

Constipation as a Rare Cause of Ventriculoperitoneal Shunt Dysfunction: A Case Report

Mesut Mete¹ Mehmet Selçuki²

¹Department of Neurosurgery, Celal Bayar University School of Medicine, Manisa, Turkey

²Department of Neurosurgery, Private Practice, Turkey

Address for correspondence Mesut Mete, MD, Department of Neurosurgery, Celal Bayar University School of Medicine, Yelken Evleri Sitesi B Blok k:5 d:16 Güzelyurt, Manisa, Turkey (e-mail: dr.mmte@hotmail.com).

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Abstract

Ventriculoperitoneal shunt (VPS) insertion is a common neurosurgical procedure for the treatment of hydrocephalus. Constipation can play an important role in shunt failure either by mechanically blocking drainage from the peritoneal end of the VPS catheter or by increasing intra-abdominal pressure. The present report describes a 2-year-old boy with shunt-dependent hydrocephalus who presented with signs of shunt dysfunction. Medical history with detailed physical examination determined the constipation. Before shunt revision, a pediatric fleet enema was administered to possibly relieve the constipation and he had good evacuation of the bowel contents. Following the enema, his continuous crying resolved and ultimately disappeared within a few hours. Brain computed tomography scans performed 4 days later showed a reduction in ventricular size.

Keywords

- ▶ constipation
- ▶ hydrocephalus
- ▶ ventriculoperitoneal shunt

Introduction

Ventriculoperitoneal shunt (VPS) insertion is a common neurosurgical procedure for the treatment of hydrocephalus. The VPS is based on the pressure differential between the ventricular space and the peritoneal cavity.^{1,2} VPS is commonly used in children with congenital hydrocephalus and the estimated rate was reported as 1.4 per 10,000 births.² The most common complications of VPS insertion include shunt obstruction, shunt infection, segmental disconnection or breakage, cerebrospinal fluid (CSF) pseudocyst formation, allergy, and shunt migration.³ VPS dysfunction is not uncommon as it occurs in ~40% of patients in the first year.^{1,2} Although VPS dysfunction may happen for a variety of reasons, one-fourth of cases are related to abdominal complications.^{1,4} Constipation is a possible abdominal-related factor that may contribute to VPS dysfunction. The present report describes a 2-year-old boy with shunt-dependent hydrocephalus who presented with signs of shunt dysfunction. Comprehensive medical history with a detailed physical examination determined the constipation. After treatment of constipation, the patient's symptoms were resolved and he was discharged without shunt revision.

Case Report

A 2-year-old boy presented to our emergency department with complaints of continuous crying, nausea, and vomiting in the absence of seizures, fever, or loss of consciousness. Communication with parents was difficult, so comprehensive medical history could not be obtained. As we learned from the epicrisis report, the patient had been treated with VPS insertion because of hydrocephalus in our department when he was 6 months old. In surgery, briefly, a pediatric medium-pressure shunt was inserted by mini laparotomy method. The neurological examination revealed that he was inactive but alert, and that his pupils were equal and reactive to light. The shunt was examined and there was resistance while pumping. No swelling or redness was found around the distal shunt tube or pseudomeningocele around the valve. Because there were no signs or complaints that would suggest a shunt infection (e.g., fever, redness around the distal shunt tube or valve), we did not take any sample from the reservoir. A physical examination revealed abdominal distension. Although constipation was not one of the complaints, we learned that the patient had been constipated for 7 days after examining the anamnesis. To determine the

