Reconstitution of the Internal Carotid Artery by the Vasa Vasorum is Associated with an Aplastic or Hypoplastic Circulus Arteriosus

Introduction The vasa vasorum are small vessels in the adventitial and medial layers of larger vessels which nourish their walls. When large vessels are occluded, the vasa vasorum may reconstitute them. We hypothesize that their hypertrophy is associated with a hypoplastic or aplastic circle of Willis which may be unable to meet the ischemic demands of the tissue perfused by the occluded vessel.

Materials and Methods We conducted a retrospective cohort study of patients with occlusion of the internal carotid artery and reconstitution of the vessel by vasa vasorum as confirmed by cerebral angiography. An electronic medical record was queried for patient demographics. The presence and caliber of an anterior communicating artery (AComm) and a posterior communicating artery (PComm) on the ipsilateral side of the lesion were measured by two experienced neurointerventionalists.

Results We reported 11 cases in 11 patients. Patients were predominantly female (n=7) and older (mean age 63.7 years, SD 15.6 years). 100% of patients had either an aplastic or hypoplastic circle of Willis. 81.8% of patients had either an aplastic AComm or ipsilateral PComm. When these vessels were present, 63.6% were hypoplastic with a mean diameter of 0.85 mm (SD ± 0.34 mm) and 0.82 mm (SD ± 0.22 mm), respectively.

Conclusion Reconstitution of an occluded internal carotid artery by the vasa vasorum is associated with an aplastic or hypoplastic circle of Willis, which may fail to compensate for the ischemic demand of the tissue initially perfused by the occluded vessel.