

Renal denervation heart technique shows promise



Prof Eoin O'Brien explains that the technique of renal denervation is a promising cardiovascular intervention but it should still be used with caution for the moment

Few techniques have excited cardiovascular medicine as much as renal denervation. There have been a limited number of publications providing promising but scant evidence, and meetings and prospective trials are being organised in many countries.

The technique has been hailed as a cure for hypertension and doctors with interventional skills have been quick to offer the procedure to patients willing to pay the very high price for the procedure. Those professing a special interest in hypertension have been more circumspect and it is timely therefore to review the evidence and reappraise renal denervation.

In simple terms, renal denervation is cutting the sympathetic nerve supply to the kidney in the renal arteries and this has the effect of lowering blood pressure, as was achieved in the past with the more radical operation of abdominal sympathectomy.

Percutaneous transluminal radiofrequency sympathetic denervation of the renal artery (to give the technique its full appellation) consists of passing a catheter via the femoral artery into both renal arteries of a sedated patient under fluoroscopic screening.

Radiofrequency energy

Radiofrequency energy is then applied to disrupt the sympathetic nerve fibres so as to interrupt both local and central neurogenic reflexes that have a major role in the regulation of blood pressure (BP) through sodium reabsorption, renin production and renal blood flow.

The pain that is caused by denervation is an indication that the sympathetic fibres have been successfully ablated.

The National Institute for Health and Clinical Excellence (NICE) has reviewed the evidence of the procedure in over 300 patients¹. In the largest randomised control trial to date (the SIMPLICITY Study) in over 100 patients with resistant hypertension (BP greater than 160mmHg on three or more antihypertensive drugs), there was a reduction in 24-hour average blood pressure in the renal denervation group of 11/7mmHg, compared to a decrease of 3/1mmHg for the control group, with drug treatment being unchanged in both groups.²

The long-term efficacy of the technique is not known, with follow-up only extending to about two years in treated patients.

Apart from peri-procedural



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loin, or para-umbilical pain, which can be effectively managed with opioid analgesia and sedation, major complications from the procedure have been infrequent. But renal artery dissection, pseudoaneurysm, haematoma, renal artery dissection and renal artery perforation, transient ischaemic attacks, angina requiring stenting, hypertensive crisis and hypotension have been reported.

Possible long-term effects, which are theoretical and will only become evident with time, are late stenosis of the renal artery, renal artery infarction, promotion of atheromatous disease in the renal artery,

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other renal artery damage, sodium depletion and hypotension.

Recommendations for clinical use

The Joint UK Societies' Consensus Statement on Renal Denervation for Resistant Hypertension has recently been published on behalf of the British Hypertension Society, the British Cardiovascular Intervention Society, the British Society for Interventional Radiology, the National Institute for Clinical Outcomes Research, the British Cardiovascular Society and the Renal Association, with guidance and advice from patients who had undergone this procedure.³

The statement recommends that the following criteria should be observed:

- **Patients with resistant hypertension:** the technique should be used only in patients with resistant hypertension, defined as a sustained clinic systolic blood pressure of ≥ 160 mmHg (≥ 150 mmHg in type II diabetes) in patients on three or more anti-hypertensive medications. Resistance to therapy should be confirmed using 24-hour ambulatory blood pressure monitoring (ABPM) that is of sufficient quality to provide at least 14 daytime readings

that must average more than 150mmHg. The use of ABPM is essential so as to allow detection of a 'white-coat', or alerting, response, which may be a cause of apparently resistant hypertension.

It is important to note that the term 'resistant hypertension' may include individuals who are truly resistant (with or without secondary causes); those who are pseudo-resistant, such as those who may be non-concordant with medication, or who may be intolerant of medication; and those taking other medications that may be contributing to their resistant hypertension.

- **Exclusion of secondary hypertension:** comprehensive exclusion of secondary causes of hypertension is mandatory prior to renal denervation. Even if a careful history and evaluation have been previously undertaken when hypertension was first diagnosed, the sudden emergence of resistant hypertension in a patient previously well controlled may signal a new secondary cause on a background of previous primary hypertension.

Renal denervation should not be used to treat resistant hypertension due to a secondary cause where a known alternative remedy exists.

- **Selection of patients:** the selection, treatment and follow-up of patients should be conducted by a multidisciplinary team, which must include hypertension specialists who can demonstrate active involvement in the routine investigation and care of patients with resistant hypertension. The European Society of Hypertension provides strict criteria for accreditation as a hypertension specialist.

The team should also include interventional cardiologists and/or radiologists and renal specialist advice should also be available. A written protocol for the renal denervation procedure, including contingency plans for the management of any complications, should be available.

- **Renal considerations:** patients must be shown to have suitable renal artery anatomy – usually one main renal artery to each kidney >20 mm in length and >4 mm in diameter without significant stenosis or other abnormality.

- **Performance of the procedure:** only interventional cardiologists or radiologists who have been trained in the procedure and are competent to manage complications such as dissection of the renal artery should undertake the intervention.

- **Patient information:** patients should be given a clear description of the procedure, including provision of contemporary statistics on success rates/potential complications, detailed technical information regarding the procedure itself and after-care. Patients must also give written and verbal consent

to treatment. A patient information leaflet is available from NICE.⁴

- **National Registry for Renal Denervation:** data on all patients undergoing this procedure in the UK must be submitted to a national registry to inform practice, generate research opportunities and permit audit of clinical effectiveness.

Conclusion

Percutaneous renal sympathetic denervation is undoubtedly a most promising cardiovascular intervention. It may be that ongoing and future trials will prove it to be the treatment of choice for patients with resistant hypertension, or even a substitute for, or adjunct to, life-long drug treatment in many patients.

But we are far from being able to make any definitive conclusions, other than to say that the technique appears to be effective in lowering blood pressure in resistant hypertension in the short term and that it has relatively few immediate complications.

The recommendations of NICE¹ and the Joint UK Societies² on the use of the technique in clinical practice are to be welcomed. They should serve as guidance to specialists wishing to make the technique available, especially in relation to the need for a multidisciplinary approach so as to remove the decision for intervention from the operator.

These recommendations also provide guidance for healthcare providers faced with deciding if the high cost of the technique is justified. Most importantly, they provide information for patients for whom renal denervation is recommended.⁴

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References:

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