CASE REPORT JSLS

Laparoscopy for a Ventriculoperitoneal Shunt Tube Dislocated into the Colon

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ABSTRACT

Introduction: Implantation of a ventriculoperitoneal (VP) shunt is a standard procedure for hydrocephalus. Different complications can occur, one of them being migration of the distal end of the tube.

Case Description: The abdominal end of a VP shunt tube had migrated into the descending colon. In a laparoscopic procedure, the shunt was retrieved, and the colonic perforation site was resected. The patient had a favorable outcome.

Discussion: Laparoscopy can play a key role and is recommended not only to make an exact diagnosis, but also for definite, safe, and trauma-minimizing treatment of intraabdominal VP shunt dysfunction.

Key Words: Laparoscopy, Colorectal surgery, Ventriculoperitoneal shunt, Adverse effects.

INTRODUCTION

Ventriculoperitoneal (VP) shunt as a means of cerebrospinal fluid (CSF) diversion is the standard therapy for hydrocephalus in the presence of an aqueduct stenosis or other passage obstacles in the CSF pathway. For example, it is frequently required after subarachnoid hemorrhage, trauma, or infection of the neurocranium or for congenital conditions.[1]

Complications at the intraperitoneally (ip) lodging distal end of the shunt tube are reported to be from 10% to 30%.[2,3] Typically, one encounters preperitoneal or ip pseudocysts, shunt infection, shunt dislocation, or disconnection.[4–6] Also, migration of the abdominal end has been reported on frequently.[6–13] It can cause a rise in intracranial pressure as a result of obstruction as well as infection of the central nervous system from ascending infection. Therefore, prompt treatment is warranted to avert a life-threatening condition.

We describe the case of a dislocated shunt tube, which could be elegantly managed using laparoscopy within interdisciplinary treatment. In most clinics, an abdominal surgeon would not be treating VP shunt patients. However, this case can be an example for combining standard diagnostics, equipment, and procedures to tailor an individual approach for an unusual condition.

CASE REPORT

A 42-y-old female patient presented with a headache that had been ongoing for several weeks as well as abdominal pain that had developed over 2 d.

Two and a half years earlier, the patient suffered from subarachnoid hemorrhage that necessitated placement of a VP shunt because of the development of hydrocephalus. After 6 mo, a pressure ulcer developed over the right-sided shunt valve. Explantation of the whole shunt was followed by the placement of a new VP shunt on the left side. One year before the current admission, the patient was successfully treated with laparoscopic adhesiolysis subsequent to an exploration when she had also presented with abdominal pain, but without any signs of infection or displacement of the abdominal shunt tube.

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Figure 1. On this CT scan, the shunt tube can be observed as a white line within the descending colon (white arrowhead).

Physical examination subsequently revealed reddened, overheated skin overlying the abdominal and thoracic course of the shunt tube. Left-sided tenderness was discovered on palpation of the abdomen. No neurological deficit was noted, and laboratory results showed no signs of infection.

Computed tomography (CT) of the abdomen showed the shunt tube regularly entering the abdominal cavity in the left-lower quadrant, but then entering and following retrogradely the descending colon until ending near the splenic flexure **(Figure 1)**. Signs of an intraabdominal fluid collection, abscess, or free air were not found.

Colonoscopy was performed. At a distance of 40cm from the anal margin, the shunt tube was observed entering the colon **(Figure 2)** and could be followed toward the splenic flexure for another 15cm, where stool contamination impaired further investigation. Visible mucosa was intact.

Operative Procedure

Diagnostic laparoscopy was initiated. A Veress needle for inflation was used below the left costal margin, followed by a 10-mm trocar in the right-upper quadrant using the scar from the former laparoscopic access. Then, a 5-mm trocar in the right-upper quadrant and one on the right side on the level of the umbilicus were placed, the latter

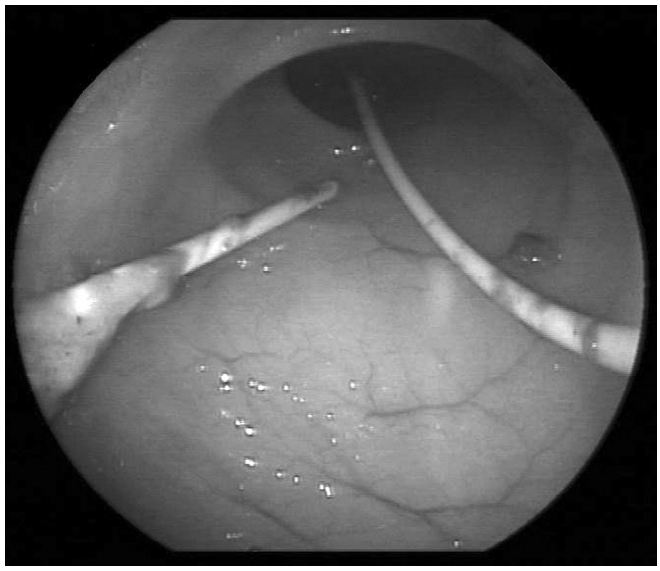

Figure 2. Intraluminal view during colonoscopy verifies the finding of the CT scan.

using another old scar from the first abdominal shunt access.

