New guidelines for drive-by renal arteriography may lead to an unjustifiable increase in percutaneous intervention

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Narrowing of the lumen of the renal artery is termed renal artery stenosis (RAS) and can be a cause of hypertension and chronic kidney disease (CKD).¹ When hypertension is caused by RAS the term renovascular hypertension is used, but the only way to be certain of the diagnosis is to demonstrate that relief of the renal artery narrowing results in a return to a normal blood pressure. This is because essential hypertension is considerably more common than, and a risk factor for, RAS so the coexistence of RAS and hypertension in a patient does not infer causality. In addition, even where clinically significant RAS is the initial cause of hypertension, reversal of the stenosis may not result in a normal blood pressure or renal function if longstanding hypertension has produced irreversible contralateral renal injury.²

RAS is most commonly due to atherosclerotic renal artery stenosis (ARAS) and has been reported to be present in around 30% of patients having routine coronary angiography and up to 50% of patients undergoing peripheral angiography.² The presence and anatomical location of RAS can be confirmed by non-invasive imaging with duplex ultrasound, computed tomographic or magnetic resonance angiography or by invasive imaging with catheter-based angiography.² Isotope renography combined with administration of the ACE inhibitor captopril can be used to assess the functional severity of the stenosis, and comparison of the renin activity in the two renal veins is sometimes useful to confirm the diagnosis.² However, none of these investigations can reliably indicate which patients will respond to percutaneous or surgical intervention and which are best managed with antihypertensive drugs.

The medical management of ARAS centres on effective blood pressure control, lipid-lowering treatment, smoking cessation and antiplatelet treatment.^{1,2} Restoration of near-normal blood flow to the kidney by angioplasty or surgery (revascularisation) holds an intuitive appeal, but a recent systematic review found no clear evidence to suggest that revascularisation was better than medical treatment.³ There may be modest improvements in hypertension control but cure of hypertension is unlikely, and no firm conclusions can be drawn about the impact of renal artery revascularisation on the development of ischaemic heart disease, stroke and death.^{3,4} In contrast, medical management of hypertension is well established and has a large evidence base.⁵ Also, there is no good evidence to support an improvement in kidney function after renal artery revascularisation.³ On the other hand, angioplasty can produce serious complications such as renal artery occlusion and cholesterol embolisation² and, with

a lack of robust evidence demonstrating benefit, its role is still unclear.

With this management uncertainty as a background, the American College of Cardiology and the American Heart Association (ACC/AHA) recently produced guidelines for when renal arteriography should be performed at the time of coronary arteriography (so called “drive-by” renal arteriography).⁶ These brief drive-by arteriography guidelines are based on the considerably more substantial guidelines for the management of peripheral vascular disease (including ARAS)⁷ and state that it is reasonable to screen for ARAS in *at-risk patients who are candidates for revascularisation*.⁶ The definitions of at-risk patients and recommendations for revascularisation are presented in table 1.

Within the guidelines the following is suggested: “Percutaneous revascularisation is reasonable for patients with haemodynamically significant RAS and unstable angina”. Haemodynamically significant renal artery stenosis is defined as (a) a 50–70% diameter stenosis by visual estimation with a peak translesional gradient (measured with a 5F or smaller catheter or pressure wire) of at least 20 mm Hg or a mean gradient of at least 10 mm Hg; (b) any stenosis of at least 70% diameter; or (c) $\geq 70\%$ diameter stenosis by intravascular ultrasound measurement.⁷ The authors acknowledge that this guidance for patients with unstable angina is based on small case series of selected patients because larger, more robust, studies have yet to be performed. Given that unstable angina is a common indication for coronary arteriography, a large number of patients will also be candidates for renal artery imaging. This is in addition to the significant number of patients who will be candidates for renal artery imaging based on a history of hypertension or CKD. In America, percutaneous renal artery revascularisation is increasingly being performed by cardiologists,⁸ so a by-product of increased renovascular imaging is likely to be an increase in renal artery revascularisation at the time of coronary arteriography. In the UK fewer cardiologists routinely perform renal artery angioplasty at present. However, because coronary angioplasty requires similar skills there is considerable potential for the number of renal artery revascularisation procedures to increase.

The new ACC/AHA guidelines for when renal arteriography should be performed in patients undergoing coronary arteriography amount to the introduction of a new and unproved screening

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Abbreviations: ACC/AHA, American College of Cardiology and the American Heart Association; ARAS, atherosclerotic renal artery stenosis; CKD, chronic kidney disease; RAS, renal artery stenosis

Table 1 ACC/AHA indications for patients to be considered at-risk for atherosclerotic renal artery stenosis (ARAS) and the recommendations for intervention**Indications of an increased risk of ARAS—from White *et al* (2006)⁶ ***

- Accelerated, resistant or malignant hypertension (class I: LOE C)
- Unexplained atrophic kidney or size discrepancy >1.5 cm between kidneys (class I: LOE B)
- Sudden, unexplained pulmonary oedema (class I: LOE B)
- Unexplained renal dysfunction, including patients starting renal replacement treatment (class IIa: LOE B)
- Development of new azotaemia or worsening renal function after administration of an ACE inhibitor or angiotensin receptor blocker (class I: LOE B)
- Multivessel coronary artery disease or peripheral arterial disease (class IIb: LOE B)
- Onset of hypertension at <30 years of age or severe hypertension at >55 years of age (class I: LOE B)
- Unexplained congestive heart failure or refractory angina (class IIb: LOE C)

