



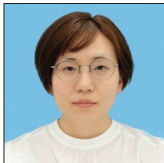
## Case Report

# Late intrathecal retraction of a lumboperitoneal shunt

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## ABSTRACT

**Background:** Lumboperitoneal (LP) shunt placement is a good option for treating elderly patients with communicating normal pressure hydrocephalus (NPH) who are also on antiplatelet therapy following endovascular treatment of unruptured bilateral internal carotid artery aneurysms. Here, in an 80-year-old male with an LP shunt, the catheter was “pinched” between adjacent spinous processes, resulting in laceration of the catheter and intrathecal catheter migration.

**Case Description:** An 80-year-old male was treated with a LP shunt for NPH 1 year after undergoing endovascular treatment of unruptured bilateral internal carotid artery aneurysms. The lumbar catheter was placed at the L2–3 level. Six months later, when he clinically deteriorated, the follow-up computed tomography showed recurrent ventricular enlargement. Further, studies additionally confirmed intrathecal migration of the lumbar catheter, warranting secondary ventriculoperitoneal shunt placement.

**Conclusion:** Patients with LP shunts may develop lumbar catheter lacerations secondary to a “pinching” effect from adjacent spinous processes, resulting in intrathecal catheter migration.

**Keywords:** Catheter rupture, Idiopathic normal pressure hydrocephalus, Intrathecal migration, Lumboperitoneal shunt, Ventricular shunt

## INTRODUCTION

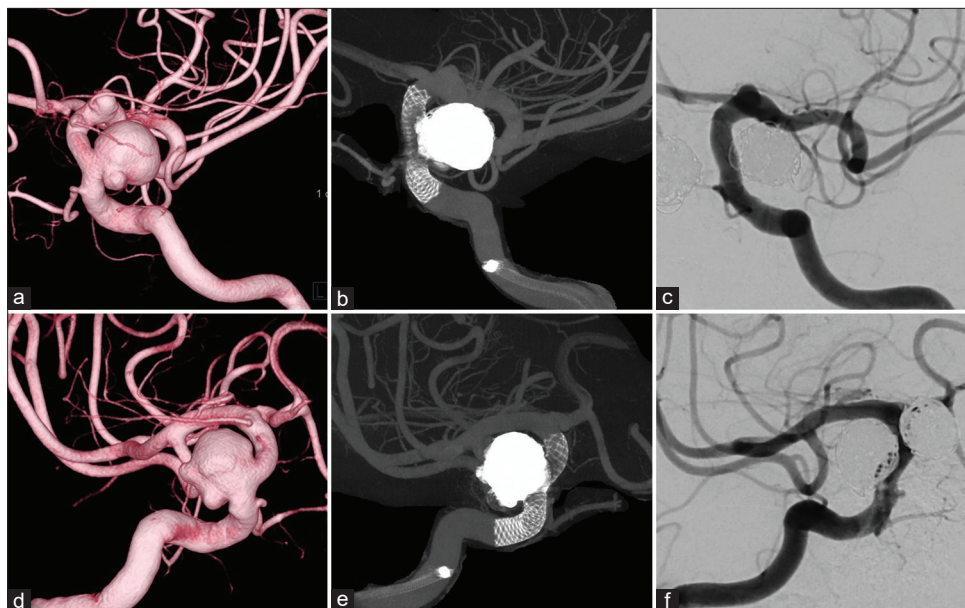
Lumboperitoneal (LP) shunts are good alternatives to ventriculoperitoneal (VP) shunts for patients requiring antiplatelet therapy. Here, one year following endovascular treatment of unruptured bilateral intracranial aneurysms, an 80-year-old patient developed idiopathic normal pressure hydrocephalus (NPH). He initially underwent placement of an LP shunt to avoid the increased hemorrhagic risks of a VP shunt. However, when the catheter became “pinched”/lacerated by the adjacent spinous processes and migrated intrathecally, he ultimately required a VP shunt.

## CASE REPORT

An 80-year-old male underwent coiling of bilateral carotid artery aneurysms [Figures 1a-f]. One year later, he developed progressive gait disturbance and cognitive dysfunction consistent with NPH. This was confirmed on brain computed tomography (CT), that showed ventricular enlargement with periventricular lucency. To reduce the risk of dual antiplatelet therapy (i.e., aspirin and clopidogrel) and intracranial hemorrhage associated with placing a VP shunt, the patient received an LP shunt (i.e., at the CT-documented “wider” L2/L3 level) [Figures 2a-c]. The shunt included a programmable valve with plastic connectors and an antisiphon device

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**Figure 1:** Angiography after flow diverter placement with coiling of bilateral carotid artery aneurysms. (a-c) Left internal carotid artery. (d-f) Right internal carotid artery. (a and d) Three-dimensional rotational angiography. (b and e) Cone-beam computed tomography. (c and f) Angiography at the 6-month follow-up.



**Figure 2:** Perioperative lumbar images when lumboperitoneal (LP) shunt placed. (a) computed tomography showed no scoliosis, hypertrophy of spinous processes, and/or marked calcification of interspinous ligament. (b) X-ray after LP shunt placement. (c) showed a shunt catheter inserted cephalad through the L2-L3 level.

(pressure setting 4, 110 mmH<sub>2</sub>O; outer diameter of catheter, 1.65 mm).

