International Surgery Journal
*Sarangi GS et al. Int Surg J. 2016 Feb;3(1):390-393*
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20160266

**Case Report**

# Late onset scrotal migration of the distal catheter of a ventriculoperitoneal shunt in a 4-year-old male with post meningitic hydrocephalus - a case report and review of literature

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**Received:** 29 October 2015
**Revised:** 01 November 2015
**Accepted:** 16 December 2015

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## ABSTRACT

The role of shunt placement is to divert cerebrospinal fluid from within the enlarged ventricles to the peritoneal cavity where excessive CSF can be absorbed. One of the rare complications of VP shunt is distal catheter migration into various abdominal contents including the scrotum. A few cases of scrotal migration of distal catheter have been reported in pediatric patients. Here we report a case of a 4 year old child who presented with a left sided hydrocele with the distal end of the shunt in the left hemiscrotum 3 years following a VP Shunt placement for post meningitic hydrocephalus.

**Keywords:** VP shunt, Ventriculoperitoneal shunt, Post meningitic hydrocephalus, Complications of VP shunt, VP shunt migration

## INTRODUCTION

Hydrocephalus is defined as an active distension of the ventricular system of the brain resulting from inadequate passage of cerebrospinal fluid from its point of production within the cerebral ventricles to its point of absorption into the systemic circulation.[2] It has a worldwide occurrence and its incidence in the general population as documented in a Swedish study is 0.66 per 1000 life births[1]. The standard treatment of hydrocephalus to date is VP shunt. In recent times, the advent of endoscopic third ventriculostomy is gaining popularity due to the high complication and failure rates of VP shunt.[3]

The success rate of VP shunt is in the range of 60% and its failure rate in literature is close to 40%.[4] Infection rate in VP shunt is close to 20% while complication rates is about 25.8% in developing countries.[5] Failure rate of VP shunt is high because of the different complications seen after the shunt. The complications of VP shunt include infections, shunt malfunction; shunt mechanical failures include breakage and migration. Shunt migration is rare and it commonly migrates to the peritoneal cavity.

In this article we report a case where the distal end of the VP shunt placed in a 4 year old for a post meningitic hydrocephalus migrated to the scrotum 3 years after its placement and led to fluid accumulation and development of a hydrocele.

## CASE REPORT

A 4 year male child presented with a swelling of the left scrotum since 15 days. The swelling was not associated with any complains of pain, fever, or any signs of intestinal obstruction. The Child had undergone a VP shunt drainage procedure 3 years back for post meningitic hydrocephalus at the age of 1 year. At presentation, there was no symptom of increasing intracranial pressure, anterior fontanel was soft and sunken, no other signs of hydrocephalus. Scars on the scalp and the abdomen signifying evidence of VP shunting. On examination the abnormal findings were in the inguinal region. Inspection revealed a swollen left hemiscrotum. No differential warmth, no tenderness on palpation. A cord like structure was palpable in the left hemiscrotum. Due to the history of previous surgery the suspicion of shunt migration was kept in mind. CT scan brain revealed a slit ventricle. X-rays of abdomen and pelvis revealed the peritoneal end of the shunt coiled up in the left scrotum (Figure 1). Under general anesthesia, the entire shunt assembly was manipulated and removed. The hydrocele subsided and the patient had an uneventful follow up.


