

E-017 IMPACT OF THE DOME OF ANEURYSM ORIENTATION IN RELATION TO GRAVITY ON THE OUTCOME AFTER SUBARACHNOID HEMORRHAGE: A SINGLE CENTER CASE SERIES

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Introduction Aneurysmal subarachnoid hemorrhage is a neurological emergency that is associated with significant morbidity and mortality. There are multiple factors both modifiable and non-modifiable that contribute to the rupture of an aneurysm. Laboratory experiment has shown that orientation of the dome of aneurysm downwards, parallel to the force of gravity, has a higher risk of thrombosis and rupture because of turbulence.¹ Another experiment revealed that red blood cells tend to settle in aneurysms that are oriented downwards.² This could trigger thrombus formation and eventual rupture. We aim to study the effect of the orientation of dome of the aneurysm on the presenting severity and outcome of the subarachnoid hemorrhage.

Methods A retrospective review of medical records of 38 subjects (with a total of 41 saccular aneurysms) who presented with aneurysmal subarachnoid hemorrhage between 2012 and 2018 was performed. The information collected for the study included the age of the patient, maximal dimension of aneurysm, orientation of dome of an aneurysm in relation to gravity, Hunt and Hess scale, Fisher scale, modified Rankin scale at discharge, modality of treatment (endovascular coiling or surgical clipping), history of hypertension, history of hyperlipidemia, history of diabetes, history of antiplatelet and anticoagulant medication usage prior to hemorrhage, history of smoking and family history of aneurysm.

Results 41 Aneurysms in 38 subjects were divided in to two groups based on the orientation of the dome of the aneurysm in relation to gravity. 20 aneurysms (48.78%) were oriented towards the force gravity with dome of the aneurysm in the direction of the force of gravity. There was no statistical

difference in the severity of the subarachnoid hemorrhage (Hunt and Hess scale, Fisher grading scale) and the outcome after subarachnoid hemorrhage (modified Rankin Scale for neurologic disability) between the two groups.

Conclusion Of the aneurysms that were oriented towards the force of gravity, 19 aneurysms (95%) were present in the anterior circulation. Application of this concept to a larger prospective database that includes both unruptured and ruptured aneurysms may show a statistical significant difference in the outcome. Such studies could serve to identify the orientation of the dome of an aneurysm in relationship to gravity as an important factor in contributing to the rupture of a saccular aneurysm.

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E-018 TRANSCIRCULATION APPROACH IN COMPLEX ENDOVASCULAR PROCEDURES: A MULTICENTER STUDY

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Background Unfavorable anatomy can preclude traditional anterograde endovascular intervention through the parent vessel. Transcirculation approaches provide alternative pathways for successful treatment of these complex cases.

Methods Eight centers provided retrospective data on patients who underwent transcirculation procedures, including embolization of intracranial aneurysms (IAs), dural arteriovenous fistulas (dAVFs) and arteriovenous malformations (AVMs), and thrombectomy of acute ischemic strokes (AIS). Procedural complications, clinical and radiological outcomes were assessed after intervention and last available follow-up.

Results A total of 43 patients were treated using endovascular transcirculation approach: 24 IAs, 13 AIS, 3 AVMs and 3 dAVFs. Mean age was 56.9±15.3 years (range 18–82 years), and 24 (55.8%) were women. Most IAs (19/24, 79.2%) presented unruptured and were treated electively. 3 AVMs and 2 dAVFs presented ruptured. The most common indication for transcirculation approach was occlusion of the parent artery (21 patients, 48.8%). The posterior communicating artery (PCOM) was crossed in 20 (46.5%) cases (10 anterior-to-posterior, 10 posterior-to-anterior), anterior communicating artery (ACOM) in 17 cases, and vertebral artery (VA) in 2 cases. In four cases, combined approaches were used (3 ACOM right-to-left and viceversa, one double transcirculation ACOM/

Abstract E-017 Table 1

Orientation of the dome of aneurysm in relation to gravity	Dome of aneurysm oriented towards the force of gravity (number = 20).	Dome of aneurysm not oriented towards the force of gravity (number = 21).
Female Gender	16	15
Anterior Circulation	19	14
Maximum Dimension in mm (mean)	5.6	5.3
Age in years (mean)	60.25	57.38
History of Hypertension	15	13
History of Diabetes Mellitus	3	2
History of Hyperlipidemia	8	9
History of Antiplatelet use	3	5
History of Anticoagulant use	1	0
Family History of Aneurysm	2	2
History of Smoking	12	16
Hunt and Hess Scale on admission (mean)	3.05	3.15
Fisher Scale on admission (mean)	2.9	3.52
Endovascular Coiling	17	15
Modified Rankin Scale on discharge (mean)	3.15	3.28

PCOM). The most common microcatheters used were Headway Duo (10 cases), SL-10 (6 cases), Marksmann (4 cases) and Echelon 10 (4 cases). In the AIS cases, 69.2% (9/13) achieved TICI 2b-3 recanalization. Ninety-six percent (23/24) of IAs achieved successful obliteration Raymond-Roy Occlusion Classification grades (RROC I-II). All AVMs and dAVFs achieved complete embolization. Two procedural complications were reported: one temporal arterial occlusion in a patient with IA, and one permanent arterial thrombosis in a patient with AIS. Of 21 IAs with radiological follow-up, complete angiographic obliteration (RROC I-II) was observed in 95.2% (20 cases).

