



Management of Idiopathic Intracranial Hypertension with the Use of the Programmable STRATA

Lumboperitoneal Shunt: A Single Academic Center's Experience and Review of the Literature

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Introduction

Idiopathic intracranial hypertension (IIH) is a condition characterized by elevated intracranial pressure due to an unknown etiology. It primarily affects overweight, reproductive-age women. Lumboperitoneal (LP) shunts, ventriculoperitoneal (VP) shunts, and optic nerve sheath fenestration (ONSF) are the most acceptable surgical techniques used in the management of IIH. While demonstrated to be effective in controlling symptoms of IIH, older LP shunt systems have been criticized for potential development of low pressure symptoms and required Chiari Malformation.

Learning Objectives

- 1) Discuss the basic pathophysiology of IIH
- 2) Discuss the advantages of programmable LP valves vs standard LP Shunts

Methods

We report our experience with LP shunts with the programmable STRATA valve and small lumen peritoneal catheters from November 2012 to June 2013. Our series included seven patients with IIH (all female) who underwent insertion of an LP shunt with a programmable valve. Demographics including age, gender, diagnosis, pre-operative and post-operative visual acuity and visual fields as well as intra-operative and post-operative complications were reported. Initial valve settings and subsequent adjustments were also reported.

The aforementioned programmable valve provides a full range of performance levels: 0.5 setting (0–3 cm H₂O), 1.0 setting (1–6 cm H₂O), 1.5 setting (5.5–11.5 cm H₂O), 2.0 setting

(10.5–17 cm H₂O), and 2.5 setting (15.5–22.5 cm H₂O). It is composed of a reservoir, which allows for injection, CSF sampling, and flushing proximally or distally. The performance level can be checked through the use of an inbuilt adjustment system or by radiographic confirmation. The small lumen peritoneal catheter consists of firmer catheter tubing than conventional LP shunts, which reduces the risk of occlusion or kinking. The small inner diameter provides an average resistance to flow of 0.1 cm H₂O per centimeter of catheter length. The flow-limiting small lumen peritoneal catheter may decrease the risk of over drainage

Results

Between November 2012 and June 2013, seven female patients underwent placement of an LP shunt with a programmable valve (Table 1). Mean age was 33.2 years (range 23 – 46). Six of seven (85.7%) procedures were elective. Mean opening pressure was 34.8 cm H₂O. Valve pressure settings ranged from 3cm H₂O to 17 cm H₂O with one patient requiring post-operative adjustment due to low pressure symptoms. No intra-operative or post-operative complications were noted in our series.

Five of seven (71.4%) of patients had received previous CSF diversion procedures. Pre-operative and post-operative visual acuity, visual fields, and optic disc status are indicated in (Table 2). One patient (14.3%) failed to attend follow up with their ophthalmologist post-operatively for visual assessment. All patients demonstrated improvements in visual function.

Table 1: Patient Demographics

Patient	Age	Gender	Urgency	Opening Pressure (cm H ₂ O)	Valve Pressure Setting
1	33	F	Elective	42	0.5
2	32	F	Elective	>18	2
3	46	F	Elective	27	2*
4	34	F	Emergent	27	1
5	33	F	Elective	18	1.5
6	32	F	Elective	40	1.5
7	23	F	Elective	>55	1.5

*Valve was adjusted to 1.5 post-operatively

Table 2: Pre-Operative vs. Post-Operative Visual Function

	Pre-Op	Pre-Op	Pre-Op/Disc	Post-Op	Post-Op	Post-Op/Disc
	VA	VF	Status	VA	VF	Status
1	OD: 20/30 OS: 20/25	Generalized constriction extended from inferior quadrant (OU)	Papilloedema (OU)	OD: 20/25 OS: 20/20	Improved (OU)	Normal (OU)
2	OD: 20/20 OS: 20/80*	Mild loss (OD) Depressed (OS)	Optic atrophy L->R (OU)	OD: 20/20 OS: 20/150	Improved (OU)	Optic atrophy (OU)
3	OU: 20/20	Normal (OU)	Mild gliotic changes (nasal surface) (OU)	OU: 20/20	Normal (OU)	Mild gliotic changes (OU)
4	OD: 20/25 OS: 20/20	Constriction (OU)	Papilloedema (OU)	OD: 20/20 OS: 20/25	Normal (OU)	Normal (OU)
5	OD: 20/20 OS: 20/20*	Mildly depressed (OD) Significant reduction (OS)	Papilloedema (OU)	OD: 20/20 OS: 20/20*	Normal (OD) Mild inferior field loss (OS)	Normal (OU)
6	OD: 20/20 OS: 20/25*	Enlarged blind spot (OU)	Papilloedema (OU)+ Secondary exudate	OD: 20/20 OS: 20/20*	Normal (OU)	Minimal disc fullness nasally (OU)
7	OU: 20/20	Loss of peripheral vision (OU)	Papilloedema (OU)	-	-	-

OD: Oculus Dexter (Right Eye); OS: Oculus Sinister (Left Eye); OU: Oculus Uterque (Bilateral); VA: Visual Acuity; VF: Visual Fields; - No follow up; *Afferent Pupillary defect detected

Conclusions

Programmable LP shunts are superior to non-programmable valves due to the ability to avoid symptoms of over-drainage. They are also superior to VP Shunts due to lower infection rates and avoidance of intra-cerebral complications with the advantage of regulating CSF flow. In conclusion, the programmable valve is effective in controlling signs and symptoms of IIH, and should be considered as first-line management over traditional LP systems and VP shunts. A prospective randomized multi centre clinical trial should be conducted to compare the efficacy of these surgical techniques.

Selected References

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