Child's Nervous System (2019) 35:2427–2430
https://doi.org/10.1007/s00381-019-04410-x

CASE REPORT

A shunt lost in the mists of time

Raja K. Kutty[1] · Sunilkumar Balakrishnan Sreemathyamma[1] · Jyothish Laila Sivanandapanicker[1] · Prasanth Asher[1] · Anilkumar Peethambaran[1]

Received: 29 August 2019 / Accepted: 3 October 2019 / Published online: 1 November 2019

Abstract
Ventriculo peritoneal shunts offer promising results in the management of hydrocephalus. However, they are not without complications. Shunt migrations and extrusions have been reported plenty of times in the literature. Migration of both the proximal and distal catheter has been reported. However; entire shunt migrations are rare and can result in worsening of the clinical condition of the patient. We report a case of entire shunt migration in to the abdominal cavity which was diagnosed during her childhood 8 years after shunt surgery. The parents of the child were advised shunt removal and new shunt insertion but they did not agree to it and they lost follow-up. The patient attended neurosurgery outpatient clinic 24 years later for evaluation of traumatic brain injury, when this finding was incidentally detected. She remained asymptomatic for this condition during all these years. To our knowledge, such incidence of entire shunt migration being remaining asymptomatic for such a long duration has never been reported in the literature.

Keywords Hydrocephalus · Ventriculo-peritoneal shunt · Migration · Asymptomatic

Introduction

Ventriculo-peritoneal shunt insertion is one of the most rewarding surgeries for hydrocephalus of childhood. However, it is not without complications. Shunt breakage, shunt extrusions, and migrations are all known complications of this surgery well described in the literature. Migration of entire shunt hardware in unison is a rare phenomenon that has been described in the literature. It is associated with worsening of hydrocephalus. We describe such a case of migrated ventriculo-peritoneal shunt into the abdomen which was rediscovered by us after a time period of 24 years.

Case report

A 31-year-old lady attended neurosurgery outpatient clinic after she was assaulted by her husband. On examination, she was fully conscious and oriented. Glasgow coma scale (GCS) was 15/15. There were no abrasions or wound over the head. There were no cranial nerve palsies or focal neurologic deficits. There was no papilledema. She was subjected to CT scan of the head from other center which showed mildly asymmetric ventricles and ventriculomegaly (Fig. 1). There was no sign of traumatic brain injury. On enquiry, her mother revealed that the patient had undergone surgery for hydrocephalus 30 years ago during the first year of her life in which a long tube was inserted into her head and passed to the abdomen. However, at present, there was no ventricular catheter visualized in the CT scan. A thorough enquiry was made in to the sequences that followed after the surgery for hydrocephalus in her childhood. Outpatient

✉ Raja K. Kutty
drrajakkutty@gmail.com

Sunilkumar Balakrishnan Sreemathyamma
drsunilkumarbs@hotmail.com

Jyothish Laila Sivanandapanicker
drjyothish@gmail.com

Prasanth Asher
prasanthasher@gmail.com

Anilkumar Peethambaran
dranilpeethambaran@yahoo.com

[1] Department of Neurosurgery, Government Medical College, Thiruvananthapuram Kerala, India

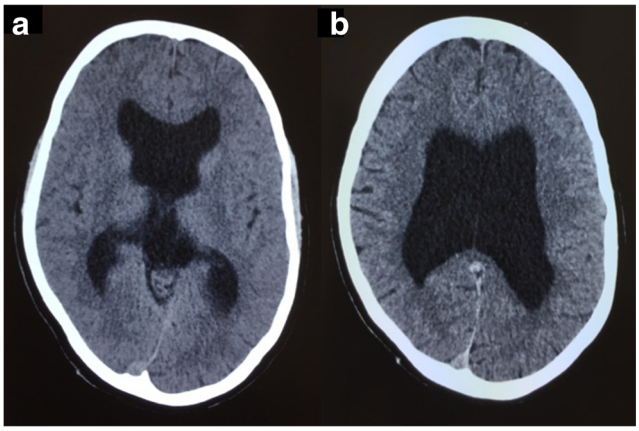

Fig. 1 CT Brain plain shows mild asymmetry of the skull. There is mild dilatation of the frontal horns and the body of the lateral ventricle. Note the batwing shape of the body of the lateral ventricle suggestive of agenesis of corpus callosum

