Calcific Cerebral Emboli and Aortic Stenosis: Detection of Computed Tomography

ASHWANI KAPILA, M.D., AND ROBERT HART, M.D.*

SUMMARY Embolism with brain infarction rarely complicates calcific aortic stenosis (CAS). We report a case with severe CAS where the patient experienced multiple embolic strokes immediately following retrograde heart catheterization. Calcific emboli in the cerebral arteries were demonstrated by computed tomography (CT).

IN THE ABSENCE OF coexistent mitral stenosis or infective endocarditis, clinical brain embolism is uncommonly associated with CAS.1-3 In a single previous report, occlusion of a femoral artery by a large calcium embolus followed left heart catheterization in a patient with severe CAS.4 We report a patient who suffered several embolic strokes following retrograde heart catheterization for CAS, with intra-arterial calcific emboli and cerebral infarction demonstrated by CT.

Case Report

A 66 year-old black male underwent aortography and left heart catheterization for evaluation of aortic valvular stenosis and suspected coronary artery disease. Prior to angiography, M-mode echocardiography had revealed a heavily calcified, stenotic aortic valve (fig. 1). The mitral valve annulus was minimally calcified; there was no mitral stenosis. Retrograde heart catheterization was done via a transfemoral approach (fig. 2). A low attenuation area was seen in the right basal ganglionic area and the adjacent corona radiata, that evolved in density on subsequent scans and was consistent with an acute cerebral infarction (fig. 3). Careful fundoscopic examination failed to reveal calcific retinal emboli.

Heparin therapy was briefly instituted, but was discontinued when hemiplegia persisted for 48 hours. No neurologic worsening occurred after the fifth day postcardiac catheterization. A follow up CT scan eight months later showed no change in the position of the calcific emboli and no extension of the area of infarction.

Discussion

While the underlying pathology of CAS is usually a congenitally bicuspid aortic valve or an inflammatory fibrocalcific process (including rheumatic valvular disease), the continuing disease process is one of organizing microthrombi on disrupted valvular endothelium...
circumflex branch of the left coronary artery by a presumably calcific embolus has also been described during thoracic aortography by Arvidson. Considering the difficulty that is encountered in traversing the aortic valve in tight AS during retrograde catheterization, a higher incidence of calcific embolization would be expected than suggested by the above reports.

CT has been instrumental in the diagnosis of cerebral infarction, based on the density changes in the infarcted parenchyma, which first appear several hours to days post-ictus. Earlier diagnosis can sometimes be facilitated by direct visualization of the embolus in a major cerebral artery, usually the middle cerebral. Calcified emboli have been demonstrated by CT in the proximal middle and anterior cerebral arteries, with good evidence to support the origin of these emboli in calcified carotid plaques (2 cases) and from mural thrombi in the atrium (1 case) and left ventricle (1 case).

Embolism in our patient was presumably precipitated by cardiac catheterization with dislodgement of cal-

Aortic valvular surgery is associated with a higher incidence of calcific embolization than occurs spontaneously as shown by Holley in a separate autopsy series where he found 82 instances of embolization in 38 of the 62 patients who underwent closed valvotomy or aortic valve replacement and died at various intervals after surgery. A single case report of a calcific embolic occlusion of a femoral artery following retrograde left heart catheterization of a patient with CAS is the only evidence of a similar process occurring with angiographic intervention. Embolic occlusion of the
Patients with CAS who experience ischemic stroke should be carefully evaluated for coexistent cerebrovascular disease or other cardiac sources of emboli before attributing the stroke to aortic valve disease. CT demonstration of calcific densities along the course of major intracranial arteries adjacent to a brain infarct is a useful radiographic finding that implicates CAS in stroke pathogenesis as a source of calcific emboli.14

Addendum

Post mortem examination ten months following stroke confirmed the persistent obstruction of intracranial arteries by calcific emboli.

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References

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A Kapila and R Hart

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