Transradial Renal Artery Angioplasty and Stenting in a Patient With Leriche Syndrome

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SUMMARY

Percutaneous interventional procedures in the renal arteries are usually performed employing a femoral or brachial vascular access. In contrast, the transradial approach has been established for coronary angiography and angioplasty. We encountered a patient with Leriche syndrome who had renovascular hypertension ascribed to a severe left renal artery stenosis. To stabilize his blood pressure, we made an attempt to relieve the renal artery stenosis with Leriche syndrome by transradial renal artery angioplasty and stenting, using devices for coronary intervention. The procedure was successful without complications or residual stenosis. His hypertension improved with less antihypertensive medications. This case suggests that the radial approach might become an alternative entry site for renal artery interventions. (Int Heart J 2005; 46: 557-562)

Key words: Radial approach, Renovascular hypertension, Leriche syndrome, Angioplasty

Renal angioplasty in combination with stenting has become an accepted procedure for the treatment of renovascular hypertension or ischemic nephropathy ascribed to atherosclerotic renal artery stenosis (RAS).1-3) The most frequent access site for endovascular treatment of RAS is the common femoral artery. However, in the case of RAS accompanied by an acute aorto-renal angle or severe peripheral arterial obstructions, a brachial or axillary approach has been traditionally used.4)

It has been reported that the radial artery approach provides an alternative entry site for coronary angiography, angioplasty, and stenting.5,6) The major advantage is a significant reduction in access site-related vascular complications such as vascular repair or blood transfusion during coronary intervention.7) A few recent reports have shown that renal artery interventions also could employ the
radial approach as a vascular access site. In this report, we describe a successful attempt to relieve RAS with Leriche syndrome by transradial renal artery angioplasty and stenting.

**CASE REPORT**

A 61-year-old male was admitted to our hospital for assessment of electrocardiography (ECG) abnormalities. He had a past history of cerebral infarction. The results of physical examination showed obesity with a height of 175.5 cm and a body weight of 80.0 kg, right-side hemiparesis with severe contracture in the right upper extremity, bilateral absence of arterial pulsation in the lower extremities, and uncontrolled blood pressure (162/94 mmHg) under medication consisting of amlodipine 10 mg/day and carvedilol 10 mg/day. The right ankle-brachial index (ABI) was 0.60 and the left ABI was 0.63. Routine blood test results were normal. The serum level of plasma renin activity was 2.70 ng/mL/hour (normal range, 0.20-2.70). An ECG taken 18 years prior to admission was normal, whereas that taken on admission showed negative T waves in leads I, aVL, and V1-6. Two-dimensional transthoracic echocardiography revealed that the apical wall of the left ventricle was thin and dyskinetic, suggesting an apical old myocardial infarction. Ultrasonography (US) showed atrophic change in the left kidney and Doppler waveform from a segmental artery in the left kidney demonstrated a turdus-parvus pattern (acceleration time 0.138 seconds) (Figure 1A), suggesting left RAS. Coronary angiography indicated a total occlusion in the just proximal left anterior descending coronary artery (LAD) with rich collateral circulation to the distal LAD from the right coronary artery, and left ventriculography showed dyskinesis in the apical wall. Subsequent aortography demonstrated a severe left renal artery stenosis with a complete occlusion in the abdominal aorta below the renal level (Figure 2A). On the basis of these angiographic findings, old myocardial infarction, renovascular hypertension due to the left RAS, and Leriche syndrome were diagnosed.

In order to stabilize his blood pressure, we attempted to treat the left RAS. Because the bilateral iliac artery was completely occluded, we decided to adopt a cranio-caudal approach. In the present case, the brachial artery access might have had relatively high vascular complication rates, since he had severe systemic atherosclerotic vascular lesions with uncontrolled high blood pressure and had taken anticoagulant therapy in addition to antiplatelet therapy. Moreover, he expressed a desire for transradial renal intervention in order to avoid any trouble with his only remaining upper extremity, even if the overall cost related to the procedure would be at his own expense. We decided to make an exception in this case and adopt a radial approach. After superficial local anesthesia, the left radial artery
was punctured and a 6 French (Fr) introducer slit-sheath (Medikit Corporation, Tokyo) was inserted. After heparin administration (5000 U, bolus), using a specially produced, extra-long, 6Fr, 110 cm Multipurpose guiding catheter (Cyber, Boston Scientific/Scimed, Inc., Maple Grove, Minnesota) and a guidewire (BMW 0.014 inch, Guidant Corporation, Santa Clara, California), the stenosis was passed through without difficulties (Figure 2B). After predilation using a balloon catheter (Quantum Maverick, 3.5/12 mm, Boston Scientific/Scimed, Inc., Maple Grove, Minnesota) at 12 atm, a premounted balloon-expandable coronary stent (Express 2, 4.0/12 mm, Boston Scientific/Scimed, Inc., Galway, Ireland) was implanted at 12 atm (Figure 2C). The lesion was subsequently postdilated with a balloon catheter (Quantum Maverick, 5.0/12 mm, Boston Scientific/Scimed, Inc., Maple Grove, Minnesota) at 12 atm without residual stenosis (Figure 2D, 2E). The final aortography showed an optimal result (Figure 2F). The sheath was removed immediately after the procedure, following which hemostasis could be achieved by application of a compression tourniquet. The overall interventional procedure lasted 60 minutes and was completed without any procedure-related complications.

