Purpose Dissecting intracranial aneurysms (DIA) can present with subarachnoid hemorrhage or ischemia, and are more common in the posterior circulation. Radiographically, DIA have similar morphological features to fusiform and dolicho-ectatic atherosclerotic aneurysms, with difficult diagnosis on traditional CTA and MRI/MRA cross sectional imaging. In addition, the rebleeding risk from ruptured DIA is considerably higher reaching up to 71.4% with 46.7% mortality, necessitating early diagnosis and treatment. We aimed to distinguish specific imaging features of spontaneous DIA using high resolution MR vessel wall imaging (VWI).

Methods In a retrospective analysis of our MR VWI database between Jan 2016 and March 2019, we identified patients with suspected DIA diagnosed by clinical history, CTA/MRA imaging findings, and conventional angiography. MRI 3D TOF and MR VWI were reviewed by two neuroradiologists for imaging findings that were diagnostic for DIA including intramural hematomas, intimal flaps and double lumen. Following diagnosis on MRI/3D TOF MRA, MR VWI was serially assessed for additional findings that could aid or confirm the diagnosis.

Results Seven patients (4M:3F) with mean age 62±13.7 were proven to have DIA, all located in the posterior circulation (6 vertebral:1 basilar). All patients presented with either severe headaches or diplopia/dizziness. There was no family history of IA, but high incidence of hypertension and hyperlipidemia (30%). On MRI/3D TOF MRA, intramural hemorrhage was observed to diagnose two DIA, which was also confirmed with intramural T1 hyperintense signal on MR VWI. Two aneurysms demonstrated fusiform morphology with intraluminal thrombus on MRI/3D TOF MRA without diagnosis, however, MR VWI identified an enhancing dissection flap and double lumen pathology for definitive DIA diagnosis. Two DIA were suspected with suggestion of intimal flap on MRI/3D TOF MRA, but improved visualization of enhancing intimal flap on MR VWI confirmed the diagnosis.

One aneurysm was diagnosed based on clinical history and an associated enhancing dissection flap with tapered occlusion of the contralateral vertebral artery, but no imaging features on 3D TOF MRA or MR VWI suggested a dissecting aneurysm.

Conclusions Spontaneous DIA are more commonly diagnosed in the posterior circulation. MR VWI is a valuable tool in confirming the diagnosis and differentiating fusiform thrombosed aneurysms from DIA with improved visualization of T1 hyperintense intramural hemorrhage, and enhancing intimal flap, and/or double lumen intracranial dissection pathology.