



Case Report

Cranial migration of lumboperitoneal shunt: A case report and review of literature

Amr AlBakry¹, Mahmoud M. Taha¹, Hassan A. Al Menshawy²

Departments of Neurosurgery, ¹Zagazig University, Zagazig, Egypt, ²AlMokatam Insurance Hospital, Cairo, Egypt.

E-mail: Amr AlBakry - Email: ambakry@live.com; *Mahmoud M. Taha - mahmoudlotfy1972@yahoo.co.uk;

Hassan A. Al Menshawy - halmenshawy@yahoo.com



***Corresponding author:**

Mahmoud M. Taha,
Department of Neurosurgery,
Zagazig University, Zagazig,
Egypt.

mahmoudlotfy1972@yahoo.
co.uk

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ABSTRACT

Background: Lumboperitoneal shunt is an easy and effective way of managing benign intracranial hypertension (BIH) and other causes of increased intracranial pressure. Yet, it is associated with a relative high failure rate. Proximal migration of the shunt is rare and only few cases have been reported.

Case Description: Here, we present a case of a 16-year-old female, diagnosed with BIH, who had a proximal shunt migration 4 months after surgery and was managed conservatively, along with the review of literature.

Conclusion: Although it is associated with a high complication rate, lumboperitoneal shunt is very effective in the management of many disorders. One of the most common complications is shunt migration. While many mechanisms explaining shunt migration have been hypothesized, the most important single preventing factor for preventing shunt migration remains proper fixation of the shunt.

Keywords: Cranial, Lumboperitoneal shunt, Migration, Proximal

INTRODUCTION

Lumboperitoneal shunt is an established treatment for the management of idiopathic intracranial hypertension.^[5] In comparison to ventriculoperitoneal shunt, it has been associated with a higher rate of complications. Obstruction, overdrainage, mechanical failure, catheter migration, catheter fracture, abdominal complications, lumbospinal complications, and infections have all been reported.^[7] Migration of the shunt occurs when it is not properly anchored or if the anchoring sutures are not tight enough.^[11] Migration may occur to the peritoneal cavity or very rarely may migrate proximally to the spinal canal or even up to the cranial cavity.^[3] Only very few cases of proximal migration have been reported in literature.^[1-4,6,8-11] Here, we report a case of proximal migration of the lumboperitoneal shunt in a case of benign intracranial hypertension (BIH) 4 months after implantation in a 16-year-old female.

CASE REPORT

A 16-year-old right-handed female complaining of headache and diminution of vision sought for ophthalmologic consultation and was found to have the 2nd degree papilledema, was then referred to our department. Full analysis of the complaint and full neurological examination



Figure 1: Anteroposterior X-ray showing the proximal end of the shunt migrating up to the vault of the skull.

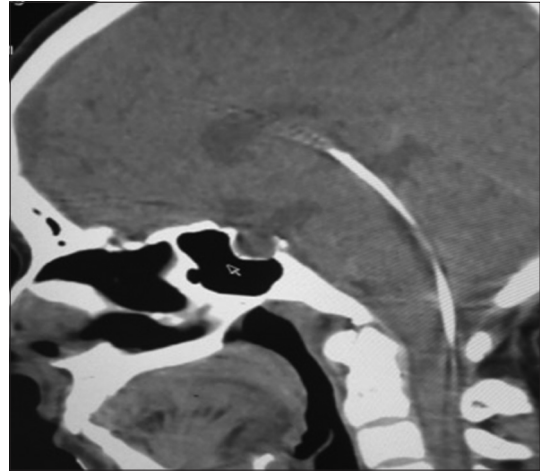


Figure 3: Sagittal computed tomography scan of the skull showing the cranial end migrating up to the ventricle.

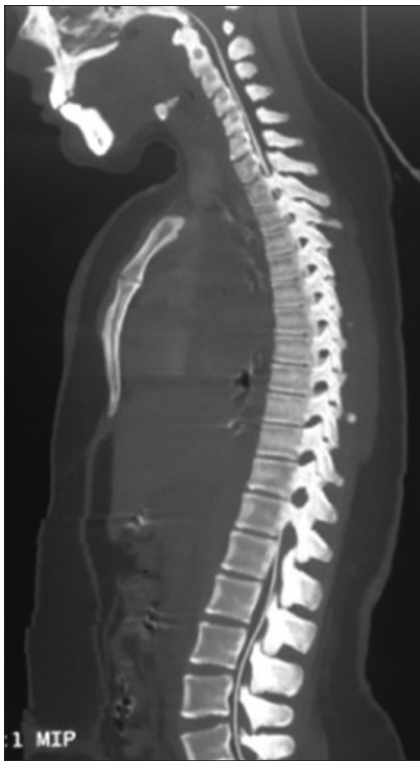


Figure 2: Sagittal computed tomography scan of the full spine and skull showing the shunt extending up to the cranial cavity.

