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DOWNWARD MIGRATION AND SCROTAL EXTRUSION OF A PERITONEAL SHUNT CATHETER: A CASE REPORT AND REVIEW OF LITERATURE

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Abstract

The most often used treatment for hydrocephalus is ventricular-peritoneal (VP) shunting. Different locations may experience VP shunt migration. The study's goal was to outline several locations for aberrant distal shunts, their pathogenesis, and appropriate therapy in each instance. Complications from scrotal extrusion are one of the uncommon causes of VP failure. We describe an uncommon complication in which the shunt migrates to an unidentified location beyond the peritoneal cavity. During the shunt revision procedures in these situations, special measures must be made.

Keyword*: hydrocephalus, Vp Shunt, migration, scrotal extrusion.*

INTRODUCTION

A ventriculoperitoneal (VP) shunt is a ventricle shunt that drains over the volume of cerebrospinal fluid (CSF) when either there is an obstruction in the normal outflow or there is reduced absorption of the fluid (1). The most common causes of VP shunt failure include obstruction, infection, pseudocyst formation, and bowel perforation (2). VP shunt malfunction rates have been estimated at roughly 11–25% within the first year applied initial shunt treatment (3–5). With an incident rate ranging from 0.1–1%, bowel perforation becomes a rare complication of VP shunt treatment (6,7). Migration of the peritoneal catheter occurred in about half of the cases of bowel perforation (8). Besides, the incidence of a hernia presenting after shunt placement has been reported to be approximately 16.8% (9,10). However, the incidence of scrotal extrusion of the peritoneal shunt into the hernia sac has not been shown in various series (11). We described a new case report and a review of the literature for all available cases of scrotal extrusion of a VP shunt catheter and spontaneous back to normal position after one-year evaluation.

Case History

A 42-day-old boy patient presented with scrotal migration at the distal part of the shunt catheter. The boy had been diagnosed with CT Scan imaging, showing hydrocephalus post VP shunt. The patient also had hydrocele due to scrotal migration of VP shunt described from a babygram imaging. The patient underwent VP shunt placement due to hydrocephalus 2 weeks before admission to our hospital, followed

by complaining of having lump in the left scrotal 1 week after shunt insertion. As the result of the insertion, the head of the patient was decreased in size without decreased in consciousness, nausea, vomiting, or even seizure.

At the time of admission, the baby was consciousness and active with normal body temperature. We found no signs of meninges infection and increased intracranial pressure. The baby showed normal bowel sound and soft abdomen in palpation. There were no any inflammations along the shunt parts. The left scrotal became huge in size with soft in consistency. The transillumination test was performed in the left scrotal, the result was positive, and the tip of VP shunt was palpated, confirming that the catheter was migrating to the left scrotal. There was no leukocytosis but anemia was presented in laboratory finding. Head CT scan showed enlargement of the ventricles and the ventricular catheter was in proper position (Fig. 1). Chest X-ray appeared the migration of the distal part of the shunt catheter into the scrotal cavity (Fig. 2). After one years evaluation, we found the spontaneous back of shunt migration to normal positions (Fig. 3).

