Adrenal venous sampling as a method of primary hyperaldosteronism assessment

Ugo Giordano[1], **Jakub Kobiałka**[2]

[1]*Department of Nephrology and Transplant Medicine, University Clinical Hospital in Wroclaw, Wroclaw, Poland*
[2]*Department of Rheumatology and Internal Medicine, University Clinical Hospital in Wroclaw, Wroclaw, Poland*

Key words: primary hyperaldosteronism; adrenal venous sampling; adrenal tumour; computed tomography

Arterial Hypertens. 2023, vol. 27, no. 3, pages: 193–195
DOI: 10.5603/ah.96381

We read with great interest the article by Orczyk et. al [1] which discussed an unusual presentation and clinical course of primary hyperaldosteronism, which is frequently caused by Conn's syndrome. Inspired by their engrossing work, we would like to address a diagnostic method that has not been employed in the aforecited case report despite accumulating evidence of its efficacy, called adrenal venous sampling.

Primary hyperaldosteronism (PH) refers to a condition of overproduction of aldosterone, which is typically caused by either a primary adrenal tumour (APA) or adrenal gland hyperplasia (IHA), and is characterised by the loss of the regulatory function of the renin-angiotensin-aldosterone (RAA) system. Patients who are referred to assess PH commonly suffer from severe, persistent, treatment-refractory hypertension. Initially the disease is asymptomatic, and eventual manifestations that may occur can be attributed to low potassium and high aldosterone levels in the blood. They may include muscle spasms, polyuria, polydipsia, weakness, fatigue, and headaches [2]. Research has indicated that individuals with PH are at a higher risk of experiencing cardiovascular complications such as atrial fibrillation, heart failure, stroke, and coronary artery disease, in comparison to those with essential hypertension [3, 4]. However, hypokalaemia is observed in less than 40% of patients with PH and even less frequently in cases caused by IHA; hence, it is not deemed a specific nor sensitive marker for this disease entity [5]. Considering the diagnostic burden and PH's detrimental impact on the cardiovascular system, there is a need for developing accurate diagnostic measures for primary hyperaldosteronism.

The 54 year old patient from the case report by Orczyk et al. [1] underwent a computed tomography (CT) scan due to nephrolithiasis symptoms. Unexpectedly, a localised abnormality was discovered in the left adrenal gland, measuring 16 mm in diameter and with a density of 34 Hounsfield units (HU). A subsequent magnetic resonance imaging (MRI) scans revealed a slight increase in size to 18 x 12 mm, and the lesion was identified as an atypical adenoma of the adrenal gland. The patient experienced symptoms of hypertension and paraesthesia; however, hypokalaemia was not present, and no tests for RAA stimulation were performed. Through specific laboratory testing conducted during two separate hospital stays, Conn's syndrome was diagnosed. The patient underwent surgical intervention which led to the resolution of all symptoms.

Address for correspondence: Ugo Giordano, University Clinical Hospital in Wroclaw, 213 Borowska, 50–556 Wroclaw, Poland; e-mail: ugogiordano1@gmail.com

Despite therapeutic success, we feel that adrenal venous sampling (AVS) could have been employed as a complementary method to other diagnostic imaging techniques.

AVS is a modality that allows to identify whether the patient is affected by unilateral or bilateral PH, and it includes cannulating of both adrenal veins in order to measure the secretion of aldosterone. Upon diagnosis of PH, it is advised to begin with a specialised adrenal protocol CT scan as the first step in screening for possible cancerous lesions [6]. The main purpose of AVS is to help doctors to determine whether a patient requires surgery. If a patient with APA desires surgery, AVS should be performed by an experienced radiologist to accurately classify the condition and avoid unnecessary removal of the adrenal gland [7]. According to the current guidelines [6, 8], CT's main role is to rule out malignant lesions of at least 0,5 cm, and the inclusion of AVS as the primary tool for lateralisation and subtyping of PH is strongly recommended (grade of recommendation 1A) [2]. The study by Zhou et. [9] al comprises a meta-analysis of 25 retrospective studies, with a total of 4669 patients. When AVS was considered the reference in PH subtyping, CT had a specificity of 60% [95% confidence interval (CI), 50–65%], and sensitivity of 67% (95% CI: 50–65%). In a retrospective study conducted by Rossi et al. in 2021 [10], involving 1311 patients from 19 centres, it was discovered that utilising CT or MRI as the main method for subtyping PH would result in the exclusion of up to 28% of patients who could have been considered suitable candidates for adrenalectomy. If a given hospital is not able to perform AVS, in case of unilateral APA the diagnosis can be made if these criteria are met: hypokalaemia, < 45 years of age, unilateral APA [2]. In these instances AVS is not mandatory, and adrenalectomy can be a viable treatment option. However, if the patients do not exhibit hypokalaemia or show bilateral or no adrenal lesions on imaging, AVS remains necessary for subtyping PH [2].

In conclusion, given that the patient from the study by Orczyk et al. [1] did not match all of the aforementioned criteria, employing AVS could have been beneficial according to the latest guidelines [2, 5, 7].

Conflicts of interest

The authors declare no conflict of interest.

Funding

This research received no external funding.

