

imaging. All angiograms were reviewed for vessel diameter, emboli location, and presence of pial collaterals. Post-thrombectomy MR studies were reviewed for the presence of DWI changes in the expected territory of the emboli. Factors such as patient age, onset to treatment time, intravenous tPA administration, and pre-existing conditions were stratified by infarct presence and absence.

**Results** Distal emboli resulted in infarction in some or all the territory at risk in 46% (33/71) of patients. Chronic hypertension ( $p = 0.004$ ) and pial collaterals ( $p = 2.5 \times 10^{-8}$ ) were significantly associated with infarct presence and absence respectively. Patient age was not associated with development of infarct.

**Conclusion** The majority of distal emboli after thrombectomy do not result in tissue infarction. Poor pial collateral flow may be an indicator of patients that may benefit from additional mechanical or pharmacological treatments aimed at revascularization.

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#### AUTOMATED PRE- AND POST-OPERATIVE VOLUMES ESTIMATES RISK OF RETREATMENT IN CHRONIC SUBDURAL HEMATOMA: A RETROSPECTIVE, MULTI-CENTER STUDY

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**Importance** Several neurosurgical pathologies, ranging from glioblastoma to hemorrhagic stroke, use volume thresholds to guide treatment decisions. For chronic subdural hematoma (cSDH), with a risk of retreatment of 10-30%, the relationship between pre- and post-operative cSDH volume and retreatment is not well understood.

**Objective** Investigate the potential link between pre- and post-operative cSDH volumes and risk of retreatment.

**Design** Retrospective chart review

**Setting** Three level one trauma centers, February 2009 - August 2021

**Participants** Patients with unilateral cSDH

**Methods** We used a 3D deep learning, automated segmentation pipeline to calculate pre- and post-operative cSDH volumes. To identify volume thresholds, we constructed a receiver operating curve (ROC) using both pre- and post-operative volumes in to predict cSDH retreatment and selected the threshold with the highest Youden's index. Then, we developed a light gradient boosting machine to predict risk of cSDH recurrence using cSDH volumes and clinical features.

**Main Outcomes** Surgical retreatment of cSDH

**Results** We identified 538 patients with unilateral cSDH, of whom 62 (12%) underwent surgical retreatment within six months of the index surgery. cSDH retreatment was associated with higher pre- (122 vs. 103 mL;  $p < 0.001$ ) and post-

operative (62 vs. 35 mL;  $p < 0.001$ ) volumes. Patients with  $>140$  mL pre-operative cSDH volume has nearly triple the risk of cSDH recurrence compared to those below 140 mL; while a post-operative volume  $>46$  mL led to an increased risk for cSDH retreatment (22% versus 6%;  $p < 0.001$ ). On multivariate modeling, our model had an area under the curve of 0.76 (95% confidence interval: 0.60 - 0.93) for predicting cSDH retreatment. The most important features were pre- and post-operative volume, platelet count, and age.

**Conclusions/Relevance** Larger pre- and post-operative cSDH volumes increase the risk of cSDH retreatment. Volume thresholds may allow identification of patients at high risk of cSDH retreatment who would benefit from adjunct treatments. Machine learning algorithm can quickly provide accurate estimates of pre and post operative volumes.

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#### FLOW DIVERSION JET: A DANGEROUS MECHANISM IN THE FLOW DIVERSION TREATMENT OF GIANT INTRACRANIAL ANEURYSMS

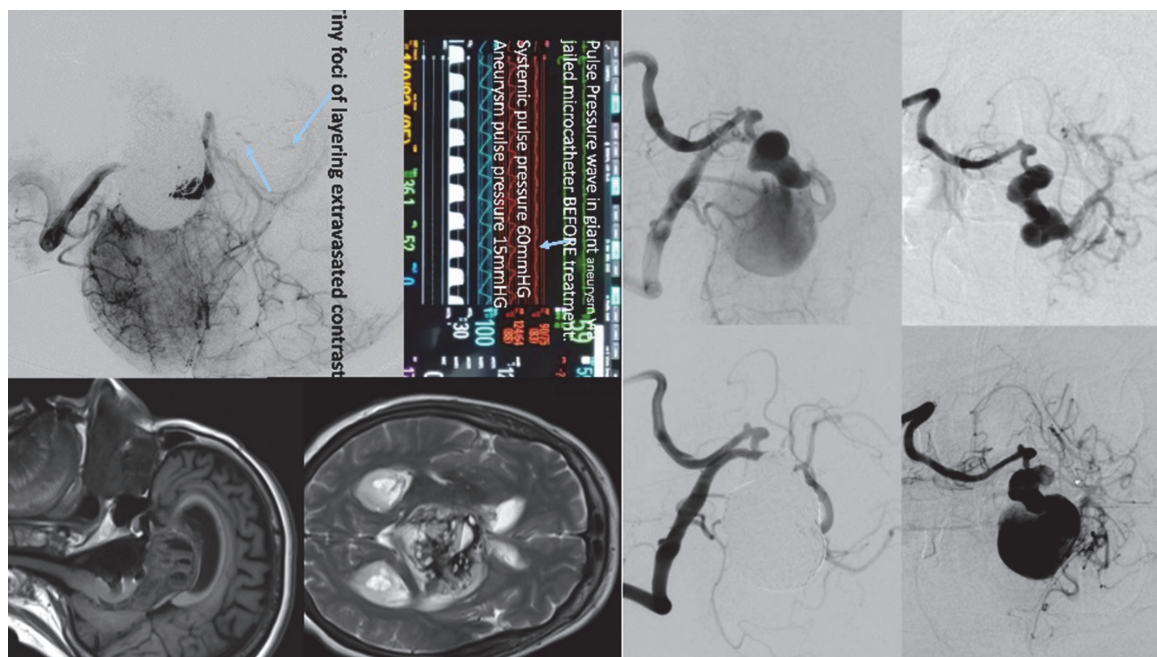
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**Introduction** The Windkessel phenomenon and normal perfusion pressure breakthrough (NPPB) represent distinct vascular physiologic processes. The windkessel phenomenon refers to the pressure-dampening effect of compliant or dilated blood vessels, while NPPB involves cerebrovascular autoregulation loss due to chronic low-pressure flow and subsequent intolerance of physiological pressures. We report a case of a patient with a long-standing giant vertebrobasilar fusiform aneurysm successfully reconstructed using flow diversion, followed by unexpected distal parenchymal hemorrhage. We analyze and summarize the pathomechanism of the combined effects of windkessel phenomenon and NPPB of this vascular lesion.

