Vessel wall magnetic resonance imaging

Three-dimensional vessel wall magnetic resonance imaging has gained popularity in the diagnosis and management of patients with cerebrovascular disease in clinical practice. Vessel wall MR imaging is an imaging technique that delivers a fundamentally different viewpoint by emphasizing the pathology of the vessel wall as opposed to traditional descriptions that focus on the vessel lumen. It shows a crucial power in detecting vessel wall changes in patients with diseases including, but not limited to, central nervous system vasculitis, moyamoya disease, aneurysms, dissections, and intracranial atherosclerotic disease [1].

The rupture risk assessment of unruptured intracranial aneurysms (IAs) is still challenging. Aneurysm wall enhancement (AWE) on vessel wall magnetic resonance imaging (VW-MRI) is suggested as a potential marker for wall inflammation, but its relationship with rupture risk of unruptured IAs has not been well described.

A retrospective study identified 45 patients with ruptured blister aneurysms between 1998 and 2017. The principle was to attempt bypass/trapping as early as possible after diagnosis (early surgery). If the early diagnosis was difficult, patients underwent elective surgery in the later stage when aneurysms were detected (elective surgery). Patient characteristics, radiological findings, clinical course, and outcomes were analyzed.

Forty-three patients were treated by bypass/trapping. Twenty-eight patients were classified as early surgery and 15 as elective surgery. Two patients experienced fatal rebleeding and did not undergo surgery. All 15 patients in the elective surgery group showed rebleeding and/or aneurysmal growth while awaiting surgery. In the elective surgery group, there were 10 aneurysms missed initially by catheter angiography. In the early surgery group, 9 patients were assessed by vessel wall magnetic resonance imaging (MRI), which showed circumferential enhancement along the aneurysm wall, most of which was shown as only a small bulge in the angiography. Postoperative rebleeding did not occur in any of the patients.

Bypass/trapping is effective to prevent rebleeding. Early surgery may be beneficial, as most patients in the elective surgery group showed rebleeding or aneurysmal growth. Vessel wall MRI is a useful adjunct for early diagnosis and may contribute to prompt early surgery [2].

Clinical data and VW-MRI images were retrospectively reviewed in patients with unruptured IAs from January 2015 to December 2016 in Department of Neurosurgery, Changhai Hospital, Second Military Medical University, Shanghai, China. MRI Core, Houston Methodist Research Institute, Houston, Texas. One hundred ten patients harboring 140 unruptured IAs were included. The presence of AWE was determined by comparing the postcontrast VW-MRI images with the precontrast ones. The rupture risk based on the PHASES score was calculated for each case. Univariate and multivariate analysis were performed to investigate the association of AWE with rupture risk and other conventional risk factors.

AWE was present in 82 (58.6%) lesions. Unruptured IAs with AWE had significantly larger size (P <

.001), more irregular shape (P = .003), and different distribution of locations (P = .023) comparing with aneurysms without AWE. The rupture risk score of AWE group was significantly higher than non-AWE group (P < .001). Aneurysm size (odds ratio = 1.536; 95% confidential interval 1.312-1.798; P < .001) and location (odds ratio = 1.592; 95% confidential interval 1.237-2.049; P < .001) were independently related with AWE in multivariate analysis.

The presence of AWE on VW-MRI was highly associated with conventional rupture-related characteristics, including aneurysmal size and location, and was detected more frequently in unruptured IAs with high rupture risk based on the PHASES score [3].

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