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BILATERAL RENAL ARTERY EMBOLIZATION FOR MANAGING UNCONTROLLED HYPERTENSION IN A HAEMODIALYSIS PATIENT: AN ALTERNATIVE TO NEPHRECTOMY

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ABSTRACT

Patients with end stage renal disease who have resistant or refractory hypertension (HTN) sometimes require bilateral nephrectomy to control their blood pressure. This treatment strategy is effective but is sometimes associated with morbidity and mortality and is costly. We report a case of a 65-year-old male on haemodialysis who developed refractory HTN, uncontrolled even with 7 antihypertensive drugs. He also had decompensated chronic liver disease and was a poor surgical candidate. He underwent bilateral renal artery chemoembolization as an alternative to bilateral nephrectomy and his BP significantly improved resulting in reduction of his antihypertensive therapy from 7 to 3 drugs. We report this case as an alternative approach to controlling resistant HTN in the haemodialysis population.

KEYWORDS

Bilateral renal artery embolization, resistant hypertension, haemodialysis

LEARNING POINTS

- Bilateral nephrectomy is an established option for blood pressure control in patients with end-stage renal disease and refractory hypertension, however, is associated with certain risks.
- Bilateral renal artery embolization is a minimally invasive alternative, particularly in patients who are poor surgical candidates.
- This approach may reduce the antihypertensive burden significantly and should be considered in multidisciplinary management of refractory hypertension in dialysis patients.

INTRODUCTION

Patients with end stage renal disease (ESRD) on haemodialysis (HD) usually hypertensive either due to pre-existing primary hypertension (HTN) or HTN that develops during HD. Factors that contribute to the pathogenesis of HTN in these patients include volume overload, sympathetic

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overactivity and activation of renin angiotensin system[1,2] and despite use of medications patients develop either resistant HTN defined as HTN requiring treatment with 4 drugs[3] or refractory HTN which requires 5 different groups of antihypertensive medications including a mineralocorticoid receptor antagonist[4].

Renal artery chemoembolization (RAE) has emerged as a promising alternative to nephrectomy in controlling resistant or refractory HTN in patients with ESRD or those who are poor surgical candidates. A subgroup of HD patients sometimes has resistant HTN that does not respond to ultrafiltration (UF) and more than 4 antihypertensive drugs administered at maximal doses. Studies have reported a prevalence of 18-45% of such HTN in the HD population[3]. Multiple modalities have been tried to control this devastating disease as it can have disastrous cardiovascular outcomes and is associated with significant morbidity and mortality. Some treatment options include changing antihypertensive drugs to those that are non-dialyzable, controlling volume overload by adjusting dry weight, low sodium bath and dietary restrictions[5].

Bilateral nephrectomy has been used as a last resort in this group especially those awaiting a renal transplant and unable to proceed because of uncontrolled HTN.

CASE DESCRIPTION

A 62-year-old male with diabetes mellitus, hypertension, decompensated liver disease secondary to hepatitis C and ESRD on HD three times a week was admitted with uncontrolled blood pressure (BP) post HD for 3 months, drowsiness for 1 day. On examination he was lethargic, with a Glasgow Coma Scale score of 7/15. He had a heart rate of 105 bpm, BP of 216/110 mmHg, oxygen saturation of 98% on room air and he was afebrile. He was mildly jaundiced, moving all extremities, normal reflexes, and all examinations were unremarkable. He had a functional atrioventricular fistula in the left radial-cephalic area.

His medication history included carvedilol 25 mg bid, hydralazine 100 mg qid, lisinopril 20 mg qid. nifedipine 90 mg bid doxazosin 4 mg bid, aldactone 25 mg bid and clonidine 0.3 mg tds, calcium acetate 667 mg tds, alphacalcidol 0.5 mg qid. His erythropoietin was on hold secondary to uncontrolled BP.

Initial lab work showed the total leucocyte count was 13.6 $\times 10^9$/l, haemoglobin 9.8 g/dl, and platelet count 85,000/l. Total bilirubin was 1.40 mg/dl, alanine aminotransferase 42 U/l, aspartate aminotransferase 54 U/l, gamma-glutamyl transferase 471 U/l, alkaline phosphatase 380 U/l, calcium 8.3 mg/dl, phosphate 5.4 mg/dl, procalcitonin 1.2 ng/ml. Urine analysis showed numerous leucocytes and bacteria with later urine culture showed *Klebsiella* sensitive to meropenem. Abdominal ultrasound showed an enlarged liver with an altered echo texture, a mildly enlarged spleen, and small- sized kidneys with small cysts.

Magnetic resonance imaging of the brain done in the emergency room was negative for intracranial bleed, acute infarct or PRES syndrome. A computed tomography renal angiogram showed small-sized kidneys with no evidence of renal artery stenosis. The patient was started on intravenous (IV) meropenem for urosepsis and IV labetalol infusion and despite that his BP ranged between 190/90 - 180/83 mmHg after 3 days of continuous infusion. The patient regained consciousness after 48 hours of hospital admission. After a detailed discussion with the patient and his family he was offered bilateral renal artery embolization as he was considered high risk/poor candidate for bilateral nephrectomy.

The patient underwent the procedure on day 5 of hospitalization. Post procedure he remained stable and his BP started to improve in next 24 hours resulting in discontinuation of IV labetalol infusion. The patient was discharged 72 hours post procedure. Follow- up to 1 month in the Hemodialysis unit showed well controlled BP.

DISCUSSION

Refractory HTN in ESRD patients is not an uncommon phenomenon and multiple studies have been done discussing its pathogenesis, factors involved and treatment options. Usually, HTN in ESRD patients is controlled by various groups of antihypertensive drugs that target the renin-angiotensin-aldosterone system. Recent studies have shown a promising role of mineralocorticoid receptor antagonists in controlling this devastating disease which is associated with high rates of morbidity and mortality[2]. However, a subset of patients remains uncontrolled despite all efforts and sometimes require nephrectomy either laparoscopic[6,7] or bilateral open nephrectomy with a high risk of morbidity (45-58%)[8,9].

Our patient had severe refractory HTN requiring seven oral antihypertensive drugs at maximal doses and also IV infusions and despite that his BP remained uncontrolled. His comorbidities of decompensated liver disease, thrombocytopenia and severe HTN put him in the category of poor surgical candidate. Based on previous case reports showing efficacy of bilateral RAE in controlling BP in dialysis patients we decided to give this patient a trial of this treatment option after thorough counselling. The patient underwent single-stage bilateral RAE. A previous study has reported bilateral RAE done as a staged procedure[10].

Our patient did very well post RAE. He had no complications. His BP started to improve in the next 36 hours, and his antihypertensive medications had to be held. The BP started to rise after 5 days and was well controlled on 3 medications. Although there is a risk of loss of residual renal function or post infarction syndrome after embolization, this was not a concern in our patient as he was anuric and had low risk of post infarction syndrome. Hence, we conclude that bilateral renal artery embolisation is an effective and safe alternative to open nephrectomy in controlling resistant hypertension in end stage renal disease patients.

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