

# Ventriculoperitoneal shunt presenting as umbilical CSF fistula

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### ABSTRACT

An umbilical cerebrospinal fluid (CSF) fistula following a ventriculoperitoneal (VP) shunt is an extremely rare complication. The shunt can get blocked and infected and present as purulent umbilical discharge. We report an 11-month-old female infant who presented with recurrent purulent umbilical discharge, 6 months after VP shunt operation for hydrocephalus. After relevant investigations, she underwent exploratory laparotomy which revealed an umbilical CSF fistula with a blocked VP shunt. VP shunt removal was done with excision of the fistulous tract. The post-op period was uneventful and umbilical discharge ceased. She is further planned for endoscopic third ventriculostomy. Umbilical discharge in a neonate may be due to several pathologies. The family physician is the first point of contact in the majority of the cases before they seek a specialist. Hence, recurrent umbilical discharge not responding to conservative management must be evaluated carefully, referred promptly, and the underlying pathology to be treated.

**Keywords:** Cerebrospinal, discharge, fluid, neurosurgery, pediatric, shunt, surgery, umbilicus, VP

### Introduction

Ventriculoperitoneal (VP) shunt is one of the most common surgical procedures performed for the management of congenital hydrocephalus.<sup>[1]</sup> VP shunt can present with abdominal complications such as peritoneal pseudocyst, obstruction of the lower end, and shunt infection, and uncommonly, hollow viscus microperforations can occur.<sup>[2]</sup> An umbilical cerebrospinal fluid (CSF) fistula following a VP shunt is an extremely rare complication.<sup>[3]</sup> We present a case of an infant with a CSF fistula developing from the umbilicus following VP shunting for congenital hydrocephalus.

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### Case Report

An 11-month-old female infant presented to pediatric surgery outpatient department (OPD) with complaints of recurrent seropurulent discharge from umbilicus for 3 months. There were no other confounding complaints. She had two episodes of similar complaints in the last 3 months and was treated on a conservative basis with antibiotics, dressing, and proper nutrition. The baby had a history of VP shunting done 6 months ago for congenital hydrocephalus. On clinical examination, her vitals were stable with a heart rate of 110 beats/min and normal capillary refill time. Systemic examination revealed. The abdomen was soft and non-tender with no lump palpable. Umbilicus was inverted with no swelling or abnormal skin changes. There was occasional spontaneous seropurulent discharge from the umbilicus which was thick in consistency, scanty, non-foul-smelling, and was not expressible. Neurosurgical reference was taken which revealed a functioning and patent VP shunt.

Hematological investigations were completely normal. The seropurulent discharge was sent for Gram stain, culture, and

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sensitivity, which revealed no growth of microorganisms. The baby was started on antibiotics, adequate nutrition, and regular dressings. The discharge was reduced after the management but did not stop completely.

A contrast-enhanced computed tomography (CECT) of the abdomen and pelvis was done which revealed free fluid in the pelvis with small peripherally enhancing collection on the right side of the urinary bladder adjacent to the distal end of the VP shunt [Figure 1] and minimal hypodense collection in the periumbilical area near the loop of VP shunt [Figure 2].

She was planned for exploratory laparotomy. Intraoperatively the tip of the VP shunt was found near the fundus of the urinary bladder with a fistulous tract [Figure 3] covering the distal end of the VP shunt which was attached to the fundus of the urinary bladder and proximally to the umbilicus. The fistulous tract was excised and the VP shunt visualized [Figure 4] with purulent discharge noted at the distal end. Neurosurgery intervention was called for intraoperatively and due to the purulent nature of discharge the VP shunt was removed and the fistulous tract was excised.

Postoperatively the baby recovered with the cessation of umbilical discharge. A CT brain was done which revealed hydrocephalus. At present, she is being planned for endoscopic third ventriculostomy.

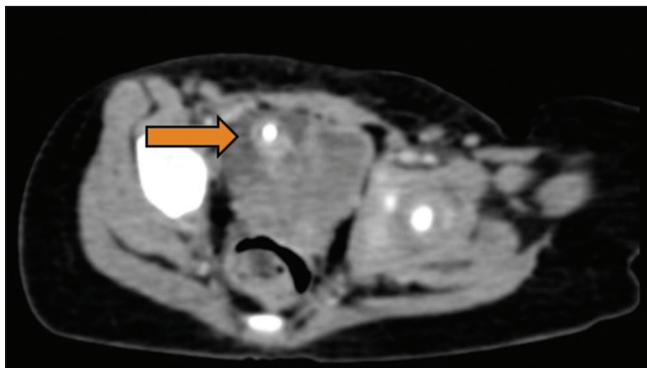
## Discussion

Complications of VP shunt have been well studied. Umbilical CSF fistula is one of the less common complications of VP shunt.<sup>[4,5]</sup> Only a few cases have been reported in the literature.

