Approach and management of hypertension after kidney transplantation

Hypertension is one of the most common cardiovascular co-morbidities after successful kidney transplantation. It commonly occurs in patients with other metabolic diseases, such as diabetes mellitus, hyperlipidemia, and obesity. The pathogenesis of post-transplant hypertension is complex and is a result of the interplay between immunological and non-immunological factors. Post-transplant hypertension can be divided into immediate, early, and late post-transplant periods. This classification can help clinicians determine the etiology and provide the appropriate management for these complex patients. Volume overload from intravenous fluid administration is common during the immediate post-transplant period and commonly contributes to hypertension seen early after transplantation. Immunosuppressive medications and donor kidneys are associated with post-transplant hypertension occurring at any time point after transplantation. Transplant renal artery stenosis and obstructive sleep apnea are recognized but common and treatable causes of resistant hypertension post-transplantation. During late post-transplant period, chronic renal allograft dysfunction becomes an additional cause of hypertension. As these patients develop more substantial chronic kidney disease affecting their allografts, fibroblast growth factor 23 increases and is associated with increased cardiovascular and all-cause mortality in kidney transplant recipients. The exact relationship between increased FGF23 and post-transplant hypertension remains poorly understood. Blood pressure targets and management involve both non-pharmacologic and pharmacologic treatment and should be individualized. Until strong evidence in the kidney transplant population exists, a BP of <130/80 mmHg is a reasonable target. Similar to complete renal denervation in non-transplant patients, bilateral native nephrectomy is another treatment option for resistant post-transplant hypertension. Native renal denervation offers promising outcomes for controlling resistant hypertension with no significant procedure-related complications. This review addresses the epidemiology, pathogenesis, and specific etiologies of post-transplant hypertension including, calcineurin inhibitor effects and failed native kidney. The cardiovascular and survival outcomes related to post-transplant hypertension and the utility of 24-h blood pressure monitoring will be briefly discussed. Antihypertensive medications and their mechanism of actions relevant to kidney transplantation will be highlighted. A summary of guidelines from different professional societies for BP targets and antihypertensive medications as well as non-pharmacological interventions, including bilateral native nephrectomy and native renal denervation, will be reviewed.