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Case Report

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Malposition of Ventriculoperitoneal Shunt to the Scrotum: Report of a Rare Case

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Abstract

Ventriculo-peritoneal (VP) shunt is the most common palliative procedure for the management of hydrocephalus. Many complications have been associated with VP shunts. Although, migration of the distal end of the VP shunt tube into the scrotum is a rare one. We report a case of VP shunt malposition to the scrotum and its management as an intraperitoneal reposition under general anesthesia in a ten months old infant who had scrotal swelling primarily diagnosed as hydrocele. The manual examination of the scrotum and X-ray of the abdomen proved the shunt migration into the scrotum. Early diagnosis and surgical repositioning of such complications is easy and can prevent subsequent serious sequelae.

Keywords: VP shunt; Hydrocephalus; Malposition; Scrotal swelling; General anesthesia; Hydrocele

Introduction

Ventriculoperitoneal (VP) shunt placement is a common neurosurgical procedure with approximately 30,000 shunt placement performed every year in the United States. Nowadays, VP shunt and ventriculo-atrial shunts are the most commonly used shunts, there are some systems like ventriculosinusal and ventriculolymphatic shunts that prove to be equally as efficient.[1] Several sites for malposition of the distal shunt end have been reported, such as intestinal perforation, we report a rare case of scrotal migration of the distal end in an infant. The lower end of the shunt tube was felt by the mother of the patient, and the its course and patency was confirmed by radiologically. Although, the baby was free of any major symptoms, and the malposition was corrected to the usual peritoneum using same tube under general anaesthesia.

Case presentation

A 10-month-old male infant, weighing 8.5 kg was admitted with distal end migration of a VP shunt catheter. The child was a known case of obstructive hydrocephalus and had undergone VP shunt placement at age of 2 months. Although, the patient was pre-term and delivered by normal vaginal delivery, but had a normal cry immediately after birth and had a normal head size at birth. However, he had a gradual progressive head enlargement followed by seizures by the end of the one week. The CT head confirmed the obstructive hydrocephalus as a result of aqueduct stenosis . Since then, the baby was put on syrup levetiracetam 50 mg BD. Last seizure episode was noted at the age of 3 months. Therefore, right sided VP shunt was performed under balanced anaesthesia technique to reduce the dangerous pressure inside the skull. Postoperative course was uneventful and baby was discharged from the hospital on third post-operative day. The patient was asymptomatic post-

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surgery until he presented with right-sided scrotal swelling at ten months. The lower end of the tube was initially felt by the mother in the right scrotum. On examination, lower end of VP shunt was felt in the scrotum and was confirmed by X-Ray abdomen (Figures 1 & 2).

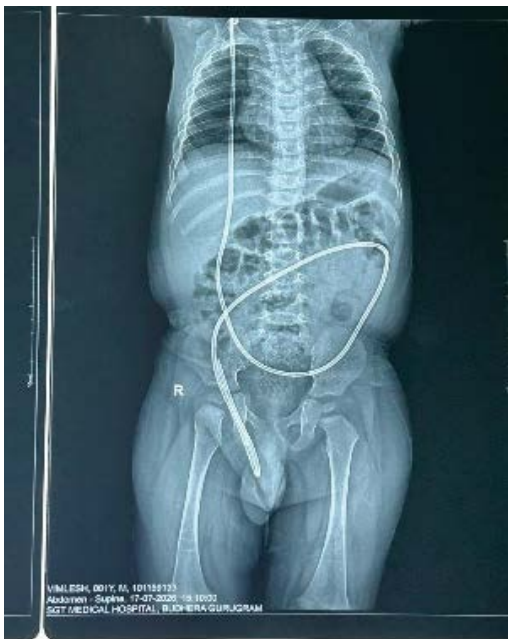

Figure 1: The X-Ray of chest,Abdomen and pelvis revealed that catheter descends along the right chest with a single loop in the lower abdomen. The catheter then courses into the right pelvis and finally it migrates into the scrotum. The tip of the catheter is seen inferior to the pubic symphysis.

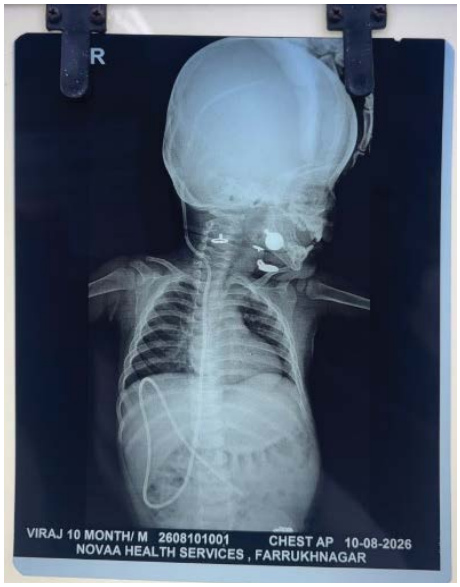

Figure 2: Postoperative X-ray Film of Head ,neck, chest and abdomen showing that the proximal and distal limbs of the right-sided ventriculoperitoneal shunt are in alignment with the reservoir and valve and functioning normal. The catheter is repositioned to the appropriate peritoneal site.

