Case Report
Étude de cas

VENTRICULOOPERITONEAL SHUNT KNOT: A RARE CAUSE OF BOWEL OBSTRUCTION AND ISCHEMIA

Yves Starreveld, MD; Dan Poenaru, MD; Peter Ellis, MD, MSc

Small-bowel obstruction caused by knotting of a peritoneal shunt catheter is an extremely rare and severe complication of a ventriculoperitoneal (VP) shunt. In the 1-week-old female infant reported here who had a VP shunt, inability to remove the peritoneal catheter was followed by small-bowel obstruction and necrosis due to intestinal strangulation in a tight loop of the catheter. An uncomplicated primary resection of the necrotic segment was followed by placement of a temporary ventriculocisternal shunt. The authors suggest that when withdrawal of the peritoneal part of a VP shunt meets with resistance, an intraoperative radiograph should be obtained to assess the position of the remaining catheter. If knotting is observed, an attempt to straighten the catheter with a guide wire is worthwhile. Should this fail, immediate laparoscopy or laparotomy is indicated.

L’occlusion de l’intestin grêle provoquée par la formation d’un nœud dans un cathéter péritonéal de dérivation représente une complication extrêmement rare et grave d’une dérivation ventriculo-péritonéale (VP). Dans le cas décrit ici d’un nouveau-né de sexe féminin âgé d’une semaine qui a subi une dérivation VP, l’incapacité d’enlever le cathéter péritonéal a été suivie d’une occlusion de l’intestin grêle et d’une nécrose attribuable à une strangulation intestinale survenue dans une boucle serrée du cathéter. Une résection primaire sans complication du segment nécrosé a été suivie de la mise en place d’une dérivation ventriculo-auriculaire temporaire. Les auteurs indiquent que lorsque l’on rencontre une résistance pendant le retrait de la partie péritonéale d’une dérivation VP, il faudrait prendre une radiographie peropératoire pour révéler la position de la sonde qui reste. Si la radiographie révèle la présence d’un nœud, il vaut la peine d’essayer de redresser le cathéter au moyen d’un fil guide. En cas d’échec, une laparoscopie ou laparotomie immédiate est indiquée.

Small-bowel obstruction caused by knotting of a peritoneal shunt catheter is an extremely rare complication of a ventriculoperitoneal (VP) shunt. To date, only 4 cases have been reported in the literature.1-3 Though rare, small-bowel obstruction by a VP shunt is an extremely serious complication, which frequently leads to laparotomy and bowel resection. Knotting of a peritoneal catheter does not occur spontaneously. Each reported case involved attempted removal or revision of the shunt. We report a case in which difficulty removing the peritoneal catheter was followed by small-bowel obstruction due to constriction of the small bowel in a loop of catheter.

CASE REPORT

A female infant with Dandy–Walker syndrome underwent placement of a VP shunt 1 week after birth. She was admitted to hospital 7 weeks later with an obvious cellulitis around the shunt tubing under her scalp. A culture of the cerebrospinal fluid (CSF) from a VP shunt valve tap grew Staphylococcus aureus. The infant’s fontanelle was soft and there was no Parinaud syndrome or papilledema to suggest shunt blockage. An antibiotic (vancomycin) was given, and removal of the shunt was attempted. Adherence of a normally placed VP shunt 7 weeks after insertion is unusual, so operative preparation and draping of only the retroauricular incision was made. During withdrawal of the peritoneal portion of the shunt, resistance was encountered,
and as a result, the peritoneal end was cut short and allowed to remain in the abdomen. Since the child had no evidence of peritonitis secondary to the CSF infection, we postponed removal of the peritoneal catheter pending clinical evolution of her condition. Postoperatively, the child became irritable and suffered episodes of bilious and subsequently feculent vomiting.

Abdominal radiography showed evidence of acute bowel obstruction and a knot in the shunt catheter (Fig. 1). At laparotomy, the peritoneal catheter was found knotted around a loop of bowel (Fig. 2). This 10-cm loop of small bowel was necrotic and was resected with a primary end-to-end anastomosis. Under cover of intravenously administered antibiotics, the infant was allowed to recover. Her hydrocephalus was managed with serial ventricular taps. Eight days after resection a ventriculoatrial shunt was inserted. The shunt was then electively replaced with another VP shunt.

**DISCUSSION**

Internal (CSF) infection of VP shunts is much more frequent in neonates than in older children. Although the management is still controversial, there is a strong trend to better cure rates and reduced chance of bacterial ventriculitis sequelae with shunt removal and systemic antibiotic therapy. Because VP shunting is the most common pediatric neurosurgical procedure, revision or removal of infected shunts is a common problem. When the peritoneal end of the catheter is removed, there is a slight chance that a loop of bowel will get caught up in a tightening coil of catheter. This is felt as resistance during removal of the peritoneal end. Although this is only the fifth reported occurrence of small-bowel obstruction caused by a knotted catheter, each occurrence followed difficulty in removing the peritoneal end of the catheter. It is remarkable that despite the complexity of the involved structures, the failure mode is very stereotyped. In the single cases reported by Murtagh, Quencer and Poole and Hlavin, Mapstone and Gauderer and the first case reported by Sanan and colleagues, the final picture of a shunt catheter knotted around a loop of small bowel was identical. All events occurred 24 to 48 hours after an unsuccessful attempt at catheter removal.

We concur with the recommendations of Sanan and colleagues that when there is difficulty in removing the peritoneal catheter at operation, the position of the remaining catheter should be assessed radiologically. If there are any signs of knotting of the retained catheter, fluoroscopically guided straightening of the catheter may be attempted with use of a guide wire, or the situation may be rectified by laparoscopy or laparotomy.

**References**


