Abdominal pseudocyst: a rare complication of ventriculoperitoneal shunting

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ABSTRACT
Abdominal cerebrospinal fluid (CSF) pseudocyst is a rare complication of ventriculoperitoneal shunting. It is well known in children but uncommon in adults. We present a 30-year-old woman with abdominal distension, vomiting and confusion caused by her developing an abdominal CSF pseudocyst, 13 years after her last shunt revision. Adult neurologists need to be aware of this late complication.

INTRODUCTION
Ventriculoperitoneal shunts are commonly inserted to manage hydrocephalus from various causes, diverting excess cerebrospinal fluid (CSF) from the lateral ventricles into the peritoneum. The peritoneal cavity rapidly and efficiently absorbs fluid, making it an ideal location for CSF diversion. Alternatives include CSF shunts into the pleural space or right atrium.

Although ventriculoperitoneal shunting is safe and straightforward, complications include shunt obstruction, tip migration, infection and over drainage. A CSF pseudocyst is rare, complicating 1%–4%.

CASE REPORT
A 30-year-old woman with cerebral palsy and spina bifida had undergone a right ventriculoperitoneal shunt for hydrocephalus. She presented with confusion, abdominal distension and vomiting, with a provisional diagnosis of urinary sepsis. She also complained of abdominal pain and cough. The shunt had been inserted when aged a few months and had been revised in 1991. She also had a urostomy following a cystectomy, ileal conduit and a hiatus hernia. A transabdominal ultrasound scan showed a large fluid density collection extending from the xiphisternum to the umbilicus, encapsulated by a thin wall; a linear structure within it corresponded to the tip of the ventriculoperitoneal shunt. The cystic structure appeared to be a CSF collection, most likely a peritoneal pseudocyst; it extended from the pelvis through the oesophageal hiatus into the thoracic cavity.

The shunt was externalised and 4 L of aseptic fluid drained over 4 days. The distal catheter tip was also externalised and connected to an external ventricular drain pack set at 0 mm Hg. A new distal catheter was subsequently inserted into the contralateral side within the peritoneal cavity.

DISCUSSION
Although the pathophysiology underlying the development of an abdominal pseudocyst is unknown, there are predisposing factors reported in both children and adults. These include high CSF protein, peritoneal adhesions from previous abdominal surgery, multiple shunt revisions and changes in CSF absorption due to peritoneal inflammation. An allergic or inflammatory reaction to the peritoneal catheter or CSF might also cause an abdominal pseudocyst, and up to 60% may relate to previous infection.

The size of a pseudocyst relates to their risk of infection: large pseudocysts—presenting as abdominal masses—are more likely sterile, and smaller or multiloculated cysts more likely infected.

The distal part of the ventriculoperitoneal shunt is associated with some common complications, including extraperitoneal retraction of the catheter, incisional hernia, subcutaneous CSF collections and pseudocyst formation.
Most abdominal pseudocysts occur in children, with only 30 cases reported in adults. Children usually present with neurological symptoms resulting from shunt malfunction, including headache, vomiting and drowsiness. In contrast, most adults cases present with abdominal symptoms, such as pain and distension; only 30% present with symptoms of shunt malfunction.

Our patient developed an abdominal pseudocyst 13 years after her last revision and 35 years after her primary shunt insertion. This is longer than previously reported cases. The most likely cause of her pseudocyst was a non-specific local tissue reaction against the shunt tubing material in the peritoneum. Her extensive abdominal adhesions, from previous surgical procedures, also predisposed her to pseudocyst development.

The main features of CSF pseudocyst on abdominal ultrasound and CT scanning are intraperitoneal fluid collection with well-defined margins, without internal septa, and the finding of the distal tip of the shunt catheter within or close to the pseudocyst (see figure 1).

There are various successful treatments for abdominal pseudocyst. Surgical evacuation followed by repositioning of the catheter in the peritoneal cavity succeeds in up to 70% and is the treatment of choice when there is no infection. CT-guided needle aspiration with or without surgical evacuation, external ventricular drainage, laparotomy and laparoscopic-assisted fluid drainage can also be used. In some cases, converting the shunt to being ventriculoatrial or ventriculopleural can help, if there is either pseudocyst recurrence or shunt malfunction, suggesting that the peritoneal cavity is not suitable as a long-term CSF diversion site.

Ventriculoperitoneal shunts can cause various abdominal problems, including volvulus, ileus, bowel obstruction and perforation from the distal catheter eroding into the gallbladder or bowel. In this case, there was some compression of proximal loops of the small intestines, causing them to be moderately dilated. Alongside this, there were further compressive symptoms due to the hiatus hernia that allowed the pseudocyst to extend in to the thoracic cavity, causing compressive atelectasis on the right lung base.

**Key points**

- Abdominal pseudocyst is a rare complication (1%–4%) of ventriculoperitoneal shunting.
- Children with abdominal pseudocyst present with neurological symptoms, whereas adults present with abdominal pain and distension.
- Neurologists should consider abdominal pseudocyst in people with a ventriculoperitoneal shunt who develop acute abdominal symptoms.

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