record, 8 years after surgery, showed that the shunt chamber was not palpable in the head and was diagnosed as possible shunt migration. There was no evidence of papilledema. However, no findings of any x-rays taken during that period were available on record. The child was admitted following this discovery and evaluated. There was no record of what was further advised to the patient. However, the mother of the patient revealed that she was advised to have regular follow-up in neurosurgery. She also revealed that she had not undergone any further surgical procedures related to the shunt tube or hydrocephalus till now as she remained asymptomatic. She had a poor scholastic performance and did not pursue her studies further after failing in 8th standard many times. She got married at the age of 22 years. She became pregnant and delivered two children at the age of 23 and 26 years. Both her children were born through normal vaginal delivery. Both her pregnancy and delivery were totally uneventful with regard to her neurological condition.

After knowing this history, we examined the patient clinically for evidence of shunt tube in the chest and abdomen which was negative. An x-ray, posterior-anterior view of the head, neck, chest, and abdomen, was ordered. There was no evidence of shunt tube on the x-ray of the head, neck, and chest. However, x-ray of the abdomen showed a coiled mass of shunt tube in the abdominal cavity. There was an intrauterine contraceptive device in the vaginal cavity visualized in the x-ray (Fig. 2). After these findings, we arrived at a diagnosis of entire VPS migration in to the abdominal cavity. She was made aware of her condition and the possible consequences she may face with regard to the migrated shunt tube in the abdomen. Since she was against any surgical procedures, she was advised to continue follow-up in the neurosurgery outpatient clinic further.

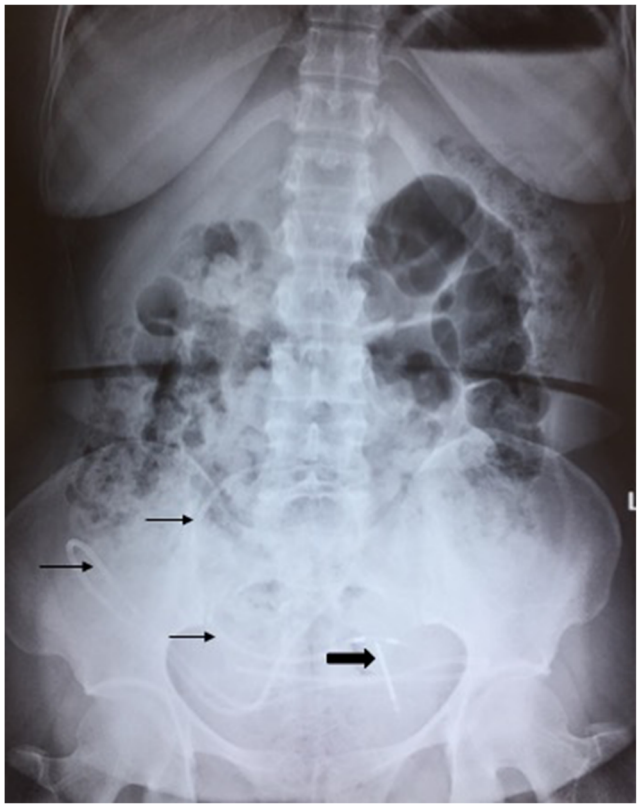

Fig. 2 X-ray abdomen antero-posterior view. There is a coiled mass of tubes in the abdominal and pelvic cavity (short arrows) suggestive of migrated shunt tube. The intrauterine contraceptive device (copper T) is also visualized in the pelvis (thick arrow)

Discussion

VPS extrusions and migrations have been reported many times in the literature [1–5]. In all instances they, have been associated with deterioration of the patient. Migration of the entire shunt hardware in one piece is rare. This has been described more so often to happen in the proximal direction rather than at the caudal end [5–10]. Proximal migrations into the subgaleal space as well as into the ventricle have been described. In this report, we present our case of migration of entire shunt hardware into the abdomen in a totally asymptomatic patient. This migration had most likely occurred during her childhood but was discovered 8 years after the shunt insertion as per the records. She was advised to undergo revision as per the mother but since she was asymptomatic, they did not undergo any surgery. There is high probability that during this course of time, the child might have become shunt independent or might have attained the so-called, "arrested state" of hydrocephalus. [11–13] Mostly, it is a clinical dilemma when one encounters such asymptomatic shunt migrations. It is prudent to advise and also educate the patient the

