CASE REPORT

Renal artery embolization for managing uncontrolled hypertension in a kidney transplant candidate

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ABSTRACT

We report a case of pre-operative bilateral renal artery embolization to control the resistant and malignant hypertension in a patient prepared for kidney transplantation. A 34-year-old man with end-stage renal disease as a result of the focal segmental glomerulosclerosis and uncontrolled hypertension that precluded the transplantation surgery and the patient's post-transplant blood pressure and the renal function remained within normal limits following the transplant for 6 months of follow-up.

Key words: Kidney transplant, malignant hypertension, renal artery embolization

INTRODUCTION

Preparing patients with end-stage renal disease and resistant uncontrolled hypertension for kidney transplant surgery is a challenging task due to the increased risk of surgery in this subset of patients. Early reports of renal artery embolization (RAE) in the 1970s focused on embolization of the kidney in cases of renal cell carcinoma.[1] Technical advances and growing experience have expanded the list of indications of RAE to include treatment of hypertension secondary to end-stage renal disease,[2] especially in patients who are poor surgical candidates for nephrectomy. The goal of RAE in patients being prepared for renal transplantation is to provide the symptomatic relief from hypertension by eliminating the renal function although avoiding the morbidity and mortality of a nephrectomy.[2,3]

We report this case of drug-resistant hypertension treated safely with RAE in preparation for renal transplant surgery.

CASE REPORT

A 34-year-old anuric male with end-stage renal failure (glomerular filtration rate (GFR) <5 mL/min/1.73 m^2) secondary to focal segmental glomerulosclerosis presented to the Emergency Department complaining of confusion and restlessness. The patient has a poorly-followed hypertension treated with metoprolol 100 mg bid, amlodipin 5 mg bid, fosinopril 20 mg qd and calcium carbonate 500 tid for 8 years. The patient was on hemodialysis for 7 months prior to admission and he developed malignant hypertension and tonic-clonic seizures after one of the dialysis sessions about 2 month before admission. Consequently, the patient was admitted to the intensive care unit and received intravenous nitroglycerine for 1 week with modifying his medications to: Valsartan 160 mg daily doxazosin 4 mg, fosinopril 10 mg bid. The decision for kidney transplantation was made, but was not possible because of his drug-resistant hypertension.

After a few days, he developed two tonic-clonic seizures, which were treated with diazepam and IV phenytoin. His BP was 230/140 mmHg after these seizures. He received hemodialysis sessions twice a week for 2 months (weight before dialysis: 56 kg, dry weight: 52 kg) until the decision was made to perform RAE. Abdominal multi-slice computed tomography scan prior to performing RAE showed 60% stenosis in the left renal artery and 90% stenosis in the right renal artery [Figure 1] and renal sizes were 7.3 cm on the right and 8.2 cm on the left.

RAE was carried out through a right common femoral artery access using the n-butyl-2-cyanoacrylate (Histoacryl; B. Braun, Melsungen, Germany) and lipidol delivered via a 5 Fr Cobra catheter [Figure 2] with no major periprocedural

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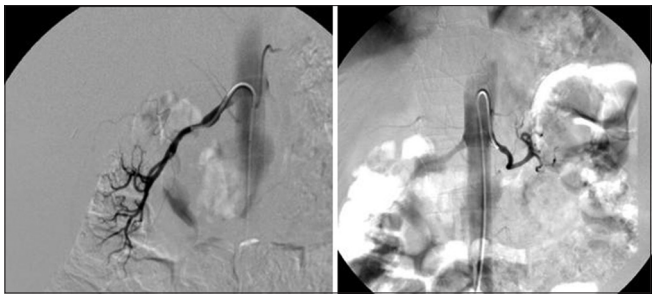

Figure 1: Right and left renal artery stenosis

complications. The patient developed the post-embolization syndrome following the procedure manifested by severe flank pain treated with analgesics.

After performing RAE, the patient's blood pressure declined to 170/100 mmHg, and he was discharged home on amlodipine 5 mg bid, clonidine 150 mcg bid, and nebivolol 5 mg bid. Renal transplantation was performed successfully without complications and he was discharged on amlodipine 5 mg and nabivolol 5 mg qd. 6 month following transplantation, the patient's creatinine was 1 mg/dl and the blood pressure normalized to 120/80 mmHg.

DISCUSSION

The pathophysiology of refractory hypertension in end stage renal disease (ESRD) patients is attributed to several factors such as activation of renin-angiotensin system, sympathetic over-activity and abnormal endothelial release of hemodynamically active compounds.[4,5] Mao *et al*. observed no over reactivity in renin angiotensin system in patients with severe refractory hypertension on hemodialysis compared to the normal population.[6] Following RAE, patients had a significant decrease in ET-1 plasma concentration, which was attributed to ablation of the endothelial cells and probably mesangial, glomerular epithelial, and medullary collecting duct cells.

Management of uncontrolled hypertension in patients with ESRD has been previously performed using the bilateral open or laparoscopic nephrectomy. Laparoscopic nephrectomy is associated with less complication rate[7,8] compared to bilateral open nephrectomy that carries significant morbidity (45-58%) and mortality (0-10%).[9,10] Neither laparoscopic nephroctomy nor bilateral open nephroctomy were possible choices in our case due patient's malignant hypertension and the significant anesthesia risk. Recently, RAE has been described as a safe and effective alternative.[6,11,12] A randomized controlled trial compared the efficiency of unilateral versus bilateral RAE in 16 patients who have severe refractory hypertension.

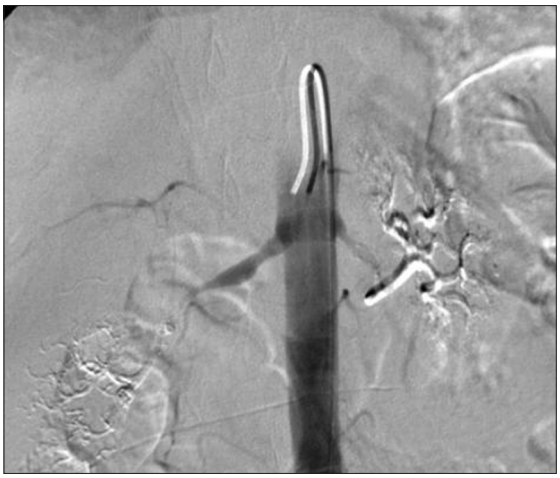

Figure 2: Renal arteries after injecting the glue

The study compared B*P* values, plasma renin activity, plasma angiotensine II, aldosterone and endothelin-1 prior and following RAE in both groups. They concluded that unilateral embolization results in better preservation of renal function with milder post-embolization syndrome when compared to bilateral RAE. However, this study did not mention if kidney transplantation was carried out after RAE.

Although RAE is minimally invasive and associated with less morbidity and mortality, it has some drawbacks such as eliminating the residual renal function. This was not of concern in our patient who was anuric and being prepared for transplant. Post-infarction syndrome is described in Bergreen study[13] as flank pain, fever and nausea that may ultimately lead to multiorgan failure. This complication according to Mao *et al*.[6] is milder in ESRD patients than in other RAE indications, such as a kidney tumor owing to the profound renal atrophy with less viable tissue.

In conclusion, this case suggests that resistant hypertension in patients with ESRD could be managed safely with RAE prior to renal transplant. Further, evaluation of this technique is still required with larger studies.

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