NEUROSURGERY

GUIDED APPLICATION OF VENTRICULAR CATHETERS (GAVCA)

STUDY SUMMARY

Thomale UW et al. GAVCA Study: Randomized, Multicenter Trial to Evaluate the Quality of Ventricular Catheter Placement with a Mobile Health Assisted Guidance Technique. Neurosurgery. 2017. nyx420.

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INTRODUCTION

This information flyer summarizes the most important findings of the Guided Application of Ventricular Catheters (GAVCA) Study. All following information and figures are derived from the published study. The figures are partially modified and reproduced by permission of Oxford University Press on behalf of the Congress of Neurological Surgeons.

BACKGROUND

Beside infections, shunt occlusion is one of the most important causes for shunt failure. With a high probability, the latter depends on two parameters: An increased protein content of the CSF or an incorrect placement of the ventricular catheter. If the holes of the ventricular catheter are completely or partially in the brain parenchyma, the aspiration of paraventricular tissue is likely and the shunt system is at higher risk for an occlusion.

By applying the freehand technique with anatomical landmarks for ventricular catheter placement a misplacement rate of 12-44% is reported in the literature. Technical advances like ultrasonography, endoscopy and neuronavigation have been proposed to improve the quality of catheter placement, however, a more simple and reliable technique may be necessary to be applied in more patients for a part of shunt surgery that takes only a few seconds.

OBJECTIVE

The objective of the GAVCA Study was to investigate the performance of the *THOMALE GUIDE* (in combination with the *THOMALE GUIDE* App) in comparison to the freehand technique regarding the accuracy of ventricular catheter placement.

METHODS

THE GAVCA Study was designed as a controlled, prospective, randomized (1:1) multicenter study.

Study centers: 9 Patients: 144
Study duration: 2 years Post-operative Follow-up: 30 days
Two armed: freehand vs. guided

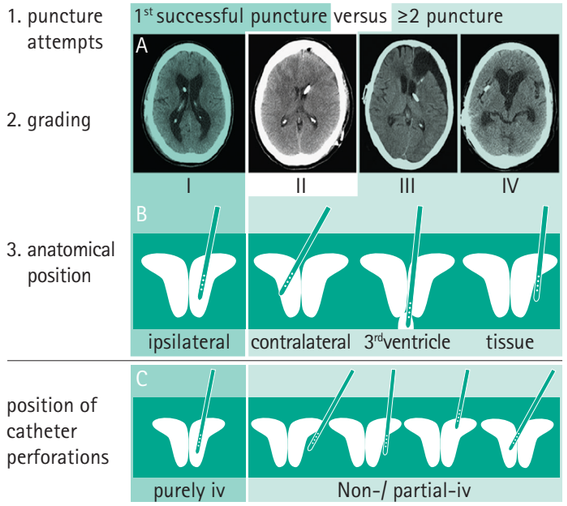

Fig. 1: Graduation of ventricular catheter placement
Grading scale (for distal 2 cm of catheter): Grade I: Catheter position without contact of more than 0.5 cm to the ventricular wall. Grade II: Contact of more than 0.5 cm to the ventricular wall or the choroid plexus. Grade III: Only partially intraventricular position of the catheter tip. Grade IV: Extraventricular position

The primary endpoint was the rate of optimal catheter placements. The optimal catheter position was defined by three distinct factors: primary successful ventricle puncture, the catheter was positioned in the ipsilateral ventricle and there optimally inside the ventricle (Grade I; fig. 1).

Additionally, the location of the catheter holes in relation to the ventricle and brain tissue are of high relevance and were therefore analyzed (fig. 2).

RESULTS

With the *THOMALE GUIDE*, in all cases (100%) the ventricle was targeted with the first attempt compared to 91.3% in the freehand group. In 70% of the cases the optimal catheter placement was reached, whereas with the freehand method, it was in 56.5%. Moreover the percentage of incorrect placements was significantly reduced from 31.9% in the freehand group to 10% in the *THOMALE GUIDE* group (fig. 1). In these 10% with misplaced catheter in the guided group (7 patients) the trajectory was correct, however the length of the catheter was either too short or too long. It was found that the use of Miethke catheters with a 0.5 cm scale showed a better optimal placement within the guided group.

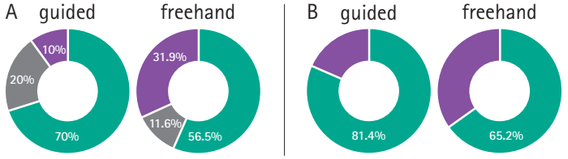

Fig. 2: A, Rate distribution for the quality of ventricular catheter position in postoperative imaging. The optimal catheter position defined as primary, grade I in the ipsilateral ventricle (dark green) reached a rate of 70% in the guided group compared to 56.5% in the freehand group (ITT: P = .099; PP: P = .137; AT: P = .045), while an incorrect catheter position (nonprimary, grade II and IV, nonipsilateral, violet) could be avoided significantly more often in the guided group (10% vs 31.9%; P = .001). Intermediate catheter position (primary, grade II, ipsilateral; grey) revealed 20% in the guided and 11.6% in the freehand group. B, The rate of complete intraventricular positioning of the catheter perforations was significantly higher in the guided group (81.4% vs 65.2% in the freehand group; P = .031).

An important characteristic for shunt functionality is that the perforated part of the catheter is positioned completely intraventricular. The results show that in 81.4% the catheter holes were completely placed in the intraventricular area with the *THOMALE GUIDE*, compared to 65.2% in the freehand group (fig. 1).

In the study no difference of cost and surgery time was observed.

CONCLUSION

The guided application of ventricular catheters is a reliable and simple technique for ventricular catheter placement. The study showed a nonsignificant improvement in optimal and a significant lower rate of incorrect catheter position in the guided group. Puncture attempts were successful in all patients, and the ventricular catheter perforations were positioned more often completely inside the ventricle using the guided technique.

OUTLOOK

One of the most important indicators for long-term shunt survival, a purely intraventricular localization of the perforated catheter part, is significantly better in the guided group. Hence the *THOMALE GUIDE* has the potential to reduce the amount of revisions due to ventricular catheter blockage. Therefore the *THOMALE GUIDE* may improve patient care without additional time-effort.

Free *THOMALE GUIDE APP* for iPhone and iPad (Apple App Store).

Free iBook quick start guide (Apple iBooks Store).

Manufacturer acc. MDD 93/42/EEC

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