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EARLY MINIMALLY INVASIVE IMAGE-GUIDED ENDOSCOPIC EVACUATION OF INTRACEREBRAL HAEMORRHAGE: A PILOT TRIAL (EMINENT-ICH PILOT TRIAL)

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Oral e-Poster Presentations - Booth 1: Vascular 3, September 27, 2023, 10:00 AM - 10:40 AM

Background: Spontaneous supratentorial intracerebral haemorrhage (SSICH) is the most devastating form of stroke with mortality rates over 50%. Currently, no sufficiently effective treatment is available. Minimally invasive endoscopic surgery (ES) seems to improve survival and functional outcome rates. We present results of our pilot trial looking at the feasibility and safety of ES for SSICH. Further, functional outcome and mortality rates will be presented.

Methods: Patients fulfilling the inclusion criteria were included and analysed from July 2021 to January 2023. Co-primary outcomes were 1) good functional outcome, defined as mRS ≤ 3 at 6 months and 2) adequate hematoma removal to below 15mL. Secondary outcomes were mortality and morbidity rates. Patients were enrolled at the emergency department of the University Hospital Basel while hematomas with a volume between 20ml and 100ml were endoscopically evacuated within 24 hours after bleeding onset. Patients were followed up over 6 months and through 6 visits including clinical assessment, imaging and laboratory studies.

Results: Ten Patients (median age 72.5 years [IQR 68.25-79.75], 70% male) were enrolled. Favourable outcome after 6 months was achieved in 83% (5/6) of the patients with completed follow-up while favourable outcome at the last registered visit was achieved in 70% (7/10). Satisfactory hematoma evacuation was achieved in 70% (7/10) with a median evacuation percentage of 69.5% [IQR 60-93%]. Two patients (20%) died from pneumonia and re-bleeding respectively while one patient died due to a glioblastoma. Four patients experienced a total of five complications, one re-bleeding, three pneumonias and one seizure. The median duration of surgery was 92 minutes [IQR 78-108].

Conclusions: ES seems feasible, safe and leads to improved favourable outcome. Adequate hematoma removal is achievable and a steep learning curve is observed. Based on this pilot trial a national multicentre RCT comparing ES to best medical treatment is planned (NCT05681988).

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ANALYSIS OF RISK FACTORS FOR SUBARACHNOID HEMORRHAGE AFTER MECHANICAL THROMBECTOMY IN ACUTE ISCHEMIC STROKE WITH MIDDLE CEREBRAL ARTERY OCCLUSION.

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Oral e-Poster Presentations - Booth 1: Vascular 3, September 27, 2023, 10:00 AM - 10:40 AM

Background: Mechanical thrombectomy(MT) has been proven for patients with acute ischemic stroke secondary to a large vessel occlusion. According to the guideline of acute ischemic stroke published from the American Heart Association/American Stroke Association, MT may be reasonable for occlusion at M2 or M3 segment. Complications associated with MT include vasospasm, arterial dissection, subarachnoid hemorrhage(SAH). Although, many studies reported SAH after MT, few of studies showed risk factors for SAH. We presented the risk factors for SAH after MT in acute ischemic stroke with middle cerebral artery(MCA) occlusion.

Methods: We retrospectively reviewed the medical records of patients treated with mechanical thrombectomy from April 2019 to December 2022. Of these patients, we selected patients with MCA occlusion. We collected data of patients' past history, procedure records, and outcomes. We analyzed data and identified the risk factors causing procedure-related risk factors. Not only this, we divided three groups based on location of retrievable stent deployment (M1, M2, M3), and searched the differences of outcomes.

Results: 72 patients were included this study. Patients with SAH and without SAH were 12 and 60, respectively. Procedural time (p-value 0.029) and numbers of passes through the occluded site (p-value 0.038) were the risk factors related with SAH. There were no differences between SAH and no-SAH group in terms of prognosis (modified Rankin Scale, mortality). Also, none of differences were found related to retrievable stent deployment groups.

Conclusions: Procedural time and numbers or passes were the risk factors related to SAH after MT. SAH and location of stent deployment didn't affect outcomes and prognosis. Therefore, we cautiously suggest that there is no need to worry too much about SAH after MT.

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AGE SHOULD NOT BE A CONTRAINDICATION FOR MECHANICAL THROMBECTOMY IN ACUTE ISCHEMIC STROKE.

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Oral e-Poster Presentations - Booth 1: Vascular 3, September 27, 2023, 10:00 AM - 10:40 AM

Background: Until today, stroke studies have not deeply analyzed the benefit of thrombectomy in the case of elderly patients comparable to thrombolysis, recent studies have suggested that performing mechanical thrombectomy in the therapeutic window represents a significant effectiveness, age 70+. Until today, elderly patients have usually been excluded from clinical trials of thrombectomy, even if the incidence rate of Stroke pathologies in their list has a clearly higher incidence in the current time. This study is aimed to evaluate a trial of patients outcome after mechanical thrombectomy based on clinic not their age in our hospital which result could easily be reported to big ones.

