

were performed using RStudio (2022.07.2+576), and results were reported as means (in mm) with 95% CI pooled random-effects estimates.

**Results** A total of 595 studies were screened, 54 were included overall, and 28 studies could be included in the quantitative synthesis after restricting to studies that met the pre-specified study selection criteria. Vessels of interest with at least 5 articles were the middle cerebral artery (MCA) M1 segment, basilar artery (BA), and vertebral artery (VA). The MCA M1 diameter for the European population (2.37mm [95% CI: 2.26 - 2.49]) was not different from the Chinese population (2.60mm [2.32 - 2.93]) ( $p=0.149$ ,  $I^2 = 99.2\%$ ). The BA diameter for the European population (2.92 [2.49 - 3.43]) was smaller compared to the Chinese population (3.66 [95% CI: 3.27 - 3.99]) ( $p=0.014$ ,  $I^2 = 98.2\%$ ). Lastly, the VA diameter for the European population (2.87 mm [95% CI: 2.57 - 3.20]) was similar to the Chinese population (2.67mm [95% CI: 2.32 - 3.07]) ( $p=0.427$ ,  $I^2 = 98.3\%$ ).

**Conclusions** In this meta-analysis, the MCA M1 and VA diameters were found to be similar for European and Chinese populations, while the BA was smaller in the European population. This suggests most models are already capturing ethnic variations in vessel size.

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#### IS FETAL-TYPE POSTERIOR CEREBRAL ARTERY A RISK FACTOR FOR RECURRENCE IN COILED ICA-PCOA ANEURYSMS? ANALYSIS OF CONVENTIONAL STATISTICS, COMPUTATIONAL FLUID DYNAMICS, AND RANDOM FOREST WITH HYPER-ENSEMBLE APPROACH

<sup>1</sup>J Chung\*, <sup>2</sup>J Cheong, <sup>2</sup>J Kim, <sup>3</sup>D Lee, <sup>4</sup>H Yi, <sup>4</sup>K Choi, <sup>5</sup>J Ahn, <sup>5</sup>J Park, <sup>5</sup>W Park. <sup>1</sup>Neurosurgery, Dankook University, Cheonan, Chung Nam, Korea, Republic Of; <sup>2</sup>Neurosurgery, Hanyang University Guri Hospital, Guri, Gyeonggi-do, Korea, Republic Of; <sup>3</sup>Radiology, Asan Medical Center, Seoul, Korea, Republic Of; <sup>4</sup>Neurosurgery, Hanyang University Medical Center, Seoul, Korea, Republic Of; <sup>5</sup>Neurosurgery, Asan Medical Center, Seoul, Korea, Republic Of

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**Background** The fetal-type posterior cerebral artery (FPCA) has been regarded as the risk factor for recurrence in the coiled posterior communicating artery (ICA-PCoA) aneurysm. However, it has not been proven in previous literatures.

**Objective** We applied conventional statistical analysis, computational fluid dynamics (CFD) simulation and random forest with hyper-ensemble approach (RF with HEA) are applied to reveal the impact of FPCA on the recurrence of ICA-PCoA aneurysms.

**Materials and Methods** Vascular parameters and clinical information from patients who underwent coil embolization ICA-PCoA aneurysms from January 2011 to December 2016 were obtained. Conventional statistical analysis was applied to a total of 95 cases obtained from patients with more than 6 months of follow-up. For CFD simulation, three sets of 3D models were used to understand the hemodynamical characteristics of various FPCAs. And the RF with HEA was applied to reinforce the clinical data analysis.

**Results** The conventional statistical analysis fails to reveal that FPCA is a risk factor. CFD analysis shows that the diameter

of FPCA alone is less likely to be a risk factor. The RF with HEA shows that the impact of FPCA is also minor compared to that of the packing density in the recurrence of coiled ICA-PCoA aneurysms.

**Conclusions** The gathered results of all three analyses show more clear evidence that FPCA is not a risk factor for coiled ICA-PCoA aneurysms. Hence, we may conclude that FPCA itself is doubtful to be the major risk factor in the recurrence of coiled ICA-PCoA aneurysms.

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#### MIDDLE MENINGEAL ARTERY EMBOLIZATION WITH LIQUID EMBOLIC AGENTS FOR CHRONIC SUBDURAL HEMATOMA: A SYSTEMATIC REVIEW AND META-ANALYSIS

<sup>1</sup>A Mowla\*, <sup>2</sup>S Abdollahifard, <sup>2</sup>A Farrokhi, <sup>2</sup>O Yousefi, <sup>3</sup>A Valibeygi, <sup>2</sup>P Azami. <sup>1</sup>Department of Neurological Surgery, University of Southern California, Los Angeles, CA, USA; <sup>2</sup>Shiraz University of Medical Sciences, Shiraz, Iran, Islamic Republic Of; <sup>3</sup>Fasa University of Medical Sciences, Fasa, Iran, Islamic Republic Of

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**Purpose** In this systematic review and meta-analysis, we will assess the efficacy and safety of MMA embolization with liquid embolic agents and the outcomes of patients following this procedure.

**Materials and Methods** A review of the literature was carried out to identify the studies investigating the efficacy and safety of MMA embolization with liquid embolysate in Chronic Subdural Hematoma (cSDH) patients in PubMed, Scopus, Embase, and Web of science. The keywords liquid embolic agent, middle meningeal artery, cSDH, and embolization and their synonyms were used to build up the search strategy. R statistical software and random-effects model were used for analysis. Heterogeneity was reported as  $I^2$  and publication bias was calculated using Egger's test.

**Results** Of the 628 articles retrieved, 14 studies were eligible to be included in this study. A total of data on 276 patients were analyzed. N-butyl cyanoacrylate and Onyx were the most commonly used embolizing agents. This study revealed a pooled mortality rate of 0%(CI:0.00-100%), recurrence and failure rate of 3%(CI:1-10%), reoperation rate of 4%(CI:2-12%), rate of size decrease of 94%(CI:79-98%), success rate of 100%(CI:76-100%) and adverse event rate of 1%(CI:0.00-4%).

**Conclusions** With low mortality, recurrence, reoperation, and adverse event rates and a remarkable decrease in the size of the hematoma, MMA embolization with liquid embolic might be considered a safe and effective treatment option in patients with previously failed surgical intervention and also as an alternative to the conventional treatments.

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