Ventriculoatrial shunt

The ventriculoperitoneal shunt (VP) option is more popular than ventriculoatrial (VA) shunts. However, shunt revisions may be required due to shunt infection, shunt obstruction, and shunt migration conditions in VP shunts. In such special events, VA shunts may be an appropriate option for continuous cerebrospinal fluid drainage.

The intraoperative appropriate vein selection and exact shunt placement is important to reduce complications such as obstruction.

Placement strategies and monitoring methods have been improved to achieve more success in VA shunt catheter replacement. 1)

58 patients with iNPH underwent primary VA shunting at a median age of 74 (IQR: 70-80) years. The most common comorbidities included hypertension (n=39, 67%) and diabetes mellitus (n=11, 19%). Median duration of symptoms prior to VA shunting was 24 (IQR: 12-36) months. All patients had gait impairment, 52 (90%) had cognitive decline, and 43 (74%) had urinary incontinence. Forty-three (74%) patients had all three symptoms. At a median last follow-up of 16 (IQR: 7-26) months, median iNPH score improved from 6 to 3 (p<0.0001), mini mental status exam (MMSE) tended to increase from 26 to 29 (p=0.082), timed up-and-go (TUG) improved from 18 to 13s (p<0.0001), and Tinetti score improved from 19 to 25 (p<0.0001) after VA shunting. 78% of patients had improvement in at least one of their symptoms with 66% of patients having improvement in gait, 53% having improvement in their cognition, and 52% having improved urinary incontinence. A total of 21 patients (36%) had improvement in all 3 symptoms.

There were significant improvements in functional outcomes as evaluated via the iNPH score, TUG, and Tinetti score, while improvement in MMSE trended toward significance. Patients also had improvement of clinical symptoms related to gait, urinary function and cognition. These results suggest that VA shunting can be an effective primary treatment alternative to VP shunting for iNPH 2).

Disadvantages

1. requires repeated lengthening in growing child
2. higher risk of infection, septicemia
3. possible retrograde flow of blood into ventricles if valve malfunctions (rare)

Complications

The VA shunt is a relatively rare procedure for hydrocephalus.

As reported, several complications of VA shunt include obstructions, malposition, shunt infections, endocarditis, heart failure, tricuspid regurgitation, intra-atrial thrombus, and pulmonary hypertension.

Vascular complications: perforation, thrombophlebitis, pulmonary micro-emboli may cause pulmonary hypertension (incidence ≈ 0.3%) 3).

In a case report and literature review, Hung et al discuss a rare case of intramuscular migration of a
venous tube 1 year after VA shunt implantation. Hung et al., also report all the possible locations of migration after placement of VA shunt 4).

**Case series**

Rymarczuk et al. retrospectively analyzed all cerebrospinal fluid shunting procedures performed over a 13-yr period at a single institution. A total of 544 pediatric shunt patients were followed for at least 90 d (VPS: 5.9 yr; VAS: 5.3 yr).

A total of 54% of VPS and 60% of VAS required at least 1 revision. VPS demonstrated superior survival overall; however, if electively scheduled VAS lengthening procedures are not considered true “failures,” no statistical difference is noted in overall survival (P = .08). VPS demonstrated significantly greater survival in patients less than 7 yr of age (P = .001), but showed no difference in older children (P = .4). VAS had a significantly lower rate of infection (P < .05) and proximal failure (P < .001).

VAS can be a useful alternative to VPS when the abdomen is unsuitable, particularly in older children. Although VPS demonstrates superior overall survival, it should be understood that elective VAS lengthening procedures are often necessary, especially in younger patients. If elective lengthening procedures are not considered true failures, then the devices show similar survival 5).

**References**

1) [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3589837/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3589837/)