Methods: All stroke alerts in our hospital from October 2019 to January 2023 were examined in this study. All patients aged ≥ 70 years who underwent mechanical thrombectomy with or without initial thrombolysis. Clinical characteristics included imaging findings, pre and postoperative National Institutes of Health Stroke Reference Scale (NIHSS), modified treatment in cerebral infarction (mTICI), and prognosis.

Results: The total was a number of 35 procedures. NIHSS score was 16.2 (range, 6-31), and 12.3 (range, 3-30) post thrombectomy. Six (17.14%) patients received iv r-tPA, four (11.42%) had symptomatic intracranial hemorrhage. Nine (25.71%) died, and five (14.28%) were discharged to hospital rehabilitation. Favorable outcome was achieved in nine (25.71%) patients. All patients had CT and CT angio before thrombectomy, and five (14.28%) of them had CT perfusion. Twenty-eight (80%) patients had mTICI 3 recanalization, seven (20%) had mTICI 2b, eight(22.85) mTICI 2a. Twenty-four (68.57%) were in the early time window, eleven (31.42%) were in the late window.

Conclusions: This study showed that mechanical thrombectomy remains to have an important role in the treatment of acute ischemic stroke in elderly patients. Even though it has a higher morbidity and mortality compared to younger patients, quality of life after ischemic stroke is the decisive factor to consider in taking the correct treatment decision.

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CLINICAL OUTCOME PREDICTORS IN SPACE-OCCUPYING CEREBELLAR INFARCTION UNDERGOING SUBOCCIPITAL DECOMPRESSIVE CRANIECTOMY

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Oral e-Poster Presentations - Booth 1: Vascular 3, September 27, 2023, 10:00 AM - 10:40 AM

Background: Despite current clinical guidelines recommending suboccipital decompressive craniectomy (SDC) in patients with space-occupying cerebellar infarction when neurological deterioration occurs, the precise definition of such deterioration remains unclear. The current study aimed at characterizing whether clinical outcomes can be predicted by the GCS score immediately prior to SDC, and whether higher GCS scores are associated with better clinical outcomes. We aimed to characterize whether clinical outcomes can be predicted by

the GCS score immediately prior to SDC, and if higher GCS scores are associated with better clinical outcomes.

Methods: In a single-center, retrospective analysis of 51 patients treated with SDC for space-occupying cerebellar infarction clinical and imaging data were evaluated at the timepoints of symptom onset, hospital admission and preoperatively. Clinical outcome was measured by mRS at the last available follow-up. Preoperative GCS scores were stratified into three groups (GCS 3-8, 9-11 and 12-15). Univariate and multivariate Cox regression analyses were performed using clinical and radiological parameters as predictors of clinical outcome.

Results: In Cox-regression analysis using mRS of 1-2 as a positive clinical outcome we found a significant increase in the proportional hazard ratio (HR) of 6.581 [CI 1.839-36.414]; $p=0.031$ for GCS scores of 12-15 prior to SDC. Clinical outcomes (mRS 3-6) were associated with infarct volume above 6.0 cm³ (HR 2.473 [CI 1.209-5.057]; $p=0.013$), tonsillar herniation (HR: 0.279 [CI 0.083-0.933]; $p=0.038$), brainstem compression (HR 0.304 [CI 0.123-0.749]; $p=0.010$) and a preoperative GCS score of 3-8 (HR 2.386 [CI 1.160-4.906]; $p=0.018$).

Conclusions: SDC should be considered in patients with infarct volumes above 6.0 cm³ with GCS scores higher than previously described in the literature, as these patients may show better long-term outcome than those in which surgery is delayed until a GCS score of 11 or lower.

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MIXED REALITY APPLIED TO SURGICAL PLANNING AND CUSTOMIZATION OF CAROTID ENDARTERECTOMIES

