Clinical Efficacy of Percutaneous Transluminal Renal Artery Stenting for the Treatment of Renovascular Hypertension Associated with Takayasu Arteritis

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Background: This study aims to observe and analyze the clinical efficacy of interventional therapy for patients with Takayasu arteritis (TA) experiencing renovascular hypertension (RH).

Methods: Eight TA patients with RH underwent percutaneous transluminal renal artery stenting (PTRAS). Patients were followed up 1, 6, 12, and 24 months postoperatively for levels of blood pressure, number of antihypertensive drugs being taken, levels of serum creatinine, and the presence of renal artery restenosis.

Results: All 8 patients were successfully followed up 1, 6, and 12 months postoperatively, but 1 was lost to follow-up at 24 months. All patients had significantly lower average blood pressure levels compared with those at baseline ($P < 0.05$); treatment efficacy rates (recovery or improvement) at 1, 6, 12, and 24 months were 94%, 90%, 80%, and 80%, respectively. The average number of antihypertensive drugs being taken was 3.5 at baseline, 1.0 at 1 month, 0.5 at 6 months, 1.0 at 12 months, and 1.5 at 24 months. Serum creatinine levels during the follow-up period were not significantly different from those at the baseline. No patient developed renal artery restenosis during the follow-up period.

Conclusions: PTRAS is a safe and effective treatment for TA-associated RH, with a high technical success rate and a low complication rate. This interventional therapy can effectively control TA-related hypertension and can also preserve and even improve kidney function.

INTRODUCTION

Renovascular hypertension (RH) accounts for about 6–27% of cases of malignant hypertension in adults.[1] RH is a secondary condition resulting from the unilateral or bilateral stenosis of branches of the renal artery,[2] common causes of which include Takayasu arteritis (TA), fibromuscular dysplasia, and atherosclerosis.[3] More than 90% of RH cases are caused by atherosclerosis,[4] but TA-related renal artery stenosis is also a major etiology.[5] TA may have a more occult onset than other causes of renal artery stenosis, with renal artery involvement likely to manifest as RH.[6] Currently, medical therapy is the standard of treatment for renal artery stenosis, but it has clear limitations.[7] Compared with the classical treatment of reconstructive surgery, interventional therapy has shown higher success rate, less invasiveness, and better safety; thus, it has become the first choice for the treatment of renal artery stenosis in many institutions.[8] However, there are few reports on interventional therapy for TA-associated RH. This study aimed to investigate the clinical efficacy of interventional treatment for TA patients with RH.

Conflict of Interest: None.

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Ann Vasc Surg 2015; 29: 816–821
http://dx.doi.org/10.1016/j.avsg.2014.12.009

Manuscript received: June 27, 2014; manuscript accepted: December 21, 2014; published online: February 25, 2015.

TA is a chronic, nonspecific, inflammatory arterial disease, mainly involving the aorta and its main branches: the brachiocephalic trunk, carotid, subclavian artery, vertebral artery, renal artery, coronary artery, pulmonary artery, and so forth. Incidence is the highest in teenagers, especially girls.[9] Renal artery stenosis can be a major symptom of TA and may exhibit an occult onset, manifesting clinically through RH only when the renal artery is extensively involved. In this study, we performed a retrospective analysis of 8 patients who were diagnosed with TA-associated RH and underwent percutaneous transluminal renal artery stenting (PTRAS) in our hospital, aiming to determine the clinical efficacy of PTRAS for TA-associated RH and the factors influencing efficacy.

MATERIALS AND METHODS

Clinical Data

Eight patients who were diagnosed with TA-associated RH in our hospital from December 2008 to December 2013 were enrolled in this study. All patients had received drug treatment, but therapeutic efficacy was poor. Therefore, PTRAS was performed on them. There were 2 male and 6 female patients, aged 17−26 years, with an average age of 19−24 years. According to the Ishikawa criteria for diagnosis of TA, cervical vascular stenosis was found on ultrasound in 3 patients, including 1 with chest pain, 1 with upper and lower pulse pressure variation greater than 10 mm Hg, and 1 with decreased limb arterial pulsation. The other 5 patients had vascular murmurs in the waist area, including 2 with upper and lower pulse pressure variation greater than 10 mm Hg and 1 with decreased limb arterial pulsation. All patients underwent conventional preoperative clinical and laboratory tests, including tests of blood pressure, blood biochemistry, kidney and liver function, and urine. All patients had undergone anti-inflammatory therapy under the guidance of specialist doctors before the surgery, but after treatment with appropriate doses of 3 or more antihypertensive drugs, blood pressure had not yet reached satisfactory results. All the patients and their families were fully informed of the surgical procedure and potential complications before the surgery and gave written informed consent. This study was conducted in accordance with the declaration of Helsinki. This study was conducted with approval from the Ethics Committee of Shani Medical University. Written informed consent was obtained from all participants.

Percutaneous Transluminal Renal Artery Stenting

Interventional technique. A Philips Allura FD20 digital subtraction angiography system (Philips Medical Systems Nederland BV; Amsterdam, Netherlands) was used for bilateral renal artery angiography to determine the morphology, extent, and scope of lesions and to measure the diameter and length of the stenotic lesions, as well as the diameter of the nearest normal segment of the renal artery. Then, a balloon catheter and stent of appropriate size were chosen (ev3 Inc., North Plymouth, MN), with the balloon diameter required to be the same or slightly bigger (by 10−20%) than the normal renal artery segments nearest to the stenotic areas; patients were systemically heparinized before dilatation, during which the balloon was slowly inserted into the stent, which had a diameter slightly greater (by 10%) than normal renal artery diameter. The guidewire was retained so that the effect of releasing the stent could be observed using renal angiography.

Perioperative medication. Enteric-coated aspirin was administered 2−3 days before the surgery, with the loading dose being 300 mg once a day. After the surgery, conventional anticoagulant therapy was performed with low-molecular-weight heparin calcium or low-molecular-weight heparin sodium twice a day for 3 days. During the first 3 days after surgery, patients received 100 mg enteric-coated aspirin once a day, after which they were instructed to swallow a 100-mg aspirin pill daily for 6 months, in addition to 75-mg clopidogrel for at least 3 months. Postoperative blood pressure, urine output, and serum creatinine were monitored. Patients with renal dysfunction were instructed to cease using nephrotoxic drugs before surgery and to hydrate themselves 1 day before the operation; postoperatively, they were asked to drink plenty of water or provided with the appropriate amount through infusion.

Postoperative Follow-up

The postoperative follow-up was conducted through regular appointments and telephone calls, with clinical tests and color Doppler ultrasound as the main methods of monitoring patients, although renal artery angiography was performed if necessary. Postoperative changes in patient conditions were recorded over time, including changes in clinical symptoms, blood pressure, number of different antihypertensive drugs being used, and renal function. The presence of renal artery restenosis was determined according to clinical symptoms, blood