Denervation in Hypertensive Renal Transplantation Patients: Verve’s Disruptive Non-vascular Catheter Option to Nephrectomy

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Presenter Disclosure Information

Name: RICHARD R. HEUSER  M.D.

Within the past 12 months, the presenter or their spouse/partner have had a financial interest/arrangement or affiliation with the organization listed below.

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• CSI, Stockholder;
• Spectranetics, Abbott, Medtronic, Bard, Abiomed, Honorarium;
• Medtronic, Abbott, AngioScore, Speaker;
• Acist Medical Systems Grant; and
• Verve Medical, Inc., Major Stockholder
• Founder, Arizona Medical Systems
• Owner/Inventor, ORACLE Thrombus Removal System

**Patents** -- RF, Snares, Wires, Balloon Catheters, Covered Stents, Devices for Arterial Venous Connection, Devices for LV and RV Closure, Vascular Access

Patents
The study shows that the strict application of the currently recommended anatomical vascular eligibility criteria for RDN would allow cardiologists to select only about 50% of hypertensive patients for this novel therapy, a major limiting factor.

• The results of the pivotal Symplicity HTN-3 trial with the sham controlled design puts a huge question of the ultimate efficacy of this technique.
The Bench-to-Bedside Transition

Limited destruction of renal nerves after catheter-based renal denervation: results of a human case study

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• There was no interruption of the nerve bundles.

• “If this pattern occurs in other cases as well, it might explain at least in part the great variability in blood pressure lowering effect.”
Neuroanatomy

• We are not getting the correct nerves...
  if we were, why don’t we get an immediate BP drop?

“In contrast to the widespread distribution of EFFERENT sympathetic nerve fibers in the kidney, the majority of the AFFERENT Renal Sensory nerves are located in the renal pelvic area.”

Kopp UC, University of Iowa. Neural Control of Renal Function 2011
HTN-3 showed an adequate safety profile (less than 5%), but it didn’t work...
20,000 renal arteries have been exposed to RF energy, ultrasound and toxic intra-wall injections and there are an increasing number of patients with renal artery stenosis.

The number of patients undergoing renal denervation prospectively prior to nephrectomy to delineate the pathophysiology of the procedure with the peri-pelvic Verve device.
The number of patients undergoing renal denervation prospectively prior to nephrectomy to delineate the pathophysiology of the procedure with the peri-arterial approach
The Structure of the Kidney

Why Not Treat the Source?
Reduction in Blood Pressure

1 Month Results

- 4 drug resistant patients on ≥ drugs

All patients normotensive at 3 months
Unlike other RDN devices, the blood pressure dropped immediately.
## Verve Phoenix Clinical Trial
### 4 Ball Efficacy Summary

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A 27 year old hypertensive Indian male presented with polycystic kidney disease and a large pelvic stone necessitating nephrectomy.
Cystocopy has been around for 137 years and an outpatient procedure and the Verve device does not need to be manipulated in the pelvis. The renal pelvis, in fact, is a potential space.
Verve’s Quest
We Were Later to the Game

- We know it works
- No placebo effect under general anesthesia
- Is it safe?
- Are we at the lowest amount of energy that we need?
- Continue to include patients excluded for all other studies
VERVE (Unique Applications)

• Existing disease or anatomic anomalies
• Patients who have failed arterial approaches
• Mild renal insufficiency
• ESRD
• Physiologic “nephrectomy”
• Renal transplant patients with severe high blood pressure...treat the existing non-functioning kidney
In the early stages of kidney disease, sympathetic activation is detectable being directly proportional to the severity of renal failure.
The Double challenge of Resistant Hypertension and Chronic Kidney Disease

42% of patients with CKD have resistant hypertension
Feasibility of catheter-based renal nerve ablation and effects on sympathetic nerve activity and blood pressure in patients with end-stage renal disease

Markus P. Schlaich a,b,c,*, Bradley Bart d, Dagmara Hering a,e, Anthony Walton b, Petra Marusic a, Felix Mahfoud i, Michael Böhm i, Elisabeth A. Lambert a,c, Henry Krum g, Paul A. Sobotka h,l, Roland E. Schmieder j, Carolina Ika-Sari a, Nina Eikelis a, Nora Straznicky a, Gavin W. Lambert a,c, Murray D. Esler a

- 12 patients with ESRD and uncontrolled blood pressure
- Three out of 12 patients could not undergo RDN due to atrophic renal arteries.
The Renal Patient With Hypertension Falls into the Sweet Spot for Urologic/Nephrologic Medicine
Exceptional Case

Renal denervation of the native kidneys for drug-resistant hypertension after kidney transplantation

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Abstract
There is a strong rationale for renal denervation (RDN) of the native kidneys in kidney transplant recipients with treatment-resistant hypertension. We present a patient with a stable graft function, who underwent RDN for posttransplant therapy-resistant hypertension (24-h ambulatory blood pressure measurement (ABPM) 143/89 mmHg, while compliantly using five different antihypertensive agents). After RDN, BP measurements and orthostatic complaints required withdrawal of two antihypertensive agents and halving a third. At 6 months, ABPM was 134/84 mmHg and allograft function remained unchanged. This case calls for designing well-designed prospective studies on RDN in kidney transplant recipients.

Keywords: kidney transplantation; renal denervation
Conclusion

Far be it for me to be cynical and/or sarcastic to prove a point and I have a huge bias

• Peri-arterial renal denervation may work in some patients
• We need renal denervation treatments that can be effective in virtually all hypertensive patients immediately and should also work in renal compromised or ESRD patients with hypertension
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