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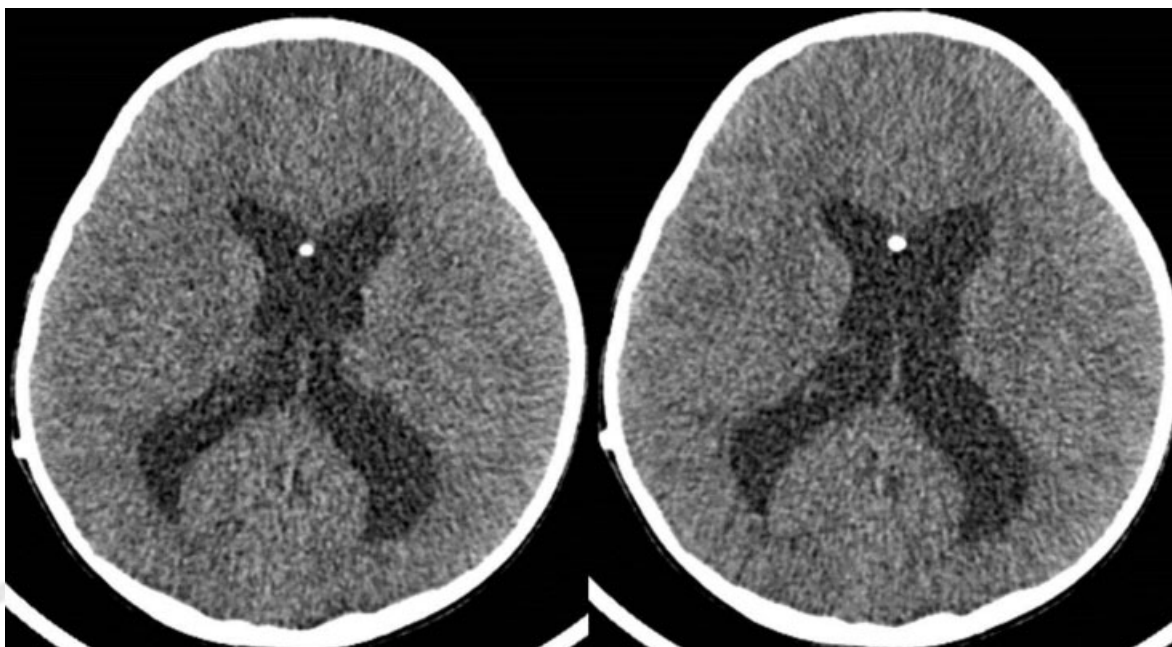


Fig. 1 Brain computed tomography scans revealed a moderate ventricular dilatation.

possible causes of shunt obstruction, brain computed tomography (CT), abdominal ultrasound (US) and abdominal radiography were taken.

The CT scan revealed a moderate ventricular dilation (→ **Fig. 1**). There were no significant periventricular lucencies and a shunt survey showed no evidence that the shunt assembly had disconnected. There was no free fluid in abdominal US. However, anteroposterior radiography of the abdomen revealed dilated colonic loops filled with fecal matter (→ **Fig. 2**). We suspected that constipation may have caused shunt dys-

function. Subsequently, a pediatric fleet enema was administered to relieve the constipation and the patient had a good evacuation of the bowel contents. Following the enema, his continuous crying resolved and ultimately disappeared within a few hours. The patient was more energetic and alert and, following removal of the feces, his abdominal distension and other symptoms improved. Brain CT scans performed 4 days later showed a reduction in ventricular size (→ **Fig. 3**). In addition, anteroposterior radiography of the abdomen showed widespread intestinal gas and the peritoneal catheter after the evacuation of fecal matter (→ **Fig. 4**).



Fig. 2 Anteroposterior radiography of the patient's abdomen showing dilated colonic loops filled with fecal contents.

Discussion

Ventriculoperitoneal shunt dysfunction is a common problem that has numerous possible causes because the etiological features may occur proximally, distally, or both.² Risks for distal shunt failure such as intestinal obstruction, pregnancy (likely secondary to the increasing size of the gravid uterus and its effect on intra-abdominal pressure²), abscesses, cyst formation, a lowering of the absorption capacity of the peritoneal cavity, urinary bladder infection, shunt migration, or silicone allergy account for up to 25% of problems.¹⁻⁵ Constipation can play an important role in shunt failure either by mechanically blocking drainage from the peritoneal end of the VPS catheter or by increasing intra-abdominal pressure.^{1,5} Constipation could block catheter drainage simply by mechanical obstruction of the catheter outlet holes. Alternatively, severe constipation with megacolon could alter intra-abdominal pressure to the degree of decreasing or stopping CSF flow through the tubing.⁴

The first study to propose constipation as a possible factor for VPS dysfunction⁴ was a case series of 19 patients with constipation and VPS malfunction symptoms.⁶ In 6 of the 19 patients, bowel cleansing was performed and the