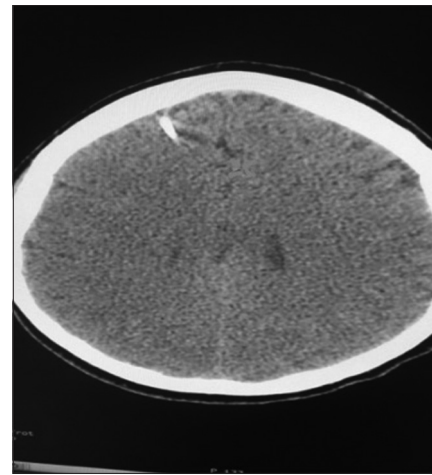


Figure 4: Axial computed tomography of the brain showing the proximal end of the shunt in the frontal horn.

were done. Computed tomography (CT) brain was free. A provisional diagnosis of pseudotumor cerebri was made. Spinal manometry revealed an elevated cerebrospinal fluid (CSF) pressure. A course of conservative measures (diuretics, steroids, and lumbar puncture) was decided, with no significant improvement. We decided to go for surgical management and a lumboperitoneal shunt was inserted. All patient's symptoms improved postoperative, and papilledema

improved in postoperative follow-up. Four months later, the patient started to complain of sudden severe back pain with recurrence of the headache, and the patient had a different complain of "something hitting the head from inside" in the patient's own words. The patient went to an orthopedic surgeon to seek for the cause of the low back pain, and she ordered a pelvis and lumbar X-ray. The lumbar X-ray showed straightening of lumbar lordosis and a diagnosis of muscular low back pain was made and the patient was treated accordingly with improvement of her back pain. Accidentally, she found the proximal end of the shunt migrating upward and the patient was referred again to us. We ordered a full spine CT scan and a CT brain and we found the shunt migrating proximally up to the frontal horn of the right ventricle [Figures 1-4]. The condition was explained to the patient and the surgery for removal of the shunt was explained to her in full details, but she refused the surgery;

the patient was given carbamazepine for the treatment of headache, diuretics, and steroids for the treatment of the elevated increased intracranial pressure, which all gave the patient a sense of relief and improvement of her symptoms, although the first round of conservative treatment failed to give the patient any relief of symptoms, and we do not have an explanation to this.

DISCUSSION

Lumboperitoneal shunt is a simple and effective procedure for the treatment of pseudotumor cerebri. Lumboperitoneal shunt accounts for 40% of the CSF shunting procedures. Possible complications of the shunt are obstruction, overdrainage, mechanical failure, catheter migration, catheter fracture, abdominal complications, lumbospinal complications, infections, or other less commonly reported complications.^[7,8] It is very important to fix the tube in place with tabs offered with the system to avoid shunt migration.^[8] Failure to fix the tube properly will lead to shunt migration either distally or proximally which interferes with normal CSF drainage.^[11] One study showed that mechanical failure of the shunt due to migration accounts for 13% of shunt complications.^[7] Up to date, we found nine publications handling proximal shunt migrations^[1-4,6,8-11] as shown in Table 1.

Possible mechanisms for proximal shunt migration are inappropriate fixation and increased intra-abdominal pressure and alterations in the CSF pressure in synchronization with the respiratory pressure.^[2-4,8,9,11] Other possible mechanisms may be due to bulk CSF flow which drives the shunt to its new position or due to placing the intrathecal end of the shunt in a rostral instead of a caudal direction.^[9] Furthermore, one of the findings is that the migration occurs in one piece shunt only

or those which do not contain a reservoir, not in those with a reservoir chamber.^[1,9]

Yoshida *et al.* reported two cases of communicating hydrocephalus where the shunt migrated into the thoracic theca, the shunt was pulled back to place and a reservoir chamber was added to fix it in place and patients remained symptom free.^[11]

