3.22 Hypertension and the Kidney

A. SURGICAL REVASCULARIZATION VERSUS PTRA FOR ATHEROSCLEROTIC RENAL ARTERY DISEASE

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Successful PTRA, %</th>
<th>Successful surgical revascularization, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonostial (20%)</td>
<td>80-90</td>
<td>90</td>
</tr>
<tr>
<td>Ostial   (80%)</td>
<td>25-30</td>
<td>90</td>
</tr>
</tbody>
</table>

B. SURGICAL REVASCULARIZATION VERSUS PTRA FOR FIBROUS RENAL ARTERY DISEASE

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Successful PTRA, %</th>
<th>Successful surgical revascularization, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main     (50%)</td>
<td>80-90</td>
<td>90</td>
</tr>
<tr>
<td>Branch   (50%)</td>
<td>NA</td>
<td>90</td>
</tr>
</tbody>
</table>

FIGURE 3-46 Abdominal aortogram in a 63-year-old male, 6 months following placement of a Palmaz stent. Note wide patency of the left main renal artery.

Surgical revascularization vs percutaneous transluminal renal angioplasty (PTRA) for renal artery disease. A, Success rates for atherosclerotic renal artery disease (ASO-RAD). B, Success rates for fibrous renal artery disease. Success of either PTRA or surgical renal revascularization is viewed in terms of “technical” success and “clinical” success. For PTRA, technical success reflects a lumen patency with less than 50% residual stenosis (ie, successful establishment of a patent lumen). For surgical revascularization, technical success is the demonstration of good blood flow to the revascularized kidney determined during surgery, or postoperatively by DPTA renal scan or other immediate postoperative imaging procedures. Technical success with either PTRA or surgical revascularization is rarely defined by postoperative angiography. “Clinical” success may be defined as improved blood pressure or improvement in kidney function, and/or resolution of flash pulmonary edema. Technical and clinical successes do not necessarily occur together because technical success may be apparent, but without improvement in blood pressure or renal function.

The “percent success” for PTRA and surgical revascularization depicted above are estimates, and reflect primarily “technical” success for both nonostial and ostial lesions in ASO-RAD. Technical success rates for surgical revascularization are high, approximating 90%, with little difference in the technical success rates between ostial and nonostial lesions. For PTRA, technical success rates are much higher for nonostial lesions. There is a high rate of restenosis at 1 year (~50% to 70%) for ostial ASO-RAD, which has promoted the use of renal artery stents for these lesions.

The success rates of surgical renal revascularization and PTRA for stenosis of the main renal artery in fibrous renal artery disease are comparable, approximately 90%. Hypertension is more predictably improved with surgical revascularization and PTRA in fibrous renal artery disease in comparison with ASO-RAD. Technical success rates with surgical renal revascularization are high for branch fibrous renal artery disease, but long-term technical and clinical success rates are not available for PTRA of branch lesions due to fibrous dysplasia. NA—not available. (Adapted from Pohl [18]; with permission.)
COMPILATIONS OF TRANSLUMINAL ANGIOPLASTY OF THE RENAL ARTERIES

- Contrast-induced ARF (mild or severe)
- Atheroembolic renal failure
- Rupture of the renal artery
- Dissection of the renal artery
- Thrombotic occlusion of the renal artery
- Occlusion of a branch renal artery
- Balloon malfunction (may lead to inability to remove balloon)
- Balloon rupture
- Puncture site hematoma, hemorrhage, or vessel tear
- Median nerve compression (axillary approach)
- Renal artery spasm
- Mortality (≤1%)

FIGURE 3-48

Complications of transluminal angioplasty of the renal arteries. The more common complications of PTRA are contrast-induced acute renal failure (ARF) and atheroembolic renal failure. Dissection of the renal artery, occlusion of a branch renal artery, and occasionally thrombotic occlusion of the main renal artery may occur. In experienced hands, rupture of the renal artery is rare. Minor complications relate primarily to the puncture site. When the axillary approach is used (because of severe iliac and lower abdominal aortic atherosclerosis), median nerve compression may transpire. Some of these complications of percutaneous transluminal renal angioplasty, particularly atheroembolic renal failure and/or contrast-induced acute renal failure (ARF) may also be observed with renal artery stent procedures.

FIGURE 3-49

Selection of treatment for patients with renal artery disease. In selecting treatment options for patients with renal artery disease, there are several factors to consider: what is the likelihood that the renal artery disease is causing the hypertension? For patients with fibrous renal artery disease the likelihood is high; for patients with atherosclerotic renal artery disease (ASO-RAD), the likelihood for a cure of hypertension is small. The more severe the hypertension, the greater the inclination to intervene with either surgery or balloon angioplasty. For children, adolescents, and younger adults, most of whom will have fibrous renal artery disease, intervention is usually recommended to avoid lifelong anti-hypertensive therapy. Cardiovascular comorbidity is high for patients with ASO-RAD and appropriate caution in approaching these patients is warranted, weighing the relative efficacy and risk of medical antihypertensive therapy, percutaneous transluminal renal angioplasty (PTRA), renal artery stenting, and surgical revascularization. Local experience and expertise of the treating physicians must be considered as well in selection of treatment options for these patients.

References
