Detection of Carotid Atherosclerotic Plaque Ulceration, Calcification, and Thrombosis by Multicontrast Weighted Magnetic Resonance Imaging

Article *in* Circulation · August 2005

DOI: 10.1161/CIRCULATIONAHA.104.494419 · Source: PubMed

8 authors, including:

Baocheng Chu
University of Washington Seattle
86 PUBLICATIONS **4,082** CITATIONS
SEE PROFILE

Marina S Ferguson
University of Washington Seattle
44 PUBLICATIONS **3,556** CITATIONS
SEE PROFILE

Jianming Cai
Chinese PLA General Hospital (301 Hospital)
49 PUBLICATIONS **2,659** CITATIONS
SEE PROFILE

Michel Kliot
University of California, San Francisco
110 PUBLICATIONS **3,275** CITATIONS
SEE PROFILE

Detection of Carotid Atherosclerotic Plaque Ulceration, Calcification, and Thrombosis by Multicontrast Weighted Magnetic Resonance Imaging

Baocheng Chu, MD, PhD; Marina S. Ferguson, MT; Hunter Underhill, MD; Norihide Takaya, MD, PhD; Jianming Cai, MD, PhD; Michel Kliot, MD; Chun Yuan, PhD; Thomas S. Hatsukami, MD

A 62-year-old man presented to the emergency department with a chief complaint of severe headache and decreased vision in his left eye. Initial physical examination demonstrated a new-onset left homonymous hemianopsia, which warranted a stroke workup. The patient's head CT was significant for a 2.3×3.7-cm acute hemorrhage in the right posterior parietal and occipital lobes. Conventional angiography was performed and interpreted as >90% stenosis of both internal carotid arteries without ulceration. The remainder of the work-up, including echocardiogram, was negative. An ensuing carotid magnetic resonance examination with a phased-array carotid coil and high-resolution (0.3×0.3 mm pixel size) multicontrast weighted sequences confirmed the stenosis and demonstrated ulceration and calcification in both carotids and mural thrombus formation in the left carotid (Figures 1 and 2). After completely recovering from the stroke, the patient underwent staged bilateral carotid endarterectomy. Histological examination of the specimens confirmed the MRI findings of bilateral ulceration and left mural thrombus formation (Figure 3).

Disclosure

Dr Kliot is cofounder of a company, UltraImage Corp, which is now part of Pathway Medical Technologies and develops and makes MRI phase-array coils similar to those used in this article.

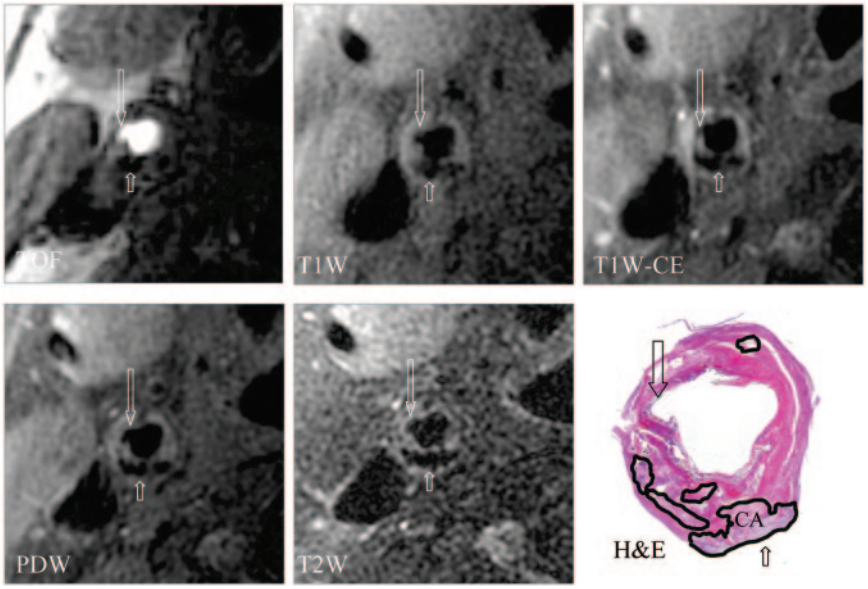

Figure 1. 3-D time-of-flight (TOF) image shows a surface ulcer (long arrow) in the distal right common carotid artery. Black-blood, fast-spin echo, T_1-weighted (T1W), postcontrast-enhanced T1W (T1W-CE), proton density weighted (PDW), and T_2-weighted (T2W) images confirm surface discontinuity. The hypointense areas on all 4 weightings correspond to calcifications (short arrows).

From the Departments of Radiology (B.C., M.S.F., H.U., N.T., J.C., C.Y.) and Surgery (M.K., T.S.H.), University of Washington, Seattle, and VA Puget Sound Health Care System (T.S.H.), Seattle, Wash.

