

Management of Lumbo-Peritoneal Shunt Complications in Patients with Idiopathic Intracranial Hypertension

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ABSTRACT

Background: lumboperitoneal (LP) shunt is one of the best surgical management in treatment of Idiopathic intracranial hypertension (IIH).

Objective: to review the LP shunt complications and their management in IIH.

Patients and Methods: a total of 20 patients who got complications after LP shunt and needed shunt revision were included. There were 18 females and 2 males treated at Al-Hussein university hospital and Al-Mataria teaching hospital during the period from December 2015 and June 2018.

Results: there were 18 (90%) females and 2 (10%) males with age ranged from 18 to 48 years. Obstruction was the most common complication happened in 8 (40%) patients. Migration was the second common complication happened in 6 (30%) patients. Shunt infection is the one of the most dangerous complication and needs early intervention. There was one (5%) case of infection which required removal of the LP shunt. Two (10%) patients had CSF leakage. One (5%) patient had symptoms of over drainage. One (5%) patient had radiculopathy. One (5%) patient had intestinal perforation.

Conclusion: LP shunts for the treatment of IIH seems to be a safe procedure. Serious complications were rare. Only one case was deteriorated. Some patients need more than one shunt revision.

Keywords: Lumboperitoneal shunt, Idiopathic intracranial hypertension, complications.

INTRODUCTION

Idiopathic intracranial hypertension (IIH) is a disorder characterized by increased intracranial pressure with normal cerebrospinal fluid composition, and no other cause of intracranial hypertension evident on neuroimaging. Main symptoms are headache, vomiting, diplopia and visual disturbances⁽¹⁾. Main signs are papilledema, visual field loss and sixth nerve palsy⁽²⁾.

The incidence of IIH is 0.9/100,000 individuals. It increases to 3.5/100,000 in women ages 15–44, and to 19.3/100,000 in women aged 20–44 years who are 20 % or more above their ideal weight⁽³⁾.

The treatment of IIH has two major goals: the alleviation of symptoms (usually headache) and the preservation of vision. Medical therapy and weight reduction are successful treatments in most patients. Visual fields should be monitored. In rare cases, visual defects or acuity may worsen despite medical treatment, and surgical treatment may be necessary. Surgical management ranges from

repeated lumbar punctures to shunt operation and optic nerve sheath decompression⁽⁴⁾.

Lumboperitoneal (LP) shunt has many advantages over ventriculoperitoneal (VP) shunt includes: lack of cerebral cannulation, the possibility of using regional anesthesia with percutaneous insertion in adults, freedom from proximal obstruction by choroid plexus and brain parenchyma, a low rate of infection and the ability of insertion in the presence of small/slit ventricles⁽⁵⁾.

AIM OF THE STUDY

It is to evaluate the LP shunt complications and their management in IIH.

PATIENTS AND METHODS

In this retrospective and prospective study, 20 patients with IIH got complications after LP shunt insertion (age ranged from 18 – 48 years with average of 31 years). There were 18 females and 2 males treated at Al-Hussein university hospital and Al-Mataria teaching hospital during the period from December 2015 and June 2018. Written consent was obtained

from all patients or their legal representative. A detailed history was taken and thorough physical examination was performed in all cases. Pre-operative investigation was done according to the complication. Post-operative follow ups at 1,3,6 months by clinical data, visual examinations and neuroimaging.

- **Inclusion criteria:**
 - Patients that received primary placement of LP shunt as treatment of IIIH.
 - Adult Patients (age >18).
 - Needs surgical management.
- **Exclusion criteria:**
 - Conditions other than IIIH treated with LP shunts.
 - Non-primary placed LP shunts.
 - Pediatric patients.
 - Pregnancy.
- **Ethical approval:**

The study was approved by the Ethics Board of Al-Azhar University.

- **Confidentiality:**

The data of the participant were recorded and analyzed without any personal identifiers, by using coded information. The source documents and identification lists were archived in a secured facility per center. Permission for accessing data will be documented per investigator.

- **Preoperative protocol includes:**
 - Complete general and neurological examination.
 - Routine preoperative investigations.
 - Plain radiographs of the Lumbar region antero-posterior and lateral views.
 - Magnetic resonance imaging (MRI).
 - Fundus examination.
 - Visual field test.
- **Post-operative protocol includes:**
 - Regular follow ups at 1,3,6 months.
 - Clinical data.
 - Fundus examination and visual field.
 - Radiological imaging:
 - CT or MRI brain.
 - X-Ray lumbar region.
- **Statistical analysis:**

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

RESULTS

Twenty patients were identified (18 women and 2 men). The average age of these patients was 31 years. Most patients were obese. Headache was the most common presenting symptom. Papilledema is the most important physical finding in patients with IIIH (**Table 1**).

