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O-036 CHANGES IN LEUKOCYTE DISTRIBUTION IN INTRACRANIAL VS. SYSTEMIC BLOOD COLLECTED DURING MECHANICAL THROMBECTOMY

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Introduction Since 2015, mechanical thrombectomy is the standard treatment for emergent large vessel occlusion stroke. Using standard techniques during mechanical thrombectomy, the Blood and Clot Thrombectomy Registry and Collaboration (BACTRAC) protocol (clinicaltrials.gov NCT03153683) isolates intracranial blood within the artery immediately downstream from the thrombus, systemic arterial blood proximal to the thrombus, and the thrombus itself. BACTRAC is the first protocol utilizing the thrombectomy technique to collect local whole blood samples during brain infarction. We aimed to augment the current collection protocol to reproducibly obtain and study local leukocyte populations during human stroke.

Methods We started with the established BACTRAC protocol (PMID: 30064997) and modified the tissue collection protocol to isolate lymphocytes for flow cytometry and to bank the thrombus and plasma. The protocol was first established in healthy controls (n=10) using venous blood samples and then initiated for thrombectomy cases (n=13). We performed a flow cytometry panel that identifies CD3, 4, 8, 11b, 11c, 14, 19, 31, 45, 66b, 161, 183 markers to investigate populations of B-cells, T-cells, dendritic cells, NK cells, macrophages/monocytes, granulocytes, endothelial cells, and progenitors, respectively. Cells were washed twice in FACS buffer and fixed in 1% paraformaldehyde plus 0.1% EDTA on ice for 30 minutes and analyzed on a FACS Symphony the same day. All gating and event analyses were performed in FlowJo V10 (TreeStar) and all statistical analyses were performed in GraphPad Prism 7 (GraphPad Software).

Results The average lymphocyte isolation yield in the intracranial blood samples of stroke patients was 2.26×10^6 cells/ml (SEM 4×10^5 cells/ml). The average viability of intracranial samples was 94.41% (SEM 2.53%). The average lymphocyte isolation from the systemic arterial blood was 4.04×10^6 cells/ml (SEM 5.1×10^5 cells/ml). The average viability of systemic arterial samples was 97.08% (SEM 0.31%). Intracranial B-cells were found to be significantly reduced in stroke patients compared to controls. Myeloid cells including monocytes and macrophages, were found to be elevated in the systemic blood of stroke patients compared to controls. Finally, T-helper cell populations were found to be diminished in the systemic compared to intracranial blood of stroke patients (paired t-tests).

Conclusions This modification to the existing BACTRAC protocol provides the opportunity, for the first time, to study changes in local leukocyte populations in the arteries undergoing ischemic stroke in the human condition. Efficient processing of lymphocytes with subsequent flow cytometry analyses will provide insight into the neuroinflammatory microenvironment of the occlusion during stroke. Future studies will be aimed at investigating changes in specific leukocyte populations and how they might relate to patient demographics, patient co-morbidities, infarct volume, and functional recovery. These data will help accelerate translational stroke research to elucidate novel approaches for drug discovery and prognosis.

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Electronic Poster Abstracts

E-001 THE ROLE OF 4D-CTA IN THE IMAGING WORK UP OF PATIENTS WITH PULSATILE TINNITUS: A TECHNICAL NOTE

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Background Pulsatile tinnitus (PT) is a debilitating condition that can be caused by various vascular conditions, including arteriovenous and venous lesions. Most of these lesions can be treated successfully by venous sinus stenting, however, the diagnosis of the venous cases remains a challenge. The purpose of our study was to evaluate the effectiveness of 4D-CTA for diagnosis of venous sinus lesions.

Methods Patients referred to our institution with symptoms of pulsatile tinnitus and inconclusive external imaging were included in our study between August 2019 to February 2020 (n=13). Patients underwent a 20s continuous volumetric 4D-CTA scan, with a 50cc bolus of iodinated contrast media injected intravenously. A 0.5s rotation time was used to produce forty 3D volumes demonstrating all phases from arterial to venous. Post-processing was performed to create 4D dynamic reconstructions of all phases. Two neuroradiologists examined the dynamic reconstructions of each patient to exclude arteriovenous disease and evaluate the venous phase.

Results A 4D-CTA was successfully performed in all 13 patients. Right sided pulsatile tinnitus was diagnosed in 85% of 4D-CTA scans (n=11/13; 15% left PT= 2/13). Ninety-two percent of cases had a stenosis on the side of PT (n=12/13), which was also the dominant venous drainage of the brain. All stenoses were ranked severe or sub-occlusive (3 or 4 points) on a 4 point Likert-scale. One PT case was caused by jugular occlusion (on the non-dominant side) and rerouting of the venous drainage.

Conclusions 4D-CTA is a sensitive imaging modality for detection and characterization of venous stenoses. As 4D-CTA is less invasive and more available in smaller hospitals compared to DSA, it may serve as a better diagnostic sequence for improved detection of venous stenosis underlying pulsatile tinnitus. As we are still enrolling in the study, we plan to present more cases at the time of the conference.

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