Migration and Sub-galeal coiling of distal components of V-P shunt in a 2-year-boy: Does Electrical stimulation as part of physiotherapy is cause or casual association?

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Abstract: The ventriculo-peritoneal (VP) shunt surgery in resource constrained centre still remains, most common form of treatment for hydrocephalus. The V. P. shunt complications can occur along entire course of shunt, distal complications are obstruction of catheter, cerebrospinal fluid ascites, abscess and ulceration of skin. However, total cranial migration and getting coiled in subgaleal space, of peritoneal catheter end is very rare occurrence and is reported in only seven cases as isolated case- report in western literature, further more rare is associated extrusion of ventricular catheter and rarer is subgaleal coiling of both peritoneal and ventricular end. Author reports a rare and unique case of complete migration of peritoneal catheter into subgaleal space in a 2-year old boy associated, with partial extrusion of ventricular end, the child was also given electric stimulation by untrained physiotherapist along the shunt tract, which might have facilitated cranial migration of distal catheter in our case. Pertinent literature is briefly reviewed.

Key words: subgaleal coiling of shunt, shunt migration, hydrocephalus, extrusion

Introduction

The ventriculo-peritoneal (VP) shunt surgery is the one of the most common form of treatment for hydrocephalus. The complications of ventriculo-peritoneal shunt may occur along cerebral ventricle to the peritoneal cavity. (1) Distal shunt catheter related complications include cerebrospinal fluid ascites, catheter malfunction, intra-peritoneal abscess and skin ulceration. (2) However, unusual complication of peritoneal catheter tip migration into stomach, urinary bladder, liver, colon, vagina, gall bladder and diaphragm are reported and may rarely migrate into heart chamber. (2, 3, 4) However, total cranial migration and getting coiled in subgaleal space, of peritoneal catheter end is very rare occurrence and is reported in few cases western literature. (3-7)

Case report

A 2-year-old boy, presented with alteration in sensorium and vomiting of five days duration, who undergone low pressure ventriculo-peritoneal shunts surgery four months back for tuberculosis meningitis (TBM) with associated hydrocephalus. After the shunt surgery child had rapid recovery and was well in the follow-up period. One day prior to admission patient developed altered sensorium with progressive increasing swelling in the occipital region of seven days. Child was given electrical stimulation by untrained physiotherapist in a remote village. Examination at admission revealed a 5cm x 4cm size irregular swelling in the occipital region with overlying scalp without ulceration or discharge. The topogram revealed coiling of distal catheter in the subgaleal space causing soft tissue swelling. (Figure 1) Bone window of computerized tomography scan showed coiling of catheter in the scalp (Figure 2). The ventricular end of ventriculoperitoneal shunt was in situ with enlarged size of lateral ventricles (Figure 3) with marked periventricular lucency. The coiled catheter in the scalp was also caused artifact.

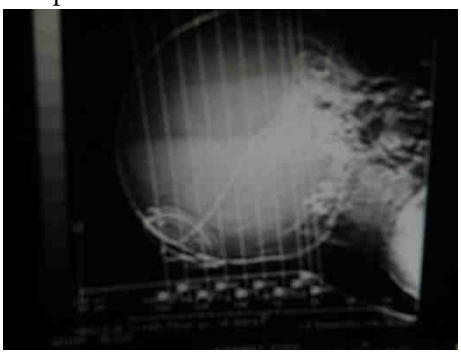

Figure 1 - Topogram showing coiling of distal catheter of ventriculo-peritoneal shunt in the scalp

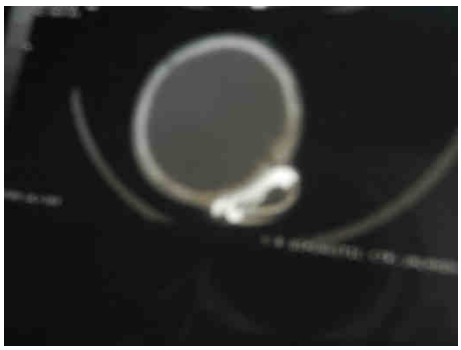

Figure 2 – Bone window C.T. scan showing coiling of catheter in the scalp

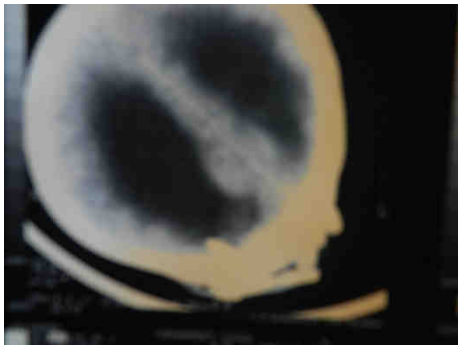

Figure 3 – Computed tomography scan showing ventricular catheter almost extruded causing shunt malfunction leading to hydrocephalus.

