A Retrospective Outcomes Review of Patients with Idiopathic Normal Pressure Hydrocephalus Treated with a Low Flow Valve System

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Introduction

The treatment of Idiopathic Normal Pressure Hydrocephalus (iNPH) entails the placement of a valve regulated CSF shunt system. The use of a Differential Pressure or Flow Regulated valve system is optional. Data regarding the efficacy of flow related devices in INPH is sparse and generally inferred. Our primary goal was to objectively evaluate the clinical outcomes in 13 patients treated with an Integra Life Sciences Low Flow Valve (LFV) at six months and one year. Secondary objectives included an analysis of the incidence of shunt related complications.

Methods

This prospective study involves the use of a LFV system in thirteen patients with an average age of 77 years (range 63 to 87), admitted to the Florida Hospital NPH Program for a trial of three day lumbar drainage with pre and post drainage Neuropsychological Assessment Battery (NAB), gait assessment (GA), and imaging studies (IS). Repeat testing (NAB, GA, IS) was performed at six months and one year post implantation of a LFV system.

Results

A statistically significant improvement was noted in gait assessments (Berg Balance Score) at six months and one year in the eight patients who completed the study at one year (Figure 1.). Neuropsychological Assessment Battery at six months and one year did not achieve statistical significance but a definite trend towards improvement was noted (Figure 2.). One patient required proximal shunt revision for malposition of the ventricular catheter.

Figure 1.
Berg Balance Test (8 patients with one year completion)

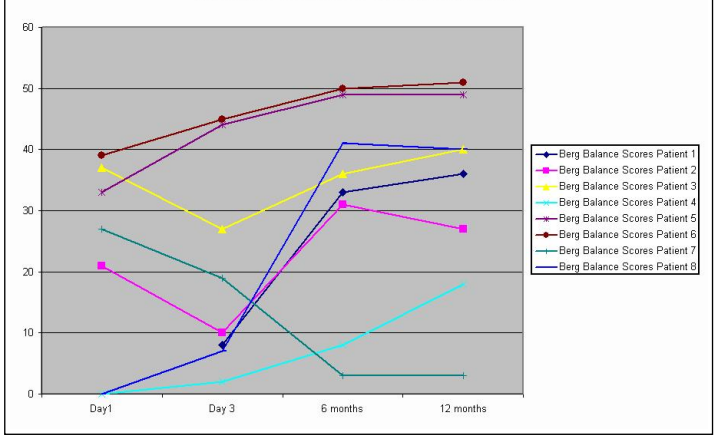
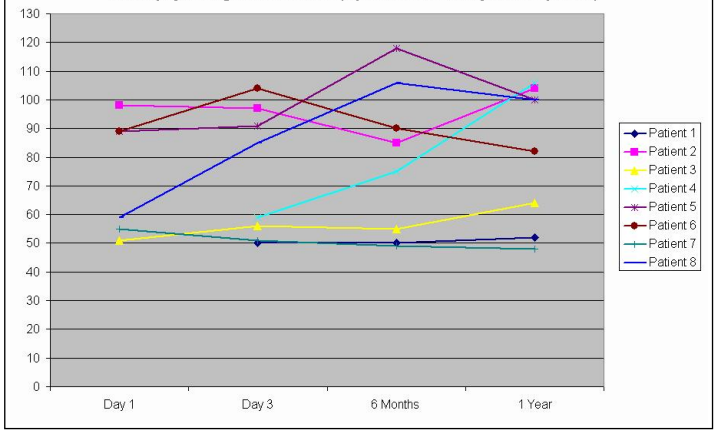


Figure 2.
Neuropsychological Evaluation (8 patients with one year completion)



Conclusions

The use of the Low Flow Valve System in patients with iNPH appears to have validity. Improvement in gait achieved statistical significance at one year post implantation. A trend towards improvement in neuropsychological assessment was observed during this period, however the small size of this study may have contributed to its lack of statistical significance. Hydrodynamic shunt related complications (subdural hematomas, obstruction) were not observed. One patient required proximal shunt revision (for ventricular catheter malposition) three months post operatively. The need for a larger prospective study using a Low Flow Valve System is warranted to further define its benefit in the treatment of patients with iNPH.

