Perioperative Management for Rectal Migration of a Ventriculoperitoneal Shunt

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Background: While ventriculoperitoneal shunt (VPS) is the most commonly performed surgical procedure for treating hydrocephalus, complications following shunt placement are associated with a high mortality rate. Preoperative medical optimization and surgery are the primary means of correcting shunt migration. We present the case of an 11-week-old patient who underwent emergent surgical intervention for transrectal VPS migration and associated infection.

Case Report: An 11-week-old female presented with VPS tubing protruding from her rectum. The patient had a history of grade III intraventricular hemorrhage complicated by hydrocephalus status post VPS placement at age 3 weeks. Shunt tap demonstrated gross infection, and she was started prophylactically on broad-spectrum antibiotics. She was taken emergently to the operating room (OR) for VPS externalization and exploratory minilaparotomy. VPS tubing was removed, and the patient was transferred to the pediatric intensive care unit for postoperative management. Cultures confirmed methicillin-resistant Staphylococcus aureus, and the patient was treated according to infectious disease recommendations. On postoperative day (POD) 5, the patient had a full component VPS replacement. On POD 23, computed tomography scan of the head obtained for lethargy demonstrated a new midline shift, and she was returned to the OR for another VPS replacement. A small abscess was discovered and drained; postoperative cerebrospinal fluid laboratory values normalized after drainage. Once the infectious process cleared, the VPS was internalized on POD 33, and the patient was discharged home on POD 35.

Conclusion: Few case reports detail the appropriate anesthetic considerations for cases of VPS migration. This report describes shunt migration pathophysiology and patient assessment with a focus on anesthetic preparation and management for this rare complication.

Keywords: Anesthesia, hydrocephalus, pediatrics, surgery, ventriculoperitoneal shunt
thrombocytosis (platelet count of 828 k/μL; reference range, 150-350 k/μL), indicating an acute infectious process. The patient also had decreased hemoglobin (6.9 g/dL; reference range, 9-14 g/dL) and hematocrit (22.3%; reference range, 33%-39%). Other laboratory results were within normal limits. She was afebrile with otherwise normal vital signs but was started prophylactically on broad-spectrum antibiotics.

Based on her neurologic status, she was taken emergently to the operating room (OR) for VPS externalization and, despite the lack of any outward signs of peritonitis, exploratory minilaparotomy.

Following standard induction and intubation with fentanyl (5 mcg), propofol (7 mg), and rocuronium (1 mg), a right femoral arterial line and a 4-French left internal jugular central line were placed for intraoperative hemodynamic monitoring and for potential medication and resuscitative needs, respectively, as well as for potential postoperative management requirements. She was maintained with sevoflurane. Intraoperatively, the patient received additional doses of rocuronium and fentanyl as needed to maintain ideal operative conditions, she was continued on maintenance fluids, and she remained hemodynamically stable with minimal noted blood loss.

Surgical aspects of the case included removal of the proximal portion of the VPS tubing and reservoir, insertion of a new reservoir, and externalization of the distal portion of the VPS. Neurosurgery administered intrathecal vancomycin (20 mg) and gentamicin (5 mg), and the skin was closed. Simultaneously, through a right lower quadrant minilaparotomy, the surgeons sharply divided the VPS tubing, extracting the proximal portion previously transected in the superior region of the chest by neurosurgery. The distal portion was then removed transanally without difficulty. The area was inspected for hemostasis and continuity of bowel. The surgeons concluded that the patient’s bowel had self-sealed and did not require additional direct repair. Incisions were closed. Following skin closure, the patient was reversed with sugammadex (13 mg) secondary to having only 1 of 4 twitches (roughly 2.5 hours total anesthesia time). Her intraoperative arterial blood gas was noteworthy for a hematocrit of 23%; she subsequently received 50 mL (15 mL/kg) of packed red blood cells.

The patient was extubated in the OR and transferred to the pediatric intensive care unit for postoperative management. The initial VPS cultures were positive for methicillin-resistant Staphylococcus aureus (MRSA), and she was treated with intraventricular vancomycin and linezolid for 21 days per infectious disease recommendations. On postoperative day (POD) 2, cerebrospinal fluid (CSF) and all subsequent cultures were negative for bacterial growth. On POD 5, the patient had a full component VPS replacement. On POD 23, computed tomography scan of the head obtained for lethargy demonstrated a new midline shift, and she was returned to the OR for another VPS replacement. A small abscess was discovered and drained; postoperative CSF laboratory values normalized after surgical drainage. After confirmation that the infectious process had cleared, the VPS was internalized on POD 33. The patient tolerated oral feeds, gained weight, and was neurologically intact; she was discharged home on POD 35 on antiepileptics (70 mg of levetiracetam twice daily and 16.8 mg of phenobarbital daily). Her posthospital follow-up was otherwise uncomplicated.

**DISCUSSION**

Medical management for congenital and infantile hydrocephalus, such as diuretics or serial lumbar punctures, is only a temporizing maneuver. As such, VPS placement is the most common treatment for obstructive or...
CONCLUSION

Distal VPS migration is a rare complication with potentially devastating consequences. While many of these cases have positive outcomes, the high mortality rate associated with shunt migrations hints at the seriousness of these occurrences. While the patient’s initial surgery and anesthetic course were without complication, these cases demand a need for a proactive medical, surgical, and anesthetic approach given the potential level of uncertainty regarding the scope of intraabdominal involvement and septic risks. Adequate preparation for unexpected events is important in providing effective and safe anesthetic for VPS surgical management.

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