Case Report

Spontaneous Coiling of Peritoneal Catheter—Uncommon Complication of Ventriculoperitoneal Shunt: Recognition and Management

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Background: Coiling of peritoneal catheter is a rare complication associated with ventriculoperitoneal shunt procedures performed for the treatment of hydrocephalus. In most of the reported cases, coiling is associated with shunt migration resulting in shunt malfunction. Case Description: Here, we report two cases where spontaneous coiling of peritoneal end was observed following insertion of shunt, one of which was also associated with pseudocyst formation, which was clinically silent. Interestingly, in both the patients, shunt system was intact. We describe the clinical features, management, and possible mechanism of this feature. Conclusion: In asymptomatic coiling of the peritoneal catheter, the patient should be kept in close observation as these groups of patients may be vulnerable to malfunction, and timely intervention may save the patient from further abdominal and cranial complications. Patients presenting with shunt malfunction should get abdominal evaluation performed to look for silent pseudocyst formation over and above a cranial computed tomography and shunt series.

Keywords: Coiling, hydrocephalus, peritoneal catheter, ventriculoperitoneal shunt

Introduction

Ever since the initial ventriculoperitoneal shunt (VPS) system developed in the 1950s and major advances took place in its technology, the neurosurgical community is still cursed by significant shunt-related complications. Shunt failures because of infection and obstruction are frequent complications that occur in 40%–70% of cases.[1] Here, we report two cases where spontaneous coiling of the peritoneal catheter was seen following VPS insertion. The first patient is an 8-month-old boy with a history of shunt insertion who presented with features of shunt malfunction and was found to have spontaneous coiling of the peritoneal end and pseudocyst formation. The second patient is an 8-year-old boy with total congenital occlusion of foramen of Monro for which biventriculoperitoneal shunt was placed and even though symptom free, he was found to be having spontaneous coiling of the peritoneal catheter in the follow-up. The possible pathophysiology and treatment are discussed.

Case Report

Case 1

An 8-month-old boy with a history of congenital communicating hydrocephalus, who underwent VPS insertion at 3 months of age, presented with refusal to accept feed and wide and tense fontanel along with setting-sun sign. On examination, the child was afebrile but drowsy, abdomen was non-tender and soft on palpation without any evidence of mass. Examination of cerebrospinal fluid (CSF) sample obtained via shunt tap showed normal results and culture revealed no growth. Cranial computed tomography (CT) revealed ventricular catheter inside the lateral ventricle along with hydrocephalus, suggestive of shunt malfunction. Shunt series was obtained, which revealed coiling of the peritoneal catheter without any migration of the shunt.
system [Figure 1]. A transabdominal ultrasonography (USG) scan showed a fluid density collection at the midline around the umbilicus encapsulated by a thin wall; a linear structure within it corresponded to the coiled part of the catheter suggestive of peritoneal pseudocyst formation.

Exploratory laparotomy was performed followed by drainage of the cyst. The bowel wall was edematous and peritoneum was thickened. The cyst contained clear CSF-like content; the cyst wall was adhered to the small bowel so only partial excision could be performed [Figure 2]. We repositioned back the peritoneal catheter over the right lobe of the liver.

The patient was in stable condition, with improved clinical status after surgery, and was eventually discharged to home in stable condition and is on regular follow-up since past 6 months.

**Case 2**
An 8-year-old boy of congenital total occlusion of foramen of Monro presented with symptoms of raised intracranial pressure. He was managed by biventriculoperitoneal shunting procedure for relieve of hydrocephalus. Postoperatively, he responded well to the procedure. A postoperative X-ray of abdomen carried out at discharge (10th day) showed satisfactory position of both the peritoneal catheters, although early coil formation was noted [Figure 3A]. He was kept on routine follow-up. An X-ray of abdomen and cranial CT were conducted at 6th month follow-up as a baseline study. Surprisingly, this time both the peritoneal catheters showed coil formation [Figure 3B]. Cranial CT, however, revealed satisfactory decompression of the ventricles suggesting functional shunt systems on both sides [Figure 4A and B]. In view of the child’s satisfactory clinical condition, no further action was taken but was advised stricter follow-up.

**DISCUSSION**
The incidence of abdominal complications associated with VPS has been reported as 5%–47% in the literature,[2,3] the most common ones cited are peritonitis, ascites, inguinal hernia, and bladder and abdominal wall perforation, whereas peritoneal pseudocyst formation is rare (1%–4.5%).[4] Peritoneal CSF pseudocysts are a rare but important complication of VPS surgery with...
a reported incidence ranging from less than 1.0% to 4.5%. Most of the reported cases are of pediatric age group or early adolescence.[5]

The most common presentation of an abdominal CSF pseudocyst in children is elevated intracranial pressure and abdominal pain, whereas local abdominal signs, such as abdominal pain, distention, nausea, or vomiting, predominate in adults.[6] The time from the last shunting procedure to the development of an abdominal pseudocyst ranges from 3 weeks to 5 years.[6]

Dominguez et al.[7] had proposed that the coiled form of catheter is comparable to the shunt packed in the box, and the retained memory of the shunt system can be a hypothesis for coiling. We feel the retained memory of the catheter system reinforced by the round edges of the pseudocyst may have prompted the catheter to get...
coiled inside the pseudocyst resulting in malfunction in our first case, whereas in second case, early peritoneal coiling was noticed at 10th day of surgery and over a period of 6 months, full-fledged coil formation occurred that involved both the peritoneal catheters. A previous report had suggested peritoneal migration and coiling as a result of abdominal wall contractions driving out the catheter into the fibrous tract around it. However, in both the current cases, the shunt system was found to be intact. This may suggest alternate mechanisms such as large peritoneal end of the catheter coupled with elasticity of the shunt tube material, which may have triggered coil formation as evident in the second case, where both the peritoneal end showed coiling simultaneously.

The formation of a CSF pseudocyst is a poor prognostic sign for the usefulness of the peritoneal cavity for shunt. Although previous abdominal pseudocyst formation and peritonitis are not contraindications to subsequent peritoneal shunting in some reports, the CSF had to be diverted to other cavities because of either recurrence of the cysts or failure of the peritoneum to absorb fluid. In our case, presence of bowel edema and the possibility of recurrence urged us to readjust the peritoneal catheter over the liver lobe, which we found to be effective.

**CONCLUSION**

This report shows two cases where spontaneous coiling of the peritoneal catheter occurred with an intact shunt system. The pseudocyst in the first case was clinically silent and incidentally detected on imaging along with coiling of the peritoneal catheter, which has not been previously reported. The other patient had asymptomatic peritoneal coiling. In patients presenting with shunt malfunction, we urge to get abdominal evaluation by means of USG/CT of abdomen to look for silent pseudocyst formation over and above a cranial CT and shunt series. In asymptomatic coiling of the peritoneal catheter, the patient should be kept in strict follow-up as these patients may be vulnerable to malfunction, and timely intervention may save the patient from further abdominal and cranial complications.

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**Conflicts of interest**

There are no conflicts of interest.

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