Laparoscopy showed no ip fluid or any signs of peritonitis. The intraabdominal part of the tube was completely peritonealized and, as described in the CT scan, entered the descending colon in the left-lower quadrant. The tube was cut at its entry point into the abdomen and mobilized from the peritoneal lining. The second 5-mm access was replaced by a 10-mm trocar to accommodate a long piece of suction tubing. Through this overtube, a long-grasping forceps was inserted and the intraabdominal shunt tube could thus be extricated without further contaminating the abdominal cavity **(Figure 3)**.

Next, the entry point into the colon was dissected. A transverse, doubled full-thickness resection of the perforation-bearing colonic wall was performed using an articulating Endo-GIA stapler. The resectate was externalized using a retriever bag through the second 10-mm trocar and sent for histological analysis. No abdominal drain was placed. The subcutaneous thoracoabdominal part of the tube was removed through a single 1-cm incision.

The remaining shunt system was explanted completely by a neurosurgeon.

RESULTS

The histological specimen showed chronic inflammation around the perforation site with localized evidence of foreign material and no signs of malignancy.

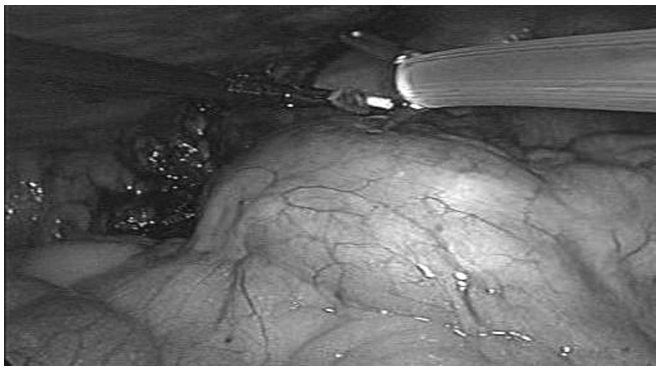

Figure 3. After the remaining shunt tubing has been grasped, the transparent overtube loaded onto the grasping forceps would be applied to minimize contamination on extraction.

Microbiological specimens revealed *Enterobacter cloacae* in CSF samples.

Concerning the abdomen, the patient had an uneventful recovery. A ventricular drain was placed instead of the shunt and could successfully be discontinued as a result of low delivery rates. No new VP shunt was necessary.

DISCUSSION

Shunt migration is a well-known phenomenon, and intra-abdominal shunt tubes have appeared in many inappropriate places.[6–13] Once shunt dysfunction or abdominal symptoms occur, a thorough physical examination is warranted, especially because VP-shunt–bearing patients frequently are not capable of adequate verbal expression. Neurological symptoms of raised intracranial pressure, such as headache, nausea, vomiting, impaired gait, nuchal rigidity, seizures, and others, in combination with abdominal pain, abdominal distention, abdominal wall rigidity, or local irritation, merit further evaluation by imaging or other diagnostic procedures, such as CT abdomen, endoscopy, or even laparoscopy and should lead to diagnosis. Also, simple X-ray images cannot reproduce an intraabdominal malposition safely. Therefore, the number of such cases may be underestimated. In this case, the incorrect position of the catheter was sufficiently diagnosed by cross-sectional imaging.

Additionally, the valve itself or an abdominal fluid accumulation can be tapped for cell counts and microbiological specimens of possibly infected CSF. Depending on whether the shunt tube is involved in, or surrounded by, infectious material, the system might be left in place after abdominal revision.[6] In our case, the shunt end was definitely exposed to harmful bacteria. Microbiological specimens revealed *E. cloacae* in CSF samples. Leaving the whole shunt system in place was out of the question.

Despite initial doubts about abdominal CO_2 insufflation with a certain pressure, as required for laparoscopic surgery, laparoscopy for abdominal procedures in the presence of a VP shunt has been reported to be feasible[14] and should be the preferred approach.[5,6,10]

An overtube can be improvised from suction tubing, which comes in different diameters and can easily be cut to an appropriate length. Thus, longitudinal structures, such as a shunt tube, can easily be withdrawn following the principles of a retriever bag without unnecessarily contaminating trocars, the trocar site, or adjacent structures. Further, it is a very cost-effective means.

Other means of minimally invasive repair have been applied with select abdominal VP shunt complications, such as transanal repair.[15]

CONCLUSION

A VP shunt system virtually crosses interdisciplinary borders. Patients need an individual approach, depending on the kind of dysfunction. Close interdisciplinary management is mandatory for a favorable outcome. Endoscopic or laparoscopic procedures can be a trauma-minimizing means for diagnosis and treatment. As in this case, old scars can be used as access to further minimize recovery time as well as risk of trocar hernia. Even smaller 3-mm appliances or a 5-mm optic used at select sites would enhance this principle.

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