



Bowel Perforation at The Delayed Stage After Shunt Surgery: Case Report

Şant Cerrahisinden Sonra Geç Dönemde Barsak Perforasyonu: Olgu Sunumu

Şant Cerrahisinden Sonrası Barsak Perforasyonu / Bowel Perforation after Shunt Surgery

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Özet

Ventriküloperitoneal şant cerrahisi hidrosefalusun tedavisinde yaygın kullanılan işlemdir. Bu invaziv işlem geç dönemde birkaç abdominal komplikasyonla birlikte- dir. Peritoneal kateter ile spontan barsak perforasyonu nadirdir, ama önemli bir komplikasyondur. Eğer erken tanı konulmazsa, kateter yoluyla taşınan gastroin- testinal floradan dolayı şiddetli ventrikülit ve en sonunda sepsis gelişebilir. Hidro- sefalili 7.5 yaşında bayan hasta, tekrarlayan menenjit nedeniyle bizim kliniğimi- ze kabul edildi. Bilgisayarlı abdomen tomografisi sigmoid kolonu perfor eden pe- ritoneal kateteri ortaya çıkardı. Eğer şanlı hastalarda peritoneal kateterin rektal çıkımı olmaksızın tekrarlayan menenjit atakları varsa barsak perforasyonu kesin-likle düşünülmelidir.

Anahtar Kelimeler

Barsak Perforasyonu; Hidrosefali; Şant İnfeksiyon; Ventriküloperitoneal Şant

Abstract

Ventriculoperitoneal shunt surgery is common used procedure in the treatment of hydrocephalus. This invasive procedure has been associated with several abdomi- nal complications. Bowel perforation from peritoneal catheter is rare, but is an important complication; if early diagnosis is established severe ventriculitis and sepsis may develop ascending infection from gastrointestinal flora migrating thor- ough catheter. A 7.5-year-old, ventriculoperitoneal shunted girl with hydroceph- alus was admitted for recurrent meningitis. Computed tomographic scan revealed peritoneal catheter perforating the sigmoid colon. Bowel perforation should be considered definitely if there is recurrent meningitis without the rectal extrusion of peritoneal catheter in patients with shunt.

Keywords

Bowel Perforation; Hydrocephalus; Shunt Infection; Ventriculoperitoneal Shunt

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Introduction

The ventriculoperitoneal shunt surgery is the most used procedure for the treatment of hydrocephalus. Intestinal perforation by peritoneal catheter is a rare complication. A variety of complications such as obstruction, infection, subdural hematoma, over drainage, visceral perforations may occur following the procedure [1]. Migration into visceral structures of shunt catheter is an infrequent complication. Spontaneous bowel perforation by peritoneal catheter is rare. However, this delayed complications may cause fatal ventriculitis, meningitis, or sepsis [1-8]. Diagnosis of bowel perforation is self-evident when the catheter protrudes thorough the anus. Pathogenesis of bowel perforation is debated. Early diagnosis is important due to high mortality. Diagnosis of bowel perforation by peritoneal catheter is simple if the catheter extrudes thorough anus. Clinical picture, pathogenesis, diagnosis and management of delayed stage bowel perforation are discussed in the current study.

Case Report

A 7.5-year-old, ventriculoperitoneal shunted girl with hydrocephalus secondary to myelomeningocele was referred to our clinic. Her general condition was deteriorated and physical examination showed fever and neck stiffness. The rectal examination was evaluated normally; there were no abdominal symptoms or signs, such as distension and tenderness. Neurological examination revealed paraplegia. Laboratory investigations were as follows: White blood cell count 17.300/ mm³, hemoglobin 12.7 g/dl, erythrocyte sedimentation rate 25 mm/h, C-reactive protein 18.2 mg/dL. Examination of cerebrospinal fluid revealed profuse cell count, with a glucose level of 18 mg/dl and protein level of 85 mg/dl. *Escherichia coli* was cultured from CSF. She had been operated on for hydrocephalus and for repair of myelomeningocele 7.5 year before. She had undergone recurrent meningitis three times for one year. Surgery was performed immediately after admission. Abdomen computed tomography showed peritoneal catheter perforating the sigmoid colon (Figure 1). Laparotomy was performed. It appeared to be perforated the sigmoid colon from peritoneal catheter (Figure 2). The peritoneal catheter and proximal segment was removed. External

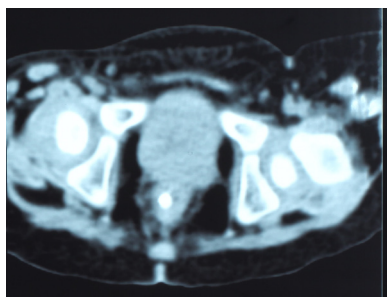


Figure 1. Abdomen computed tomographic scan showing the peritoneal catheter perforating the sigmoid colon.



Figure 2. Intra-operative view: The picture of the distal peritoneal catheter perforating the sigmoid colon.

ventricular drainage catheter was inserted. The patient was treated for bacterial meningitis with broad spectrum intravenous antibiotics for two weeks. After infection is resolved, a new shunt system was inserted. She was asymptomatic during the follow-up period for twenty months and a computed tomography scan revealed ventricles with normal size.

