Outcomes and Experience with Lumbopleural Shunts in the Management of Idiopathic Intracranial Hypertension

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OBJECTIVE: **To report five patients who underwent lumbopleural (LPl) shunting for the treatment of idiopathic intracranial hypertension (IIH) and to describe the considerations, complications, and outcomes related to this rarely described procedure.**

METHODS: **The clinical data of five patients treated with LPl shunting over a 23-year period were retrospectively analyzed. Factors including the age at diagnosis of IIH, age at time of LPl shunting, body mass index (BMI), reason for LPl shunt placement, number of revisions before LPl shunt placement, valve type, time to first revision, presence of overdrainage and its management, complications and their management, survival time of LPl shunt, and clinical course at last follow-up were analyzed.**

RESULTS: **All patients were morbidly obese females with an average of 4.6 shunt revisions before an LPl shunt. The average overall survival time of the LPl shunt was 48 months. Two patients experienced failure of their LPl shunts with subsequent replacement within the first year. Four patients experienced complications related to shunt overdrainage, requiring placement of an antisiphon device (ASD) or additional valve. One patient developed a symptomatic pleural effusion, and one patient developed a small pneumothorax, which was managed conservatively.**

CONCLUSIONS: **LPl shunting, though rarely used, is a viable option in the treatment of IIH refractory to standard peritoneal shunting. When pursuing this treatment, a valve and ASD are recommended to mitigate the risks of overdrainage and pleural effusion. Chest imaging should be obtained if the patient becomes symptomatic but can be deferred if the patient remains asymptomatic and is doing well.**

INTRODUCTION

Idiopathic intracranial hypertension (IIH) is defined as the pseudotumor cerebri syndrome in the absence of an underlying cause. The diagnostic criteria includes elevated intracranial pressure (ICP) with a normal cerebrospinal fluid (CSF) profile. Patients often present with severe headaches and may suffer from papilledema and visual loss. The standard treatment typically involves medical management with acetazolamide, but in refractory patients, surgical interventions such as ventriculoperitoneal (VP) or lumboperitoneal (LP) shunting, optic nerve sheath fenestration, or venous sinus stenting may be required.

IIH that is refractory to medical management can be notoriously difficult to treat, often involving multiple shunt revisions. Although the primary surgical treatment modality involves VP or LP shunting, there is an exceedingly high failure rate, with a reported 86% failure rate for LP shunts within 18 months and a 75% failure rate for VP shunts within 24 months (1). Given this high failure rate, as well as some patients who are poor candidates for a peritoneal catheter such as following peritonitis or other abdominal pathology, lumbopleural shunting is a potential option.

We retrospectively evaluated five patients with IIH who were treated with LPl shunting at some point in their treatment course. The general anatomy and surgical approach for LPl shunt

Key words
- Hydrocephalus
- Idiopathic intracranial hypertension
- Lumbopleural shunt
- Pseudotumor cerebri

Abbreviations and Acronyms
ASD: Antisiphon device
BMI: Body mass index
CSF: Cerebrospinal fluid
H-V: Horizontal-vertical
IIH: Idiopathic intracranial hypertension
ICP: Intracranial pressure
LA: Lumboatrial
LP: Lumboperitoneal
LPl: Lumbopleural
SA: Shunt assistant
VP: Ventriculoperitoneal
VPl: Ventriculopleural

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placement is illustrated in Figure 1, as it has not been depicted in the literature previously. In this article, we discuss the difficulties inherent to surgical management of patients with IIH, explain the unique problems faced when using an LPl shunt, and discuss the clinical outcomes of our use of LPl as a guide for other practitioners.

METHODS

Institutional review board approval was obtained to review patient records and imaging studies. The inclusion criterion was any adult patient treated with an LPl shunt at our institution during the 23-year interval between 1991 and 2014. Five patients who met the inclusion criteria, out of a total of 135 patients treated with a shunt for IIH, were identified. Their records and imaging studies were reviewed to examine preoperative factors including the age at diagnosis of IIH, age at time of LPl shunting, body mass index (BMI), reason for LPl shunt placement, and the number of revisions before LPl shunt placement. Additionally, perioperative and postoperative factors were evaluated including valve type, time to first revision, presence of overdrainage and its management, complications and their management, survival time of LPl shunt, and clinical course at last follow-up.