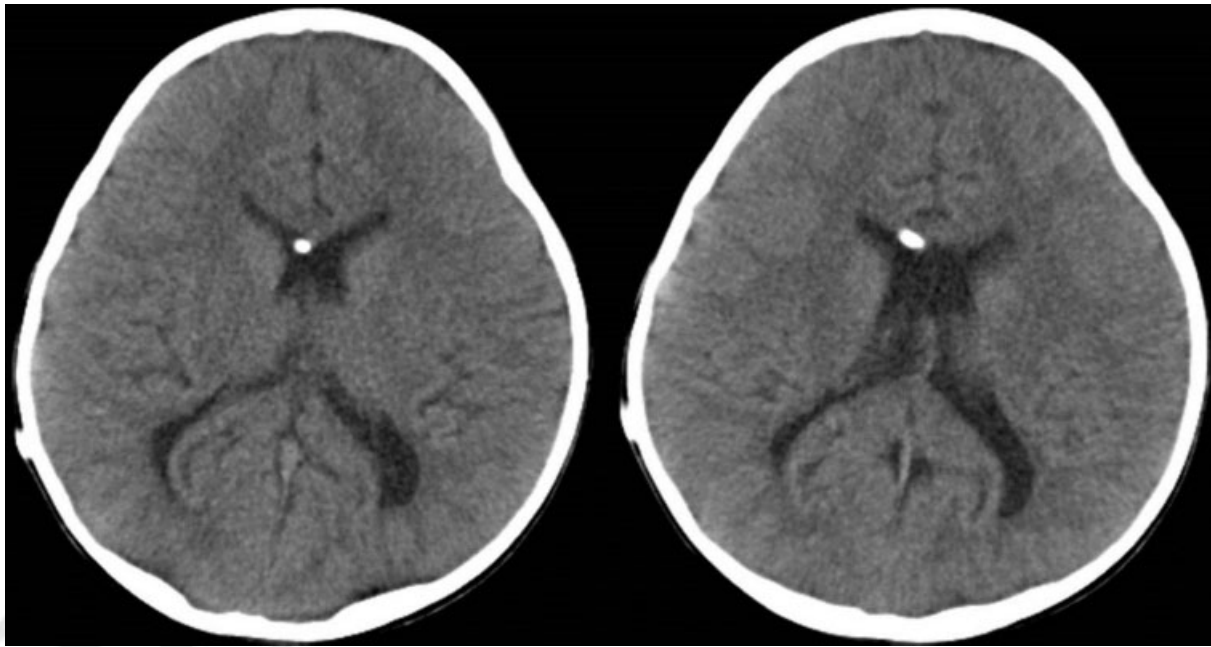


Fig. 3 Brain computed tomography demonstrated reduction in ventricular size.



Fig. 4 Anteroposterior radiography of the abdomen, showing the widespread intestine gas and peritoneal catheter within the abdomen after evacuation of fecal contents after administration of enema.

shunt was not revised. However, these authors could not directly confirm the relationship between VPS malfunction and constipation.⁴ In recent years, reversible VPS dysfunction has been reported in both pediatric and adult patients

with constipation.^{1,2,5} For example, Morais et al reported the case of a 6-year-old girl with VPS who was implanted with a shunt due to hydrocephalus secondary to myelomeningocele. She presented with intermittent headache, vomiting, constipation, abdominal distension, and pain, and the authors reported a decrease in ventricular size after a fleet enema.¹ Similarly, Muzumdar and Ventureyra reported the cerebral palsy case of a 16-year-old boy with shunt-dependent hydrocephalus secondary to prematurity and intraventricular hemorrhage at birth who presented with intermittent headache, nausea, and constipation. Following a bowel enema, the patient's headaches and nausea resolved over the next few hours and post-treatment CT scans showed a significant decrease in ventricular size.⁵ Similar to these studies, the patient admitted to our emergency department complained of continuous crying, nausea, and vomiting. Because the physical examination revealed abdominal distension, we thought that shunt dysfunction symptoms could improve with constipation therapy. Following the pediatric fleet enema, symptoms were improved.

In patients with spinal dysraphism or cerebral palsy, chronic constipation can occur secondary to the neurogenic bowel. However, as in our patient and those with no history of chronic constipation, the pathophysiology is still unclear. Miele et al reported three cases with VPS dysfunction secondary to transient increase in intra-abdominal pressure. One of the patients had cerebral palsy, one had postoperative ileus, and the other had small bowel obstruction. The authors stated that ileus or small bowel obstruction can alter the pressure balance needed for proper distal function.² Since our patient did not have a history of chronic constipation, the constipation may have arisen due to small bowel obstruction as a result of the foods that were consumed.

In clinically symptomatic patients, the diagnosis of VPS dysfunction is usually done with brain CT scans. To determine

whether the problem is at the proximal or distal end, a shunt series should be taken that includes anteroposterior and lateral views of head, a cervical thoracic view, and an abdominal view.^{1,2,5} Thus, the fracture, kink, or rupture in the catheter can be clearly revealed.

Conclusion

Constipation represents a rare cause of VPS malfunction and should always be considered in differential diagnosis. If it is difficult to communicate with the child or the parents, a comprehensive medical history with a detailed physical examination should be done to prevent unnecessary surgery.

Conflict of Interest
None declared.

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