In the case reported by Bunc *et al.*, they had an LP shunt placed for the management of posttraumatic hydrocephalus with neck infection, which interfered with implantation of a VP shunt. The patient’s symptoms started to improve followed by deterioration, radiological investigation showed the shunt to migrate to the ambient and prepontine cistern, removing the shunt from its new site was risky, especially that it was not causing any symptoms and the decision was to leave it in place and insert a VP shunt.^[3]

In Alleyne *et al.*, a 38-year-old female had a lumboperitoneal shunt inserted for BIH; 2 months later, the shunt migrated proximally into the thecal sac with recurrence of symptoms, surgical intervention was done, and the shunt was pulled back to place with improvement of the symptoms; 3 months later, symptoms recurred and the shunt was found to migrate into the posterior fossa and surgical removal was difficult and the plan was to leave it in place and insert a VP shunt.^[1]

Carroll and Jakubowski reported that a shunt placed for BIH which migrated entirely into the spinal canal and was removed through a laminectomy.^[4]

Rodrigues *et al.* reported three cases of LP shunt migration; a 37-year-old female had an LP shunt which migrated into the thecal sac to opposite D11 following a road traffic accident and was removed through a laminectomy and a new shunt was inserted and fixed tightly to rectus abdominus and

Table 1: Previous publications of Lumboperitoneal shunt migration

Author	year	Number of cases	Age (years)	Sex	Diagnosis	Time after Surgery	Proximal tip	Management
James <i>et al.</i>	1981	1	-	-	-	-	Spinal canal	-
Alleyne <i>et al.</i>	1996	1	38	F	BIH	3 months	Thecal sac Posterior fossa	Surgical
Anthogalidis <i>et al.</i>	1999	1	48	F	CSF fistula	1 year	Left Thalamus	Conservative
Carroll <i>et al.</i>	2000	1	20	F	BIH	3 years	Spinal Canal	Surgical
Yoshida <i>et al.</i>	2000	2	60 36	M F	Communicating hydrocephalus in both cases	7 days After discharge	Thoracic Spinal Canal	Surgical
Satow <i>et al.</i>	2001	1	50	F	Hydrocephalus following SAH	3 days	Intrathecal	Surgical
Rodrigues <i>et al.</i>	2005	3	37 26 20	F F F	BIH BIH BIH	- 3 years 3 years	Spinal Subarachnoid space; D11 D10 Quadrigeminal Cistern	Surgical
Solaroglu <i>et al.</i>	2005	1	40	F	CSF rhinorrhea	-	Neural Foramin	Surgical
Bunc <i>et al.</i>	2011	1	19	M	Post-traumatic Hydrocephalus	-	Prepontine and ambient cistern	Conservative

lumbar fascia; a 26-year-old female had an LP shunt placed for BIH, 3 years later, the shunt migrated to opposite D10 after normal vaginal delivery and was retrieved and a new one was put, a 20-year-old female had an LP shunt for the management of BIH, and after an attack of acute bronchitis and severe cough, the shunt migrated into the 4th ventricle and was left in place and a new one was applied.^[8] We notice that all the cases were associated with an increase in the intra-abdominal pressure.

The case reported by Solaroglu *et al.* was a 40-year-old female with CSF rhinorrhea following surgical removal of a clival tumor. Postoperatively, the proximal end of the shunt was found inside the foramina with severe radicular pain, the patient was taken to theater and the shunt was pulled back.^[10]

Anthogalidis *et al.* reported a 48-year-old female with CSF fistula, who had the shunt slipped after 1 year into the left thalamus. The shunt was a one-piece valveless shunt. Removing the shunt was associated with a high risk of injury, so decision was to leave it in place and insert a new VP shunt.^[2]

The case by Satow *et al.* was a 50-year-old female who had hydrocephalus following SAH. An LP shunt was inserted and 3 days later, no improvement in symptoms or CT imaging was noticed. The shunt migrated intrathecally and the peritoneal end slipped out of the peritoneal cavity. Shunt revision was done and repositioned with proper fixation. They conveyed the shunt migration to the movement of the spine which acts like a driving force pushing the shunt from its place.^[9]

CONCLUSION

Although it is associated with a high complication rate, lumboperitoneal shunt is very effective in the management of many disorders. All measures to avoid these complications are a must. One of the most common complications is shunt migration. Although many mechanisms explaining shunt migration have been hypothesized, yet the mainstay for preventing shunt migration remains proper fixation of the shunt.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not

be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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