Hypertension Research (2022) 45:1271–1273
https://doi.org/10.1038/s41440-022-00962-9

COMMENT

Special Issue: Current evidence and perspectives for hypertension management in Asia

Patient preference and Long-term outcome of renal denervation for resistant hypertension

Yukako Ogoyama[1] · Kazuomi Kario[1]

Received: 11 May 2022 / Revised: 29 May 2022 / Accepted: 30 May 2022 / Published online: 9 June 2022

Hypertension is one of the most important cardiovascular risk factors [1]. However, the control rates among people with hypertension in 2019 were 23% for women and 18% for men [2], and its causes are thought to include suboptimal adherence, economics, drug intolerance, and clinical inertia [3]. Non-adherence in particular is one of the limitations of pharmacotherapy, and may not necessarily be due to forgetfulness, but may involve patient preferences such as refusal to take medication, which should be taken to action. Non- adherence to antihypertensive medications has been reported in at least 50% of patients [4], and associated with uncontrolled blood pressure (BP), poor clinical outcomes [5] and consequently with increased health care costs [6]. Device therapies such as renal denervation (RDN) are antihypertensive treatments that can eliminate drug adherence. However, it is invasive and there are responder and non-responder issues, and it is necessary to select patients for whom it is indicated. Patient perspectives on treatment strategy are vital in controlling hypertension and, from the patient's point of view, he or she has the right to choose between medical therapy and device therapy. Patient preference has been emphasized to be considered during hypertension treatment strategy determination through shared decision making in almost all recently published consensus documents and papers on RDN [7–9]. On the other hand, patient preferences are greatly influenced by the information provided by the medical providers, so it is important to provide unbiased and up-to-date medical information.

Three previous studies on patient preferences for RDN and pharmacotherapy for hypertension were reported. The first is based on 1011 patients in Germany [10], the second on 2768 patients in Western Europe and the United States [11], and the third reports patient preferences for RDN based on a survey of 2392 patients in Japan [12]. These studies were done without presurvey education of updated medical information about RDN, which is not an appropriate environment for shared decision making. In this issue of the Journal, Zhang et al. reported patient preferences for RDN on a survey of 402 patients in China [13], who were explained about RDN in advance, which would have made shared decision making possible. The results are similar to previous survey investigations. 30% hypertensive patients were willing to choose RDN as a BP control strategy. These patients were younger, more likely to be males, took more antihypertensive drugs, and had concomitant metabolic disorders. Interestingly, Zhang et al. reported that perspectives of patients on RDN were not dependent on their education levels. In Zhang's study, 83.9% of patients expected that RDN will decrease their BP by > 15 mmHg, while 68.8% of patients expected that the efficacy of RDN could span for more than 15 years if they underwent the invasive procedure and no patient would choose RDN therapy if the efficacy in less than 5 years. Among patients surveyed in Japan and Germany, 40% expected RDN to reduce SBP at least 15 mmHg, with higher expectations in China. These four surveys show that although expectations for RDN are high, there is a gap between the expected BP reduction and the effect obtained in randomized clinical trials [14, 15]. In fact, even a BP reduction of 5 mmHg is sufficient to prevent cardiovascular events [16, 17], but patients are not adequately provided updated information for RDN and prevention for CV events.

In this issue of the Journal, Panchavinnin et al. reported that the reduction of systolic BP was −30.0 ± 12.7 mmHg at 9 years in performed 18 RDNs in 17 patients with resistant hypertension in Thai and there was heterogenous BP responses after RDN. Effectiveness of the RDN outcome were achieved (a reduction of office systolic BP ≧10 mmHg, or a reduction of the number of antihypertensive drugs taken, or both outcomes) in 88% at 1 year and more than 75% of

✉ Kazuomi Kario
kkario@jichi.ac.jp

[1] Division of Cardiovascular Medicine, Department of Medicine, Jichi Medical University School of Medicine, 3311-1 Yakushiji, Shimotsuke, Tochigi 329-0498, Japan

patients during the entire follow-up at each time point up to 9 years follow-up without any intervention related adverse events [18]. The GSR reported that systolic BP reduction after RDN was sustained over 3 years, with office systolic BP (−16.5 ± 28.6 mmHg) [19] and (−32 ± 18.8 mmHg) in GSR Korea [20]. Mahfoud et al. demonstrated that 24-h ambulatory systolic BP reduction was 10.0 mmHg (95% CI −16.6 to −3.3; $p = 0.0039$) at 36 months in SPYRAL HTN-ON MED trial, independent of concomitant antihypertensive medications and without major safety events. Fengler et al. showed that, among 296 patients treated with RDN, 180 patients with 24-h ambulatory systolic BP reduction of ≧5 mmHg at 3 months had a 47% reduction in major adverse cardiovascular events, compared to those with <5 mmHg reduction, during a median follow-up of 48 months. Thus, the long-term efficacy and safety of RDN is being reported but has not yet reached the expected effect for patients. However, instead of simply providing information on only the antihypertensive value, all these updated information for clinical outcomes should be provided to patients before assessing patient preference.

In Asians, the slope of the association between increasing BP and the risk of cardiovascular events is steeper than in Westerners [21]. Kario et al. reported that uncontrolled morning hypertension and residual nocturnal hypertension despite antihypertensive pharmacotherapy are promising targets for the use of RDN in Asia [22, 23]. Although there are issues to be resolved for RDNs, such as responder and non-responder identification and intraoperative endpoints, RDN could provide an adjunctive treatment modality in the management of patients with hypertension.

