Contrast-Enhanced Magnetic Resonance Angiography Carotid Arteries

To the Editor:

We were very interested to read the recent study by Johnston et al regarding the use of contrast-enhanced MRA (CEMRA) for carotid stenosis. The authors correctly highlight in their introduction the limitations of many current studies of noninvasive tests. We, however, remain to be convinced that their own study is an adequate reflection of the performance of CEMRA in “routine clinical practice.”

Up to 55% of MRA studies reported in the literature may include a significant proportion of carotid arteries with minor stenosis. These populations may not reflect the true population in which CEMRA would be used. It is thus quite possible that such studies actually tend to overestimate the overall performance of CEMRA compared with routine clinical practice. It is difficult to know whether the significant misclassification rate of 24% quoted by Johnston et al may be a reflection of that because the study population is not clearly defined in terms of the percentage of patients with significant disease.

Another important point to raise is the fact that there is no mention at all of the number of views in which both catheter angiography (DSA) and CEMRA were reported. DSA is usually acquired in two or four 2D projections while CEMRA is a 3D technique. For CEMRA, most radiologists would either print a series of 12 to 18 MIP projections or choose a limited selection of MIP projections from the workstation to demonstrate the tightest stenosis. There is substantial body of evidence in the literature showing that increasing the number of projections can lead to greater severity of stenosis.

We therefore firmly believe that any direct comparison between DSA and CEMRA should use exactly the same projections with both techniques. It may be possible that the overestimation found by Johnston et al may represent a difference in the number of projections acquired rather than an actual inherent difference between CEMRA and DSA.

We agree with the authors that the practice of “selective angiography” in their study population will have introduced significant bias. It seems plausible that the study population quoted would have comprised a much higher proportion of cases where ultrasound or CEMRA would have been equivocal. Even if CEMRA alone is subsequently shown to be good enough to replace DSA, DSA will still be required in such equivocal cases in routine clinical practice. Moreover, there is no mention of whether the official DSA reports were based on actual measurements by radiologists rather than the “eye-balling” technique which may be more widespread than thought. The retrospective nature of the article also suggests that the official DSA reports were done by radiologists who did not know at the time whether their results would be used in a study as opposed to the CEMRA measurements.

Despite our reservations, we do agree fully with the authors that some caution is needed before using noninvasive techniques such as CEMRA alone before such techniques are properly validated. The absence of procedural complication does not necessarily make CEMRA safer if significant misclassification of carotid disease is going to occur. The research setting, be it an academic center or a community hospital, should not in itself affect the extrapolation of results to routine clinical practice. Poor methodological criteria will do so.

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Response

We thank Dr U-King-Im and colleagues for their comments. They generally agree with our conclusions, but were concerned that the study did not adequately reflect “routine clinical practice.” We feel that this concern is largely unfounded. Rather than conducting the analyses based on studies performed in an academic medical center, we chose a community hospital. In addition, the purpose was not to prospectively define the sensitivity and specificity of CEMRA using a research protocol dictating how the test was to be performed and interpreted. We investigated how the test was performed and interpreted in a practice setting. The same was true for the traditional “gold standard,” catheter angiography.

However, we verified the accuracy of the original clinical interpretations of both CEMRA and angiography by comparing them to subsequent interpretations by neuroradiologists in an academic center. We limited the tests to those being performed for a specific indication (patients being considered for carotid endarterectomy). The range of stenoses reflect those of tests performed for that reason in clinical practice. Finally, we determined how frequently a decision to perform or defer the surgery would be in error relying solely on the results of CEMRA as reflected in the official radiology reports.

The study described by Dr U-King-Im and colleagues would address the test characteristics of CEMRA under ideal research conditions. Our study reflects the performance of CEMRA in a clinical practice setting.
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