Table 1 Summary of reported cases of complications of abandoned shunt catheters

Author/year	Age at shunt insertion	Age at diagnosis	Presentation	Patient symptom	outcome
Ashpole, 1995 [15]	3.5 years	4 years	Passed through anus	Asymptomatic	good
Chen, 2000 [16]	4 months	16 years	Anal protrusion	Asymptomatic	Good
O'Donoghue, 2002 [17]	8 years	33 years	Anal Protrusion	Asymptomatic	Good
Thipphavong, 2004 [14]	7 months/1 year	12 years	Spontaneous passage per anum	Abdominal pain	Good
Huang, 2011 [18]	85 years	95 years	Anal protrusion	Asymptomatic	Good
Rinker, 2013 [19]	NA	23 years	Asymptomatic Incidentally diagnosed bowel perforation	Asymptomatic	Good
Riccardello, 2016 [20]	1 year	14 years	Jejunal perforation	Abdominal pain with subcutaneous emphysema	Good
Suryadevara, 2018 [21]	Early childhood, 10 years/12 years	27 years	Abscess at spinal surgery site	Pain and fever	Good
Present case, 2019	1st year	30 years	Asymptomatic Incidentally diagnosed	Asymptomatic	Good

possible consequences that can occur in case of foreign body in the abdominal cavity. Abandoned or retained peritoneal end of catheters in the peritoneal cavity after disconnection of VPS has been associated with complications later in life. These shunts act as a free-floating tube and cause significant movement depending upon patient movement and bowel peristalsis [14]. Such free floating abandoned peritoneal catheters have been reported to cause bowel perforation [14–20]. Ricardello et al. reviewed patients who had complications related to retained or abandoned catheters published in the literature. They noted only six previous reports causing bowel perforation. They also noted that despite bowel perforation, most of the patients were asymptomatic [20]. Complications other than bowel perforation by abandoned catheter has been described by Suryadeva et. al,. They noted a weeping spinal abscess caused by migration of a abandoned peritoneal catheter at the site of a previsou spinal surgery(21). A summary of cases of complications of abandoned catheters and their outcome is summarised in Table no 1. The time duration of presenting with problems related to retained/abandoned shunt after initial disconnection varied in each case. Patients sought medical attention in a period as short as 6 months to as long as 12 years after diagnosis of initial disconnection. In our unique case, the patient sought medical attention for an unrelated cause after 24 years of initial suspicion of migration. This history of migrated shunt was rediscovered incidentally upon enquiring the past medical history. In view of previous reports of abandoned catheters reported with bowel perforations, we did give a choice of removal of the shunt tube to the patient. But since she was not keen on any surgical intervention, we had advised her to follow up in our outpatient regularly. The rate of bowel perforation for intact peritoneal end of VPS has been reported to be around 0.7 to 1% [22]. The customary practice of leaving behind the peritoneal end of VPS at the time of revision as a result of disconnection is a very common. Given the number of shunt revisions performed worldwide and the fewer number of complications reported so far pertaining to abandoned peritoneal catheters, we presume that the rate of complications related to bowel perforation is very low in case of abandoned catheters. The history of successfully completing two pregnancies along with the migrated shunt in the abdomen without any complications makes this case a real unique report.

