Letters to the Editor

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Letter by Markl and Harloff Regarding Article, “Right–Left Propensity and Lesion Patterns Between Cardiogenic and Aortogenic Cerebral Embolisms”

To the Editor:

With great interest we read the work by Kim et al.1 regarding right–left propensity and lesion patterns between cardiogenic and aortogenic cerebral embolisms. The retrospective comparison of patients with cardioembolic and aortogenic sources of stroke revealed significant left–right differences in terms of cerebral lesion patterns. The authors conclude that the different locations of the embolic sources (heart versus aorta) result in more likely embolization pathways toward the left or right hemisphere. They hypothesize that different properties of the outlet anatomy of the supra-aortic great arteries and retrograde flow into the aortic arch originating from high-risk plaques ≥4 mm located in the distal aortic arch can explain these findings.

Unfortunately, Kim et al. do not precisely define the aortic segments. They should clarify if plaques ≥4 mm thickness of the distal arch (ie, of the proximal descending aorta and thus within the aortic arch distal to the left subclavian artery as defined by Amarenco et al2) were considered for the correlation with brain lesion patterns. Otherwise, a previously demonstrated potential aortogenic stroke mechanism,3–5 retrograde brain embolization from complex plaques in the proximal descending aorta would have been entirely neglected. This phenomenon is based on enhanced diastolic retrograde flow in the presence of aortic atherosclerosis, which was already demonstrated by Bogren et al in 1994 using 3-dimensional blood flow visualization based on 3-dimensional MR velocity mapping.3 More recently, 3-dimensional MR velocity mapping proved that flow reversal in the proximal descending aorta was frequent in patients with stroke and independent of aortic valve insufficiency.4 Furthermore, direct visualization of retrograde embolization pathways from complex plaques of the proximal descending aorta to the supra-aortic artery supplying the infarcted brain territory was systematically demonstrated in 2 cohorts of patients with acute stroke.4,5

Because plaques in the descending aorta are found with increased frequency and thickness compared with the ascending aorta and proximal arch, embolization into the posterior circulation and into the left hemisphere may indeed be more likely as shown in the present study by Kim et al.1 However, the precise location of aortic plaques and their correlation with the infarcted brain territories was not reported in the study by Kim et al. The incidence of left-sided brain embolism might thus be underestimated if plaques in the distal aorta were not considered.

In their discussion of the result, the authors suggest that “emboli from aortic plaques may move backward into the right hemisphere because the aorta has normally turbulent flows in the diastolic stage.” A number of studies have shown that diastolic retrograde flow in the atherosclerotic aorta is indeed a frequent phenomenon. Although we agree that such retrograde diastolic flow can cause embolization in more proximal vessels, it does not coincide with turbulence, which describes stochastic and non-deterministic flow. Flow through vessel narrowing, for example, internal carotid artery stenosis, may become turbulent and recirculation zones with flow reversal may form distal to the narrowing. Turbulent diastolic flows, however, are not expected in the nonstenotic aorta. High, systolic flow may induce short-lived turbulence during peak systole, which is unrelated to diastolic retrograde flow.

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