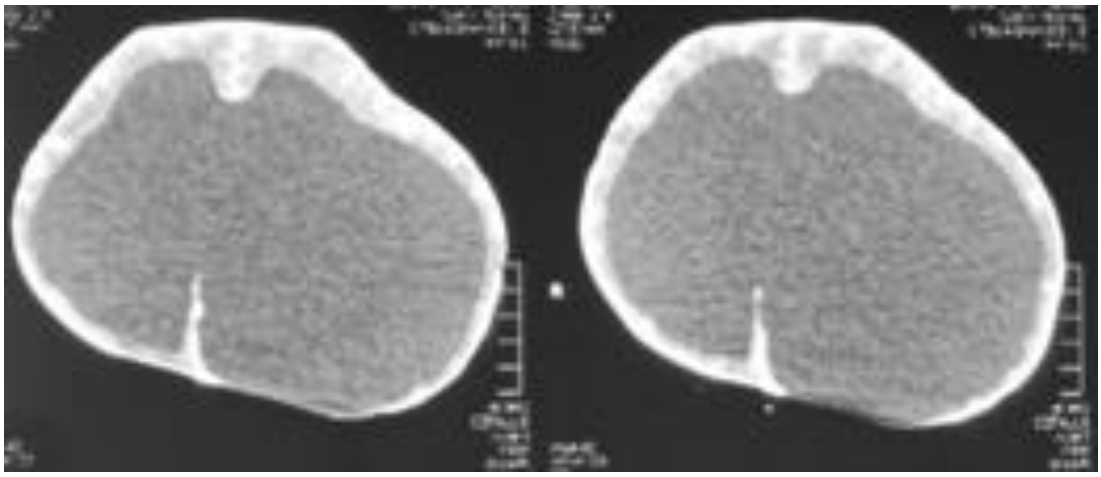

Figure 1. Head CT scan showed enlargement of the ventricles

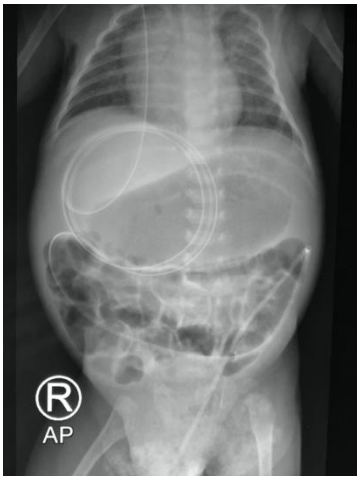

Figure 2. Babygram showed shunt migration into scrotal cavity

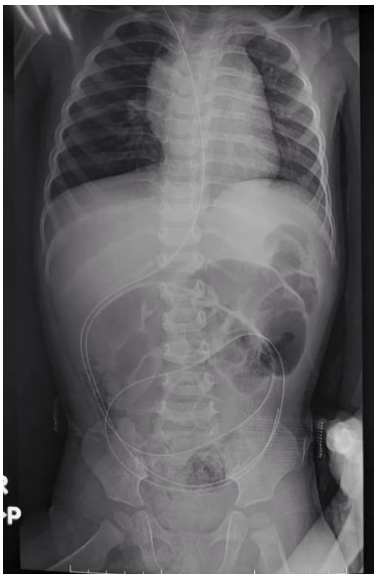

Figure 3. Babygram showed spontaneous back of shunt migration to normal positions after one years evaluation.

DISCUSSION

Hydrocephalus management still becomes a challenge for neurosurgeon and many complications from the management, for instance using ventriculoperitoneal shunt, are still able to appear unpredictably. As described most cases of VP shunt migration occurred in children, commonly during infancy and in the first six months after shunt placement (12). Migration may be broadly explained as "translocation of the part/whole of the shunt system (proximal/distal catheter/reservoir/valve) from the compartment where it was intended to be to a new compartment which may be associated with/without shunt dysfunction" (13).

Based on a study regarding to cell biology of isolated peritoneal layers in humans, it is explored that the cells of peritoneal layers have to produce a specific

immunomodulation mechanism as a response against inflammation process. Foreign bodies which are exist inside the peritoneal cavity are able to stimulate macrophages and monocytes, followed by activating mesothelial cells to produce immune-mediators such as interleukins (IL) (14).

In the beginning, macrophages and monocytes are converted into a reactive form, leading to primary immune-mediation such as IL-β1, prostaglandin 2 (PGE-2), and prostacyclin 2 (PGI-2). These primary immune-mediators then stimulate IL-6 and IL-8, usually in high amounts in patients who suffered peritonitis. While the IL-6, PGE-2, and PGI-I take role as a limitary of the inflammation process, the IL-8 attracts neutrophils to come in the inflammation area. It is suggested that IL-β1 produced by monocytes and macrophages may have a crucial role in pathophysiology of peritoneal fibrosis. There are evidences indicating that peritoneal fibroblasts may respond to inflammatory stimuli by expanding and increasing the extracellular matrix compounds, with a potential contribution for the development of peritoneal fibrosis in patients suffering CAPD (14).

