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Abdominal Cerebrospinal Fluid Pseudocyst—A Rare Complication of Ventriculoperitoneal Shunt

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Abstract

An abdominal cerebrospinal fluid pseudocyst is a rare complication of ventriculoperitoneal shunt. Several theories have been suggested to explain its occurrence. The main symptoms are painful abdominal distension and vomiting, abdominal distension on examination, as abdominal ultrasound and computed tomography confirm its diagnosis. The treatment involves drainage associated with drain relocation and resection of the pseudocyst's wall. We report two patients diagnosed with this condition who underwent surgical treatment. The first patient had an unremarkable 12-month follow-up, while the second died on the seventh postoperative day due to intravascular disseminated coagulation. In these patients, the cause has not been identified; however, an infection cannot be ruled out.

Keywords

Abdominal Pseudocyst, Cerebrospinal Fluid, Children, Complication, Ventriculoperitoneal Shunt

1. Introduction

An abdominal pseudocyst is a rare complication of a ventriculoperitoneal shunt (VPS) in hydrocephalus [1]. Several authors report an incidence ranging from 0.25% to 10% [2]. The location of the distal end of the drain can be associated with several abdominal complications involving the Pediatric Surgeon, such as an abdominal pseudocyst. Its cause is still debated, and several factors have been suggested, such as a history of abdominal surgery, infections, necrotizing ente-

rocolitis, multiple revisions of the drain, or an inflammatory reaction of the peritoneum to cerebrospinal fluid's (CSF) proteins or drainage material [3] [4]. We report two cases treated in the pediatric surgery service of the Albert Royer National Children's Hospital Centre in Dakar, Senegal.

2. Patients

2.1. Case 1

A 9-year-old girl with a history of VPS indicated for hydrocephalus secondary to a tumor of the posterior fossa was diagnosed four years ago and treated with a VPS two months ago. On admission, he complained of permanent abdominal pain for three days, associated with postprandial vomiting and anorexia. On physical examination, he was fully conscious, with a voluminous asymmetric abdominal distension extending from the hypogastrium to the left hypochondrium, renitent, painless on palpation, and interfering with walking. She presented with a fever (38˚C). Laboratory results revealed mild hyperleukocytosis at 11,000 elements/ml and increased C-reactive protein (26 mg/l). Abdominal ultrasound revealed a large, homogeneous cystic collection encapsulating the distal end of the VPS drain. Abdominopelvic computed tomography (CT) showed a cystic mass occupying the upper two-thirds of the epigastric region, the retro-omental cavity, and extending to the hypogastrium, with homogeneous, well-limited content (**Figure 1**).

The diagnosis of abdominal pseudocyst without valve dysfunction was advanced, indicating surgical exploration. The latter revealed a thick-shelled cyst containing about 1000 ml of clear fluid. The peritoneal end of the drain, which continued to produce clear CSF, was identified within the mass (**Figure 2**). We drained the fluid and excised the wall of the pseudocyst, then moved the peritoneal end of the drain into the right iliac fossa. The culture of the drained fluid was sterile. Analysis of the CSF taken from the peritoneal end revealed a clear CSF with proteinorachia at 0.48 g/l, glycorachia at 0.66 g/l, and five lymphocytes in cytology. The postoperative 12-month follow-up was unremarkable.

2.2. Case 2

A 10-year-old boy with a history of VPS indicated for a malformative hydrocephalus, performed at one month, was received in our pediatric surgery service for a diffuse, painless, and precocious abdominal distension, progressing for four months, which became painful after three weeks with alimentary vomiting. He had no headache neither disturbance of consciousness. The examination found clear consciousness, reactive pupils, and a considerable left asymmetric abdominal distension, with a mass extending from the left hypochondrium to the hypogastrium, renitent, sensitive to palpation, and dull to percussion. The diagnosis of abdominal pseudocyst with CSF was evoked and confirmed by abdominal computed tomography (**Figure 3**).

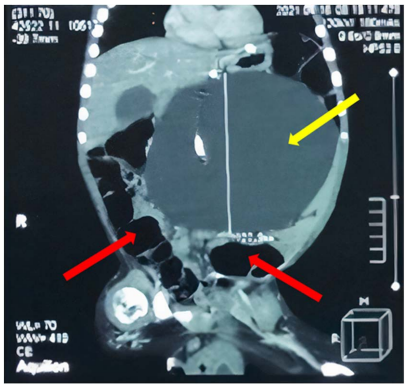

Figure 1. Abdominal CT, coronal section. Note the low-density circumscribed abdominal mass mainly occupying the left side of the peritoneal cavity, which is the abdominal CSF pseudocyst (yellow arrow). It mass affects bowels that are moved into the right side of the peritoneal cavity (red arrow).

