Computed tomographic angiography and magnetic resonance angiography were specific, but could not rule out renal artery stenosis

Vasbinder GB, Nelemans PJ, Kessels AG, et al. **Accuracy of computed tomographic angiography and magnetic resonance angiography for diagnosing renal artery stenosis.** Ann Intern Med. 2004;141:674-82.

QUESTION

In patients with suspected renal artery stenosis (RAS), what is the diagnostic performance of computed tomographic angiography (CTA) and magnetic resonance angiography (MRA) compared with digital subtraction angiography (DSA)?

METHODS

Design: Blinded comparison of CTA and MRA with confirmatory DSA (Renal Artery Diagnostic Imaging Study in Hypertension [RADISH] study).

Setting: 6 hospitals in the Netherlands.

Patients: 356 hypertensive patients 18 to 75 years of age (mean age 52 y, 52% men) with diastolic blood pressure > 95 mm Hg were routinely screened for RAS, and had ≥ 1 predefined clinical clue indicating RAS. Exclusion criteria were known allergy to iodinated contrast agents; pregnancy; and contraindications to MRA, CTA, or DSA.

Description of tests: CTA, MRA, and DSA were done within a 3-month period for each patient; no intervention was done before testing was complete. The degree of stenosis was determined by the diameter of the most severely affected part of a renal artery measured and related to the reference diameter (diameter of a representative nonaffected portion of the artery beyond the site of poststenotic dilatation [if present]). Fibromuscular dysplasia (FMD) was diagnosed when multiple aneurysms separated by focal narrowing (string-of-beads sign) were observed. For CTA, MRA, and DSA, clinically relevant RAS was defined as luminal narrowing ≥ 50% and all cases of FMD. For each patient, observers first recorded the number of renal arteries, which were then judged with respect to the presence or absence of stenosis (percentage of luminal narrowing), the nature of the stenosis (atherosclerotic or FMD), the location of the stenosis (ostial or truncal), and the level of confidence in the diagnosis (high, moderate, or poor).

Diagnostic standard: Each DSA test result was evaluated by 3 to 4 vascular radiologists. The first observer performed the test, and the second and third observers judged each DSA examination and were aware of the first radiologist's opinion. If discrepancies existed among the first 3 radiologists with respect to the number of renal arteries or nature, location, or severity of disease (differences of > 10% in the degree of stenosis), a fourth observer made the final diagnosis.

Outcomes: Sensitivity, specificity, and positive and negative likelihood ratios for the diagnosis of RAS.

MAIN RESULTS

Multiple clues suggestive of RAS were present in 126 patients (35%). 96 kidneys of 72 patients (20%) had clinically relevant RAS, and 27 patients of all those with RAS (38%) had FMD. The test characteristics for CTA and MRA are in the Table.

CONCLUSION

In patients with hypertension and suspected RAS, computed tomographic angiography and magnetic resonance angiography were specific but not sensitive enough to rule out renal artery stenosis.

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Diagnostic characteristics of computed tomographic angiography (CTA) and magnetic resonance angiography (MRA) for detecting renal artery stenosis*

Tests	Sensitivity (95% CI)	Specificity (CI)	+LR	–LR
CTA†	64% (55 to 73)	92% (90 to 95)	8.00	0.39
MRA‡	62% (54 to 71)	84% (81 to 87)	3.88	0.45

*Diagnostic terms defined in Glossary; LRs calculated from data in article.
†Interrater agreement moderate (κ range 0.59 to 0.64).
‡Interrater agreement moderate (κ range 0.40 to 0.51).

COMMENTARY

RAS is often associated with refractory hypertension and renal failure; reliable noninvasive screening tests would help clinicians identify and treat RAS. A recent meta-analysis of noninvasive tests for RAS identified 18 studies of MRA and 5 of CTA, many of which reported both sensitivity and specificity between 90% and 100% (1). However, the carefully done study by Vasbinder and colleagues (to my knowledge, the largest to date: previous studies had 12 to 88 patients) found that CTA and MRA are not reproducible and sensitive enough to rule out RAS in hypertensive patients with high pretest probability of RAS.

What accounts for the low sensitivity of this study compared with previous studies? The prevalence of patients with FMD (38% of those with RAS) was higher than in most previous studies, some of which excluded FMD from their analysis. CTA and MRA are known to have less ability to visualize FMD of the distal renal arteries than the more proximal lesion in atherosclerotic RAS (2). Subgroup analysis confirmed low sensitivity (25%) in patients with FMD. However, even in the atherosclerotic RAS subgroup, sensitivity (77%) was lower than that of previous reports. Furthermore, in clinical practice it is not possible to exclude patients with FMD before ordering CTA or MRA.

The results of Vasbinder and colleagues' study show that the noninvasive screening tests are not as accurate as previously thought. But even if MRI and CTA were perfect screening tests, it would not help us to decide whether to proceed with revascularization versus continued medical therapy alone, because there is no randomized trial comparing revascularization and medical therapy with medical therapy alone in patients with angiographically proven RAS. The "Cardiovascular Outcomes in Renal Atherosclerotic Lesions" (CORAL) study has started to enroll patients and is designed to answer this question. Meanwhile, the problem for clinicians is not so much diagnostic accuracy of screening tests but rather the uncertainty of any benefit provided by revascularization.

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References

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