



Case Report

Rare complication of lumboperitoneal shunt with distal catheter migration into the inguinal hernia sac in two adults: A case report

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ABSTRACT

Background: Despite the proven benefits of lumboperitoneal shunt (LPS) for idiopathic normal-pressure hydrocephalus, complications such as catheter migration remain a problem. Inguinal complications of the distal catheter are rare in adults, and their management is uncertain. Herein, we present two cases of distal catheter migration into the inguinal hernia sac after LPS in adults and recommend their management.

Case Description: An 86-year-old man presented with inguinal swelling. In another 82-year-old man who did not show any improvement after LPS, shunt angiography revealed LPS dysfunction due to lumbar catheter occlusion and distal LPS catheter in the right inguinal hernia sac, and lumbar catheter reconstruction was performed. Both patients did not have any symptoms, except inguinal swelling, and were followed up. After 2 weeks and 4 days, the distal catheter moved into the peritoneal cavity.

Conclusion: Inguinal complications due to the migration of the distal catheter into the inguinal hernia sac are rare in LPS because frequent movements of the distal catheter due to trunk rotation dislodge it from the inguinal hernia sac for a short period. Urgent surgery was not recommended because the catheter was moved in a short period and the patients did not wish to undergo hernia repair.

Keywords: Adult, Catheter migration, Complication, Hernia repair, Hydrocephalus, Inguinal hernia sac, Lumboperitoneal shunt

INTRODUCTION

A recent randomized controlled trial has reported that lumboperitoneal shunt (LPS) placement can be beneficial for patients with idiopathic normal-pressure hydrocephalus (iNPH).^[3] It is relatively safe because the shunt catheter does not pass through the central nervous system; however, complications such as infection, obstruction, over- or under-drainage, and proximal or distal catheter migration (into the abdominal wall, diaphragm, heart, lungs, scrotum, or rarely, the inguinal hernia sac) can occur.^[1,3-15] Although distal catheter migration usually has

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minor and benign consequences, as tubing often remains within the peritoneal cavity, if the catheter is in the inguinal hernia sac, it can cause symptomatic shunt dysfunction or perforation, which can be debilitating and fatal.^[12,15] Inguinal complications of ventriculoperitoneal shunt (VPS) procedures have been reported, particularly in children, but are rare in adults;^[1,4,6,7,9-12,15] in LPS, only one case of distal catheter migration into the scrotum has been reported.^[5]

Herein, we report two cases of distal catheter migration into the inguinal hernia sac after LPS in adults.

CASE DESCRIPTION

Case one

An 86-year-old man underwent LPS insertion for a confirmed diagnosis of iNPH after serial lumbar punctures and neurological assessments. No immediate complications were observed, and postoperative abdominal radiography confirmed the correct placement of the distal catheter [Figure 1a]. The patient showed improvement in gait and cognition. Four months postoperatively, he developed right inguinal swelling without pain. He was systemically well with no neurological changes. Abdominal radiography and computed tomography (CT) revealed an LPS distal catheter in his right inguinal hernia sac with ascites [Figures 1b and 2]. Moreover, no intestinal strangulation was observed. As the patient was asymptomatic, he was followed up. Two weeks later, an abdominal radiograph showed a distal catheter in the correct position [Figure 3]. The inguinal hernia was asymptomatic; therefore, the patient was under observation only.

Case two

An 82-year-old man was referred to our hospital because his symptoms did not improve after LPS insertion. Head CT showed enlarged ventricles. Suspecting LPS failure, shunt angiography was performed, which showed an obstruction of the lumbar catheter and deviation of the distal catheter into the inguinal hernia sac [Figure 4]. Abdominal CT revealed a deviation of the intestinal tube and distal catheter into the right inguinal hernia sac, with the contrast distributed around the intestinal tube. Moreover, no intestinal strangulation was observed.

Three days later, lumbar catheter reconstruction was performed. Immediate postoperative three-dimensional CT showed a deviated abdominal catheter in the right inguinal hernia sac [Figure 5a]; however, the distal catheter was in the correct position on abdominal radiography the day after the operation [Figure 5b] and 3 months later. The patient's gait, cognitive, and urinary disorders improved. As the inguinal hernia was asymptomatic, the patient was followed up.

