

Free-hand External Ventricular Drain Placement: Accuracy and Complications Rates on a Preliminary Prospective Observational Study.

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Learning Objectives



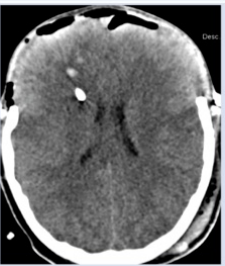
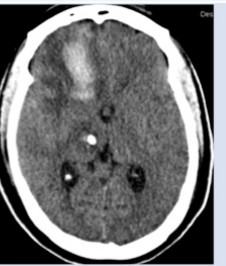
- By the conclusion of this session, participants should be able to:
- 1) Better understand the importance of EVD complications
 - 2) Identify ways to better avoid them in their current practice.

Introduction

Few prospective studies have analyzed catheter position accuracy and procedure-related complications, although external ventricular drain (EVD) placement represents a common procedure. Our study was designed to prospectively collect these results.

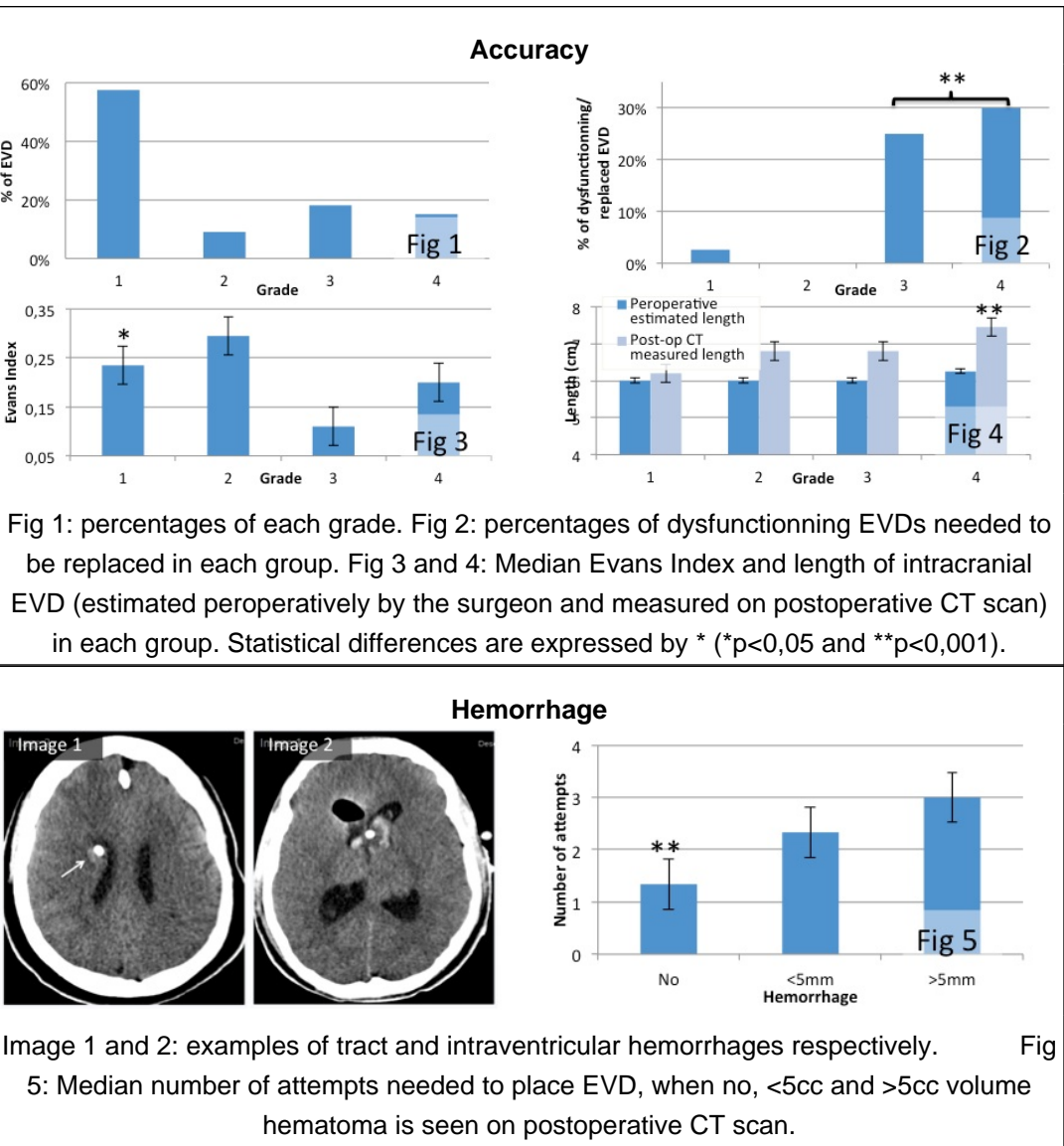
Methods

Since November 2010, all patients requiring EVD placement underwent a postoperative CT scan to check EVD position and hemorrhage rates. EVD accuracy was graded based on catheter tip position and trajectory as shown in Table 1:

Table 1: Grading scale of EVD placement accuracy			
Grade 1	Grade 2	Grade 3	Grade 4
Optimal	Suboptimal	Misplacement	
Catheter tip in the foramen of Monro or ipsilateral frontal horn	Catheter tip in other CSF spaces	Catheter tip in non-eloquent parenchyma	Catheter tip or path passing through eloquent parenchyma
			
Examples of postoperative CT scans of each grade			

Results

Sixty-six EVDs were placed in 50 patients. Grades 1 to 4 were noted respectively in 58%, 9%, 18% and 15% (Fig 1). Out of 22 grades 3 and 4, 10 (45%) EVDs needed to be replaced while only one grade 1 EVD became non-functional after 3 days ($p<0.001$) (Fig 2). Statistical significant risk of misplacement were Evans index lower than 0.2 ($p=0.04$) (Fig 3) and intracranial catheter length longer than 6.5 cm ($p<0.001$) (Fig 4), while surgeon’s experience and preoperative midline shift were not. Six postoperative hemorrhages were observed either along the EVD tract ($n=5$) or in the ventricles ($n=1$) (Images 1 and 2 respectively). All were of small size and none required drainage. Multiple attempts to insert EVD were a statistical significant hemorrhage risk factor ($p<0.001$) (Fig 5) while coagulation disorders were not associated with a higher risk.



Conclusions

Similarly to the literature, our preliminary study suggests that free-hand EVD insertion has a low accuracy and potential complications. Too deep catheter insertion is the main procedure-related pitfall that could be easily avoided. Multiple attempts represent the main risk factor of hemorrhages.

References

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3. **Huyette and al**, J Neurosurg. 2008 Jan;108(1):88-91.
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