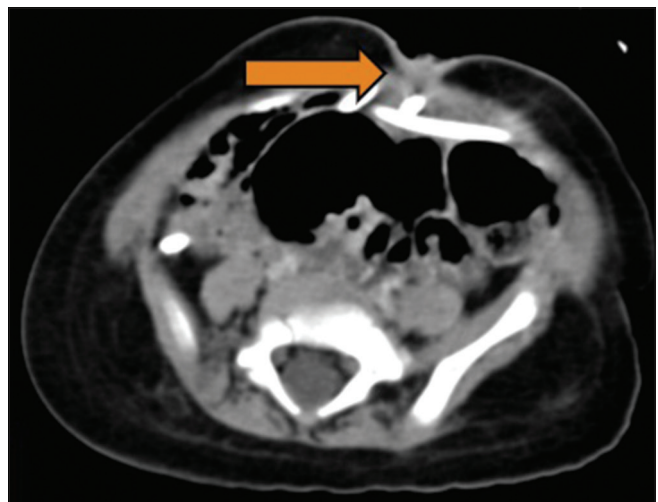
Most of the umbilical CSF fistula cases have concurrent extrusion of VP shunt through the umbilicus or anterior abdominal wall.<sup>[6,7]</sup> It is mostly due to weakened anatomic area or a patent vitello-intestinal duct. The distal of the tip of the VP shunt may irritate the anterior abdominal wall and create a pressure effect over the peri-umbilical region resulting in adhesions to urachus resulting in a fistula.

Some authors have provided the role of infection, malnutrition, tissue weakness, wire spring catheters, and abdominal adhesions as the major factors responsible for the transmural shunt penetration into the anterior abdominal wall.<sup>[5,8-10]</sup>

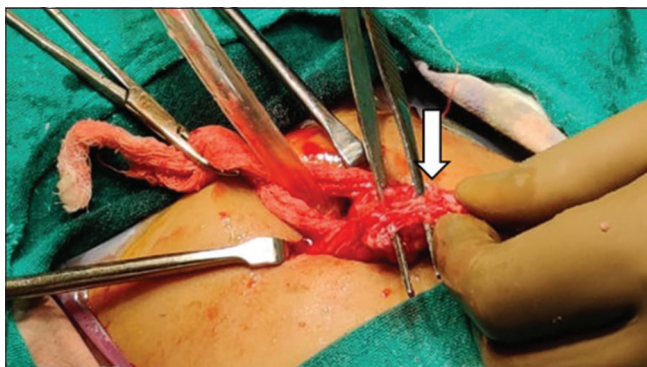
In our case, pericatheter fibrosis, secondary to shunt infection, leading to the formation of a fistulous tract from the urinary bladder wall to the umbilicus is the likely pathophysiology.



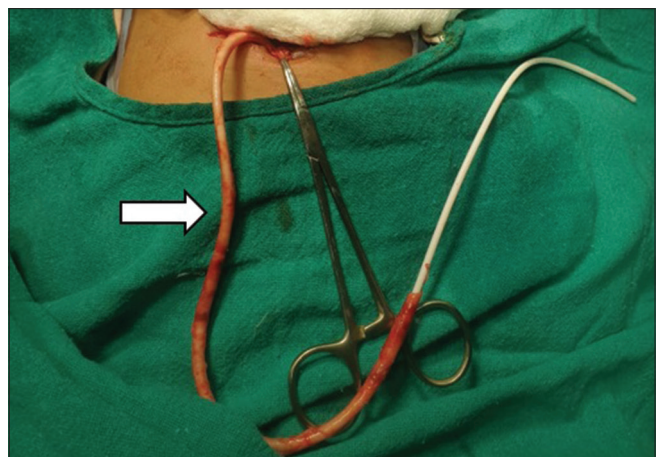
**Figure 1:** CECT pelvis showing the distal end of VP shunt on the right side of the urinary bladder with a small collection



**Figure 2:** CECT abdomen showing periumbilical collection near to loop of VP shunt



**Figure 3:** Fistulous tract covering the VP shunt, attached distally to the fundus of the urinary bladder and proximally to the umbilicus



**Figure 4:** Distal end of VP shunt with the fistulous tract covering

Umbilical CSF fistula following VP shunting, itself being a rare entity, in our case was unique as the tip of the shunt was not lying adjacent to the umbilicus.

Moreover, the patent VP shunt made it harder to reach the diagnosis.

Umbilical discharge has various etiologies<sup>[1]</sup> and many respond to conservative treatment. Usually, family physicians are the first point of contact for such complaints. It is important for the treating physician to carefully evaluate such cases and a prompt referral should be made if needed. Timely referral and early intervention can prevent further complications caused by the underlying etiology for umbilical discharge. Recurrent umbilical discharge not responding to conservative management should be given special attention and rare pathologies should be suspected as well.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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