Ventriculoperitoneal Shunt Complications

see External ventricular drainage complications

see also Cerebrospinal fluid shunt complications.

Catheter migration or disconnection

Ventriculoperitoneal shunt is the most common treatment to manage hydrocephalus; It is unfortunately burdened by up to 25% of complications. The peritoneal approach may expose patients to many complications.

Patients with a ventriculoperitoneal shunt tend to develop epidural fluid accumulation after cranioplasty and also have a higher frequency of syndrome of the trephined after bone flap removal. Thus treatment of patients with postcranioplasty infection and a VP shunt is often challenging.

The management of ventriculoperitoneal shunt complication or failure is a common problem in neurosurgical practice. On occasion, extraperitoneal sites for CSF diversion are required when shunting to the peritoneal cavity has failed after multiple attempts.

Complications frequently associated with a VP shunt: includes shunt obstruction, infection, overdrainage of CSF, and perforation of the gastrointestinal tract, gallbladder, vagina, and abdominal wall at the umbilicus... [1].

Despite procedural and equipment advances, the procedure it is accompanied by frequent complications and malfunctions. Some studies have shown an overall shunt failure rate as high as 59%, with the majority of failures occurring within the first 6 months after shunt placement [2].

Endoscopic placement of ventriculoperitoneal (VP) shunt catheters in pediatric patients has been increasingly used in an attempt to minimize the unacceptably high rates of revision. Although this procedure carries an increased expense, there is currently no evidence to support an improved long-term outcome.

Endoscopic assisted ventricular catheter placement decreased the odds of proximal obstruction but failed to improve overall shunt survival in a 6 year experience [3].

Diagnosis

The evaluation of children with suspected ventriculoperitoneal shunt (VPS) malfunction has evolved into a diagnostic dilemma. This patient population is vulnerable not only to the medical risks of hydrocephalus and surgical complications but also to silent but harmful effects of ionizing radiation secondary to imaging used to evaluate shunt efficacy and patency. The combination of increased medical awareness regarding ionizing radiation and public concern has generated desire to reduce the reliance on head computed tomography (CT) for the evaluation of VPS malfunction. Many centers have started to investigate the utility of low dose computed tomography and alternatives, such as

fast magnetic resonance imaging for the investigation of VP shunt malfunction in order to keep radiation exposure as low as reasonably achievable.

A pilot study demonstrates that utilization of limited head CT scan in the evaluation of children with suspected VP shunt malfunction is a feasible strategy for the evaluation of the ventricular size [4].

In the study of Afat et al., low-dose computed tomography (LD-CT) provides excellent sensitivity and higher diagnostic confidence with lower radiation exposure compared with radiographic shunt series (SS) [5].

Ventriculoperitoneal shunt infection

see Ventriculoperitoneal shunt infection.

Ventriculitis

Intraventricular administration of proper antibiotics is a reliable and effective way to treat ventriculitis associated with ventriculoperitoneal shunts.

Vancomycin is the preferred antibiotic for ventriculitis, but other kind(s) of some antibiotics are necessary in a few patients in addition to or instead of vancomycin [6].

Ventriculoperitoneal shunt malfunction

Ventriculoperitoneal shunt overdrainage

see Ventriculoperitoneal shunt overdrainage

Ventriculoperitoneal shunt obstruction

see Ventriculoperitoneal shunt obstruction

Shunt calcification

see Shunt calcification

Abdominal complications

see Ventriculoperitoneal shunt abdominal complications.

Silicone allergy

Ventriculoperitoneal shunt complications have rarely been attributed to silicone allergy, with only a handful of cases reported in literature. The classic presentation of allergy to silicone ventriculoperitoneal shunt, i.e., abdominal pain with recurrent skin breakdown along the shunt tract, is nonspecific and difficult to distinguish clinically from other causes of shunt-related symptoms. It can be diagnosed by detection of antisilicone antibodies and is treated with removal of the shunt and replacement, if needed, with a polyurethane shunt system.

Kurin et al. report the first case of suspected silicone allergy presenting as clinical peritonitis without overt colonic perforation [7].

Progression of Normal-Tension Glaucoma [8].

Case series

Merkler et al., performed a retrospective cohort study of adult patients hospitalized at the time of their first recorded procedure code for VPS surgery between 2005 and 2012 at nonfederal acute care hospitals in California, Florida, and New York. We excluded patients who during the index hospitalization for VPS surgery had concomitant codes for VPS revision, CNS infection, or died during the index hospitalization. Patients were followed for the primary outcome of a VPS complication, defined as the composite of CNS infection or VPS revision. Survival statistics were used to calculate the cumulative rate and incidence rate of VPS complications.

17,035 patients underwent VPS surgery. During a mean follow-up of 3.9 (±1.8) years, at least one VPS complication occurred in 23.8% (95% CI, 22.9-24.7%) of patients. The cumulative rate of CNS infection was 6.1% (95% CI, 5.7-6.5%) and of VPS revision 22.0% (95% CI, 21.1-22.9%). The majority of complications occurred within the first year of hospitalization for VPS surgery. Complication rates were 21.3 (95% CI, 20.6-22.1) complications per 100 patients per year in the first year after VPS surgery, 5.7 (95% CI, 5.3-6.1) in the second year after VPS surgery, and 2.5 (95% CI, 2.1-3.0) in the fifth year after VPS surgery.

Complications are not infrequent following VPS surgery; however, the majority of complications appear to be clustered in the first year following VPS insertion [9].

Case reports

2017

Intermittent change in ventricular size in patients with ventriculoperitoneal shunts is a recognised complication but definitive imaging evidence is rare.

Aly et al. report a 3 years old boy with a spinal cord astrocytoma and ventriculo-peritoneal shunt placement who demonstrated intermittent ventriculomegaly during a single MRI scan [10)]

2015

A extremely rare and potentially severe complication of vesical calculi formation on the slit valves of distal end of VP shunt which erosively migrated into the urinary bladder. Suprapubic cystolithotomy performed, peritoneal end of the tube found to be eroding and entering into the bladder with two calculi firmly stuck to slit valves in the distal end of the tubing were removed. Shunt was functional, therefore, it was pulled out and repositioned on the superior aspect of the liver; the urinary bladder was repaired. Patient did well postoperatively. This complication was revealed 1.5 years after the shunt was implanted. Although there were symptoms of dysuria and dribbling of urine of short duration, the patient did not show obvious peritoneal signs; suggesting that, penetration of a VP shunt into the urinary bladder can remain asymptomatic for a long period of time, disclosed late and can lead to considerable morbidity. Careful follow-up is important and management should be individualized [11)].

2009

An unusual case of perforation of the distal end of the VP shunt into the bladder, with vesical calculus formation [12)].

2002

A bladder stone formed secondary to the erosion of a ventriculoperitoneal shunt through a normal bladder wall [13)].

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