Initial Experience with Implantation of ReFlow Shunt Device and Prophylactic Flushing in Pediatrics

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BACKGROUND: Hydrocephalus treatment continues to be one of the most costly pediatric implant-related conditions at >$2 billion annually. Ventriculoperitoneal shunts (VPS) malfunction rates are as high has 60% by 2 years. Debris, protein and cellular ingrowth most commonly obstruct the proximal ventricular catheter and valve and no current effective prevention exists. The ReFlow (Anuncia Inc, Lowell, MA, USA) is a novel flushing device which is implanted adjacent and proximal to the valve to flush fluid into the proximal ventricular catheter. This maneuver may open obstructed proximal ventricular catheters and we hypothesize, prevent obstruction.

METHODS: We present our first 4 cases ReFlow implantation with detailed discussion of patient selection, surgical procedure, post-operative follow up and prophylactic flushing protocol.

RESULTS: Ages range 3.5 -11years old at implantation. All patients have post-hemorrhagic hydrocephalus. Three of four were implanted with ReFlow at the time a new VPS, and one at the time of a VPS revision. Two patients were implanted with cerebrospinal fluid protein levels >800mg/dl. One patient was implanted with a VPS + Reflow after Intracranial Pressure (ICP) monitoring demonstrated pathology. Another patient was implanted after complete treatment for VP shunt infection and persistently elevated CSF protein. One infection and no obstructions have been noted with follow up 1-9 months.

CONCLUSIONS: Some hydrocephalic children are at high risk for VPS malfunction, and therefore any novel prevention method would greatly improve quality of care. The ReFlow device provides a method to prevent VPS obstruction. Implantation in patients with high risk of VPS obstruction was uneventful. We defined this group as post-hemorrhagic, post-infectious, slit-like ventricles with proximal obstruction and chronic protein elevation. Prophylactic flushing of the ReFlow provides a theoretical advantage, is safe and easy to flush, and the regimen is easily teachable to the family to do after implantation.