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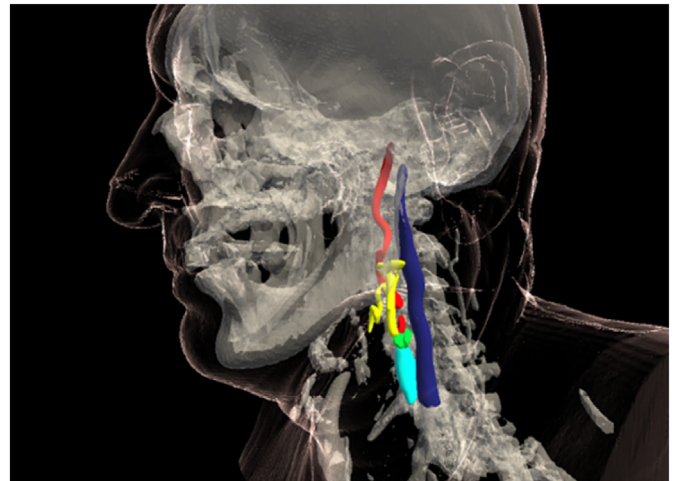
Background: Carotid endarterectomy (CEA) is the first line treatment for preventing stroke in symptomatic patients with a carotid stenosis greater than 50% and asymptomatic patients with a stenosis >60%. Preoperatively, a radiologic workup with Doppler-Ultrasound and computer tomography (CT) and/or magnetic resonance imaging (MRI) of the head and neck is indicated to examine the patient-specific anatomy and plaque's features. This is important to predict risks and intraoperative challenges. Perioperative three-dimensional (3D) anatomical visualization with mixed reality (MxR) may have a relevant impact on adequate CEA planning compared to standard imaging studies.

Methods: Twenty-four consecutive cases with high-grade carotid stenosis and treated with a CEA were prospectively included. Using the preoperative head and neck CT-angiography (CTA) and/or the neck MR-angiography (MRA), the common carotid artery (CCA), the internal carotid artery (ICA) and the external carotid artery (ECA) were segmented. The holographic rendering was customized with a novel cloud environment. Hologram preparation time was recorded. The resulting 3D interactive hologram was visualized with MxR glasses in the operator room after patient positioning. Hologram preparation time was documented. After three months of use of the system, the neurosurgeons performing the CEAs were provided with a 30 Likert scale (each question with a score from 1 to 7) to evaluate user's experience and satisfaction with the MxR system.

Results: The twenty-four included cases included 11 left CEAs (46%) and 13 (54%) right-side procedures. Mean hologram's preparation time was 23 +/- 7 minutes. The most represented bifurcation's height in the cohort was at the level C4-C5 (33%). The plaque was segmented in 4 cases (17%), to document its height and length. Moderate kinking of the stenotic ICA was seen in 3 cases (13%) and one case (4%) presented a loop of the ICA distal to the plaque. Customization of skin incision after 3D surgical planning was done in 16 cases (67%). Good usability of the MxR system was reported by all users and a mean score above 5 (out of 7) was documented in all categories (i.e.: Usefulness, Ease of Use, Ease of Learning and Satisfaction). Improved anatomical understanding with the 3D interactive visualization was documented by all neurosurgeons.

Conclusions: Preoperative CEA planning with MxR seems to be beneficial for precise anatomical understanding and intraoperative orientation. Future research should focus on quantification of the benefits in neurosurgical training and assess the impact on surgical outcomes.

Optional Image



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RATIONALE FOR DOUBLE-BARREL BYPASS FOR CEREBRAL ISCHEMIA. SINGLE-CENTER STUDY

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Oral e-Poster Presentations - Booth 1: Vascular 3, September 27, 2023, 10:00 AM - 10:40 AM

Background: Indications for double-barrel bypasses are still unclear. The aim of the study was to evaluate early and late results double-barrel bypasses in order to determine the most appropriate indications for additional revascularization.

Methods: From 2009 to 2021 in Burdenko Neurosurgical Center double-barrel bypasses were performed in 100 patients. Among them there were 59 patients with chronic ICA occlusion, 32 patients with moyamoya disease, 4 patients with acute stroke and 5 patients with giant ICA aneurysms. Most of the patients had focal neurologic symptoms (86%) and ischemic foci (75%). All bypasses were evaluated during follow up using TCD, MRI 3DTOF or CTA. In all cases cerebral MR ASL perfusion was studied before and after revascularization.

Results: In the early postoperative period there were good results in the most of patients (82%) with the immediate improvement of clinical symptoms in 17% of cases. The ischemic complications were seen in 9 patients (9%). Double-barrel bypasses were effective in 100% in patients with aneurysms, in 89% in moyamoya patients, in 75% in ICA occlusion group and in 67% in patients with acute stroke. Immediate clinical improvement more often was seen in patients with acute stroke (67%). Local blood flow evaluation in cortical vessels revealed hemodynamic interference between branches, resulting in efficacy decrease of bypass and smaller branch thrombosis during follow up. Hemodynamic planning of double-barrel bypass and its contraindications were discussed.

Conclusions: Double-barrel STA-MCA bypass is feasible and advantageous method for restoring blood flow but only in selected groups of patients. Double-barrel bypass planning must consider local cerebral hemodynamic changes.

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DURATION OF INTRACRANIAL PRESSURE INCREASE AFTER ANEURYSMAL SUBARACHNOID HEMORRHAGE: PROGNOSTIC FACTORS AND ASSOCIATION WITH THE OUTCOME

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Oral e-Poster Presentations - Booth 1: Vascular B (Aneurysma & AVMs),