Bolt-connected external ventricular drainage

- Risk factors for complications in bolt-connected external ventricular drains
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- Bolt-connected external ventricular drainage: The key to a better accuracy and less complications?
- Fewer complications with bolt-connected than tunneled external ventricular drainage
- Accuracy of tunnelated vs. bolt-connected external ventricular drains

Acutely increased intracranial pressure (ICP) is frequently managed by external ventricular drainage (EVD). This procedure is life-saving but marred by a high incidence of complications. It has recently been indicated that bolt-connected external ventricular drainage (BC-EVD) compared to the standard technique of tunnelled EVD (T-EVD) may result in less complications [1].

see External ventricular drainage complications.

To prospectively sample and compare two cohorts by consecutive allocation to either BC-EVD or T-EVD from the introduction of the BC-EVD technique in the Aalborg University Hospital.

Patients undergoing ventriculostomy between the 1st of March 2017 and the 28th of February 2018 were considered for inclusion. The neurosurgeon on-call sovereignly set the indication and decided on EVD type (BC-EVD or T-EVD), consequently resulting in two cohorts as 3/7 senior neurosurgeons on call were open to the use of BC-EVD, while 4/7 were reluctant to use this technique. Data was continuously collected using patient records, including results of cerebrospinal fluid (CSF) culturing and available CT/MRI-scans. Recorded complications included CSF leakage, accidental discontinuation, placement-related intracranial hemorrhage, malfunction, migration, infection and revision.

Forty-nine EVDs (32 T-EVDs/17 BC-EVDs) were included; 19/32 (59.4%) T-EVDs and 3/17 (17.6%) BC-

EVDs were found to have complications (p = 0.007). The relative risk of complications when using T-EVD was 3.4 times that of BC-EVD.

Ventriculostomy by BC-EVD compared to T-EVD reduces incidence and risk of complications and should be the first choice in EVD placement. That said, T-EVD has a role in paediatric patients and for intraoperatively and occipitally placed EVDs [2)].

All patients subjected to an EVD performed through a new burr hole from 2009 through 2010 at two Depts. of Neurosurgery in Denmark (Odense and Aarhus) were retrospectively identified. Patient files were evaluated for EVD fixation technique (tunneled or bolt-connected EVD) and complications including unintended removal, catheter obstruction, infection, CSF leakage, and mechanical problems.

A total of 271 patients with 272 separate EVDs met the inclusion criteria. There was a statistically higher rate of complications leading to reinsertion in the tunneled EVD group (40 %), compared to the bolt-connected EVD group (6.5 %). There was no significant difference in infection rates.

Tunneled EVD has a relatively high frequency of complications leading to reinsertion. The use of Bolt-connected EVD technique can lower this frequency significantly. The number needed to treat is three for preventing a complication requiring reinsertion. Infection rates are low for both types of ventriculostomies. Accordingly, we recommend use of Bolt-connected EVDs in neurosurgical practice [3)].

Bergdal et al., retrospectively identified all patients who received an EVD from January 1st 2008 to December 31st 2010. Postoperative images were evaluated for anatomical placement of the EVD-tip, distance from tip to optimal placement and were categorized as optimal, suboptimal and undesired. Patient files were evaluated for EVD technique, number of passes and postoperative complications and handling.

147 patients with 154 separate EVDs met the inclusion criteria. They found a statistical significant higher accuracy in the bolt-group compared to the tunnelated-group (p=0.023). Eleven patients were reoperated following ventriculostomy and they found a statistical significant 11.9% reduction in reoperations due to poor placement in the bolt-group (p=0.006).

They showed in this study that by using a bolt-connected EVD and maintaining the freehanded technique we can significantly increase precision and decrease the number of reoperations due to poor placement [4)].

References

[1)], [3)]
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[2)]
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