Unusual Ventriculoperitoneal Shunt Extrusion: Experience with 5 Cases and Review of the Literature

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Key Words
Ventriculoperitoneal shunt · Hydrocephalus · Distal catheter migration

Abstract
Distal migration of ventriculoperitoneal shunt is rare. We present this unusual complication in 5 patients. The lower end of the shunt was extruded from right lumbar region, cervical area, umbilicus and rectum. The cause of such extrusion is not known. The patients were managed by shunt removal followed by shunt replacement on the opposite side.

Introduction
Ventriculoperitoneal (VP) shunt is an established method of diverting CSF for the management of hydrocephalus. The procedure is associated with various complications. Shunt infection, malfunction, peritoneal complications, pseudocyst and extrusion are common. The reported incidence of abdominal complications is 10–30% [1]. Migration of the lower end of the shunt catheter is an infrequent problem, which occurs without any recognizable cause. The reported incidence of distal shunt migration is 10% [2]. Approximately 30–35 patients undergo VP shunt insertion at our institute annually. The incidence rate of all sorts of complications in these patients is around 22%. Unusual distal catheter migration with extrusion was seen in 5 patients. As would have been expected, not all but 1 patient had associated features of meningitis. No specific cause of the abnormal migration could be identified.

Case Summary
Five patients with spina bifida with lumbosacral defects underwent VP shunt placement due to associated hydrocephalus. The age at shunt placement ranged from 1 to 3 months. The age at time of shunt extrusion ranged from 3 to 6 months with the average time interval of 3 months.

The patients presented with the distal end of the shunt catheter tip coming out from the right lumbar region in 1 patient (fig. 1), cervical region in 2, umbilicus in 1 (fig. 2) and rectum in 1 (fig. 3). In all patients, the catheter tip was draining CSF well, as observed after pressing the shunt reservoir. The 1st patient with the extrusion from the right lumbar region had an associated lumbar hernia due to neurological deficit. He presented with meningitis and severe septicemia to which he succumbed later on. This was the only mortality in the presented series. In the remaining 4 patients, there were no features of meningitis. Cerebrospinal fluid taken through aspiration of shunt reservoir showed growth of coliforms in the 1st patient with lumbar extrusion. The remaining 4 patients had negative CSF growth.
All the 5 patients were initially managed by shunt removal through a small incision below the ipsilateral parietal eminence. In 4, the entire shunt was removed through this incision, whereas in the patient with rectal extrusion the distal end of the catheter was pulled out through the rectum after division of the shunt just below the reservoir. This was done to avoid catheter track contamination. This was followed by intravenous antibiotics in meningitic doses.

Replacement of VP shunt was done after an interval of 3–6 weeks during which negative CSF examination and cultures were ensured. Due to nursing difficulty and problems with home management, exteriorization of the shunt is not practiced at our hospital. Patients were kept on oral acetazolamide and glycerin in adequate dosages to limit the increasing hydrocephalus.

**Discussion**

We use medium-pressure spring valve-based Chabra VP shunt in all patients. It is made from silastic rubber, which is the most supple, flexible and soft of all the catheters used in medical practice. The reported incidence of distal catheter migration is less than 10% [1]. The occurrence of such a complication is fatal due to ascending bacterial meningitis.

Several reports regarding the abnormal migration of the lower end are available in the literature. The commonest type reported is the migration within the peritoneum. The favored sites are within the bowel lumen [3] (perforation), rectum [4] and out through the umbilicus [5]. Isolated reports are available of shunt catheter coming out through the mouth [6]. Migration into the scrotum through an inguinal hernia is also reported [7]. The other common extraperitoneal sites are the thorax through the diaphragm resulting in CSF hydrothorax [8]. None of the authors in the literature have been able to identify a specific cause of these complications. Akyuz et al. [8] hypothesized that the catheter tip adheres to the visceral wall, a local inflammatory process weakens the bowel wall and the tip then erodes into the lumen over a period of time. A constant pressure abutting the tip of the catheter with the viscera or the extruding surface usually co-occurs in this kind of setting. This favors the tip migration through the abnormal site. Similar etiopathogenesis was given by Shetty et al. [9]. Previously, with the use of stiffer catheters the occurrence of abdominal compli-

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**Fig. 1.** Shunt catheter coming out through the right lumbar region.

**Fig. 2.** Shunt catheter coming out through umbilicus.

**Fig. 3.** Rectal extrusion of shunt.
cations was high, but now with the introduction of more soft and supple catheters this has been reduced.

The basic principles in the management of these patients are [3] prompt removal of shunt, intravenous antibiotics and an adequate recovery gap so that CSF culture is sterile on two successive occasions. This is followed by shunt replacement on the opposite side. During the interval which is around 3–4 weeks, the patient can be kept on cerebral dehydrants to limit the increasing hydrocephalus.

In summary, unusual distal catheter tip migration of VP shunt is a rare but serious problem. We were not able to point out any specific cause of this; shunt behavior is unpredictable. The complication occurs even after all precautions with the technique of placement have been taken; however, in view of the potential for meningitis prompt and aggressive management is essential to avoid morbidity and mortality.

References