Discussion

Ventriculoperitoneal shunt is most frequent used method for treatment of hydrocephalus. However, spontaneous bowel perforation is a rare complication from peritoneal catheter and its incidence is between 0.1-0.7% in shunted patients [2,3]. Bowel perforation may manifest immediately after surgery or several years later. The ventriculitis, meningitis, intraabdominal abscess and generalized peritonitis that occur due to intestinal perforation are life-threatening complications [3]. The most common presentation of bowel perforation is extrusion of catheter thorough anus [2-6]. Wilson et al. [4] first reported an intestinal perforation induced by peritoneal catheter. In case of bowel perforation noted, clinical peritonitis incidence is less than 15-25%; meningitis incidence is 43-48% and *Escherichia coli* is most common organism in CSF culture [7]. We reported a case of colonic perforation by ventriculoperitoneal catheter with no tube protruding from the anus.

In early bowel perforation, previous abdominal infections may lead to adhesions and use of toracar to introduce catheter into the peritoneal cavity; Therefore, many authors prefer to approach the periton under direct vision. Early stage bowel perforation is result of technical error rather than inflammation. The delayed stage bowel perforation may result from a chronic inflammatory process. Exact pathogenesis of ventriculoperitoneal shunt-related organ perforation is unclear and various mechanisms are suggested, such as foreign body reaction, pressure necrosis and poor general condition with weakening of intestinal wall and stiff end of shunt tube causing intestinal perforation [2-8]. De Aquino et al. [1] analyzed that all reports related to these complications; assumed that the length of catheter and the presence of fibrosis around the distal catheter are important factors; however, whether the length of the peritoneal end of the shunt has a important role in occurrence of the bowel perforation is unclear [5]. Also authors have stated that unloaded silicon catheters, which do a foreign body-like reaction, are also responsible for bowel perforation [2,5,6]. Malnutrition may enhance chronic irritation and cause intestinal perforation. Previous inflammation and irritation to bowel wall, undergone abdominal surgery, use of sharp, hard tipped and long peritoneal catheters may contribute to perforation [2,3]. Di Rocco et al. [8] consider that patient with myelomeningocele may be at increased risk for bowel perforation. These children may be more susceptible to developing perforation due to a weakness in the bowel wall resulting from deficient innervation. Therefore, bowel may be easily perforated by hard-tipped catheters. In light of literature, the patient's clinical condition and used

type of catheter may be significant factors.

Early diagnosis of bowel perforation is essential. Most important finding of intestinal perforation is protrusion of distal shunt catheter from the anus. However, diagnosis of bowel perforation is frequently difficult if no anal extrusion of distal catheter exist. Bowel perforation due to peritoneal catheter should be considered in any patient with ventriculoperitoneal shunt who

presents with central nervous system infection from enteric gram negative organism, the most common of these being *Escherichia coli*. In any case of doubt, cerebro spinal fluid should be obtained from lumbar puncture or tapping of the shunt. Bowel perforation causes obstruction of shunt because of meningitis or ventriculitis; therefore, these patients are referred for shunt failure. Signs of infection along catheter tract is another factor raising suspicion of shunt infection. The abdominal computed tomographic scan with contrast and ultrasonography may be helpful, showing location of distal catheter in the periton, local inflammation and thickened muscular layer and mucosa. Endoscopy may reveal perforation site of catheter thorough the colonic wall. if shunt is not protruded externally, radiography following injection of contrast medium into the shunt system can be used to diagnose bowel perforation. It may be very important to see the catheter extending into the intestinal lumen following injection of contrast medium into the shunt system in the radiography [5,6].

The treatment of patients who developed intestinal perforation from chronic irritation should include following: removal of shunt, external drainage and broad spectrum antibiotics, followed by insertion a new peritoneal shunt. The peritoneal catheter should be removed distally and this point is very important in order to avoid the spread of infection to the CNS. An external ventricular drainage should be performed until meningitis or ventriculitis subside and then shunt is revised. Atrial shunt is indicated only if abdominal problem is not solved at the time of shunt insertion. Bowel perforation should be prevented as much as possible. Our patient underwent laparotomy, but many cases reported in literature have a good results by removing the catheter by percutaneous or endoscopic approach instead of by laparotomy [2,4-7]. For patients with catheter protruding thorough the anus and no signs of intraabdominal infection, the catheter can be removed safely by pulling thorough the anus.

Conclusion

Early diagnosis of bowel perforation is significant. If catheter is left inside gastrointestinal lumen for a long time, severe ventriculitis and finally sepsis may develop ascending infection from gasrointestinal flora migrating thorough catheter. Because mortality of generalized sepsis or of gram-negative ventriculitis secondary to bowel perforation by a shunt is high, we emphasize that symptoms, such as fever, vomiting and abdomen tenderness, which may occur following perforation, must be evaluated carefully in patients with ventriculoperitoneal shunt.

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