

EDITORIAL COMMENT

Renal Denervation Using an Irrigated Radiofrequency Ablation Catheter for Management of Drug-Resistant Hypertension

A Demonstrated Value?*

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Ahmed et al. (1) clearly define the 3-fold purpose of their paper: 1) new therapeutic approach for renal denervation; 2) description of their irrigated radiofrequency ablation catheter technique; and 3) the indication for the use of this procedure (i.e., management of drug-resistant hypertension). Each of these highlighted points are worthy of editorial discussion.

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Importance. First and foremost is the clinical problem for which this newly advanced technique has been designed: drug-resistant hypertension. The magnitude of this problem may be overinterpreted. There are over 60 million potential patients with hypertension in the United States and far more when one considers that 100% of very old individuals (i.e., ≥ 80 years of age) also have hypertension. Therefore, the fundamental clinical problem is not that of “drug resistance” but hypertension resistant to multidrug therapy, which occurs in only a minority of patients with hypertension. Most assuredly, by far, over 60% of these potential patients with hypertension either remain unrecognized or are untreated or have been entered into a treatment program but do not have their blood pressures controlled (2). Only a small fraction of patients with hypertension actually have “drug-resistant hypertension.” Many of these patients may adhere poorly to the prescribed treatment (3).

Drug-resistant hypertension. The realistic problem of failure to control blood pressure (<140 mm Hg systolic and <90 mm Hg diastolic) relates to inappropriate selection of medications, inadequate medical follow-up, or that the patient has not been advised about his/her treatment program, which includes nondrug therapeutic approaches that may not have been clearly promoted. These latter lifestyle mechanisms may not have been provided if the doctor/patient relationship is simply “touching third base on the way home.” Therefore, first and foremost, the patient must understand fully his/her overall treatment program. In this regard, a realistic dietary control program is necessary and must also include a clear-cut understanding concerning the necessity for controlling the sodium content of the patient’s diet (4). In addition, a meaningful weight control regimen with alcohol moderation must always be emphasized (2,5,6). This latter consideration is particularly applicable to the elderly population whose alcohol intake frequently may be unappreciated and unrecognized.

The next important issue is that of a very specific definition of “drug-resistant” hypertension. The patient with drug-resistant hypertension must be receiving at least 3 different antihypertensive drugs, including a diuretic (2,7,8). The purpose of the diuretic must be appreciated by the prescribing healthcare provider. It includes the realization that blood pressure reduction with antihypertensive drugs may be frequently associated with intravascular volume fluid expansion, and the necessary addition of a diuretic (with careful attention to potassium balance) may very well enhance the antihypertensive effectiveness. Further, remember that all potassium-retaining agents are not diuretics. Each of these foregoing concerns have been well documented over the years, from the original publications preceding the Joint National Committee’s 7 reports, through specific reports and the many supplements that detail nondrug treatment issues as well as the specific drug actions (2,6,8,9).

Patient selection. Having defined the underlying problem and definition of the drug-resistant state, the major issue remains proper selection of the patient for catheter intervention by renal denervation treatment. This selection begins in the physician’s office. Is the provider certain that the patient is receiving the appropriate number and types of prescribed pharmacological agents and that the patient’s blood pressure (not the drugs) is actually “drug resistant.” To my way of thinking, this should be demonstrated, if possible, on a repeated office visit, during which time, the overall adherence to treatment is confirmed and that both the patient and physician are truly aware of the importance and inclusion of prescribed nondrug treatment modalities.

Renal sympathetic innervation and denervation. A clear understanding of the physiological importance of renal innervation has been well documented over the years (10–15). The medical literature has emphasized repeatedly the im-

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portance of the renin-angiotensin-aldosterone system in maintaining control of blood pressure and the pathophysiological importance of this system in participation in various aspects of hypertensive disease and treatment. Further discussion of this issue is not necessary for the purview of this editorial. However, recognition of the value of other invasive surgical approaches (i.e., thoracodorsal sympathectomy) and pharmacological agents (including antiadrenergic compounds) in the publications concerning treatment of hypertension is also abundantly available. Thus, a number of reports are available for reference dealing with the importance of the adrenergic nervous system for the role of renal innervation and denervation in maintaining renal function and blood pressure control (2,10-17). Thus, the literature is replete with justification of the merits, indications, and potential value of renal denervation procedures (2).