**Methods** A retrospective review of the patient's medical record was performed.

**Results** A 60-year-old female with a pulsatile neck mass was diagnosed with dolichoectasia of the right cervical internal carotid artery and two large, irregular vertebrobasilar aneurysms. After 10 years of conservative management and the development of gait ataxia, new imaging showed growth of the more distal giant aneurysm. Flow diversion with partial coiling was pursued. Following successful flow diverter reconstruction, DynaCT revealed catastrophic thalamic and midbrain hemorrhage with intraventricular extension. Time stamped intra-operative intra-aneurysmal pressure measurements, angiography, MRI, and neuromonitoring data were retrospectively analyzed. They demonstrate aneurysmal pulse-pressure suppression prior to flow diversion and subsequent rupture of multiple deep perforators and simultaneous loss of somatosensory and motor evoked potential within the minute after finalizing the flow diverting construct.



Abstract E-237 Figure 1

**Conclusions** These findings support the theory that giant fusiform aneurysms function as a windkessel reservoir, chronically reducing distal pulse pressure which predisposes the brain vasculature to experience NPPG and potentially disastrous hemorrhage. This report is the first in the literature, to our knowledge, to identify the windkessel phenomenon and subsequent NPPB in vivo in the context of treating giant aneurysms with flow diversion. Despite an unfavorable outcome, understanding these mechanisms and employing careful intra-operative blood pressure management could mitigate or avert complications.

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#### E-238 FLOW-DIVERTERS USE FOR EXTRACRANIAL CAROTID ARTERY PSEUDOANEURYSMS

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**Background and Purpose** Flow diversion has been well established as a treatment for intracranial aneurysms, but its use for extracranial internal carotid artery (ICA) pseudoaneurysms has not been well described. Here we provide the largest single institution case series to evaluate the technical safety and effectiveness of flow redirection therapy for extracranial ICA pseudoaneurysms.

**Materials and Methods** A retrospective review of our single institution's prospectively collected endovascular database revealed 5 cases of flow diverter placement for extracranial ICA pseudoaneurysms treated between 2015 and 2022.

**Results** We found 5 extracranial ICA pseudoaneurysms in four patients treated with flow-diverter stents. The underlying etiology of pseudoaneurysms was trauma in four aneurysms and iatrogenic in one. One patient was treated for bilateral ICA pseudoaneurysms. The average pseudoaneurysm size was

2.1cm x 1.0 cm. Pipeline Flex with shield technology was used in one pseudoaneurysm, Pipeline Flex was used in three pseudoaneurysms, and classical Pipeline was used in one pseudoaneurysm. One to two Pipelines were used for each pseudoaneurysm. Technical success, defined as proper flow-diverter placement across the lesion with good angiographic wall apposition, was achieved in 100% of cases. No adverse events were reported in the immediate postoperative period. All cases underwent angiographic follow-up ranging from 3 to 21 months post-placement. In one case, short-term angiographic follow-up exhibited endoleak due to pipeline foreshortening in the setting of pseudoaneurysm enlargement and required retreatment with a second flow diverter. Angiographic follow-up showed complete obliteration of pseudoaneurysm in 3/5 cases, and minimal pseudoaneurysm filling in 2/5. There were no cases of in-stent occlusion or retreatment during long-term follow-up.

**Conclusion** Our initial experience with the use of flow diversion for extracranial ICA pseudoaneurysms suggests this treatment is safe and effective. Further studies should further delineate when flow diverters may be appropriate for extracranial use.

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#### E-239 ROLE OF EMBOLIZATION IN HEAD AND NECK CANCER: REVIEW OF INDICATIONS AND CURRENT PRACTICE

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**Introduction** Head and neck tumors can provide challenging pathologies given their location in relation to essential structures, their potential for hypervascularity, and difficulty in management of recurrent or advanced cancer. Here we review