Compliance with ethical standards

Conflict of interest KK reports research funding from Otsuka holdings; honoraria from Otsuka Medical Device, JIMRO and Terumo, outside the submitted work. The other author declares no competing interests.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

1. Whelton PK, Carey RM, Aronow WS, Casey DE Jr., Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol. 2018;71:e127–e248.
2. Collaboration NCDRF. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. Lancet. 2021;398:957–80.
3. Umemura S, Arima H, Arima S, Asayama K, Dohi Y, Hirooka Y, et al. The Japanese Society of Hypertension Guidelines for the Management of Hypertension (JSH 2019). Hypertens Res. 2019;42:1235–481.
4. Lawson AJ, Hameed MA, Brown R, Cappuccio FP, George S, Hinton T, et al. Nonadherence to antihypertensive medications is related to pill burden in apparent treatment-resistant hypertensive individuals. J Hypertens. 2020;38:1165–73.
5. Kim S, Shin DW, Yun JM, Hwang Y, Park SK, Ko YJ, et al. Medication adherence and the risk of cardiovascular mortality and hospitalization among patients with newly prescribed antihypertensive medications. Hypertension. 2016;67:506–12.
6. Cutler RL, Fernandez-Llimos F, Frommer M, Benrimoj C, Garcia-Cardenas V. Economic impact of medication non-adherence by disease groups: a systematic review. BMJ Open. 2018;8:e016982.
7. Kario K, Kim BK, Aoki J, Wong AY, Lee YH, Wongpraparut N, et al. Renal denervation in asia: consensus statement of the asia renal denervation consortium. Hypertension 2020;75:590–602.
8. Kandzari DE, Townsend RR, Bakris G, Basile J, Bloch MJ, Cohen DL, et al. Renal denervation in hypertension patients: Proceedings from an expert consensus roundtable cosponsored by SCAI and NKF. Catheter Cardiovasc Inter. 2021;98:416–26.
9. Schmieder RE, Mahfoud F, Mancia G, Azizi M, Bohm M, Dimitriadis K. et al. European Society ofHypertension position paper on renal denervation 2021. J Hypertens. 2021; https://doi.org/10.1097/HJH.0000000000002933.
10. Schmieder RE, Hogerl K, Jung S, Bramlage P, Veelken R, Ott C. Patient preference for therapies in hypertension: a cross-sectional survey of German patients. Clin Res Cardiol. 2019;108:1331–42.
11. Schmieder RE, Kandzari DE, Wang TD, Lee YH, Lazarus G, Pathak A. Differences in patient and physician perspectives on pharmaceutical therapy and renal denervation for the management of hypertension. J Hypertens. 2021;39:162–8.
12. Kario K, Kagitani H, Hayashi S, Hanamura S, Ozawa K, Kanegae H. A Japan nationwide web-based survey of patient preference for renal denervation for hypertension treatment. Hypertens Res. 2022;45:232–40.
13. Zhang Z, Zhang X, Ye R, Li X, Chen X. Patient preference for renal denervation therapy in hypertension: A cross-sectional survey in Chengdu, China. Hypertens Res. 2022;45:954–61.
14. Ogoyama Y, Tada K, Abe M, Nanto S, Shibata H, Mukoyama M, et al. Effects of renal denervation on blood pressures in patients with hypertension: a systematic review and meta-analysis of randomized sham-controlled trials. Hypertens Res. 2022;45:210–20.
15. Katsurada K, Shinohara K, Aoki J, Nanto S, Kario K. Renal denervation: basic and clinical evidence. Hypertens Res. 2022;45:198–209.
16. Blood Pressure Lowering Treatment Trialists C. Pharmacological blood pressure lowering for primary and secondary prevention of cardiovascular disease across different levels of blood pressure: an individual participant-level data meta-analysis. Lancet. 2021;397:1625–36.
17. Kario K, Sakima A, Ohya Y. STEP to estimate cardiovascular events by home blood pressure in the era of digital hypertension. Hypertens Res. 2022;45:11–14.
18. Panchavinnin P, Wanthong S, Roubsanthisuk W, Tresukosol D, Buranakitjaroen P, Chotruangnapa C, et al. Long-term outcome of renal nerve denervation (RDN) for resistant hypertension. Hypertens Res. 2022;45:962–6.
19. Mahfoud F, Bohm M, Schmieder R, Narkiewicz K, Ewen S, Ruilope L, et al. Effects of renal denervation on kidney function and long-term outcomes: 3-year follow-up from the Global SYMPLICITY Registry. Eur Heart J. 2019;40:3474–82.
20. Kim BK, Kim HS, Park SJ, Park CG, Seung KB, Gwon HC, et al. Long-term outcomes after renal denervation in an Asian

population: results from the Global SYMPLICITY Registry in South Korea (GSR Korea). Hypertens Res. 2021;44:1099–104.
21. Lawes CM, Rodgers A, Bennett DA, Parag V, Suh I, Ueshima H, et al. Blood pressure and cardiovascular disease in the Asia Pacific region. J Hypertens. 2003;21:707–16.
22. Kario K, Wang TD. Perspectives of renal denervation from hypertension to heart failure in Asia. Hypertens Res. 2022;45: 193–7.
23. Kario K, Mogi M, Hoshide S. Latest hypertension research to inform clinical practice in Asia. Hypertens Res. 2022;45:555–72.