Ventricular shunt

Surgical procedure in which a tube is placed in the ventricle.

Ventricular shunt placement for treating hydrocephalus is one of the most common neurosurgical procedures.

The rate of shunt failure, however, has not appreciably changed with time.

Ventricular shunts for pediatric hydrocephalus continue to be plagued with high failure rates. Reported risk factors for shunt failure are inconsistent and controversial.

Types

Fourth ventricular shunt

Fourth ventriculostomy

Ventriculostomy

Ventriculoperitoneal shunt

Ventriculopleural shunt

Ventriculoatrial shunt

Ventriculo azygos vein shunt.

Ventriculobiliary shunt.

Image guided placement

A systematic review was undertaken to answer the following question: Do technical adjuvants such as ventricular endoscopic placement, computer-assisted electromagnetic guidance, or ultrasound guidance improve ventricular shunt function and survival?.

The conclusión was that there is insufficient evidence to recommend the use of endoscopic guidance for routine ventricular catheter placement [1)].

Nesvick et al. performed a systematic literature review using PubMed and MEDLINE databases for studies that use ultrasound and frameless stereotaxy for ventricular catheter placement for hydrocephalus. All articles assessed the accuracy of catheter tip placement and/or overall shunt survival, and the rate of accurate shunt catheter placement, the overall failure rate, and the average time to shunt failure were extracted for analysis.

Although each modality (ultrasound/stereotaxy) did not increase catheter placement accuracy, a combined random-effects metaanalysis of 738 catheters (136 guided by ultrasound, 168 guided by frameless stereotaxy, and 434 freehand) demonstrated a weak benefit of image guidance (risk ratio:

1.19, 95% confidence interval: 1.02-1.39, P = .02), but this result was limited by considerable heterogeneity among studies (I = 86%, P < .001 by Cochrane's Q test). A meta-analysis could not be performed for shunt survival due to heterogeneity in data reporting.

Although image guidance offers a promising solution to lower the risk of inaccurate catheter placement, which could lead to lower premature failure of ventricular shunts, the review demonstrated that there is not yet a clear benefit of these technologies. Current literature is limited to case series and cohort studies, and significant between-study heterogeneity in methodology and reporting currently limits a higher order analysis [2].

Case series

2015

99,472 pediatric patients with shunted hydrocephalus, 16% of whom were admitted on a weekend. After adjustment for disease severity, time to procedure, and admission acuity, weekend admission was not associated with an increase in the inpatient mortality rate (p = 0.46) or a change in the percentage of routine discharges (p = 0.98) after ventricular shunt procedures. In addition, associations were unchanged after an evaluation of patients who underwent shunt revision surgery. High-volume centers were incidentally noted in multivariate analysis to have increased rates of routine discharge (OR 1.04 [95% CI 1.01-1.07]; p = 0.02).

Contrary to those of previous studies, the authors' data suggest that weekend admission is not associated with poorer outcomes for ventricular shunt insertion or revision. Increased rates of routine discharge were noted at high-volume centers [3].

1)
Flannery AM, Duhaime AC, Tamber MS, Kemp J; Pediatric Hydrocephalus Systematic Review and Evidence-Based Guidelines Task Force. Pediatric hydrocephalus: systematic literature review and evidence-based guidelines. Part 3: Endoscopic computer-assisted electromagnetic navigation and ultrasonography as technical adjuvants for shunt placement. J Neurosurg Pediatr. 2014 Nov;14 Suppl 1:24-9. doi: 10.3171/2014.7.PEDS14323. Review. PubMed PMID: 25988779.
2)
Nesvick CL, Khan NR, Mehta GU, Klimo P Jr. Image Guidance in Ventricular Cerebrospinal Fluid Shunt Catheter Placement: A Systematic Review and Meta-Analysis. Neurosurgery. 2015 Sep;77(3):321-31. doi: 10.1227/NEU.0000000000000849. PubMed PMID: 26103441.
3)
Attenello FJ, Christian E, Wen T, Cen S, Zada G, Kiehna EN, Krieger MD, McComb JG, Mack WJ. Reevaluating the weekend effect on patients with hydrocephalus undergoing operative shunt intervention. J Neurosurg Pediatr. 2015 Nov 6:1-7. [Epub ahead of print] PubMed PMID: 26544080.