On examination, the infant was fully conscious, alert, with normal head size, and milestones attained as per age. The cardiovascular and respiratory system examination was unremarkable. Airway assessment revealed adequate mouth opening on cry, and unrestricted neck movements, and confirming easy tracheal intubation. Routine biochemical and hematological values were within normal limits. His HR was 124 bpm and BP was 96/ 50 mmHg. The baby was posted for the VP shunt revision after obtaining an informed consent from the parents.

In OR, a standard ASA monitors comprising electroencephalography, pulse oximetry, non-invasive blood pressure, capnography, and temperature probe were attached. Intravenous induction of anaesthesia was performed using midazolam(0.5 mg), fentanyl (20 mcg), propofol (15mg), glycopyrrolate(0.04 mg) and Vecuronium(1mg) was used as muscle relaxant to facilitate endotracheal intubation with a 3.5 mm(ID) flexometallic tube fixed at 12cm. Anaesthesia was maintained using sevoflurane 1 MAC in oxygen with FiO_2 - 0.6. Dexamethasone and hydrocortisone and ondansetron were given according to institutional protocol. Perioperatively assessment confirmed the normal functional VP shunt, and same was repositioned to the normal peritoneum position in the abdomen. Surgery lasted for approximately 20 minutes, and neuromuscular blockade was reversed using neostigmine (0.04 mg) and glycopyrrolate (0.08 mg) and the patient was extubated smoothly. The rest of the course was uneventful, and patient was discharged from the hospital on the same day in fully alert state, with the instructions to attend the pediatric surgery OPD for herniotomy.

Discussion

The VP shunt placement is the most common neurosurgical procedure to reduce the abnormally high pressure in the skull. VP shunt has been utilized for more than 5 decades, and despite major advancements in valve designs and catheters, malfunctions and complications occur relatively often [2]. The literature have suggested that 40% of shunts in pediatric patients and 29% of the adult patients have shunt failure in the first year after surgery and up to 81% of patients undergo at least one shunt revision in their lifetime [3,4]. It is also potential for several complications like infection, obstruction, abdominal pseudocyst, bowel perforation, over drainage and subdural hematoma [5,6].

When placement of a ventricular shunt in hydrocephalus is indicated, the distal end of the shunt catheter is most commonly placed in the peritoneum. However, over 36 distal shunt insertion sites have been used [1]. The malposition of the VP shunt can involve the proximal (Cranial) or distal end of the shunt tube. Proximally it commonly happens in the Brain Parenchyma, here the catheter migrates out of the ventricle and enters into the brain tissue directly, or into the Choroid Plexus, Or at a times, the catheter coils outside the ventricular system into the subdural or epidural Space [5].

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The malposition of the distal (Abdominal) sites include as most often into the colon as a result of perforation, or into the Subcutaneous/Abdominal Wall, rectus femoris muscle. Rarely it may migrate down through a patent process vaginalis in children into the Scrotum/Inguinal Canal [7-9].

The evaluation of a shunt malfunction includes a complete history and physical examination, including a funduscopic examination. The symptoms of shunt malfunction may include reduced alertness due to increased ICP, pain in the neck or chest wall region, limitation of neck movement due to tethering of the shunt, and cutaneous manifestations such as skin irritation overlying the shunt [10]. Usually, radiological imaging(USG/ CT/ MRI) used to establish enlarged ventricle size, Kinking ,obstruction, fracture and malposition of the VP shunt [11]. Some authors have used cerebral regional oxygen saturation monitoring in the assessment of pediatric shunt patients patency. This technology is commonly used as intraoperative monitoring of children undergoing repair of congenital heart disease. It is a noninvasive, easy-to-apply technology that gives instantaneous readings. The authors found that in the setting of malfunctioning shunts, there is an asymmetrical hemispheric cerebral regional oxygen saturation, and greater changes in regional oxygen saturation occur for distal versus proximal shunt malfunction [11].

It is a case of an intact VP shunt that displays a normal course from the patient's head through the right side of chest and abdomen and after looping in the lower abdomen and finally malposition to the scrotum and the shunt tip could be felt manually in the scrotum. A VP shunt may migrate to the scrotum through a patent processes vaginalis, an open channel from the abdomen into the scrotum, the shunt tip is pushed by fluid pressure and guided by body movements to the final destination. Regular body shifting, gradual growth, and the smooth and fine texture of the catheter helps in the distal tip migration step-by-step through the open pathway into the scrotum. This rare mechanical complication primarily affects infants and young boys. However, the VP shunt coils within the abdomen and is then seen inferior to the pubic symphysis to the scrotum. The patient was asymptomatic (no pain, leukocytosis) at home and throughout the patient's hospitalization. Scrotal malposition or migration of a VP shunt is a rare mechanical complication, with specific studies reporting an incidence ranging from **3.7%** up to approximately **10%** of distal shunt migrations in pediatric cohorts [10].

Conclusion

The VP shunt placement is the most common neurosurgical procedure to reduce the abnormally high pressure in the skull. Usually it is safe, but malposition have been reported such as Extraventricular placement, Choroid plexus or wall abutment, penetrating the opposite ventricular wall or basal cisterns, and migration to the colon as a result of perforation,or into the Subcutaneous/Abdominal Wall, rectus femoris muscle. The migration of shunt into scrotum is quite rare. In the neonates it can be diagnosed even by the parents by observing a scrotal swelling or even the tube may be manually felt in the scrotum. Early detection is prime to avoid the complications.The usual management is repositioning the shunt and standard herniotomy.

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