

Transcatheter Unilateral Renal Artery Embolization for Managing Refractory Hypertension Prior to Renal Transplant

Abstract

We report a case of unilateral renal artery embolization as a management of refractory hypertension that precluded renal transplantation in a patient with end-stage renal disease and not a candidate for nephrectomy. Over the subsequent few months, the targeted blood pressure was achieved followed by noncomplicated renal transplantation.

Keywords: *High-risk surgery, refractory hypertension, renal transplant, unilateral renal artery embolization*

Introduction

Hypertension is common among patients with end-stage renal disease (ESRD) and often resistant to medical therapy.^[1] The traditional treatment for severe refractory hypertension in ESRD patients is nephrectomy; however, due to the associated high risk, not all patients can undergo surgery.^[2-4] Renal artery embolization (RAE) is a minimally invasive alternative to nephrectomy in the management of refractory hypertension with a lower degree of morbidity and mortality.^[5-8] Blood pressure control can be achieved with bilateral or unilateral RAE with less postembolization syndrome in unilateral group.^[1]

We report this case of refractory hypertension managed safely with unilateral RAE before renal transplant.

Case Report

We present a 35-year-old female with ESRD on regular hemodialysis. The patient has refractory uncontrolled hypertension on eight antihypertensive medications: prazosin 3 mg Q12h, labetalol 600 mg Q12h, candesartan 32 mg OD, clonidine 0.5 mg Q8h, nifedipine 120 mg OD, hydralazine 50 mg Q6h, spironolactone 50 mg OD, and furosemide 40 mg Q12h; which preclude renal transplantation and surgical nephrectomy. Over the past

2 years, she required several intensive care unit admissions for malignant hypertension requiring urgent intravenous antihypertensive medications. The patient could not complete most of her dialysis sessions due to high blood pressure that leads to the termination of dialysis and sending her to the emergency department.

Investigations for other causes of secondary hypertension, including renal artery stenosis, pheochromocytoma, Cushing's disease, and hyperaldosteronism were negative.

Unilateral RAE was done under moderate sedation and local anesthesia. The preprocedure antibiotic cover was commenced with a loading dose of ceftriaxone. Her blood pressure during admission was 212/120 mmHg.

Through the right common femoral artery, arteriography of the right and left renal arteries showed no renal artery stenosis [Figure 1]. Embolization of the interlobar branches with microcatheter was done [Figure 2] using 150–250 μ contour polyvinyl alcohol particles (Boston Scientific, Natick, USA). Post-right RAE arteriography demonstrated complete stasis [Figure 3].

Postprocedure blood pressure monitoring and pain management were done in intensive care unit. The patient developed postembolization syndrome manifested as flank pain, leukocytosis, and low-grade fever. The culture was taken and empirical

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Figure 1: Digital subtraction angiography of the right renal artery before embolization



Figure 2: Digital subtraction angiography during selective catheterization of the right renal artery interlobar branches using microcatheter



Figure 3: Digital subtraction angiography of the right renal artery after embolization

antibiotic (Tazocin) was given while awaiting the result. She was discharged home on clonidine 0.5 mg Q6h,

hydralazine 25 mg Q6h, labetalol 400 mg Q8h, and nifedipine 90 mg OD.

Her blood pressure at discharge was 138/72 mmHg. The patient stopped clonidine a week after discharge due to low blood pressure in dialysis unit, hydralazine reduced to 25 mg Q8h and labetalol also reduced to 200 mg Q12h. Blood pressure remained well controlled, and she required no admission related to hypertension over several subsequent months. Six months after RAE, she underwent a noncomplicated renal transplantation and discharged home with normal creatinine level. Since transplantation 5 months ago, the patient is doing well, blood pressure remains controlled on labetalol 200 mg Q12H and nifedipine 90 mg OD and renal functions are stable.

Discussion

Hypertension is common among patients with ESRD and often resistant to medical therapy.^[1] The activation of renin-angiotensin system and abnormal endothelial release of hemodynamically active compounds is important factors in the pathophysiology of refractory hypertension in patients with ESRD.^[9,10]

The traditional treatment for severe refractory hypertension in ESRD patients is open or laparoscopic nephrectomy. Open bilateral nephrectomy has a significant morbidity rate of 45%–58% and mortality rate of 0%–10% when performed in ESRD population.^[2-4] Laparoscopic nephrectomy has a lower rate of complications compared to open surgery.^[11,12]

The present patient was neither a candidate for laparoscopic nor open nephrectomy due to her multiple comorbidities. Bilateral RAE is a minimally invasive alternative treatment for refractory hypertension related to ESRD in patients with multiple comorbidities that preclude open and laparoscopic nephrectomy.^[5-7] Renal embolization is associated with decrease in the plasma concentration of endothelin-1 (ET-1), which is produced by different cell types, including mesangial, glomerular epithelial, and medullary collecting duct cells.^[1] ET-1 is believed to contribute to blood pressure regulation, and decreasing its concentration may be responsible for the pressure reductive effect of renal embolization.^[1] Therefore, effective parenchymal embolization/ablation with particulate embolic agents or alcohol is recommended. Proximal RAE with coils or plugs should be avoided as it may induce parenchymal ischemia and further activate the renin-angiotensin system.

Postinfarction syndrome is common after RAE which can manifest by flank pain, fever, nausea, and vomiting.^[13] A randomized study by Mao *et al.*,^[1] concluded that unilateral RAE is as effective as bilateral RAE in the management of refractory hypertension in ESRD patients, in addition to the advantage of less postinfarction syndrome with unilateral technique.

In the present case, the patient experienced only mild postinfarction syndrome manifested by pain, which was managed conservatively and resolved within the next 5 days.

In conclusion, the outcome of this case shows that unilateral RAE is an effective and safe therapy for the management of refractory hypertension in patients with ESRD prior to renal transplant.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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