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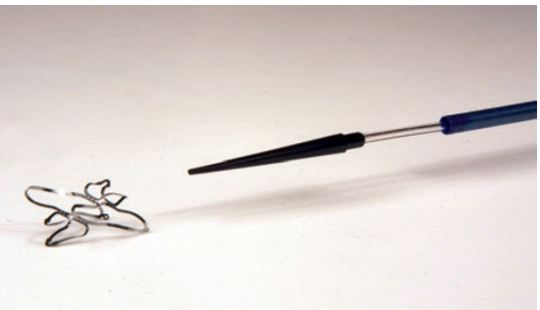
HYPERTENSION

Immediate reduction of blood pressure by iliac arteriovenous anastomosis

New findings from the ROX CONTROL HTN study show that insertion of a stent-like device in patients with uncontrolled hypertension produces an instant lowering of blood pressure (BP). In their open-label, multicentre, prospective, randomized controlled trial, Melvin Lobo and colleagues assessed the effects of inserting the ROX coupler device (ROX Medical, USA) to create an iliac arteriovenous anastomosis.

The coupler device was originally designed to alleviate breathlessness in patients with chronic obstructive pulmonary disease. "Whilst there was a modest improvement in lung function parameters, a BP lowering signal was noted," explains Lobo. "This observation led to a very small unpublished study in eight patients with resistant hypertension that demonstrated substantial BP lowering. We decided, therefore, to investigate the potential of the coupler to lower BP in a randomized controlled trial."

The ROX CONTROL HTN study included patients aged 18–80 years who had an office systolic BP ≥140 mmHg and an average daytime ambulatory systolic BP ≥135 mmHg and diastolic BP ≥85 mmHg, despite an antihypertensive regimen of three or more drugs of different classes. The patients were randomly assigned to either undergo creation of a central iliac arteriovenous anastomosis and continue their current drug regimen ($n = 42$), or to continue their current drug treatment alone ($n = 35$). In the intervention group, the coupler was placed using standard cardiovascular catheterization techniques between the distal external iliac vein and artery, above the level of the femoral head and ischial spine. The primary end point was mean change from baseline in office and 24 h ambulatory systolic BPs at 6 months.



Arteriovenous ROX coupler and deployment catheter. Permission obtained from ROX Medical, San Clemente, CA, USA.

"Highly significant lowering of office and ambulatory BPs were identified in the coupler group, with no significant change in BPs in the control group," describes Lobo. "There was also a striking difference in hypertensive complications, which occurred with much higher frequency in the control group, resulting in five hospital admissions with hypertensive crisis. Furthermore, 29% of patients in the control group increased their antihypertensive medications during the study, whereas 26% of the coupler group had medication reductions."

The researchers state that as they analysed their data using a modified intention-to-treat approach, the changes made to antihypertensive treatment might have masked the true differences in BP between the control and coupler groups, thus leading to an even greater difference in BP lowering with the coupler. "Unlike renal denervation, the coupler effects are immediate and thus procedural success is verifiable. Furthermore, the coupler is reversible," explains Lobo.

A total of 25 procedure-related or device-related adverse events were reported in the intervention group, the most prevalent being the development of iliac vein stenosis proximal to the anastomosis in 29% of patients. "The adverse effect of venous stenosis requiring a venous stent is not surprising and was dealt with in a conventional day case manner," says Lobo. "This complication might be considered a small price to pay for the successful and durable BP reduction that was seen."

The researchers acknowledge that the design of this initial open-label study presents some limitations. Firstly, the trial did not include a sham-control group. However, Lobo argues that "a sham control would be difficult and unnecessary because the BP reduction is immediate and known." Secondly, cardiovascular consequences of the small shunt were not formally assessed.

The researchers now hope to resolve these shortcomings in forthcoming trials and to verify the safety and utility of this innovative technique. "A USA investigational device exemption study, which might need to be sham controlled, is in the pipeline. A global registry with inclusion criteria that will allow patients with medication intolerances to be treated has started, and we will also attempt to characterize the haemodynamic effects of the coupler in much more detail in order to better understand its true mechanism of action," says Lobo. "Furthermore, we will undertake detailed cardiac MRI studies to determine the effects on cardiac structure and function following coupler insertion, which results in increased cardiac output, albeit in the face of reduced total peripheral resistance."

The researchers hope that this new device will one-day be used to address the unmet clinical needs of patients with hypertension who cannot achieve optimum BP control. They conclude that their new findings confirm the role of arterial compliance and abnormalities in vascular resistance in patients with arterial hypertension.

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