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Case Report

Renal denervation in a patient with Alport syndrome and rejected renal allograft

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ABSTRACT

Renal denervation is a new intervention to treat resistant hypertension. By applying radiofrequency (RF) to renal arteries, sympathetic nerves in adventitia layer of vascular wall can be denervated. Sympathetic hyperactivity is an important contributory factor in hypertension of hemodialysis patients. Hyperactive sympathetic nervous system aggravates hypertension and it can cause complications like left ventricular hypertrophy, heart failure, arrhythmias and atherogenesis. Our report illustrates the use of renal denervation using conventional RF catheter for uncontrolled hypertension in a patient with Alport syndrome and rejected renal allograft. Progressive and sustained reduction of blood pressure was obtained post-procedure and at 24 months follow-up with antihypertensives decreased from 6 to 2 per day, thereby demonstrating the safety, feasibility, and efficacy of the procedure. There are some reports available on the usefulness of this technique in hemodialysis patients; however, there are no studies of renal denervation in patients with Alport syndrome and failed allograft situation.

1. Introduction

Renal denervation is a novel therapy for resistant hypertension. Here, we present an interesting case with progressive and sustained reduction of systemic blood pressure (BP) following renal sympathetic nerve denervation (SND) using conventional radiofrequency (RF) catheter for resistant hypertension in a failed renal allograft recipient with Alport syndrome on maintenance hemodialysis.

2. Case presentation

A 19-year-old male presented with history of continuous occipital headache of one-year duration. He was diagnosed to have chronic kidney disease (CKD) stage-V due to Alport's syndrome at 12 years of age and received a renal allograft from his mother after a year of ambulatory peritoneal dialysis. Allograft failure occurred due to chronic rejection a year post-transplant and maintenance hemodialysis was initiated.

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Fig. 1 – Renal angiogram showing right renal artery.

While on dialysis, he developed resistant hypertension. Treatment compliance was maintained with strict family supervision. Dietary salt and fluid restriction was kept in check. Ultrafiltration was done on hemodialysis to maintain the post-dialysis ideal weight with regular reassessments. Despite the above, the BP was resistant to pharmacological treatment with six different anti-hypertensive drugs. On examination, he had pulse rate of 60/min, BP of 244/132 mmHg, respiratory rate 16/min, and the temperature was 98.6 °F. Cardiovascular system examination was normal and chest was clear. His hemoglobin was 10.5 mg/dL and creatinine 3.4 mg/dL. The 24 h mean ambulatory BP was 223/125 mmHg. Renal angiogram revealed a good sized right renal artery (Fig. 1) and a small left renal artery with no evidence of renal artery stenosis. In view of him being diagnosed to have resistant hypertension, renal SND was planned. After discussing risks and benefits of renal artery denervation, a 5F (St. Jude Medical, CA, USA) conventional RF ablation catheter (Fig. 2) was advanced into the right renal artery through Mullins sheath. A Stockert RF generator was used to deliver RF energy in unipolar mode. We delivered RF energy for 45–60 s each of 10 W and created 5 focal lesions, longitudinally separated along the length of right renal artery. Left renal artery was not suitable for RF ablation due to its smaller diameter. The cutoff point was taken as a reduction in impedance by 10%. The catheter tip impedance was monitored continuously. RF delivery was stopped if there was rise in impedance by more than 5 Ω. BP was 172/103 mmHg following the procedure. Post-procedure renal angiogram was done to assess for procedural complications within the renal arteries. Next day BP was 141/92 mmHg with same medications. The patient was discharged on second post-procedure day. A complete physical examination including office BP monitoring, drug compliance and renal profile, which were assessed at baseline were repeated at 1, 3, 6, 12, 18, 24 months post-SND. He was on home BP monitoring. During 24-month follow-up, his BP continued to fall and his antihypertensives were reduced. 24 h mean ambulatory BP 24 months post-procedure was 132/84 mmHg (i.e. 91/41 mmHg reduction) while on two antihypertensives.

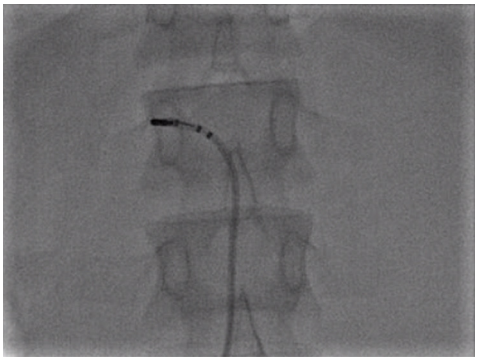

Fig. 2 – Ablation catheter in right renal artery.

3. Discussion

Drug-resistant hypertension is very common in patients with CKD Stage V treated by hemodialysis. The prevalence of hypertension has been evaluated to be over 50% and upto 80%.[1,2] The mortality figures remain high in these patients due to cardiovascular complications of CKD and hypertension. Hemodialysis patients show sympathetic hyperactivity.[3] Sympathetic nervous system (SNS) is vital in the initiation and maintenance of high BP.[4] The degree of SNS activation correlates with the severity of hypertension.[5] The renal sympathetic nerves arise from T10-L1 and enter the kidneys through the adventitia of the renal arteries. Catheter-based SND of the renal sympathetic nerves in these patients causes reduction of renal sympathetic afferent and efferent activity and the BP can be lowered. SND is a minimally invasive procedure involving the application of RF energy in short bursts along the length of the main renal arteries to ablate the renal nerves that lie within and just beyond the adventitia of the renal artery as they pass to the kidneys.

The feasibility, safety, and efficacy of the procedure have already been demonstrated in the Symplicity-1 trial. 153 patients with drug-resistant hypertension underwent bilateral application of RF to the renal arteries.[6] A significant BP reduction at 1-month follow-up of 14 and 10 mmHg (systolic and diastolic, respectively) was followed by a sustained response with a pronounced systolic and diastolic BP reduction of 32 and 14 mmHg, respectively, at 36 months. Symplicity HTN-2 randomized trial confirmed the above findings. In this study, 106 patients with resistant hypertension were randomized to catheter-based therapy in addition to conventional antihypertensive medications, versus antihypertensive medications only, in a 1-to-1 fashion.[5] There was a significant difference in BP changes from baseline between patients treated with catheter-based renal sympathectomy and those treated medically, with a mean BP difference of 33/14 mmHg between the groups at 36 months. In Symplicity 1 and Symplicity 2 trials, simplicity catheters were used, which are for single use only and expensive for developing countries. In our case, we used conventional RF catheter, which is reusable and the cost of

procedure dramatically reduced. Cost reduction was important in our case where he has undergone renal transplant and on maintenance hemodialysis, which is expensive.

The safety, feasibility, and efficacy of the SND procedure have also been demonstrated in hemodialysis patients.[7–9] Narasimhan and co-workers[8] have reported a mean BP reduction of 43.5/21 mmHg among 8 patients including those with CKD on maintenance hemodialysis. Yaduvanshi et al.[9] have demonstrated a mean BP reduction of 41.8/20.4 mmHg among 9 patients with end stage renal disease. Till date, there are no published reports of renal denervation in patients with Alport syndrome and prior renal transplantation. Our case demonstrated acute response to renal denervation, which persisted after 24 months, despite the presence of failed renal allograft in situ.

Conflicts of interest

The authors have none to declare.

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