Catheter approach to denervation. Recently, several publications have appeared introducing a new technique of a catheter-based renal denervation for patients with drug-resistant hypertension (18-20). These reports have provided the need for selecting patients for renal denervation and the selection process involving a meaningful number of patients with drug-resistant hypertension who may be subjected to the procedure of catheter-based renal denervation. Indeed, the procedure, indications, and its value have attracted the attention of, perhaps, an overexcited lay press as well as physicians and concerned patients.

Renal denervation with a saline-irrigated radiofrequency ablation catheter. The use of catheter-based techniques for procedures involving a catheter means for denervation is not new to intervention-oriented cardiovascular physicians. This therapeutic procedure has been employed by electrophysiological cardiologists for ablation of cardiac and great vessel centers and has been shown to be of value in patients with cardiac dysrhythmias safely and with efficacy for some time.

Although found to be of value and of success in a substantial number of patients with drug-resistant hypertension, the value of saline-irrigated catheters has been said to have putative advantages for preventing thrombus formation at the ablation catheter site (1). The merits and details of this catheter for bilateral renal sympathetic nerve denervation is discussed in technical detail by Ahmed et al. (1) elsewhere in this issue of *JACC: Cardiovascular Interventions*. However, as suggested by these authors, the new and current experimental technique employed by the Symplicity HTN (Renal Sympathetic Denervation in Patients With Treatment-Resistant Hypertension) trials involves a solid-tip radiofrequency ablation catheter which Ahmed et al. (1) indicate may promote thrombus/char formation at the catheter sites along the renal artery. This potential complication has not been reported in the number of patients reported from 19 centers from Australia, Europe, and the United States (18-22). Although renal arterial dissection was reported in 1 patient, and a few other

vascular complications were reported before the ablation procedure, none were said to be related to catheter-induced ablation in the Symplicity study (18-22). Thus, there appears to be no patients who developed thrombosis/char, although reference was made to this potential by Ahmed et al. (1). Their saline-irrigated catheter was used by the authors in (only) 10 essential hypertensive patients from the Homolka Hospital, Prague, Czech Republic, who were shown to have drug-resistant hypertension and were without evidence of renal arterial disease or other secondary forms of hypertension, impaired glomerular filtration rate <45 ml/min, diabetes, previous stenting, or angioplasty. A detailed description of the procedure using the saline-irrigated catheter was provided, and the averaged arterial pressure reduction of their study was compared with that experienced in the Symplicity trial. However, comparison of these 2 reports do not permit a valid statistical comparison with the 10 patients, much fewer than in the Symplicity trial, and who were not followed as long following the ablation. Thus, at present, any comparison in outcomes and complications drawn from experiences with 2 different catheters would be, at best, totally inappropriate.

Finally, any concluding comment, such as that made by Dr. Mehmet Oz, host of the nationally syndicated television talk show, reflects premature excitement (21). Oz commented that "there is reason for a happier New Year" (if one has hypertension) and that promise from the "large" Symplicity trial's results in 2012 are awaited. However, he did not caution that if one has hypertension, it must be resistant to antihypertensive treatment consisting of 3 medications (including a diuretic) to be considered for the procedure. Consequently, the mass extrapolation to all patients with hypertension for the promise of this very specialized procedure does not seem appropriate at present. Clearly, for the larger group of patients with hypertension, they should not be considered for renal arterial ablation therapy. They should be seeking care from their physicians and, if the patients' blood pressure is established as abnormally elevated, they should be treated and followed closely so that their blood pressures remain well controlled by conventional nondrug and drug therapy.

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Key Words: drug resistant hypertension ■ radiofrequency catheter ablation ■ renal denervation ■ Symplicity HTN study.