

A novel catheter based approach to denervate the human kidney reduces blood pressure and muscle sympathetic nerve activity in a patient with end stage renal disease and hypertension

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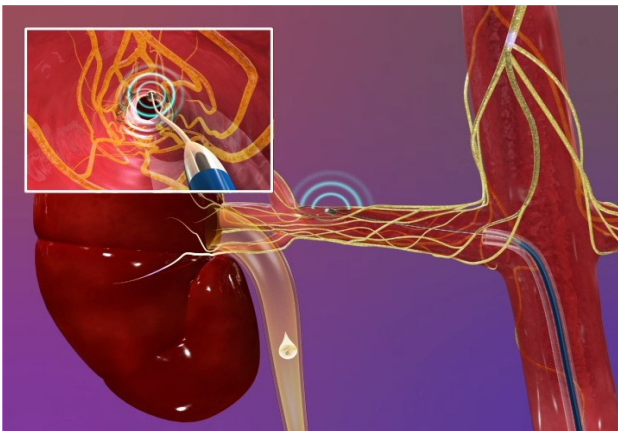
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Background

Sympathetic activation is a cardinal feature of end stage renal disease (ESRD) and contributes to the poor cardiovascular outcome in this patient cohort. Both efferent renal sympathetic nerve activity and afferent signaling via renal sensory nerves from the diseased kidneys play a crucial role in blood pressure regulation and hypertension commonly associated with ESRD. We aimed to evaluate the effects of a novel catheter based approach to functionally denervate the kidneys on indices of sympathetic activity and blood pressure.

Methods

The ARDIAN Nerve Modulation System, a novel catheter based device developed for renal denervation via the delivery of radiofrequency energy, was utilised in a 37 year old patient with end stage renal disease (FSGS) and hypertension. To assess physiologic responses to the intervention systemic blood pressure, whole body and renal noradrenaline spillover (radiotracer dilution methodology) and muscle sympathetic nerve activity (microneurography) were measured at baseline and 4 months after treatment of both kidneys.



Results I

The patient underwent treatment of both kidneys in one session. Serial angiographic evaluation before, directly after and 4 months post procedure confirmed the absence of pathologic findings in the treated renal arteries. Compared to baseline we observed a reduction in renal (from 130 to 101 ng/min) and whole body noradrenaline spillover (from 761 to 646 ng/min) at 4 months post procedure. Similarly, muscle sympathetic nerve activity was reduced from 46 to 33 bursts/min (Figure 1). These changes were accompanied by a reduction in office blood pressure from 155/95 to 133/81 mmHg (Figure 2) without changes in concurrent antihypertensive medication (ACEI, ARB, CCB, BB)

Results II

Figure 1

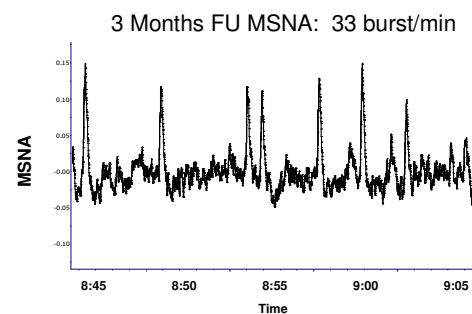
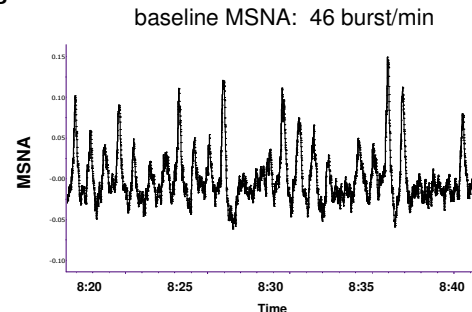
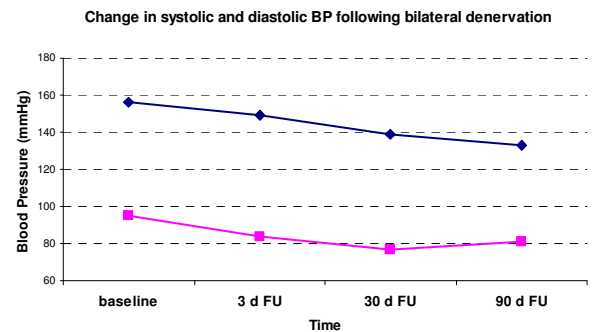


Figure 2



Conclusion

Targeting renal nerves by this novel catheter based approach achieved a reduction in sympathetic activity and systemic blood pressure in a patient with ESRD and hypertension, possibly by a reduction in both efferent sympathetic and afferent sensory activity of renal nerves. This procedure may prove to be useful to improve blood pressure control and cardiovascular outcomes by reducing sympathetic activity in patients with ESRD.