

Dissertation summary

Surgical aspects of brain ischemia

Flowmetry in a clinical practice and experiment

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The aim of this dissertation is to assess the options and benefits of a transit time flow measurement (TTF) in brain ischemia prevention in neurosurgery.

Case reports from the Department of Neurosurgery, Charles University, Faculty of Medicine in Pilsen show the use and the limits of TTF. Presented case reports show the need of an individual approach in the case of a complex brain vessel surgery.

A group of patients surgically treated for an unruptured middle cerebral artery aneurysm was analysed. Possible restriction of blood flow after the clip placement was quantitatively assessed by TTF in the first subgroup of patients. No quantitative flow measurement was performed in the second subgroup. There was no statistically significant difference between the two groups in terms of ischemia prevention. Some cases may entitle the surgeon to consider TTF use. TTF measurement is an invasive procedure and it demands a careful approach to the vessel and its preparation. The authors suggest to leave the use of the TTF to the surgeon's discretion. The surgeon must decide whether the benefit gained from the measurement outweighs the risk of the vessel manipulation.

The experimental part of the dissertation was objectively quantified by TTF via the change of the blood flow through the microanastomosis of a common carotid artery (CCA) of a rat two weeks after the anastomosis surgery. The blood flow through both CCAs was identical. Thus the blood flow through the anastomosis could be compared to the blood flow through the other intact CCA with a high reliability. The difference was noted as a percentage. Examined values were independent of environmental factors such as a pulse, blood pressure or vessel size.

Two types of suture methods were compared – a standard single suture method and a less frequently used running suture method. A sample of 32 rats showed a minimal difference in the anastomosis blood flow maturation in both subgroups. Additionally, the sample showed significant time savings when using the running suture. Authors conclude that this finding can have a clinical impact. Technical errors made when using a running suture are difficult and time consuming to repair. That could potentially negate the time savings. Requirement for a running suture application is a perfect surgical technique.