**Figure 1: X ray picture showing coiled up catheter of VP shunt in left hemi scrotum.**

## DISCUSSION

VP shunt implantation is a common treatment of hydrocephalus. Many complications can occur after this surgery.[6,7] Some of these are related to the abdominal end of the catheter. It's prevalence ranges between 5-45%.[7,8] In addition to these complaints caused by dysfunction of distal end of the shunt, intracranial symptoms also happen. Many authors reported distal catheter migration as a cause of shunt failure,[1,2] that can be attributed, among many others causes, to inadequate surgical technique. One of the rare sites of distal catheter migration is the scrotum. Other reported sites of migration include the ventricle, scalp/subgaleal space, neck, mouth, breast, breast implant, thoracic cavity, pulmonary artery, intracardiac, lungs/pleural space/transdiaphragmatic, anterior chest wall, intraabdominal wall, abdominal subcutaneous fat tissue, umbilicus, stomach, large intestine, liver, gall bladder, bladder/urethra, inguinal sac, buttocks, canal of Nuck, which is the female counterpart of the spermatic cord, vulva/vagina, rectum/anus, and knee.[9-29] The prevalence of scrotal migration of distal edge of the shunt is between 3.8% and 16.8%.[7] This causes hydrocele and patients go to emergency room (ER) for testicular lumps such as in our case. In addition to these complaints because of shunt dysfunction intracranial pressure increases and symptoms such as vomiting or discomfort happen. However slit ventricle syndrome as seen our patient is not reported. Time for such a complication varies between 1 day and 30 months. Mean time is 3.8 months.[30,7] In our case this time duration for the complication to occur was almost 3 years. There has been just three cases reported so far of such late onset of the complication and only two have been reported to have been in paediatric patient and the other one was a 46 year old male.[33]

The involvement of the right sided scrotum was dominant, and this can be explained by the fact that the right testicle descends later than the left testicle. At 60% of the cases, scrotal migration happens at right side.[7] In our case this migration was to the left hemiscrotum which is another rarity.

It is very difficult to explain the reason for the migration of peritoneal catheter. But some possible mechanisms exist. First of these are unclosed processus vaginalis. There are similar cases in the literature.[31] Normally, processus vaginalis is patent at 60-70% of infants in first three months of life. It could be established as patent at 50-60% of 1 year olds and 40% for children between ages 2-16 years.[7] This ratio is approximately 15-30% at adults.[32] Continuous CSF drainage to peritoneum can increase intraabdominal pressure and thus keep the processus vaginalis open.[7] The presence of patent processus vaginalis creates the conduit through which the distal catheter in the abdominal cavity can travel to reach the scrotum. In pediatric patients the patency of processus vaginalis can be theoretically prolonged by the increased abdominal pressure from VPS placement creating constant inflow of fluid. Moreover, as the residual peritoneal cavity volume is linearly correlated with the body surface area, younger pediatric patients have a higher tendency to have VPS distal catheter migrate into the scrotum due to patent processus vaginalis and smaller peritoneal cavity. This explains the dominance of distal catheter migration into scrotum in pediatric patients.

Another reason for this situation is increased intracranial pressure.[32] The origin of this theory is also continuous intraabdominal CSF drainage. When intraabdominal pressure increases it keeps the processus vaginalis open as mentioned before. Children with a V-P shunt

implantation are more likely to develop hernia and hydrocele.[30,31] Intraabdominal pressure increases after V-P shunt implantation for two reason: CSF drainage and localization of shunt catheter in abdomen. This causes migration of shunt to other anatomical localizations. Also past meningomyelocele operation increases intraabdominal pressure and thus is a risk factor for peritoneal catheter migration.[7,31] In our case both patent processus vaginalis and increase in intraabdominal pressure can be accepted as causes of this complication.

The most common management encompassed repositioning of the distal catheter and processus vaginalis closure. The CSF flow into the patent processus vaginalis can create a trough effect, drawing the shunt tip into the center. This would indicate the proper management would include not only the repositioning of the catheter but would also have to include catheter truncation, as simple repositioning can lead to recurrence of migration. But in our case due to the late onset of the complication the simple removal of the entire shunt assembly sufficed and the patient had a fast recovery.

## CONCLUSION

In this case report a late onset of distal catheter migration into scrotum in a 4 year old is illustrated. It is a unique case as most cases are reported to have early onset, and there are only three other cases of such late onset reported in patient with VP Shunt migration into the scrotum. Also this is rare case as the hydrocephalus was a post meningitic complication rather than a congenital etiology.

As our case demonstrates, detection of scrotal migration of the distal catheter prevents VP Shunt malfunction. Prompt surgical management of catheter repositioning and truncation is therefore recommended to avoid the risk of further complications, though a prophylactic closure of processus vaginalis during VP Shunt placement is still a far fledged option and requires further studies.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: Not required*

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**Cite this article as:** Sarangi GS, Mohanty S, Rout SS. Late onset scrotal migration of the distal catheter of a ventriculoperitoneal shunt in a 4-year-old male with post meningitic hydrocephalus - a case report and review of literature. Int Surg J 2016;3:390-3.