

A rare complication with ventriculoperitoneal shunt in pediatric cases

Pediyatrik olgularda ventriküloperitoneal şantın nadir komplikasyonu

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Summary

Ventriculoperitoneal shunt surgery is the commonly used technique for the management of hydrocephalus in pediatric cases. This procedure is associated with various complications. The most common complications are shunt infection and obstruction due to the ventriculoperitoneal shunt device. Migration of the peritoneal catheter is one of the rarest complications of the ventriculoperitoneal shunt procedure. We describe two cases of migration of a peritoneal catheter with regard to the spontaneous extrusion of the distal portion of the ventriculoperitoneal shunt through the anus and through the intact abdominal wall. The proper follow-up and management with acceptable diagnostic tools are discussed in light of related literature for the present cases.

Key words: Abdominal wall, anal protrusion, hydrocephalus, ventriculoperitoneal shunt, complication.

Özet

Ventriküloperitoneal şant cerrahisi pediyatrik çağda görülen hidrosefali olgularının tedavisinde yaygın olarak kullanılan bir yöntemdir. Şant kullanılan hastalarda en sık görülen komplikasyon infeksiyon ve şantın tıkanmasıdır. Peritoneal kateterin yer değiştirmesi ise oldukça nadir görülen bir komplikasyondur. Bu çalışmamızda peritoneal kateterin sağlam karın duvarına ve anüse olan iki farklı migrasyonunu sunmak istedik. Pediyatrik çağda ventriküloperitoneal şant takılan olguların ilgili literatür ışığında uygun takip ve tedavisi tartışılmıştır.

Anahtar kelimeler: Karın duvarı, anal protrüzyon, hidrosefali, ventriküloperitoneal şant, komplikasyon.

Introduction

Ventriculoperitoneal shunt (VPS) establishment is a frequently used procedure for hydrocephalus treatment. A high range of complications has been reported following this procedure (1). More than 50 % of patients require shunt revision which may lead to shunt infection and mechanical obstruction as the most common probable complications (2, 3).

However, migration of the peritoneal catheter is a relatively rare complication and spontaneous extrusion of the distal portion of a ventriculoperitoneal shunt through the anus is an unusual, but serious complication of VPS (4,5). In addition, spontaneous extrusion of the peritoneal catheter through intact abdominal wall is very rare (6). Mechanical trauma of the VPS catheter should be taken into consideration for various symptoms after shunt procedure including distension, nausea, vomiting and fever. The need for early diagnosis and proper treatment are discussed in light of related literature for a good outcome.

Yazışma Adresi: Ahmet DAĞTEKİN

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Case 1

A twenty-month old male baby was brought to the pediatrics clinic with seizures and general discomfort. Physical examination revealed a tight, 4x4 cm anterior fontanalle. The VPS procedure was conducted because of the diagnosis of hydrocephalus. In the postoperative first month, the patient was hospitalised for abdominal distension and fever. Antibiotic treatment was administered due to a diagnosis of peritonitis secondary to meningitis. A Cerebrospinal fluid (CSF) culture was negative and the patient was discharged after 10 days of antibiotic treatment. Two weeks after discharge, he was admitted to the emergency department with the shunt catheter's distal end protruding through the anus (Figure-1). After abdominal ultrasonography (USG) and plain radiographs, the shunt was removed immediately. An external ventricular drainage (EVD) was established directly following the shunt removal. The patient was followed-up with erythrocyte sedimentation rate, C-reactive protein and white blood cell counts. No-extra interventions were performed for the perforated gut. Antibiotic prophylaxis prevented any further infections. After the closure of EVD, the shunt procedure was not planned again due to the lack of any signs of hydrocephalus. The patient was discharged with the advice of periodical hydrocephalus controls.



Figure 1: The distal tip of the ventriculoperitoneal shunt which perforated the colon anus exiting from the anus.

Case 2

A two-year old male baby was admitted with the shunt catheter's distal end protruding through the intact abdominal wall (Figure-2). He had undergone VPS insertion twenty months prior for congenital hydrocephalus. Five days prior to his current admission, the family noticed a painless, small blister and erythema

on abdominal wall. After abdominal USG, the shunt was removed immediately and broad-spectrum antibiotic treatment was started. CSF culture was negative. Computed tomography (CT) of the head revealed dilated ventricles on the postoperative day 3. A new VP shunt was put to the opposite side. A postoperative CT showed that the size of the ventricles had decreased. The patient was discharged with the advice of periodical hydrocephalus controls.



Figure-2: Spontaneous extrusion of the distal peritoneal catheter through the intact abdominal wall.