Correspondence to Baocheng Chu, MD, PhD, Department of Radiology, Box 357115, University of Washington, 1959 NE Pacific St, Seattle, WA 98195. E-mail chubc@u.washington.edu

(*Circulation.* **2005;112;e3-e4.**)

Circulation **is available at http://www.circulationaha.org** **DOI: 10.1161/CIRCULATIONAHA.104.494419**

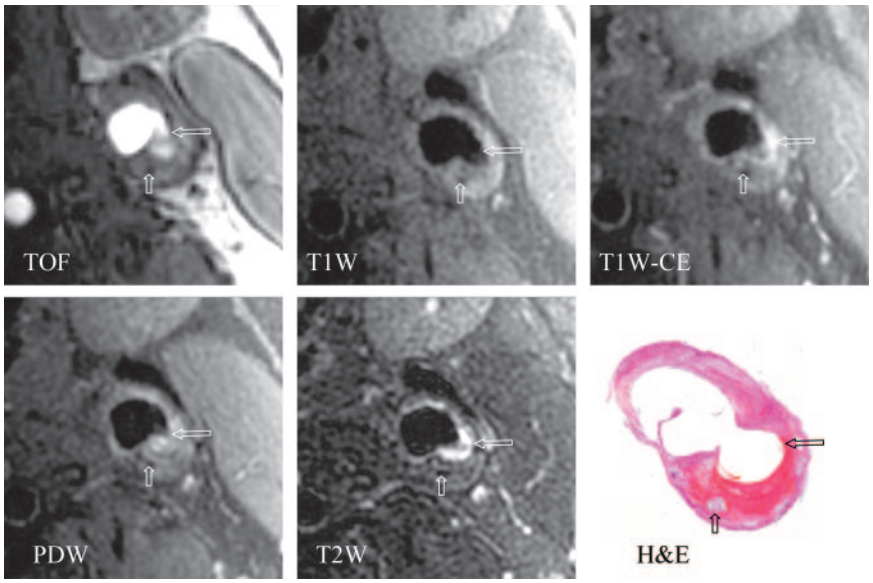

Figure 2. All weightings of the left carotid artery show a distinct ulcer (long arrows) and a small calcification (short arrows). The striking hyperintensity on the ulcer surface in the T_2-weighted (T2W) image indicates the presence of a mural thrombus. Focal contrast enhancement on postcontrast-enhanced T1W (T1W-CE) indicates vasculature at the base of the thrombus.

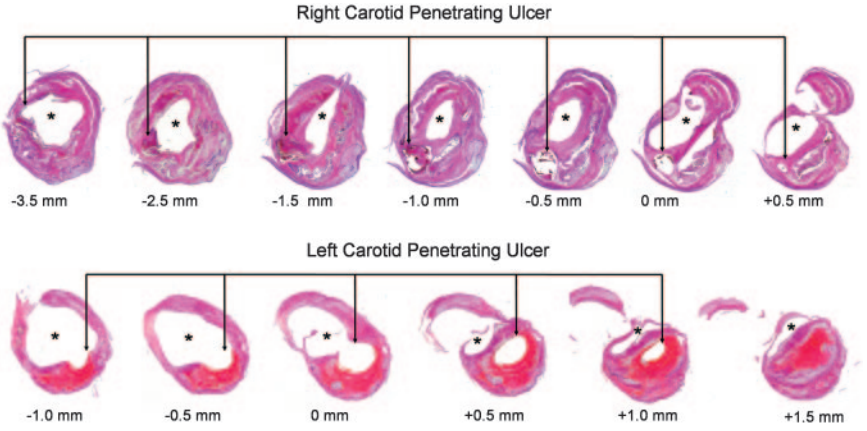

Figure 3. H&E stain of right and left carotid endarterectomy specimens. The right plaque contained extensive calcifications and fibrosis. A well-defined penetrating ulcer extends 4 mm from the lumen surface through a fibrotic matrix. A penetrating ulcer with mural thrombus formation is seen in the left carotid endarterectomy specimen. Asterisks are placed in the lumen of the common and the internal arteries of both carotids. Location indicators are millimeter distance to the bifurcation. + indicates locations in the internal carotid artery; –, locations in the common carotid artery.

Detection of Carotid Atherosclerotic Plaque Ulceration, Calcification, and Thrombosis by Multicontrast Weighted Magnetic Resonance Imaging

Baocheng Chu, Marina S. Ferguson, Hunter Underhill, Norihide Takaya, Jianming Cai, Michel Kliot, Chun Yuan and Thomas S. Hatsukami

Circulation. 2005;112:e3-e4
doi: 10.1161/CIRCULATIONAHA.104.494419
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Print ISSN: 0009-7322. Online ISSN: 1524-4539