Learning Objectives

1. Flow regulated valve systems may be recommended for treatment of Idiopathic Normal Pressure Hydrocephalus.

2. Shunt related complications in the treatment of Idiopathic Normal Pressure Hydrocephalus may be reduced by the use of Flow Regulated Valve systems.

References

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Hanlow, Patrick W., et al. Treatment of hydrocephalus determined by the European Orbis Sigma Valve II survey: a multicenter prospective 5-year shunt survival study in children and adults whom a flow-regularing shunt was used. J Neurosurg 99: 52-57, 2003.

Zemack M.D., Goran, et al. Adjustable Valves in noraml-pressure hydrocephalus: A retrospective study of 218 patients. Neurosurgery 51:1392-1402, 2002.

Figure 1.

Berg Balance Test (8 patients with one year completion)

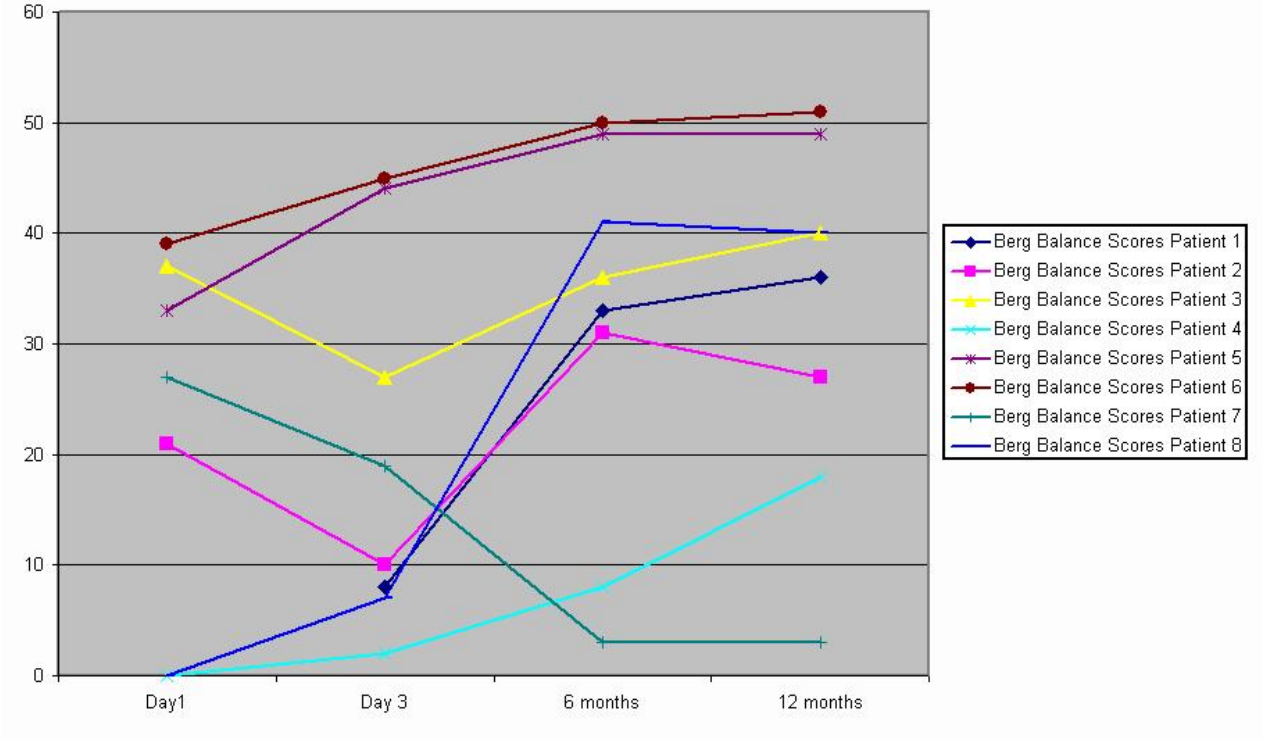
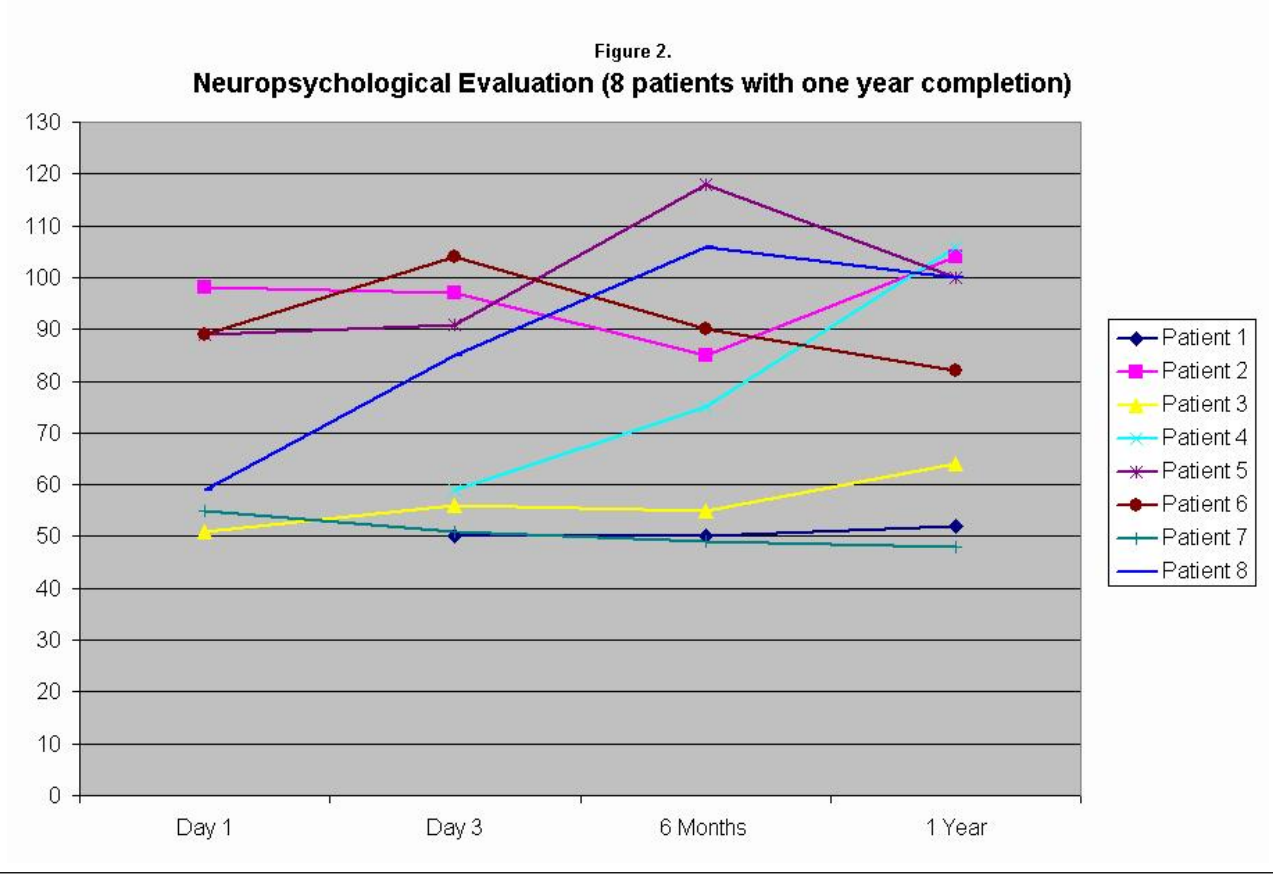


Figure 2.


Neuropsychological Evaluation (8 patients with one year completion)
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Day 1
Day 3
6 Months
1 Year
Patient 1
Patient 2
Patient 3
Patient 4
Patient 5
Patient 6
Patient 7
Patient 8