EARLY EXPERIENCE WITH PATIENT TREATMENT AND DRUG DELIVERY WITH IRRA*flow*

An Automatically Irrigating and Draining Ventricular Catheter

Presented by Babar Khan, MD

and from Nicholas Brandmeir, MD,
and WVU Rockefeller Neuroscience Institute

at The Neurosurgical Society of the Virginias Annual Meeting

The need for improving EVDs

EVD COMPLICATION RATES

- Infection: 4-20%
  - Increases with occlusion
  - Current abx impregnated catheters only prevent gram + infection
- Revision: 13%
  - Occlusion: 25-50% in IVH
- Hemorrhage: 8%

IRRA*flow*®

Applications

- **IVH**
  - Irrigation
  - tPA infusion
- **VENTRICULITIS**
  - IT infusion of abx
- **SAH**
  - IT infusion of anti-vasospasm agents (nicardipine)
- **SDH**
  - Irrigation

Conclusion

Preliminary data confirms that IRRA*flow* might reduce rates of catheter occlusion, infections, symptomatic and radiographic vasospasm.

Future prospective (randomized) studies will be conducted to confirm these findings.

Yuen J, Selbi W, Muquit S, Berei T. Complication rates of external ventricular drain insertion by surgeons of different experience. Ann R Coll Surg Engl [Internet] 2018;100:221–5

Atkinson RA, Fikrey L, Vail A, Patel HC. Silver-impregnated external-ventricular-drain-related cerebrospinal fluid infections: a meta-analysis. J Hosp Infect [Internet] 2016;92:263–72

Talibi SS, Silva AH, Afshari FT, Hodson J, Roberts SA, Oppenheim B, et al. The implementation of an external ventricular drain care bundle to reduce infection rates. Br J Neurosurg [Internet] 2020;34:181–6.

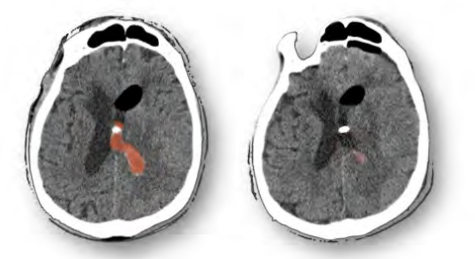
Gilard V, Djoubairou BO, Lepetit A, Metayer T, Gakuba C, Gourio C, et al. Small versus Large Catheters for Ventriculostomy in the Management of Intraventricular Hemorrhage. World Neurosurg [Internet] 2017;97:117–22.

Patient Characteristics

45 patients

Gender	Male	28 (62%)
	Female	17 (38%)
Length of Stay (days)	ICU	7.4 ± 5.8
	Hospital	14.4 ± 9.8
	Age (years)	60.2 ± 17.3
Indications	IVH	23 (51.1%)
	SAH HH1 (0), HH2 (2), HH3 (6), HH4 (2), HH5 (2)	12 (26.6%)
	SDH	13 (28.8%)
	Ventriculitis	3 (6.6%)
	Hydrocephalus (Other)	2 (4.4%)
Insertion Location	R frontal	26 (57.7%)
	L frontal	6 (13.3%)
	Burr hole	5 (11.1%)
	Craniotomy	8 (17.7%)
Average Duration	(days)	6.8 ± 4.9
Insertion Method	Stealth (bedside)	18 (40%)
	Anatomic	14 (31.1%)
	Craniotomy/burrhole	13 (28.8%)

CT and endoscopic images confirm impact of IRRA*flow*'s automated irrigation



Pre-IRRA*flow* **Post-IRRA*flow***

- IRRA*flow* inserted directly in clot
- Irrigation performed with tPA
- Endoscopic evaluation performed on day 4

NO OCCLUSION FORMATION EVEN IN HEAVY CLOT BURDEN

Irrigation from IRRA*flow* cleansing the catheter tip, keeping the **catheter free of occlusions**

Images provided by Dr. Nicholas Brandmeir

Outcomes

Complications	Ventriculitis	1 (2.2%)
	Mortality	9 (20%)
Intrathecal Medications administered	tPA	9 (20%)
	Vancomycin	2 (4.4%)
Catheter Occlusion		0%
Shunt dependence (IVH)		3/23 (13%)**
Vasospasm	Clinical	2/12 (17%)***
	Radiographic	3/12 (25%)***
SDH	MLS before: 4.9±2.6 MLS after 2d: 0.8± 1.2	Percentage improved 13/13 (100%)

* Compared to 19% permanent, 41% temporary occlusion.
Fargen etl al. JNS 2016

** Compared to 18% in literature. Clear III trial.
Murthy et al. Neurology 2017

*** Compared to 40-70% in literature.
Bracard et al. Interventional Neuroradiology 2008

IRRAS
www.irras.com

IF-507_A