In addition, the weakness of several peritoneal areas and the umbilical end of the vitello-intestinal duct and the processus vaginalis into the scrotum might still have not obliterated yet, which could act as the locus minoris for the mechanism of migration (15–17). Anatomically, the distal catheter enter the scrotum through the patent processus vaginalis (9). This processus normally obliterated at birth but in roughly 90% population of newborn babies, it remained patent. Moreover, 50-60% of babies in the first year also had patent processus vaginalis (10,18).

In present case, the baby may develop patent processus vaginalis which became the locus minoris so that the shunt could move into the defect. We followed the case for 1 year later and found that the baby aged 15 months had multiple congenital diseases such as open lip schizencephaly and agenesis of corpus callosum. By having both defect condition, the baby probably had other conditions that strongly suggested developmental delay of the internal anatomy structures, including processus vaginalis. The presence of patent processus vaginalis builds the way in which the distal part of the catheter in the peritoneal cavity may pass to the scrotal cavity. In pediatric patient, the patency of the processus vaginalis can be temporarily prolonged by the increased abdominal pressure from the shunt placement resulting persistent in-flow of fluid (10).

Although being a chosen treatment of hydrocephalus, VP shunt has potential complications that should be avoided earlier. Here are several risk factors that can cause shunt migration to scrotal cavity. Among children, most of the extrusions were observed in 84,8% of them with aged less than 2 years (13). Theoretically, a patent processus vaginalis and raised intra-abdominal pressure are considered as the cause of peritoneal catheter migration to the scrotum (19–21). Additionally, it is thought that the use of catheter with less friction and hydrophilic surface may lead to a possibility of shunt migration (22,23).

The proper management of VP shunt migration involves repositioning of the shunt catheter (9,10). It is also recommended to perform close monitoring of palpable hernias after shunt insertion. Shunt removal using laparoscopy has also been reported with its advantages (24). Even though the scrotal migration of shunt catheter is not a threatening condition, it can present with an acute scrotum or incarcerated hernia (10,12,25). While the treatment is quite easy, the complication prevention is difficult. In our case, we did reposition of the distal shunt. But sometimes shunt revision is not required due to spontaneous normal position of the abdominal shunt after follow up (24).

CONCLUSION

In our case report, an early onset of distal catheter extrusion into scrotum in baby boy is described. It is a rare case as most babies were only reported having probability of patent processus vaginalis without follow-up. We followed the case and found the congenital defects that appeared after about one year from the first VP shunt placement. As our case presents, early detection of shunt migration prevents VP shunt obstruction and other serious complications. Prompt management of catheter reposition and sometimes processus vaginalis closure are recommended to avoid shunt malfunction and further outcomes. In others case catheter can back to normal position spontaneously.

REFERENCES

1. Fowler JB, De Jesus O, Mesfin FB. Ventriculoperitoneal Shunt. In Treasure Island (FL); 2021.
2. Paff M, Alexandru-Abrams D, Muhonen M, Loudon W. Ventriculoperitoneal shunt complications: A review. Interdiscip Neurosurg Adv Tech Case Manag. 2018;13(June 2017):66–70.
3. Wu Y, Green NL, Wrensch MR, Zhao S, Gupta N. Ventriculoperitoneal shunt complications in California: 1990 to 2000. Neurosurgery. 2007 Sep;61(3):553–7.
4. Khan F, Rehman A, Shamim MS, Bari ME. Factors affecting ventriculoperitoneal shunt survival in adult patients. Surg Neurol Int. 2015;6:25.
5. Khan F, Shamim MS, Rehman A, Bari ME. Analysis of factors affecting ventriculoperitoneal shunt survival in pediatric patients. Child's Nerv Syst ChNS Off J Int Soc Pediatr Neurosurg. 2013 May;29(5):791–802.
6. Snow RB, Lavyne MH, Fraser RA. Colonic perforation by ventriculoperitoneal shunts. Surg Neurol. 1986 Feb;25(2):173–7.
7. Vinchon M, Baroncini M, Laurent T, Patrick D. Bowel perforation caused by peritoneal shunt catheters: diagnosis and treatment. Neurosurgery. 2006 Feb;58(1 Suppl):ONS76-82; discussion ONS76-82.
8. Park CK, Wang KC, Seo JK, Cho BK. Transoral protrusion of a peritoneal catheter: A case report and literature review. Child's Nerv Syst. 2000;16(3):184–9.
9. Kita D, Hayashi Y, Kinoshita M, Ohama K, Hamada J. Scrotal migration of the peritoneal catheter of a ventriculoperitoneal shunt in a 5-year-old male. Case

