not completely clear. It is suggested that the interaction of the catheter tip at the insertion time or later, leads to a local inflammatory changes and fibrosis that may lead to adhesion to the bowel and delayed perforation.

The diagnosis of a VP shunt bowel perforation may be suggested by radiographs, however abdominal and pelvic computed tomography may be necessary to establish the diagnosis.

Additionally, chest radiographs can be performed to evaluate proper positioning of lines and tubes. Endoscopy can evaluate the specific site of penetration and characterize the site of penetration for later surgical management. This can help determine if there is a scar, ulceration, or inflammatory changes [1,10].

VP shunt perforation may be a surgical emergency. The management typically starts with prophylactic antibiotics. Next, the proximal drainage is externalized and once the CSF culture is negative, a new shunt can be performed on the contralateral side. The distal drain management is variable. If there is no associated peritonitis or abdominal abscess the catheter can be clipped endoscopically [1,5,11] as the surrounding fibrosis/adhesion prevents the spillage of bowel contents [1]. If there are peritoneal signs, intra-abdominal abscess, or a fistulous tract then laparotomy and shunt removal is recommended [1,10,11]. In our case surgery was not indicated as there were no signs of intracranial infection and the distal end appeared fibrosed.

Conclusion

VP shunts causing bowel perforation are indeed a rare complication, however due to the potential high mortality due to central nervous system and abdominal infections, it is important to be aware for this complication. When detected, immediate administration of antibiotics as well as surgical repair may be required. Careful evaluation of tubes and lines on radiographs as well as CT may be required to establish the diagnosis.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2018.08.004.

REFERENCES

[1] Sathyanarayana 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.
[2] Sells CJ, Loeser JD. Peritonitis following perforation of the bowel:a rare complication of a ventriculoperitoneal shunt. J Paediatr 1973;83:823–4.
[3] The scientific history of hydrocephalus and its treatment. Neurosurg Rev. 1999;22(2-3):67–93 Octdiscussion 94-5.
[4] Ferguson AH. Intraperitoneal diversion of cerebrospinal fluid in cases of hydrocephalus. NY Med J 1898;67:902 Jun.

[5] Snow RB, Lavyne MH, Fraser RA. Colonic perforation by ventriculoperitoneal shunts. Surg Neurol 1986;25:173–7.
[6] Sells CJ, Loeser JD. Peritonitis following perforation of the bowel: a rare complication of a ventriculoperitoneal shunt. J Paediatr 1973;83:823–4.
[7] Abu-Dalu K, Pode D, Hadani M, Safar A. Colonic complications of ventriculoperitoneal shunts. Neurosurgery 1983;13:167–9.
[8] Lee FA, Gwinn JL. Complications of ventriculo-peritoneal shunts. Ann RadioI 1975;18:471–8 May-Jun.
[9] Vinchon M, Baroncini M, Laurent T, Patrick D. Bowel perforation caused by peritoneal shunt catheters: diagnosis and treatment. Neurosurgery 2006;58 ONS76-82.
[10] Yousfi MM, Jackson NS, Abbas M, Zimmerman RS, Fleischer DE: Bowel perforation complicating ventriculoperitoneal shunt:
[11] Martinez Hernández-Magro P, Barrera Román C, Villanueva Sáenz E, Zavala MJ. Colonic perforation as a complication of ventriculoperitoneal shunt: a case report. Tech Coloproctol 2006;10:353–5.
[12] Ibrahim AW. *E. coli* meningitis as an indicator of intestinal perforation by V-P shunt tube. Neurosurgery Rev 1998;21(2-3):194–7 PMID: 9795961.
[13] Shetty PG, Fatterpekar GM, Sahani DV, Shroff MM. Pneumocephalus secondary to colonic perforation by VP shunt catheter. Br J Radiol 1999;72:704–5 PMID: 10624329.