CT Angiography of the Circle of Willis Using Matched Mask Bone Elimination

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Purpose
Matched Mask Bone Elimination (MMBE) is a new technique for the rapid removal of bone pixels from CT angiography (CTA) data sets. The principle of MMBE is that the bone pixels are identified in an unenhanced data set, and that the corresponding pixels in the CTA data set are given an arbitrarily low value. Maximum Intensity Projection (MIP) and Shaded Surface Display (SSD) images free from overprojecting bone then can be obtained in the ordinary way. The purpose of this study was to investigate the feasibility and effectiveness of CTA using MMBE for the detection of aneurysms.

Materials & Methods
Eighteen consecutive patients with subarachnoid hemorrhage underwent CTA using MMBE. In each patient two spiral CT scans of the same region were made using a spiral CT scanner with double or multiple detector array. First an unenhanced low radiation-dose spiral CT scan was made, followed by the CTA examination. After bone elimination with the MMBE method, MIP and SSD images were generated and examined for the presence or absence of aneurysms. The CTA-MMBE results were compared with digital subtraction angiography (DSA; n = 14), findings at surgery (n = 10) and coiling (n = 2).

Results
High quality MIP and SSD images without overlying bone were obtained in a fully automated way in all patients. Eighteen aneurysms were found in 15 patients with CTA-MMBE. The presence of these aneurysms was confirmed in 10 of 14 patients who underwent DSA. In two patients DSA was technically inadequate due to movement artifacts in one and inability to catheterize the carotid arteries in the other patient. In these two patients the presence of aneurysms was confirmed at surgery. In two patients both CTA and DSA were negative. In four patients DSA was not performed. In three of these patients a total of five aneurysms was found, confirmed at surgery and coiling in two patients.

Conclusion
High quality MIP and SSD images without any overlying bone can be obtained in a fully automated way from CTA data sets using MMBE. Good correlation between CTA and DSA results and findings at surgery and coiling were found.

References