DISCUSSION

To the best of our knowledge, the migration of distal catheters into the inguinal region after VPS or LPS is more common in children and rare (nine cases only) in adults.^[1,4,6,7,9-12,15] In LPS, only one case of distal catheter migration into the inguinal region has been reported. Kimura *et al.* reported a case of ruptured distal catheter migration into the scrotum in a 57-year-old man, resulting in a right scrotal mass, in which the distal catheter was removed through a 1-cm skin incision in the scrotum under local anesthesia.^[5]



Figure 1: (a) Abdominal radiographs after lumboperitoneal shunt (LPS) showing correct placement of the distal catheter. (b) Four months postoperatively, abdominal radiographs showed the presence of an LPS distal catheter in the right inguinal hernia sac (white arrow).

Table 1: Summary of adult cases with distal shunt catheter inguinal migration.

Cases	Author, year	Age at migration (year)	Age at shunt placement (year)	Sex	Shunt	Distal Catheter Side	Affected side	Symptoms	Treatment for catheter migration
1	Rehm A, et al., 1997	46	42	Male	VPS	Right	Right	Perforation and infection	Catheter removal via mini-laparotomy, infection treatment, and VPS revision surgery
2	Kimura T, et al., 2011	57	57	Male	LPS	NA	Right	Shunt dysfunction and scrotal swelling (due to distal catheter fracture)	Catheter removal through a small incision in the skin of the scrotum
3	Lee BS, et al., 2015	65	65	Male	VPS	Right	Right	Scrotal swelling	Catheter trimming via laparoscopy
4	Foster M, et al., 2017	27	0	Male	VPS	Right	Right	Shunt dysfunction (due to proximal catheter disconnection) and scrotal swelling	Hernia repair during which the distal catheter was not encountered
5	Kopelman D, et al., 2019	73	71	Male	VPS	Right	Right	Inguinoscrotal pain	Hernia repair
6	Trang J, et al., 2021	82	79	Male	VPS	Right	Right	Shunt dysfunction	Catheter trimming via mini-laparotomy
7	Perret C, et al., 2021	22	16	Male	VPS	Right	Right	Shunt malfunction and scrotal swelling (due to distal catheter fracture)	Hernia repair and VPS revision surgery
8	Khoudir M, et al., 2022	75	75	Male	VPS	Right	Right	Scrotal swelling	Catheter trimming via mini-laparotomy
9	Ndongo Sonfack DJ, et al., 2022	73	73	Male	VPS	Right	Right	Scrotal swelling	Hernia repair
10	Our case 1	86	86	Male	LPS	Right	Right	Scrotal swelling	Follow-up
11	Our case 2	82	81	Male	LPS	Right	Right	Shunt dysfunction (due to lumbar catheter obstruction)	Follow-up

VPS: Ventriculoperitoneal shunt, LPS: Lumboperitoneal shunt, NA: Not applicable

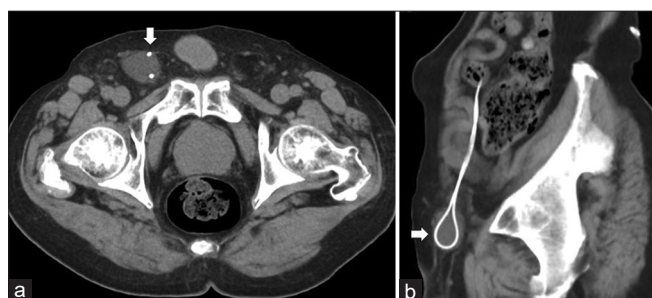


Figure 2: Abdominal computed tomography showing the presence of a lumboperitoneal shunt distal catheter in the right inguinal hernia sac with ascites (white arrow). (a: Axial slice, b: Sagittal slice).

Previous cases in adults are summarized in Table 1.^[1,4-7,9-12,15]

All cases were male, and the distal side of the catheter was the affected side, except for one case in which data on the affected side were unavailable. The lifetime incidence of inguinal hernias, in which internal organs and fatty tissue protrude through the inguinal or femoral canal, is 27–43% in men and 3–6% in women.^[2] Moreover, because the catheter is straightened downward in the abdominal cavity by gravity, the inserted side of the distal catheter is considered the affected groin side.

Symptoms included a scrotal mass, inguinal pain, intracranial hypertension due to shunt failure (e.g., headache, vomiting, and



Figure 3: Two weeks later, abdominal radiograph showed a distal catheter in the intraperitoneal space.