Table (1): Patient characteristics:

Variables	No. (%)
Age range (years)	18-48
Male: Female	1:9
Obese	17 (85%)
Anemia	7 (35%)
Diabetes mellitus	4 (20%)
Contraceptive pills	4 (20%)
Headache	18 (90%)
Blurring of vision	16 (80%)
Papilledema	17 (85%)
Visual field affection	16 (80%)

Regarding complications (**Table 3**):

In our series shunt obstruction was the most common complication of LP shunt as it presents in 8 patients (40%). Diagnosis of obstruction was done by recurrence of the symptoms and signs and normal imaging. Unfortunately, the diagnosis confirmed only intra-operative. The most common site of complication was the peritoneal catheter.

Shunt migration were found in 6 patients (30%). Migration of the peritoneal catheter may lead to pseudocyst formation. Shunt migration can easily diagnose by radiological imaging.

Shunt infection is one of the most dangerous complications and meningitis is the one potentially life-threatening complication of the LP shunt. In our series, one patient had wound infection (5%) and treated by removal of shunt and intra-venous antibiotics.

Intestinal perforation, a very rare complication, happened in one patient with the use of percutaneous technique.

Table (2): LP shunt Complications:

Complication	Frequency	Percent
Shunt obstruction	8	40%
Shunt migration	6	30%
Over drainage	1	5%
CSF Leakage	2	10%
Infection	1	5%
Radiculopathy	1	5%
Intestinal Perforation	1	5%

Regarding outcome (**Table 3**):

80% of patients achieved good symptoms improvement. Only one patient deteriorated due to infection.

Table (3): Outcome of shunt revision:

Variables	Improve	Same	Deteriorated
Obstruction	6	2	0
Migration	6	0	0
CSF Leakage	1	1	0
Over drainage	1	0	0
Infection	0	0	1
Radiculopathy	1	0	0
Intestinal Perforation	1	0	0
Total (percent)	16 (80%)	3 (15%)	1 (5%)

DISCUSSION

LP shunts have been demonstrated to be effective in the treatment of IIIH. Although LP shunt has many advantages over VP shunt, LP shunt associated with number of complications⁽²⁾. However, serious complications are rare. This study included 20 patients with IIIH and got complications after placement of LP shunt. There were 18 females (90%), 2 males with a ratio of 9:1. The female predominance was found in the series of **Kalyvas et al.**⁽⁶⁾ who reported that females representing 90.1% of the patients in their study. Also, **Yadav et al.**⁽⁷⁾ reported 91.6% were females and **Eggenberger et al.**⁽⁸⁾ reported 88% were females.

In our study, 17 (85%) patients were obese. The strong association of IIIH with obesity has been reported in many previous studies, but the pathophysiologic mechanism of obesity and increased intracranial pressure is undetermined. **Kalyvas et al.**⁽⁶⁾ reported that 81.7% were obese patients. Also, **Jones et al.**⁽⁹⁾ reported that 67% were obese and **Eggenberger et al.**⁽⁸⁾ reported that 88.8% were obese.

In our series, shunt obstruction was the most common complication of LP shunt as it presents in 8 patients (40%). Diagnosis of obstruction was done by recurrence of the symptoms and signs and normal imaging. Unfortunately, the diagnosis confirmed only intra-operative. **Kalyvas et al.**⁽⁶⁾ reported shunt obstruction in 51.6% of operated patients.

Shunt infection is one of the most dangerous complications and meningitis is the one potentially life-threatening complication of the LP shunt. In our series, one patient had wound infection (5%) and treated by removal of shunt and intra-venous antibiotics. **Wang et al.**⁽¹⁰⁾ reported shunt infection in 1.8% of operated patients.

In fact, over drainage is a common complication of LP shunt but most of symptoms are mild and no surgical management is needed. So, only one (5%) in our series developed over drainage and treated by higher pressure shunting. Significant over drainage may lead to serious complication as subdural collection and acquired Chiari malformation. **Jusué-torres et al.**⁽¹²⁾ reported over drainage in 20% of patients. **Barash et al.**⁽¹¹⁾ reported a rare case of bilateral subdural hematoma.

Radiculopathy and myelopathy were reported as a complication for LP shunt and they usually occur in adult patient. Radicular pain maybe resolved spontaneously within 3 weeks but if persist revision is necessary but myelopathy occurs in the form of paraparesis which need urgent revision. In our series, one patient (5%) had radicular pain and treated by reposition of the shunt. **Jusué-torres et al.**⁽¹²⁾ reported radiculopathy in 8% of patients.

CONCLUSION

Shunt obstruction was the most common complication. Unfortunately, diagnosis confirmed only intra-operative. Shunt migration was the second most common complication and the investigation of choice was C-T. The most dangerous complication was infection and needs urgent management. In cases with failed LP shunt, CSF diversion could be preceded by VP shunt or optic nerve sheath fenestration. Intestinal perforation was happened with the use of percutaneous technique. So, we recommend open surgery and laparoscopic technique.

Overall, LP shunts for the treatment of IIH seems to be a safe procedure. Serious complications were rare. Only one case was deteriorated. Some patients need more than one shunt revision.

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