Compliance with ethical standards

Conflict of interest Nil

References

1. Eljamel MS, Sharif S, Pidgeon CN (1995) Total intraventricular migration of unisystem ventriculo-peritoneal shunt. Acta Neurochir 136(3–4):217–218
2. Gupta PK, Dev EJ, Lad SD (1999) Total migration of a ventriculo-peritoneal shunt into the ventricles. Br J Neurosurg 13(1):73–74
3. Dominguez CJ, Tyagi A, Hall G, Timothy J, Chumas PD (2000) Sub-galeal coiling of the proximal and distal components of a ventriculo-peritoneal shunt: an unusual complication and proposed mechanism. Childs Nerv Syst 16(8):493–495
4. Pikis S, Cohen JE, Shoshan Y, Benifla M (2015) Ventriculo-peritoneal shunt malfunction due to complete migration and subgaleal coiling of the proximal and distal catheters. J Clin Neurosci 22(1):224–226
5. Nadkarni TD, Menon RK, Dange NN, Desai KI, Goel A (2007) Cranial migration of complete ventriculo-peritoneal shunt assembly. J Clin Neurosci 14(1):92–94

6. Acharya R, Bhutani A, Saxena H, Madan VS (2002) Complete migration of ventriculoperitoneal shunt into the ventricle. Neurol Sci 23(2):75–77
7. Al Hinai QS, Pawar SJ, Sharma RR, Devadas RV (2006) Subgaleal migration of a ventriculoperitoneal shunt. J Clin Neurosci 13(6): 666–669
8. Sengul G, Tuzun Y, Kadioglu HH, Aydin IH (2005) Complete intraventricular unisystem ventriculoperitoneal shunt migration. Pediatr Neurosurg 41(6):337–338
9. Sharma S, Gupta DK (2005) Intraventricular migration of entire VP shunt. Indian Pediatr 42(2):187–188
10. Villarejo F, Alvarez-Sastre C, Gimenez D, GONZALEZ C (1979) Migration of an entire one-piece ventriculoperitoneal shunt into the ventricle. Neurochirurgia (Stuttg) 22(5):196–198
11. McLone DG, Aronyk KE (1993) An approach to the management of arrested and compensated hydrocephalus. Pediatr Neurosurg 19(2):101–103
12. Hong J, Barrena BG, Lollis SS, Bauer DF (2016) Surgical management of arrested hydrocephalus: case report, literature review, and 18-month follow-up. Clin Neurol Neurosurg 151:79–85
13. Hurni Y, Poretti A, Schneider J, Guzman R, Ramelli GP (2018) Arrested hydrocephalus in childhood: case series and review of the literature. Neuropediatrics 49(5):302–309
14. Thipphavong S, Kellenberger CJ, Rutka JT, Manson DE (2004) Hepatic and colonic perforation by an abandoned ventriculoperitoneal shunt. Pediatr Radiol 34(9):750–752
15. Ashpole R, Boulton R, Holmes AE (1995) A case of asymptomatic passage per-rectum of a fractured redundant peritoneal catheter from a ventriculo-peritoneal shunt. Eur J Pediatr Surg 5(5):280–281
16. Chen HS (2000) Rectal penetration by a disconnected ventriculoperitoneal shunt tube: an unusual complication. Chang Gung Med J 23(3):180–184
17. O'Donoghue GT, Kumar R, Taleb F, Philips J (2002) Per-anal extrusion of a disconnected ventriculopertoneal catheter - an unusual comlication. Ir Med J 95(3):88–89
18. Huang HM, Lee WY, Chen DC (2011) Disconnected subduroperitoneal shunt catheter induces silent bowel perforation: an unusual complication. Int J Surg Case Rep 2(5):76–78
19. Rinker EK, Osborn DA, Williams TR, Spizamy DL (2013) Asymptomatic bowel perforation by abandoned ventriculoperitoneal shunt. J Radiol Case Rep 7:1–8
20. Riccardello GJ, Barr LK, Bassani L (2016) Bowel perforation presenting with acute abdominal pain and subcutaneous emphysema in a 14-year-old girl with an abandoned distal peritoneal shunt catheter: case report. J Neurosurg Pediatr 18(3):325–328
21. Suryadevara R, Lieber BA, Garcia E, Sood S, Haridas A, Ham S (2018) Migrations of a ventriculo-peritoneal shunt catheter into a back incision of a patient with previous spinal fusion. Childs Nerv Syst 34:787–9
22. Vinchon M, Baroncini M, Laurent T, Patrick D (2006) Bowel perforation caused by peritoneal shunt catheters: diagnosis and treatment. Neurosurgery 58:76–82