Renovascular Hypertension and Ischemic Nephropathy

FIGURE 3-38
Distribution of endstage renal disease diagnoses. Atherosclerotic renal artery disease (ASO-RAD) has been claimed to contribute to the ESRD population. This diagram from the US Renal Data System Coordinating Center 1994 report indicates that 29% of calendar year 1991 incident patients entered ESRD programs because of "hypertension (HBP)." No renovascular disease diagnosis is listed. Crude estimates of the percentage of patients entering ESRD programs because of ASO-RAD range from 1.7% to 15%. Precise bases for making these estimates are both unclear and confounded by the high likelihood of coexisting arteriolar nephrosclerosis, type II diabetic nephropathy, and atheroembolic renal disease. ASO-RAD as a major contributor to the ESRD population is probably small on a percentage basis, occupying some portion of the ESRD diagnosis "hypertension (HBP)." For dialysis-dependent patients with ASO-RAD, predictors of recovery of renal function following renal revascularization and allowing for discontinuance of dialysis (temporary or permanent) include 1) bilateral (vs unilateral) renal artery stenosis, 2) a relatively fast rate of decline of estimated glomerular filtration rate (less than 6 months) prior to initiation of dialysis; and 3) mild-to-moderate arteriolar nephrosclerosis angiographically.

Treatment of Renovascular Hypertension and Ischemic Nephropathy

TREATMENT OPTIONS FOR RENOVASCULAR HYPERTENSION AND ISCHEMIC NEPHROPATHY

- Pharmacologic antihypertensive therapy
- PTRA
- Renal artery stents
- Surgical renal revascularization

FIGURE 3-39
Treatment options for renovascular hypertension and ischemic nephropathy. The main goals in the treatment of renovascular hypertension or ischemic nephropathy are to control the blood pressure, to prevent target organ complications, and to avoid the loss of renal function. Although the issue of renal function may be viewed as mutually exclusive from the issue of blood pressure control, uncontrolled hypertension may hasten a decline in renal function, and renal insufficiency may produce worsening hypertension. Even in the presence of excellent blood pressure control, progressive arterial stenosis might worsen renal ischemia and promote renal atrophy and fibrosis. Therapeutic options include pharmacologic antihypertensive therapy, percutaneous transluminal renal angioplasty (PTRA), renal artery stents, and surgical renal revascularization. Pharmacologic antihypertensive therapy is covered in more detail separately in this Atlas.

INCREASING COMORBIDITY IN PATIENTS UNDERGOING RENOVASCULAR SURGERY

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<td>Cerebrovascular disease</td>
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<tr>
<td>Claudication</td>
<td>35.7</td>
<td>56.4*</td>
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*P <0.001.

FIGURE 3-40
Comorbidity in patients undergoing renovascular surgery. Patients presenting for renovascular surgery or endovascular renal revascularization are at high-risk for complications during intervention because of age, and frequently associated coronary, cerebrovascular, or peripheral vascular disease. As the population ages, the percentage of patients being considered for interventional maneuvers on the renal artery has increased significantly. Approximately 30% of patients currently undergoing interventional approaches to renal artery disease have angiina, or have had a previous myocardial infarction. Congestive heart failure, cerebrovascular disease (eg, carotid artery stenosis), diabetes mellitus, and claudication are frequent comorbid conditions in these patients. Their aortas are often laden with extensive atherosclerotic plaque (Fig. 3-33), making angiographic investigation or endovascular renal revascularization hazardous. (Adapted from Hallet and coworkers [17]; with permission.)
**FIGURE 3-41**
Diminished operative morbidity and mortality following surgical revascularization for atherosclerotic renovascular disease. Operative morbidity and mortality in patients undergoing surgical revascularization have been minimized by selective screening and/or correction of significant coexisting coronary and/or carotid artery disease before undertaking elective surgical renal revascularization for atherosclerotic renal artery disease. Screening tests for coronary artery disease include thallium stress testing, dipyridamole stress testing, dobutamine echocardiography, and coronary arteriography. Aortorenal bypass with saphenous vein grafting is a frequently used surgical approach in patients with nondiseased abdominal aortas. Severe atherosclerosis of the abdominal aorta may render an aortorenal bypass or renal endarterectomy technically difficult and potentially hazardous to perform. Effective alternate bypass techniques include splenorenal bypass for left renal revascularization, hepatorenal bypass for right renal revascularization, ileorenal bypass, bench surgery with autotransplantation, and use of the supraceliac or lower thoracic aorta (usually less ravaged by atherosclerosis). Simultaneous aortic replacement and renal revascularization are associated with an increased risk of operative mortality in comparison to renal revascularization alone. Some surgeons advocate unilateral renal revascularization in patients with bilateral renovascular disease.

**FIGURE 3-42**
3.21 Renovascular Hypertension and Ischemic Nephropathy

FIGURE 3-43
Percutaneous transluminal renal angioplasty (PTRA) of the renal artery. A, High-grade (more than 75%) nonostial atherosclerotic stenosis of the left main renal artery in a patient with a solitary functioning kidney (right renal artery totally occluded). Note gradient of 170 mm Hg across the stenotic lesion. B, Balloon angioplasty of the left main renal artery was successfully performed with reduction in the gradient across the stenotic lesion from 170 mm Hg pre-PTRA to 15 mm Hg post-PTRA. Repeat aortogram 3 years later demonstrated patency of the left renal artery.

PTRA of the renal artery has emerged as an important interventional modality in the management of patients with renal artery stenosis. PTRA is most successful and should be the initial interventional therapeutic maneuver for patients with the medial fibroplasia type of fibrous renal artery disease (eg, Fig. 3-5A). Excellent technical success rates have also been attained for nonostial atherosclerotic lesions of the main renal artery, as shown here.

FIGURE 3-44
High-grade atherosclerotic renal artery stenosis at the ostium of the right main renal artery in a 68-year-old man with a totally occluded left main renal artery. Several attempts at balloon dilatation were unsuccessful. Over the subsequent 10 days, severe renal insufficiency developed (serum creatinine increasing from 2.0 to 12.0 mg/dL) requiring dialysis. Renal function never improved and the patient remained on dialysis.

Palmaz stent, expanded. Because percutaneous transluminal renal angioplasty (PTRA) has suboptimal long-term benefits for atherosclerotic ostial renal artery stenosis, endovascular stenting has gained wide acceptance. Renal artery stenting may be performed at the time of the diagnostic angiogram, or at some time thereafter, depending on the physician’s preference and the risk to the patient of repeated angiographic procedures. From a technical standpoint, indications for renal artery stenting include 1) as a primary procedure for ostial atherosclerotic renal artery disease (ASO-RAD), 2) technical difficulties in conjunction with attempted PTRA, 3) post-PTRA dissection, 4) post-PTRA abrupt occlusion, and 5) restenosis following PTRA. It is unclear what the long-term patency and restenosis rates will be for renal artery stenting for ostial disease. Preliminary observations suggest that the 1-year patency rate for stents is approximately twice that for PTRA.