Prepontine Cisternal Shunting for Idiopathic Intracranial Hypertension

Todd Douglas Vogel MD; Charles Glen Kulwin MD; Shaheryar Ansari MD; Michael S. Turner MD, BS
Department of Neurological Surgery, Indiana University School of Medicine, Indianapolis, IN

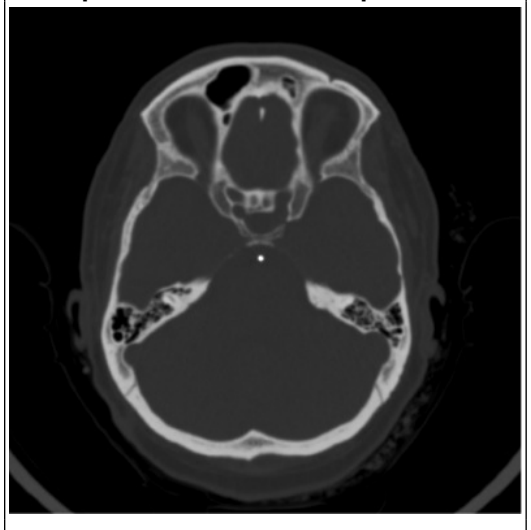
Introduction

CSF diversion continues to be problematic in the idiopathic intracranial hypertension (IIH) population (1). The trend from lumbar shunts to ventricular shunts has been complicated by failure of the proximal shunt limb due to collapse of the lateral walls in patients with slit-like ventricles (2). The prepontine cistern is a non-collapsing space of interest. This case series investigates a new surgical technique of prepontine cisternal shunting (PPS) to determine safety and efficacy.

Methods

This case series represents a retrospective chart review of 54 patients who underwent PPS between 1/1/2005 and 12/31/2012 for IIH. Primary outcome was revision of proximal catheter and indication. Secondary outcomes were all revision surgeries and indications.

Prepontine cistern shunt placement



Axial head CT without contrast demonstrating proximal catheter tip within the prepontine cistern.

Description of Procedure

The patient is placed in a beach chair position with the head turned slightly to the left. Tracing the facial features estabilshes electromagnetic stereo navigation using a Medtronic AxiEM StealthStation. A semi-circular incision is made at Kocher's point, a linear incision behind the ear, and a linear incision over the right upper quadrant of the abdomen. A burr hole is placed with a high-speed drill. Tunneling of the catheter from the head to the abdomen is carried out, and an anti-siphon device is secured at the posterior auricular position. A Medtronic Innervision intraventricular catheter is placed in the ventricle using intraoperative guidance from the Medtronic AxiEM StealthStation. Once in the ventricle, a Medtronic NeuroPEN Neuroendoscope is used to direct the proximal catheter through the foramen of Monro, create an endoscopic third ventriculostomy, and place the proximal catheter in the prepontine cistern. A right-angle Codman Hakim programmable valve with Siphonguard is set to 200mm H20 and secured to the proximal and distal tubing.

Results

28 patients had PPS placed as their initial shunt surgery. 19 patients had a previous ventricular shunt that required revision for proximal malfunction or infection. 7 patients had a previous lumbar shunt that had failed. There were 92 total procedures performed. There were 7 proximal revisions in four patients: 6 were for infection and 1 for a proximal malfunction. There was one hemorrhage related to removal of a ventricular shunt with subsequent PPS placement. There were 31 additional revisions of the distal shunt. 13 revisions were for addition of an anti-siphon device. 11 revisions were for distal tubing malfunction or migration. 4 revisions were for exposure of hardware with replacement. 2 revisions were for removal or ligation of shunt. 1 revision was for a malfunctioning programmable valve.

Conclusions

PPS is a safe and effective shunting technique in the IIH population. This case series demonstrates removal from, and replacement into, the prepontine cistern. One problem not anticipated was over-drainage and low pressure headaches leading to the addition of an anti-siphon device. We have subsequently modified the procedure and now implant an anti-siphon device at the time of surgery. A single case-report exists for performing an endoscopic third ventriculostomy to shunt the prepontine cisternal space similar to our procedure (3). Further research is needed to examine if this technique is noninferior to placement of the proximal catheter into the ventricle in regard to proximal revision rate.

Rerferences

1. McGirt M, Woodworth G, Thomas G, Miller N, Williams M, Rigamonit D. Cerebrospinal fluid shunt placement for pseudotumor cerebri-associated intractable headache: predictors of treatment response and an analysis of long-term outcomes. **J Neurosurg** 101:627-632, 2004.
2. Thomale UW, Hosch H, Koch A, Schulz M, Stotenburg G, Haberl EJ, Sprung C. Perforation holes in ventricular catheters--is less more? **Childs Nerv Syst** 26:781-789, 2010.
3. Stan H, Popa C, Iosif A, Nistor S. Combined endoscopically thrid ventriculostomy with prepontine cistern placement of the ventricular catheter in a ventriculo-peritoneal shunt: technical note. **Minim Invasive Neurosurg** 50:247-50, 2007.

Prepontine cistern shunt placement

Lateral skull film demonstrating proximal catheter in the prepontine cistern.