Recommendations for renal artery revascularisation—from Hirsch *et al* (2006)⁷*Asymptomatic stenosis*

- Percutaneous revascularisation may be considered for treatment of an asymptomatic bilateral or solitary viable kidney with a haemodynamically significant RAS (class IIb: LOE C)
- The usefulness of percutaneous revascularisation of an asymptomatic unilateral haemodynamically significant RAS in a viable kidney is not well established and is presently clinically unproved (class IIb: LOE C)

Hypertension

- Percutaneous revascularisation is reasonable for patients with haemodynamically significant renal artery stenosis (RAS) and accelerated hypertension, resistant hypertension, malignant hypertension, hypertension with an unexplained unilateral small kidney, and hypertension with intolerance to drug treatment (class IIa: LOE B)

Preservation of renal function

- Percutaneous revascularisation is reasonable for patients with RAS and progressive chronic kidney disease with bilateral RAS or a RAS to a solitary functioning kidney (class IIa: LOE B)
- Percutaneous revascularisation may be considered for patients with RAS and chronic renal insufficiency with unilateral RAS (class IIb: LOE C)

Impact of RAS on congestive heart failure and unstable angina

- Percutaneous revascularisation is indicated for patients with haemodynamically significant RAS and recurrent, unexplained congestive heart failure or sudden, unexplained pulmonary oedema (class I: LOE B)
- Percutaneous revascularisation is reasonable for patients with haemodynamically significant RAS and unstable angina (class IIa: LOE B)

Classification and levels of evidence (LOE) are given. Class I, intervention is useful and effective; class IIa, weight of evidence/opinion is in favour of usefulness/efficacy; class IIb, usefulness/efficacy less well established by evidence/opinion; class III, intervention is not useful/effective and may be harmful. Levels of evidence: A, sufficient evidence from multiple randomised trials; B, limited evidence from single, randomised trial or other non-randomised studies; C, based on expert opinion, case studies or standard of care.

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Box 1 Criteria for a screening programme

- Is the disease an important public health problem?
- Is there an effective treatment for localised disease?
- Are facilities for further diagnosis and treatment available?
- Is there an identifiable latent or early symptomatic stage of disease?
- Is the technique to be used for screening effective?
- Are the tests acceptable to the population?
- Is the natural history of the disease known?
- Is there a strategy for determining which patients should and should not be treated?
- Is the cost of screening acceptable?
- Is effective treatment available and does management of cases in the early stages have a favourable impact on prognosis?

programme. However, the guidelines fail to meet the screening criteria adopted by the World Health Organisation⁹ (box 1) because haemodynamically significant ARAS will be diagnosed without a strong evidence base for management. We would strongly discourage renal artery revascularisation at the time of coronary arteriography until a considerably more robust evidence base is available.

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Commentary: Shoot the renals!

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Atherosclerotic renal artery stenosis (ARAS) is a growing dilemma. The condition is increasingly common and can promulgate hypertension and result in renal failure. However, patients with ARAS generally die owing to their coronaries or cerebral vessels. Intervention, by stenting or angioplasty is beloved and believed, but not proved. The American Heart Association has recently published guidelines regarding patients at high risk for ARAS who are potential candidates for revascularisation. Since this phraseology includes practically every patient with atherosclerosis, these guidelines appear ill advised.

In this issue of *Heart*, Dear, Padfield and Webb¹ take umbrage at recent (2006) recommendations published by the American Heart Association (AHA) regarding new guidelines for “drive-by” renal arteriography during interventions for atherosclerotic lesions elsewhere in the body.² This Practice Guideline was followed by a multispecialty consensus document stating basically the same thing.³ The multispecialty pundits concluded that renal angiography should be

“selectively applied to patients at high risk for atherosclerotic renal artery stenosis (ARAS) who are potential candidates for revascularisation”. Dear *et al* draw attention to the fact that the guidelines recommend screening for ARAS in all patients at risk who are candidates for revascularisation.¹ “At risk” was defined according to hypertension, age of onset, accelerated course, kidney size discrepancy, “flash” pulmonary oedema, worsening renal function and multivessel atherosclerosis elsewhere. Since the “unstentable” patient is yet to be encountered, Dear *et al* suggest that the number of patients subjected to renal artery stenting is bound to increase. They point out that the AHA recommends a generalised “screening programme” for an entity that has no sound basis for management. A recent meta-analysis by Balk *et al* underlines their view.⁴ Have Dear *et al* indeed caught old Auntie AHA with her pantaloons at half mast?

The issues are complex. ARAS is a moving target in an ever-aging, ever-more diabetic population. Furthermore, the options

Abbreviations: AHA, American Heart Association; ARAS, atherosclerotic renal artery stenosis; CORAL, Cardiovascular Outcomes in Renal Atherosclerotic Lesions