### Postoperative course

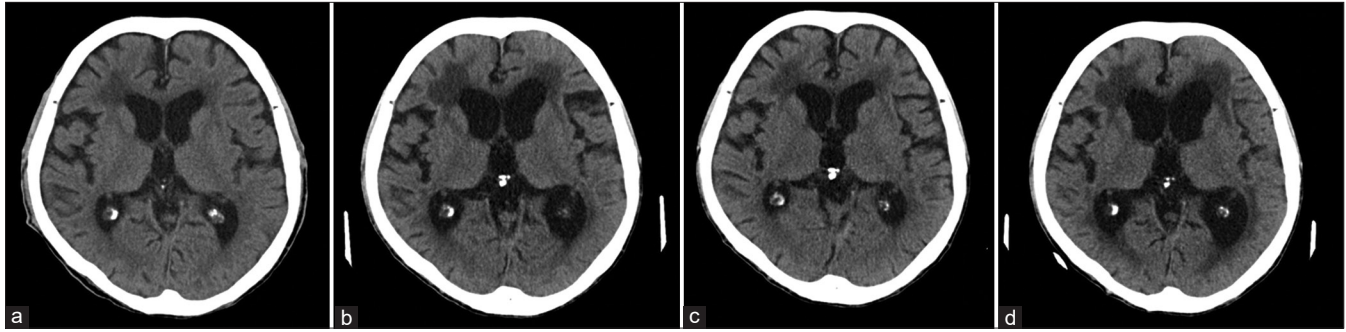
Postoperatively, his gait/cognitive function improved, and the ventricles decreased in size. However, six months later, symptoms recurred, and the CT once again showed enlarged ventricles/periventricular lucency, plus L2 intrathecal migration of the lumbar catheter [Figures 3a-d and 4a-d]. A VP shunt was placed,

and within five days, the patient was clinically improved (i.e., Mini-Mental State Examination score improved from 19/30 to 28/30).

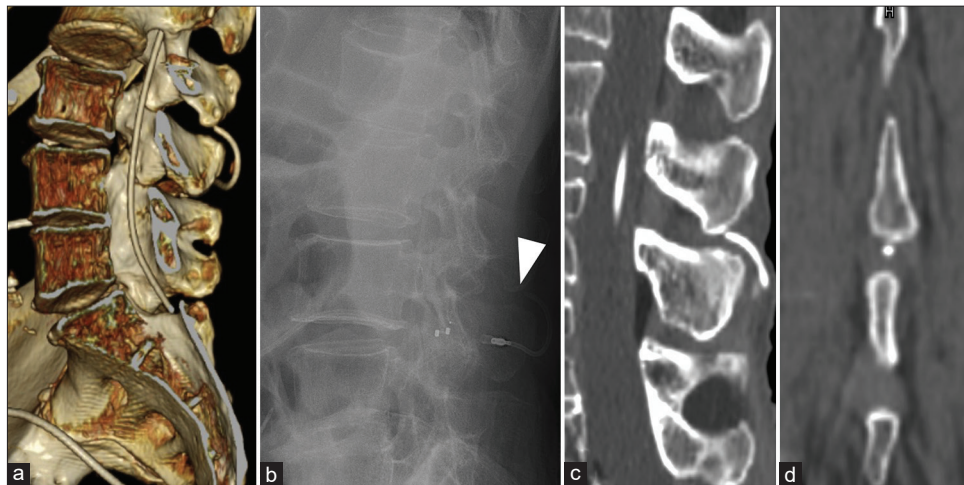
### DISCUSSION

#### Incidence of LP shunt intrathecal retraction/migration

An 80-year-old male developed a 6-month delayed rupture of an LP shunt catheter that was originally placed at the L2/L3 level (i.e., migrated intrathecally). Catheter



**Figure 3:** Brain computed tomography (CT). (a) Preoperative-flow diverters. (b) CT Image after recurrent worsening of normal pressure hydrocephalus symptoms/signs following bilateral flow diverter placement; enlarged lateral ventricles/periventricular lucency-anterior horns. (c) Image when symptoms improved after lumboperitoneal shunt. (d) Six months later, the patient deteriorated.



**Figure 4:** Lumbar spine images after shunt retraction. (a) Computed tomography (CT) showed that the shunt catheter retracted/migrated intrathecally. (b) X-ray at the site of catheter retraction. The arrow indicates the location. (c) Sagittal bone window CT scan. (d) Coronal CT of spinous processes.

rupture is described in <1% of patients following LP shunt surgery.<sup>[4]</sup> One study found a 13% incidence of proximal LP shunt migration due to failure of fixation.<sup>[1,3]</sup> Other studies demonstrate the following additional mechanisms for LP shunt catheter migration/failure: increased intra-abdominal pressure, changes in cerebrospinal/respiratory pressures, degenerative changes in the intervertebral disc with reduction of an interspinous space, vertebral deformity, and others.<sup>[5]</sup>

#### **Choice to initially place an LP shunt, followed secondarily by a VP shunt**

We chose to place an LP shunt rather than a VP shunt as our patient was on dual antiplatelet therapy following endovascular treatment of unruptured bilateral internal carotid artery aneurysms. Hudson *et al.* reported that such patients are at increased risk for intracranial hemorrhages following VP shunt placement.<sup>[2]</sup> We placed the proximal LP shunt at the widest L2/L3 level (3.1 mm). Still, the catheter presumably became “lacerated/pinched” by the adjacent

spinous processes and migrated intrathecally, warranting secondary placement of a VP shunt. Obtaining a preoperative CT to document a shortened distance between lumbar spinous processes may have convinced us to place a VP rather than an LP shunt primarily. In addition, paramedian rather than midline placement of the proximal lumbar end of the LP shunt catheters may limit/avoid such catheter ruptures.<sup>[6]</sup>

#### **CONCLUSION**

Multiple factors go into choosing an LP rather than a VP shunt for treating elderly patients with NPH. Obtaining preoperative CT studies to document sufficient interspinous space/distance may avoid future lumbar proximal catheter lacerations and intrathecal retraction.

#### **Declaration of patient consent**

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

### Financial support and sponsorship

Nil.

### 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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