Clot lysis

Ultrasound has been extensively investigated to promote clot lysis for the treatment of stroke, myocardial infarction, and acute peripheral arterial occlusions, with or without the use of tPA or contrast agents. In the age of modern minimal invasive techniques, magnetic resonance imaging-guided high intensity focused ultrasound is a new emerging modality that seems to promise therapeutic utilities for both ischemic and hemorrhagic stroke. High-intensity focused ultrasound causes thermal heating as the tissue absorbs the mechanical energy transmitted by the ultrasonic waves leading to tissue denaturation and coagulation. Several in-vitro and in-vivo studies have demonstrated the viability of this technology for sonothrombolysis in both types of stroke and have warranted clinical trials. Apart from safety and efficacy, initiation of trials would further enable answers regarding its practical application in a clinical setup. Though this technology has been under study for treatment of various brain diseases for some decades now, relatively very few neurologists and even neurosurgeons seem to be acquainted with it. The aim of this review is to provide basic understanding of this powerful technology and discuss its clinical application and potential role as an emerging viable therapeutic option for the future management of stroke [1)].

Intraventricular fibrinolysis (IVF) in subarachnoid hemorrhage (SAH) is a strategy aiming to hasten clot lysis, treat hydrocephalus, and reduce permanent shunt rates. Because of clinical heterogeneity of investigated patient effects of IVF on permanent shunt incidence and functional outcome are widely debated. The present study is the first to investigate solely endovascular-treated SAH patients.

88 consecutive patients with aneurysmal SAH requiring external ventricular drain placement and endovascular aneurysm closure were included. Functional outcome and shunt dependency were assessed 90 days after event. A matched controlled sub-analysis was carried out to investigate the effects of IVF treatment (n = 14; matching criteria: age, neuro-status and imaging). Multivariate modeling was performed to identify independent predictors for permanent shunt dependency.

In IVF-patients neurological status was significantly poorer [Hunt&Hess: IVF = 4(3-5) vs. non-IVF = 3(1-5); p = 0.035] and the extent of ventricular hemorrhage was increased [Graeb Score: IVF = 7(6-8) vs. non-IVF = 3(1-4); p ≤ 0.001]. Consecutive matched controlled sub-analysis revealed no significant therapeutic effect of IVF with respect to shunt dependency rate and functional outcome. Multivariate analysis revealed Graeb score [OR = 1.34(1.02-1.76); p = 0.035] and sepsis [OR = 11.23(2.28-55.27); p = 0.003] as independent predictors for shunt dependency, whereas IVF did not exert significant effects (p = 0.820).

In endovascular-treated SAH patients IVF neither reduced permanent shunt dependency nor influenced functional outcome. Despite established effects on intraventricular clot resolution IVF appears less powerful in SAH as compared to ICH. Given the reported positive effects of lumbar drainage (LD) in SAH, a prospective analysis of a combined treatment approach of IVF and subsequent lumbar drain sOeems warranted aiming to reduce permanent shunting and improve functional outcome [2)].

1)
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2)
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