Author contributions

Conceptualization, U.G. and J.K.; methodology, U.G. and J.K.; formal analysis, U.G.; resources, U.G. and J.K.; writing — original draft preparation, U.G. and J.K.; writing — review and editing, U.G. and J.K.; supervision, U.G.; project administration, U.G. and J.K. All authors have read and agreed to the published version of the manuscript.

References

1. Orczyk J, Ołownia A, Gałązka J, et al. Nonspecific clinical picture and the course of Conn syndrome — current findings in the screening program for hypertensive patients. Arterial Hypertens. 2023, doi: 10.5603/AH.a2023.0015.
2. Yang YH, Chang YL, Lee BC, et al. Strategies for subtyping primary aldosteronism. J Formos Med Assoc. 2023 [Epub ahead of print], doi: 10.1016/j.jfma.2023.05.004, indexed in Pubmed: 37202237.
3. Hundemer GL, Curhan GC, Yozamp N, et al. Cardiometabolic outcomes and mortality in medically treated primary aldosteronism: a retrospective cohort study. Lancet Diabetes Endocrinol. 2018; 6(1): 51–59, doi: 10.1016/S2213-8587(17)30367-4, indexed in Pubmed: 29129576.
4. Monticone S, D'Ascenzo F, Moretti C, et al. Cardiovascular events and target organ damage in primary aldosteronism compared with essential hypertension: a systematic review and meta-analysis. Lancet Diabetes Endocrinol. 2018; 6(1): 41–50, doi: 10.1016/S2213-8587(17)30319-4, indexed in Pubmed: 29129575.
5. Magill SB, Raff H, Shaker JL, et al. Comparison of adrenal vein sampling and computed tomography in the differentiation of primary aldosteronism. J Clin Endocrinol Metab. 2001; 86(3): 1066–1071, doi: 10.1210/jcem.86.3.7282, indexed in Pubmed: 11238487.
6. Rossi GP, Funder JW. Adrenal Vein Sampling Is the Preferred Method to Select Patients With Primary Aldosteronism for Adrenalectomy: Pro Side of the Argument. Hypertension. 2018; 71(1): 5–9, doi: 10.1161/HYPERTENSIONAHA.117.09295, indexed in Pubmed: 29229742.
7. Rossi GP, Auchus RJ, Brown M, et al. An expert consensus statement on use of adrenal vein sampling for the subtyping of primary aldosteronism. Hypertension. 2014; 63(1): 151–160, doi: 10.1161/HYPERTENSIONAHA.113.02097, indexed in Pubmed: 24218436.
8. Naruse M, Katabami T, Shibata H, et al. Japan Endocrine Society clinical practice guideline for the diagnosis and management of primary aldosteronism 2021. Endocr J. 2022; 69(4): 327–359, doi: 10.1507/endocrj.EJ21-0508, indexed in Pubmed: 35418526.
9. Zhou Y, Wang D, Jiang L, et al. Diagnostic accuracy of adrenal imaging for subtype diagnosis in primary aldosteronism: systematic review and meta-analysis. BMJ Open. 2020; 10(12): e038489, doi: 10.1136/bmjopen-2020-038489, indexed in Pubmed: 33384386.
10. Rossi GP, Crimì F, Rossitto G, et al. Identification of Surgically Curable Primary Aldosteronism by Imaging in a Large, Multiethnic International Study. J Clin Endocrinol Metab. 2021; 106(11): e4340–e4349, doi: 10.1210/clinem/dgab482, indexed in Pubmed: 34212188.

Response to the Letter to the Editor

We would like to thank Mr. Ugo Giordano and Mr. Jakub Kobiałka for your effort and interest in our article and continuing the discussion of patients with Conn syndrome. The gold standard for differentiating forms of primary hyperaldosteronism is indeed adrenal venous sampling (AVS), but the multiple imaging tests (CT scan, MRI studies) as well as the tilt table test and observation of the patient allowed us to conclude Conn syndrome and rule out another diagnosis.

In adrenocortical adenoma, aldosterone levels do not increase in the tilt table test, and may even decrease, as in the case of this patient. In contrast, in adrenal hyperplasia, aldosterone concentration increases after the tilt table test [1].

In addition, AVS is technically very difficult, not widespread in Poland and it is performed only in specialized centers [2]. In the authors' affiliated unit, AVS is not performed.

But on the other hand, the authors of this article hope that this examination will widespread to become a standard test in diagnosing this disease to provide the appropriate level of health care for all patients with primary hyperaldosteronism.

We would like also to remind that in the discussion section of our article, we wanted to underline and catch readers' attention at the increasing need for screening tests for a primary hyperaldosteronism as a underdiagnosed cause of secondary hypertension. For the patients with positive result of screening tests, the advanced diagnostic should be performed, including imaging tests, tilt table test and AVS.

Yours sincerely,
Jakub Orczyk
Aleksandra Ołownia
Jakub Krzysztof Gałązka
Agnieszka Polak
Beata Matyjaszek-Matuszek

References

1. https://www.mp.pl/interna/chapter/B16.II.11.3.
2. https://pulsmedycyny.pl/pierwotny-hiperaldosteronizm-cewnikowanie-zyl-nadnerczowych-umozliwia-wlasciwa-kwalifikacje-chorych-do-operacji-906264.