Arterial Stenting and Balloon Angioplasty in Renal Artery Stenosis

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Physiologically significant stenosis of the renal arteries stimulates the renin angiotensin aldosterone system and causes an elevation of blood pressure, which is defined as renovascular hypertension. There are two major types of stenotic lesions; fibromuscular dysplasia and atherosclerosis of the renal artery. Accordingly, revascularization of these stenotic lesions is a radical treatment of the disease, normalizing the blood pressure. Percutaneous transluminal renal angioplasty (PTRA) may be preferably selected as the first choice among the treatments of revascularization. In some other cases, surgical revascularization including kidney autotransplantation could be the best selection. The remaining cases must be treated with antihypertensive medication.

Ramsay and Waller (1) evaluated the efficacy and safety of PTRA in the treatment of renovascular hypertension in 10 published series including 691 patients; 464 patients with atherosclerotic stenosis, 193 with fibromuscular stenosis, and the remainder mainly with post-transplant stenosis. In 670 patients with available follow-up data, the technical success rate of PTRA was 88%. The overall cure rate for hypertension was 24% and a further 43% was improved. Each series patients with fibromuscular lesions had a significantly higher cure rate (50%) than those with atherosclerotic lesions (19%), indicating serious limitations of PTRA in the treatment for atherosclerotic lesions. Therefore, to establish the efficacy of PTRA further randomized trials are needed in a comparison with medical therapy. There have been several such reports, which suggest no difference in the efficacy between PTRA and medical treatment (2, 3).

Natural history of atherosclerotic renal artery stenosis has been observed in the patients under medical treatment using sequential angiography and duplex ultrasound scanning (4). These studies suggest that progressive arterial obstruction occurs in 42–53% of these patients, and that complete renal artery occlusion was observed in 9–16%. The long-term response of PTRA appears to be poor especially for the ostial lesions of atheromatous stenosis as compared with nonostial ones.

In addition to renovascular hypertension, ischemic renal disease (IRD) is another major clinical consequence of atherosclerotic renal artery stenosis. IRD may be associated with progressive loss of renal parenchyma caused by renal ischemia, which is independent of hypertension and is also associated with a reduction of the glomerular filtration rate (GFR) (5). Thus, atherosclerotic renal artery stenosis is the cause of end stage renal disease (ESRD) in up to 20% of patients starting maintenance dialysis (5). In over 80% of cases this type of stenosis is produced by encroachment of aortic atheromatous plaques at the renal artery ostium (6), and is bilateral in 30% of cases (4).

Renal artery stenosis leading to loss of renal function is potentially salvageable by PTRA or surgical revascularization. More recently, an incidence of patients with ESRD on maintenance hemodialysis due to diabetes mellitus is increasing in Japan as well as in the Western civilized countries. IRD due to bilateral atherosclerotic renal artery stenosis may contribute to the increase in diabetic patients starting hemodialysis. Thus, the salvage of renal function in diabetic patients with IRD becomes a very important procedure to prevent an increasing incidence of ESRD. Several reports have demonstrated improvements in renal function in patients after PTRA for hypertension. In a series by Sos (7), renal angioplasty had a 47% benefit in the entire group with azotemia and in 58% of those, the procedure was technically successful. Considering the good results of PTRA in this series with renal dysfunction, PTRA is encouraging and a justifiable procedure.

Kitazawa et al (8) presented a case of a 70-year-old man with NIDDM having renovascular hypertension, based on a stenosis of the ostial portion of the left renal artery in this journal. Although his blood pressure and plasma renin activity was normalized by PTRA, restenosis occurred three months later. So, stenting was performed successfully, and his blood pressure and plasma renin activity were normalized again, and the level was lasting during a one-year follow-up. As this report suggests, the stenting may contribute further improvement of effect of angioplastical procedures, especially for ostial renal artery stenosis.

See also p 464.

In most ostial lesions like the above case, even if the initial success of PTRA is achieved, in half of these restenosis occurs within 6 months (3). However, an introduction of percutaneous transluminal stenting seems to overcome these restenosis problems. The initial technical success of stenting is reported to reach over 90%, and restenosis occurs in less than 20% (9). Thus, ischemic renal failure due to severe bilateral atherosclerotic renal artery stenosis could be hopefully salvaged by means of revascularization including stenting. An increase in collat-
eral blood supply following renal revascularization may be involved in the improvement of renal function. In some cases renal biopsy may be valuable in order to assess the degree of irreversible parenchymal damage. There have been two recent studies on renal artery stenting, which show significant slowing of impaired renal function up to 4 years (10, 11). PTRA and stenting, therefore, would prevent progression to IRD, thereby reducing the occurrence of hemodialysis.

Tanenao Eto, MD
The First Department of Internal Medicine,
Miyazaki Medical College,
5200 Kihara, Kiyotake, Miyazaki 889-1692

References