Discussion

Shunt migration is rare but important cause of shunt malfunction. Various types of migration is reported in literature. It may be partial, however, total migration of a ventriculo-peritoneal shunt into ventricles are also reported. (2, 4, 5) Reduplication of ventriculo-peritoneal shunt catheter tip back through the shunt tract has been reported. (5)

However, total migration of distal catheter of ventriculo-peritoneal shunt into subgaleal space in the scalp is an extremely rare complication, and only seven cases been

reported in the literature reporting migration of the distal components of the VP shunt into a subgaleal pocket causing scalp swelling and associated shunt malfunction, further only three case report describes complete migration of proximal and distal components in subgaleal space. (3-7) Current case is unique as having total migration of distal end and partial extrusion of ventricular catheter and getting coiled in subgaleal pocket.

Various hypotheses are proposed to explain the cranial migration of ventriciloperitoneal shunt. These include combination of mechanism formation of cyst at distal catheter, excessive head movement, low resistance, the shorter length of catheter between ventricular end and peritoneal ends specially in infant, inadequate fixation at cranial end and failure to properly put purse string suture at peritoneal end, relatively larger burr hole size and severe constipation causing upward displacement of peritoneal catheter due to raised intra-abdominal pressure. 8 the cranial migration of catheter can also be explained by gradient between intracranial and intra-abdominal pressure, and small peritoneal space in pediatric population. Further postulates includes further explanation are windlass effect, inadequate shunt fixation, and increased intra-abdominal pressures. Dominguez et al. proposed migrated and coiled shunt in sub-galeal pocket the occipital region in a tightly coiled manner mimicking as appearance to that of the pre-insertion shunt lying in the package as get supplied; and concluded that the migration was secondary to retained 'memory' of the shunt tubing. (3) The child was also given electric stimulation by untrained physiotherapist along the trunk which might have further facilitated other mechanism for cranial migration of distal catheter in our case, however large size reservoir might have prevented further cranial migration into the ventricle. Placement of a purse string suture about the shunt catheter is common practice, which may reduce the chances of cranial migration of catheter. (2)

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References

1. Cheng JY, Lo WC, Liang HH, Kun IH. Migration of ventriculo peritoneal shunt into the stomach, presenting with gastric bleeding. Acta Neurochir (Wien) 2007; 149(12):1269–70.
2. Fewel ME, Garton HJ. Migration of distal ventriculoperitoneal shunt catheter into the heart. Case report and review of the literature. J Neurosurg. 2004; 100(2 Suppl Pediatrics): 206–11.
3. Dominguez CJ, Tvagi A, Hall G, Timothy J, Chumas PD. Sub-galeal coiling of the proximal and distal components of a ventriculo-peritoneal shunt. An unusual complication and proposed mechanism. Childs Nerv Syst. 2000; 16(8):493–5.
4. Heim RC, Kaufman BA, Park TS. Complete migration of peritoneal shunt tubing to scalp. Childs Nerv Syst. 1994; 10(6):399–400.
5. Kim KJ, Wang KC, Cho BK. Proximal migration and cutaneous coiling of a peritoneal catheter: report of two

cases. Childs Nerv Syst. 1995; 11(7):428–31. doi: 10.1007/BF00717412

6. Pikis S, Cohen JE, Shoshan Y, Benifla M Ventriculo-peritoneal shunt malfunction due to complete migration and subgaleal coiling of the proximal and distal catheters J Clin Neurosci. 2015 Jan; 22(1):224-6.

7. Brian T Kloss, David M Hart, LaLainia Secreti Subgaleal coiling of the proximal and distal components of a ventriculoperitoneal shunt. Int J Emerg Med. 2012; 5: 15.

8. Taub E, Lavyne MH: Thoracic complications of ventriculo-peritoneal shunts: Case report and review of the literature. Neurosurgery 1994; 34:18 – 184.