Conclusions In this multicenter case series, the endovascular transcirculation approach was feasible and safe. Development of newer endovascular devices will further improve angiographic results and neurological outcomes in these complex cases.

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E-019 COMPARE THE CLINICAL RESULTS BETWEEN THE CLIPPING & COILING IN RUPTURED INTRACRANIAL ANEURYSM PATIENTS

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Background and purpose Craniotomy with neck clipping or endovascular coiling is treatment modality for cerebral aneurysm. In general, coiling is faster and less invasive, but not able to remove the subarachnoid hemorrhage. It is well known that substances released from the blood from the subarachnoid hemorrhage and inflammatory process might be the main cause of vasospasm and hydrocephalus. Authors analyzed our data to compare the incidence of vasospasm and hydrocephalus according to treatment modalities.

Methods Total 1039 cerebral aneurysm patents (723 ruptured & 315 unruptured; among 723 ruptured cases, 320 patients clipped & 403 patients coiled) between March 2007 & February 2017, were include in this analysis. In this study, most MCA aneurysms were treated clipping while most posterior circulation aneurysms were treated coiling. Authors compare the incidence of vasospasm and chronic hydrocephalus, procedure time, neurologic improvement rate and re-treatment rate.

Results Vasospasm developed 10.6% in clipping and 5.5% in coiling group ($p=0.007$). Chronic hydrocephalus, need shunt operation, developed similar incidence in both groups (11.6% in clipping and 9.4% in coiling, $p=0.208$). The procedure time (from anesthesia induction to wake up time) was 114.8 minutes in coiling while it was 394.2 minutes in clipping group ($p=0.000$). Initial neurologic status was worse, but neurologic improvement (= eGCS - iGCS) was frequent in coiling group (57.6% in coiling and 40.9% in clipping, $p=0.000$). Re-treatment rate ($p=0.238$) were statistically no difference in both groups.

Conclusions From our study, mechanical irritation to the offending vessel might be the most important cause of

vasospasm development while subarachnoid hemorrhage does not influence on the hydrocephalus development. Overall re-treatment rate after coiling and clipping was similar.

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E-020 SINGLE CENTER ANALYSIS OF EFFICACY OF HYDROGEL COILS IN TREATMENT OF ANTERIOR COMMUNICATING ARTERY ANEURYSMS

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Introduction/Purpose Approximately 30–37% of all cerebral aneurysms occur in the anterior communicating artery (AComm), making it the most common site for such lesions. These aneurysms constitute 12–15% of all unruptured and 23–40% of all ruptured cerebral aneurysms, and account for approximately 40% of aneurysmal subarachnoid hemorrhage (SAH) in adults.^{1,2} AComm aneurysms, when compared to other anterior circulation cerebral aneurysms, are more likely to rupture, as 50% of those that experience rupture do so at less than 7 mm diameter². Series outlining the safety and efficacy of hydrogel coils in aneurysm treatment show favorable angiographic outcomes, reduced thromboembolic complications, reduced recanalization, recurrence, and procedure-related morbidity and mortality when compared to bare platinum coils.^{3,4} However, despite the demonstrated success of hydrogel coils in treating cerebral aneurysms at large, no studies in the United States to date have examined outcomes related to the use of these coils versus bare platinum coils in the treatment of aneurysms of the anterior communicating artery, specifically. This study aims to compare these coil types for efficacy in terms of aneurysm obliteration and recurrence, and coil number and packing density.

Materials and methods A retrospective chart review of 36 patients with untreated, ruptured and unruptured, saccular AComm aneurysms who were treated via bare platinum or hydrogel-coated coil embolization during the period of August 2014 to present was conducted. Data extracted from patient charts included aneurysm size, morphology, rupture status, endovascular coil number, type, and size. Additionally, each aneurysm was assigned a Raymond-Roy Occlusion Classification (RROC) grade based on accompanied follow-up imaging at 6–12 months. RStudio was used to conduct all relevant statistical analysis including Welch's two-sample t-testing, least-squares regression, and non-parametric testing.

Results Hydrogel coil-treated AComm aneurysms, when compared to those treated with bare metal coils, demonstrated an equal rate of aneurysm obliteration with reductions in average number of coils used per aneurysm ($\beta=-0.4150$, $P=0.027$), packing density per aneurysm ($t(26.1)=2.09$, 95% CI 0.19–22.62, $P=0.046$), retreatment ($P=0.031$), and median six-month recurrence ($W=183$, $P=0.043$).

Conclusions In the setting of coil embolization of AComm aneurysms, hydrogel-coated endovascular coils exhibit similar rates of aneurysm obliteration when compared to bare platinum coils, but achieve these obliteration rates with lower mean packing densities, fewer coils used, and lower