A few days after the renal artery stenting, his arterial hypertension gradually improved and the amounts of antihypertensive medications decreased (carvedilol 10 mg/day alone). Repeat Doppler US demonstrated marked improvement in
waveform morphology, with a well-defined early systolic peak (acceleration time, 0.069 seconds) (Figure 1B)

**DISCUSSION**

Percutaneous transluminal renal angioplasty (PTRA) is now established as the preferred revascularization procedure for the treatment of RAS.\(^1\)-\(^3\) Because of its low morbidity and mortality, it usually results in better control of hypertension and leads to improvement or preservation of renal functions. Moreover, from recent reports, it has been clarified that primary renal stent placement is superior to renal balloon angioplasty alone in view of the angiographic results, the functional results, and vessel patency, particularly in ostial lesions characterized by a high restenosis rate.\(^1\)-\(^3\) Precise implantation of the stent is considered to be critical to minimize the chances of restenosis. Optimally, 1-2 mm of the stent should
protrude into the abdominal aorta to suppress invasion of aortic atherosclerotic plaque over the ostium of the renal artery.

At present in Japan, balloon angioplasty catheters and stents employed for PTRA require a large lumen sheath and guiding catheter (7-8 Fr), and as a result, a femoral or brachial vascular access site has been traditionally used. However, femoral artery complications, such as the necessity of access-site vascular repair or blood transfusion, were reported to occur in 2-6% of patients undergoing coronary and renal angioplasty.\(^7\) In addition, Kiemeneij, et al documented that femoral and brachial artery accesses have similar complication rates.\(^7\) In contrast, the transradial access is widely accepted in coronary angiography and intervention, because of its reduced vascular complications.\(^7\) The superficial course of the radial artery allows for hemostasis by simple application of a pressure bandage over the puncture site, and clinically significant bleeding is uncommon. As far as PTRA is concerned, however, the radial artery has not become popular as a vascular access site.

A major issue concerning transradial renal angioplasty and stenting compared to traditional approaches is that the distance between the puncture site and target lesion is longer. In addition, the length of presently available guiding catheters is 100 cm. We could solve this problem by employing the left radial artery as an access site (reduced distance between puncture site and ostium of renal artery, compared with the right radial artery) and using an extra-long, specially produced, 6 Fr multipurpose guiding catheter with a length of 110 cm. Other important limitations of the transradial approach for renal intervention is that it is not possible to implant a peripheral stent through this access site, because it is generally accepted that a sheath larger than 6 Fr not be introduced into the radial artery. Therefore, nowadays in Japan we have no other alternative but to use only a coronary balloon catheter and stent system in transradial renal intervention. Since the length of the coronary balloon catheter and stent system is 130 cm, we could not make the length of the guiding catheter longer than 110 cm. Fortunately, most renal interventions are performed within a few centimeters from the renal artery ostium. Therefore, it is reasonable to propose that the guiding catheter with a length of 110 cm could offer a sufficient working length in most of the population with RAS receiving transradial renal stenting, except for patients more than 180 cm in height.

Indications for the cranio-caudal approach are an acute aorto-renal angle, severe peripheral arterial obstructions, and a severely diseased infrarenal aorta.\(^14,15\) In inferiorly angulated renal arteries, precise stent deployment is difficult from the femoral approach. Approaching such a renal artery from above facilitates a more natural position for the guiding catheter, balloon catheter, and stent system within the aorta and renal artery. We speculate that with refinement
of the endovascular equipment, the transradial approach could become more attractive than the brachial approach as a vascular access site in these cases. To the best of our knowledge, this is the first report to document a case of RAS with Leriche syndrome treated by transradial renal artery angioplasty and stenting.

The present case demonstrates that the transradial technique can be applied to treat RAS in a patient with Leriche syndrome. With further miniaturized equipment (balloons and stents) and longer interventional equipment (guiding catheters, and balloon and stent delivery systems), transradial renal artery angioplasty and stenting will become easier and more popular.

REFERENCES