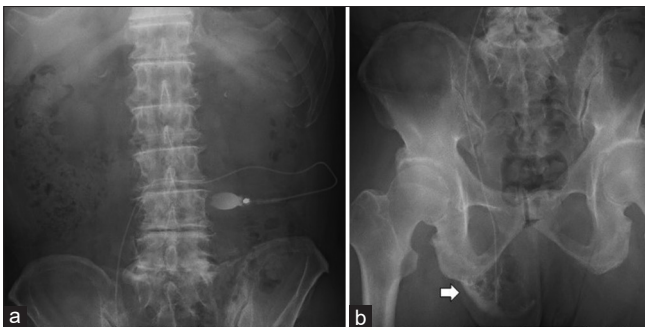


Figure 4: (a) Shunt angiography showing obstruction of the lumbar catheter. (b) Shunt angiography showing deviation of the distal catheter into the inguinal hernia sac with contrast (white arrow).

disturbed consciousness), perforation, and infection.^[1,4-7,9-12,15] All of these were treated surgically, including catheter removal, catheter trimming, shunt reconstruction, and hernia repair.^[1,4-7,9-12,15]

In our cases, the LPS distal catheters migrated into the inguinal hernia sac without any symptoms, except groin swelling. The distal catheter was moved to the correct location during short-term follow-up without surgery.

Inguinal hernias are almost asymptomatic, and the management of inguinal hernias is surgical, regardless of whether they are symptomatic or not.^[2] The rationale was that surgical treatment of asymptomatic inguinal hernias would prevent hernia complications (e.g., obstruction and

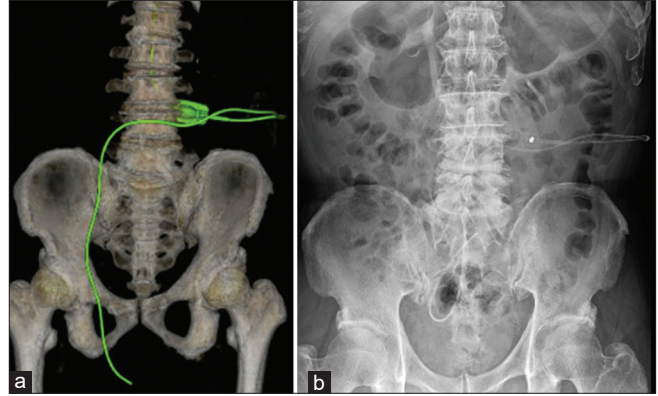


Figure 5: (a) Three-dimensional computed tomography after lumbar catheter reconstruction showing a deviated abdominal catheter in the right inguinal hernia sac. The green structure showing the shunt system. (b) Abdominal radiography on the day after surgery showed a distal catheter in the intraperitoneal space.

strangulation).^[2] The current literature suggests the possibility of surgical overtreatment in men with asymptomatic inguinal hernias.^[2] Asymptomatic patients with VPS or LPS should be followed initially because of the risk of shunt infection owing to aggressive surgical treatment.

Distal catheter migration into the abdominal wall is more common with LPS than with VPS because of more frequent movements of the distal catheter due to trunk rotation in LPS.^[3,8]

Inguinal complications due to the migration of the distal catheter into the groin are rare in LPS because frequent movements of the distal catheter due to trunk rotation dislodge it from the inguinal hernia sac for a short period.

In our cases, no surgery was performed because the catheter was moved in a short period and the patients did not wish to undergo hernia repair. However, careful follow-up is necessary because the shunt always depends on the spinal fluid absorbency of the peritoneal cavity, and there is a low risk of perforation of the thin and enlarged inguinal skin.

CONCLUSION

In adults, distal catheter migration into the inguinal hernia sac is a rare complication of LPS. Inguinal complications are rare in LPS because frequent movements of the distal catheter due to trunk rotation dislodge it from the inguinal hernia sac for a short period. Urgent surgery was not recommended because the catheter was moved in a short period and the patients did not wish to undergo hernia repair.

Asymptomatic patients should be followed initially because of the risk of shunt infection owing to aggressive surgical treatment. Careful follow-up is necessary because the shunt always depends on cerebrospinal fluid absorbency of the

peritoneal cavity and the risk of perforation of the thin and enlarged inguinal skin is low.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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