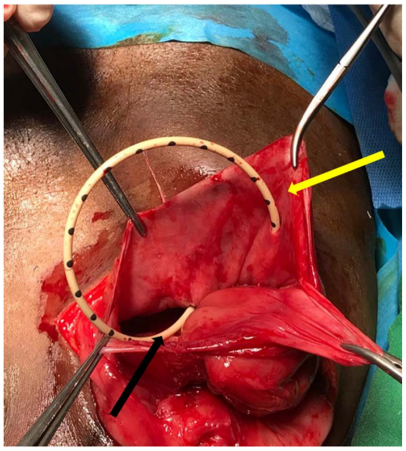

Figure 2. Intraoperative findings. The peritoneal end of the VPS (black arrow) was identified within the pseudocyst, which was opened. Note its thick wall (yellow arrow).

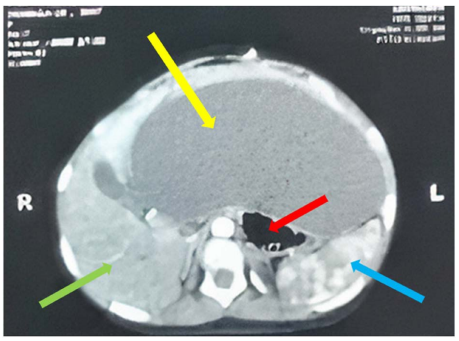

Figure 3. Abdominal CT, cross-section. The abdominal CSF pseudocyst appears as a low-density well-delimited abdominal mass (yellow arrow) in the peritoneal cavity, exerting mass-effect on intraperitoneal organs: tight stomach (red arrow), posteriorly displaced spleen (blue arrow) and, more rightly displaced liver (green arrow).

We performed pseudocyst drainage with excision of the pseudocyst wall and peritoneal toilet with isotonic saline. We have left a suction redon drain, which was removed on postoperative day two. The patient's death occurred seven days after the operation of disseminated intravascular coagulation.

3. Discussion

Abdominal CSF pseudocyst is a rare complication of VPS. It should be suspected in any patient who develops abdominal symptoms after placement of a VPS [3]. Many hypotheses on the cause have been reported, such as the possibility of an allergic reaction of the peritoneum to components of the shunt system, a peritoneal inflammatory reaction caused by an unidentified protein fraction in the CSF, or by a high concentration of proteins in the peritoneal cavity, a decreased absorption capacity of the peritoneum, and a history of device revision, abdominal surgery or intercurrent infections [1] [5]. In our patients, no cause was found, but a decrease in the reabsorption capacity of the peritoneum would be likely in our second patient.

Abdominal mass, abdominal pain, vomiting, headache, or signs of compression are the most frequently encountered clinical symptoms [6]. Our two observations found abdominal pain, abdominal mass, and vomiting. An abdominal ultrasound may be sufficient for the diagnosis, showing an anechoic collection of CSF encapsulated by a fibrous layer [7]. However, it is often associated with an abdominal CT scan, as in our patients. On the other hand, several studies have demonstrated the equivalence of sensitivity between ultrasound and CT to confirm the diagnosis of abdominal CSF pseudocyst [5] [8]. However, some authors consider CT more indicated in some instances of large or too painful pseudocysts or the search for other etiologies [6] [7].

Laparotomy or laparoscopic surgery can be performed, but laparotomy is preferred to laparoscopic surgery in case of recurrence or history of abdominal surgery [3]. The surgical treatment modalities include drainage of the cyst, repositioning the peritoneal end of the drainage device, and resection of the walls of the pseudocyst [9]. Recently, various therapeutic techniques have been described, including aspiration of the CT-guided collection, paracentesis, and laparotomy with removal of the cyst walls [10]. In our cases, resection of the pseudocyst by laparotomy with repositioning of the distal catheter was performed in our two patients. Several cases of pseudocyst recurrence have been described, and the possibility of untreated or poorly treated infection has been suggested as the etiology [3]. For some authors, the displacement of the peritoneal catheter in the abdomen could lead to the recurrence of an abdominal pseudocyst [11]. This explains why some authors propose reimplanting the drain in the atrium, the pleural cavity, or the gall bladder [3].

4. Conclusion

Abdominal CSF pseudocyst remains a rare complication of a VPS for hydroce-

phalus. It should be considered in any patient with a ventriculoperitoneal bypass with abdominal symptoms and confirmed by ultrasound and CT. In our environment, it is a life-threatening condition. Better postoperative and long-term follow-up is crucial.

Consent for Publication

A written consent for publication was obtained from the patient's parents.

Conflicts of Interest

The authors declare that they have no competing interests.

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