RESULTS

Patient demographics and treatment selection parameters for LPl shunting are summarized in Table 1. All patients were female. The average age at diagnosis of IIH was 31.2 (range 24–42). The average time between diagnosis of IIH and placement of LPl shunt was 4.8 years (range 0–11). The average BMI was 42 (range 36–45). The average number of shunt revisions before placement of an LPl shunt was 4.6 (range 0–10). The results of the patient responses and complications following LPl shunting are presented in Table 2. The average time to first revision for the LPl shunt was 41.8 months (range 1–168), and the average overall lifespan of the LPl shunt, before converting to a different treatment type, was 48 months (range 2–178). Two patients (40%) experienced failure of the LPl shunts with subsequent replacement within the first year. Four patients (80%) experienced complications related to shunt overdrainage, requiring placement of an antisiphon device (ASD) or additional valve. One patient (20%) had developed a symptomatic pleural effusion requiring conversion to an LA shunt, and one patient (20%) developed a small pneumothorax after LPl shunt placement, which was managed conservatively.

Out of the five LPl shunts placed, one was converted to a lumboatrial (LA) shunt due to a symptomatic pleural effusion, which subsequently became infected and was removed. It did not require replacement. Three were converted back to either VP or LP shunts, and only one LPl shunt remained in place and was functional, though with only 1 month of follow-up since the last revision.

DISCUSSION

Patients with refractory IIH are often challenging to manage, and alternative surgical treatment strategies may need to be pursued, including the use of LPl shunts. Although ventriculopleural shunts have been described many times in the literature (2-7), to the best of our knowledge, this article represents the first case series describing the use and outcomes of LPl shunts and is also the first time this management strategy has been described in adult patients.

There is minimal mention regarding the use of an LPl shunt in the literature. For instance, two case reports exist on using

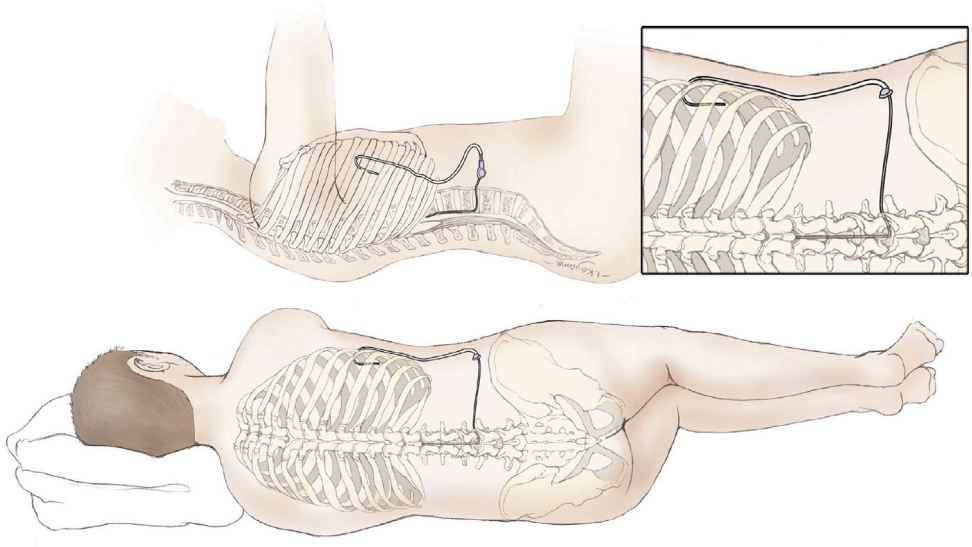

Figure 1. Illustration depicting the relevant anatomy and surgical approach for placement of a lumbopleural shunt. The patient is placed in the left lateral decubitus position, and the spinal canal is entered at L3-4 or L4-5. The catheter and valve are tunneled to the flank and then to the thorax, and the catheter is placed into the pleural space.