



Editorial

Renal Denervation for Treatment of Hypertension: From High-Level Quality Evidence to Implementation in Clinical Practice

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According to the National Health and Nutrition Examination Survey, the rate of blood pressure control (<140/90 mm Hg) of adults in the United States has consistently declined over the past decade (2009-2012: 52.8%, 2013-2016: 51.3%, 2017-2020: 48.2%; $P = .034$).¹ This unsatisfactorily high prevalence of uncontrolled hypertension paradoxically occurs despite the availability of safe, effective, and largely affordable antihypertensive drugs and lifestyle modifications. Thanks to clinical trials investigating device-based therapies for hypertension, which included objective assessment of medication adherence using highly accurate adherence testing of urine and/or plasma, non-adherence to medication has been identified as a major reason for uncontrolled hypertension.²

Catheter-based renal denervation represents an alternative treatment approach to lower blood pressure continuously over 24 hours, independent of pharmacokinetics, drug adherence, and dosing schemes.³ Several randomized clinical trials have proven the efficacy and safety of renal denervation in a broad range of patients, ranging from mild-moderate hypertension with no concomitant antihypertensive medication up to resistant hypertension on a triple fixed-dose combination.⁴ Given the positive data supporting the use of renal denervation in the management of hypertension, several national and international societies have published position and consensus articles.⁴⁻⁶ The recently released 2023 European Society of Hypertension guidelines for the management of arterial hypertension were the first guidelines to update their view on renal denervation.⁷ These guidelines recommend that renal denervation can be considered a treatment option in patients with preserved renal function (estimated glomerular filtration rate >40 mL/min/1.73 m²) who have uncontrolled blood pressure despite the use of antihypertensive drug combination therapy or if drug treatment elicits serious side effects and poor quality of life.

In this issue of JSCAI, the Society for Cardiovascular Angiography & Interventions (SCAI) publishes an updated expert consensus statement on renal denervation for hypertension, reviewing appropriate patient

selection, optimal procedural and technical considerations, as well as center qualification.⁸ The expert group acknowledged that renal denervation has demonstrated efficacy across a wide range of patients with combined systolic and diastolic hypertension. The group recommends considering renal denervation not only in patients with resistant hypertension (ie, patients on at least 3 antihypertensive drugs) but also in those who are unable or unwilling to tolerate antihypertensive medication. The authors also highlight the importance of shared decision-making, which aligns well with other clinical consensus statements, such as the one published by the European Society of Cardiology.⁴

Currently, the multi-electrode Symplicity Spyral catheter system (Medtronic) and the Paradise Ultrasound Denervation System (ReCor Medical), both pending Food and Drug Administration approval, are commercially available in several regions, including Europe. These 2 devices come with specific features and treatment recommendations and require appropriate training and experience, for example, with gaining femoral access and managing potential complications, although very rare, associated with renal denervation. The expert group recommends follow-up at 2 months after procedure for assessment of blood pressure while, interestingly, not advocating for routine imaging following the procedure. This is likely justified by the very low rate of renal artery stenosis (of 0.5% per year) identified through long-term follow-up after the procedure.⁹

When compared with other documents, the SCAI group proposes detailed recommendations for training and competency of operators. The first cases should be independently performed by the first operator but supervised by either an experienced operator in renal denervation or a representative industry proctor. When the proceduralist has experience with endovascular training, a minimum of 5 proctored cases per device, at least in the beginning, are recommended. For interventionalists without endovascular training, the expert group suggests 10 supervised renovascular procedures (either revascularization or renal denervation), half as a primary operator. Interventionists should be

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Table 1. Comparison of recent consensus statements and guidelines for renal denervation for the treatment of hypertension.

| | ESH 2023 | ESC-EAPCI 2023 | SCAI 2023 |
|--|-------------|-------------------|-------------------|
| Uncontrolled HTN | X | X | X |
| Resistant HTN (≥ 3 drugs) | X | X | X |
| Intolerant to medications | X | X | X |
| High CV risk patients | | X | X |
| Patient preference | X | X | X |
| Minimum number of renal artery interventions | | | >5-10 renal cases |

CV, cardiovascular; EAPCI, European Association of Percutaneous Cardiovascular Interventions; ESC, European Society of Cardiology; ESH, European Society of Hypertension; HTN, hypertension; SCAI, Society for Cardiovascular Angiography & Interventions.

capable of managing potential complications such as renal vascular perforations, dissection, and therapeutic embolization. This prerequisite is indeed important because, in general, the volume of renal artery angiographies and interventions has significantly declined over past years given the mixed evidence supporting the value of renal artery revascularization. Table 1 summarizes the most important aspects of the recent consensus statements and guidelines.

Independent of the above, the time has come to devote the major focus to implementation of renal denervation in clinical practice. It is unquestionable that intensive blood pressure lowering translates into improved outcomes when compared with standard therapy.¹⁰ However, long-term follow-up of the SPRINT trial suggested that after approximately 5 to 6 years following the termination of the study, in a real-world scenario, these improvements in outcome diminished until no differences between study groups were detectable.¹¹ These data indicate the following: (1) no legacy effect of antihypertensive therapy exists, (2) therapeutic inertia frequently occurs, (3) nonadherence to medication is often dynamic and a major contributor to uncontrolled blood pressure, and (4) maintaining more intensive blood pressure targets throughout adulthood is essential for risk management in patients with hypertension. This clearly advocates for the implementation of novel strategies in hypertension management.

Unlike most other cardiovascular interventions, including coronary revascularization in chronic coronary syndrome and pulmonary vein isolation in atrial fibrillation, renal denervation has succeeded and proved its efficacy over and above an invasive placebo procedure in various clinical trials.¹² Since the reliance on the traditional concept of hypertension management, which is solely based on lifestyle interventions and antihypertensive drugs, has failed, significant revision in this thinking is required. There is an enormous potential to improve patient care, disease burden, and financial consequences of high blood pressure by implementing novel treatment strategies, including renal denervation. This procedure will neither cure hypertension nor will it become a first-line therapy but should be regarded as a welcomed additive treatment option in adult patients with uncontrolled hypertension confirmed by ambulatory blood pressure measurements and an alternative treatment for patients unable or unwilling to tolerate antihypertensive medications.

Certain, but not all, patients are interested in alternatives to traditional pharmaceutical and lifestyle interventions to manage their blood pressure, and it is crucial that we align the treatment strategies with patient values in a shared decision-making process.¹³ It is about time to implement the recommendations of national and international societies

in order to improve the unsatisfactory low blood pressure control rates around the world. Let us, therefore, together take up the challenge.

Declaration of competing interest

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