Discussion

VPS is among the most frequently performed operations in the management of hydrocephalus. Abdominal complications secondary to VPS surgery include intestinal obstruction (7), mechanical blockage of the distal end by omentum causing shunt failure (2), formation of abdominal pseudocyst (8), extrusion through the scrotum (9), umbilicus (1), intact abdominal wall (6), transoral (10), or transanal protrusion (4). Although some studies have reported higher rates (2.51%) (4), spontaneous bowel perforation is a rare complication of VPS surgery (0.01-0.07%) (11). The sharp tip at the distal end of the catheter is blamed for higher complication rates. It should be kept in mind that this is a rare but a highly mortal complication (15%) (12). Spontaneous extrusion of the distal peritoneal catheter through the intact abdominal wall is very rare (6). Various hypotheses have been put forward regarding causes of spontaneous extrusion of the peritoneal catheter through the intact abdominal wall or chest wall (6, 13). Etiology of early extrusion of the shunt may include focal wound dehiscence and infection while delayed presentation may be attributed to ischemic necrosis of dermis overlying shunt components (13).

Other factors that may contribute to shunt extrusion include poor host immunity, factors related to surgical technique and bioreactivity of shunt components (13). Superficial peritoneal shunt catheter placement can also cause extrusion of the shunt catheter (14).

Secondary to colonic perforation shunt malfunction, nausea and vomiting, abdominal abscess formation, fever and peritonitis can be seen. The symptoms are usually occult / unknown? / acute? (15). The median interval between the first symptoms and the diagnosis of bowel perforation by peritoneal catheter is reported as 30 days (5 days–6 months) (16). One has to be extremely watchful to notice the invisibly dislocated anus in mildly symptomatic colonic perforation cases. The incidence of the anal dislocation of the distal tip was reported to be between 15.7%-44% (11, 12). Therefore, being suspicious in diagnosing colonic perforation is of utmost importance for patients secondary to VPS with diarrhea and/or abdominal symptoms of unknown origin, or enteric bacteria related meningitis in previously shunted patients (4, 11). In our case, the perforation at the first admission was probably missed due to a lack of suspicion.

X-ray, USG and CT scan are diagnostic tools (11). CT scanning and USG show occasionally a thickened bowel wall and mucosa and focal peritonitis. However, in the majority of cases, the radiological study of the abdomen is negative or unspecific. In the first case, plain x-ray showed the distal tip of the shunt entering the colon and exiting through the anus. A cerebrospinal fluid examination showed pleocytosis with 50% positive culture. The most common bacteria were *Escherichia coli* (12). This patient had polymorphonuclear leukocyte and protein increase in CSF and *E.Coli* propagation in CSF culture. In the other case, abdominal USG did not show any signs of intraabdominal pathology and the catheter was removed.

The formation of an encasing fibrosis is reported to be an important factor in explaining the anchoring effect on the tube, resulting in pressure on an area of the bowel

leading to perforation (17). There is not an obvious relationship between the distal end length of the shunt and perforation rates (12, 18). In a study where a 75 cm distal tip was used, the authors reported that there may be a relationship between the length of the shunt and perforation rates (4). Although another investigation showed that extended length (120 cm) was not associated with increased complication (19). Despite the fact that spring-loaded catheters have become notorious for their ability to perforate virtually any viscus in the abdomen (11, 16, 18, 20), other reports have shown that unloaded silicon catheters are also responsible for bowel perforation (19, 21, 22). In our cases, we used a 60 cm soft non-cutting distal tipped catheter. It is advised that the trocar should not be used and the distal shunt should be placed under direct vision.

More recently, evidence of silicon allergy, which may result in a foreignbody-like reaction, has been implicated in the breakdown and perforation of the bowel (23). Three such instances of bowel perforation have been reported, suggesting the possibility of silicon allergy as the etiology.

The shunt can be removed directly without laparotomy only if we are sure that there is evidence of neither abdominal abscess formation nor peritonitis. Laparotomy is indispensable in peritonitis cases (15, 24). The previously shunted patients are compelled to use shunts so it is necessary to perform EVD. Meningitis or ventriculitis secondary to retrograde migration of bacteria should be treated according to the culture-antibiogram results.

The intestinal perforation should be kept in mind in VPS patients with abdominal symptoms. The cardinal factors preventing mortality are early diagnosis and appropriate treatment. If spontaneous extrusion of the distal peritoneal catheter through the intact abdominal wall is encountered, prophylactic antibiotics should be started without delay and the shunt should be removed completely.

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