report. Neurol Med Chir (Tokyo). 2010;50(12):1122–5.
10. Grosfeld JL, Cooney DR. Inguinal hernia after ventriculoperitoneal shunt for hydrocephalus. J Pediatr Surg. 1974 Jun;9(3):311–5.
11. Bawa M, Garge S, Garg R, Narasimha Rao KL. Scrotal Migration of Tubing: An Unusual Complication after Ventriculo-peritoneal Shunt. Asian J Neurosurg. 2017;12(4):738–40.
12. Mohammadi A, Hedayatiasl A, Ghasemi-Rad M. Scrotal migration of a ventriculoperitoneal shunt: a case report and review of literature. Med Ultrason. 2012 Jun;14(2):158–60.
13. Harischandra LS, Sharma A, Chatterjee S. Shunt migration in ventriculoperitoneal shunting: A comprehensive review of literature. Neurol India. 2019;67(1):85–99.
14. Jörres A, Ludat K, Sander K, Dunkel K, Lorenz F, Keck H, et al. The peritoneal fibroblast and the control of peritoneal inflammation. Kidney Int Suppl. 1996 Nov;56:S22-7.
15. Antunes AC, Ribeiro TR. Spontaneous umbilical fistula from ventriculoperitoneal shunt drainage. Report of two cases. J Neurosurg. 1975 Oct;43(4):481–2.
16. Kwok CK, Yue CP, Wen HL. Bilateral scrotal migration of abdominal catheters: a rare complication of ventriculoperitoneal shunt. Surg Neurol. 1989 Apr;31(4):330–1.
17. Ramani PS. Extrusion of abdominal catheter of ventriculoperitoneal shunt into the scrotum. Case report. J Neurosurg. 1974 Jun;40(6):772–3.
18. Rowe MI, Copelson LW, Clatworthy HW. The patent processus vaginalis and the inguinal hernia. J Pediatr Surg. 1969;4(1):102–7.
19. Bristow DL, Buntain WL, James HL. Ventriculoperitoneal (VP) shunt migration causing an acute scrotum: a case report of Doppler evaluation. J Pediatr Surg. 1978 Oct;13(6):538–9.
20. Wong CW. Scrotal migration of a ventriculo-peritoneal shunt: report of a case. J Formos Med Assoc. 1994 Jul;93(7):640–1.
21. Ammar A, Ibrahim AW, Nasser M, Rashid M. CSF hydrocele--unusual complication of V-P shunt. Neurosurg Rev. 1991;14(2):141–3.
22. Morrison JF, Sung KE, Bergman AM, Rosenblatt MS, Arle JE. A novel solution to reduce the complications of distal shunt catheter displacement associated with obesity. J Neurosurg. 2010 Dec;113(6):1314–6.
23. Nakahara K, Shimizu S, Oka H, Utsuki S, Iida H, Fujii K. Migration of the distal end of a ventriculoperitoneal shunt into the abdominal wall in an obese patient: case report. Neurol Med Chir (Tokyo). 2009 Oct;49(10):490–2.
24. Bawa M, Garge S, Garg R, Narasimha Rao K. Scrotal migration of tubing: An unusual complication after ventriculo-peritoneal shunt. Asian J Neurosurg. 2017;12(4):738.
25. Shahizon AMM, Hanafiah M, Hing EY, Julian MR. Migration of a fractured ventriculoperitoneal shunt into the scrotum: A rare complication. BMJ Case Rep. 2013;1–3.