Reninoma Masked by the Use of an Angiotensin Receptor Blocker

Min Jung Kim, Joo Hui Kim, Il Young Kim, Dong Won Lee, Soo Bong Lee

Department of Internal Medicine, Pusan National University School of Medicine, Yangsan; Research Institute for Convergence of Biomedical Science and Technology, Pusan National University Yangsan Hospital, Yangsan, South Korea

Keywords. hypertension, hypokalemia, reninoma, angiotensin receptor blocker

Reninoma is a tumor that secretes excessive renin and is a rare cause of secondary hypertension. We report a case of reninoma with delayed diagnosis in a 33-year-old woman taking an angiotensin receptor blocker. During angiotensin receptor blocker medication, she had exhibited no electrolyte abnormality. The angiotensin receptor blocker was stopped for pregnancy planning purposes, and subsequent hypokalemia was observed. Abdominal computed tomography showed an enhanced round mass in the right kidney. Right partial nephrectomy was performed and the renal mass was removed. Histologic findings confirmed a diagnosis of reninoma. The patient's blood pressure and serum potassium remained normal after surgery. Diagnosis of reninoma might be delayed in patients taking angiotensin receptor blockers because they can mask hypokalemia due to reninoma.

IJKD 2016;10:413-5
www.ijkd.org

INTRODUCTION

Secondary hypertension is responsible for less than 10% of cases of hypertension in the general population.[1] Reninoma is a tumor that secretes excessive renin and is a rare cause of secondary hypertension.[2,3] Although uncommon, reninoma should be considered in any patient with hypokalemia and an elevated aldosterone level associated with refractory hypertension. Patients with reninoma usually exhibit hypokalemia at the time of diagnosis.[2,3] However, hypokalemia may be disguised by the effects of the antihypertensive regimen on serum potassium level, particularly treatment with agents acting on the renin-angiotensin system. We present a case of a reninoma masked by use of an angiotensin receptor blocker (ARB).

CASE REPORT

A 33-year-old pregnant woman was referred to our hospital with refractory hypertension and proteinuria. Five years earlier, she visited local clinic for hypertension. The patient was evaluated for possible secondary causes of hypertension; however, no abnormalities were found. She used antihypertensive medication for 5 years until she became pregnant. At 18 weeks of gestation, poorly controlled blood pressure and proteinuria were observed in the patient. On admission, her blood pressure was 200/100 mm Hg, and proteinuria (3400 mg/d) was noted. Despite intensive medical treatment, her blood pressure was not controlled and proteinuria worsened; thus, the pregnancy was terminated at 20 weeks of gestation.

After pregnancy termination, she was followed up for persistent hypertension. Nifedipine (60 mg twice a day) and candesartan (8 mg once a day) were used for blood pressure control. During the follow-up period, her blood pressure was well controlled and proteinuria improved. Other chemical and hematological profiles showed no abnormalities. Six months later, she began planning a second pregnancy, and candesartan was stopped.

Two months after discontinuing candesartan,

Case Report

hypokalemia (2.7 mEq/L) was observed. Results of arterial blood gas analysis (pH of 7.475, carbon monoxide pressue of 44 mm Hg, and serum bicarbonate level of 32 mEq/L) indicated metabolic alkalosis. Serum renin (55.9 ng/mL; reference range, 0.2 ng/mL/h to 2.8 ng/mL/h) and aldosterone (537.2 pg/mL; reference range, 40 pg/mL to 310 pg/mL) were markedly elevated. Abdominal computed tomography revealed a 1.3-cm moderately-enhanced round mass in the lateral aspect of the right kidney (Figure 1). Right partial nephrectomy was performed and the renal mass was removed. The gross specimen demonstrated a well-encapsulated lesion measuring 1.4 × 1.3 × 1.0 cm. Histologic findings confirmed a diagnosis of reninoma (Figure 2). The tumor was composed of closely-packed, uniform, round-to-polygonal cells with clear to acidophilic cytoplasm. At high magnification, tumor cells showed oval-to-round nuclei with inconspicuous nucleoli. Mitotic activity was not observed. Neoplastic cells were diffusely positive for vimentin and CD34, focally positive for smooth muscle actin, and negative for epithelial membrane antigen, cytokeratin, and human melanoma black 45.

On the second postoperative day, the patient's serum potassium was 3.9 mEq/L. One week after operation, concentrations of plasma renin and aldosterone were normalized. The patient's blood pressure and serum potassium remained normal without antihypertensive treatment during follow-up.

DISCUSSION

Reninoma is a rare tumor that produces excessive amounts of renin, resulting in secondary hyperaldosteronism. It occurs mainly in children and young adults, and has a female predominance (approximately 2:1).[4,5] Previously reported data indicated that the most common symptom of reninoma was headache and hypokalemia was detected at presentation in 81% of cases.[6] In this case,

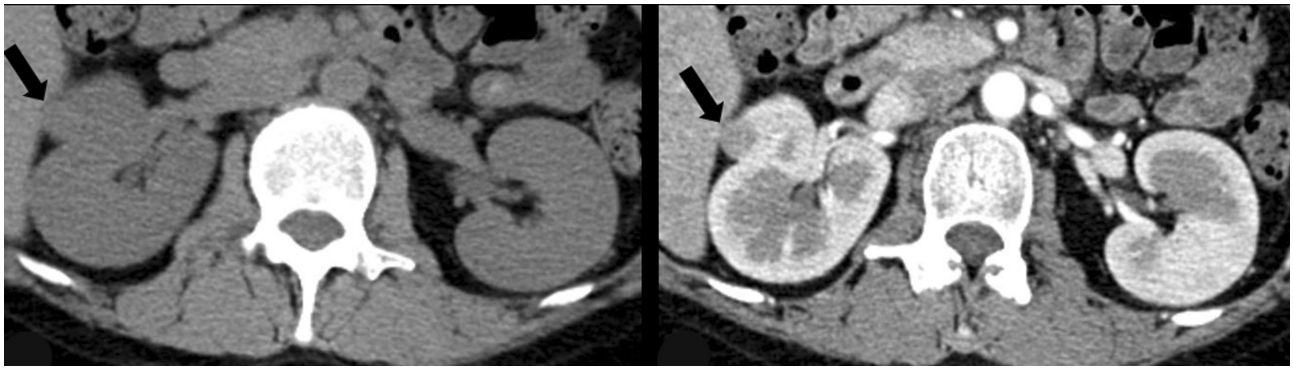

Figure 1. Computed tomography revealed a solid, well-circumscribed lesion in the right kidney. Left, The mass was not delineated on a pre-enhanced scan. Right, The mass was moderately enhanced on an enhanced scan.

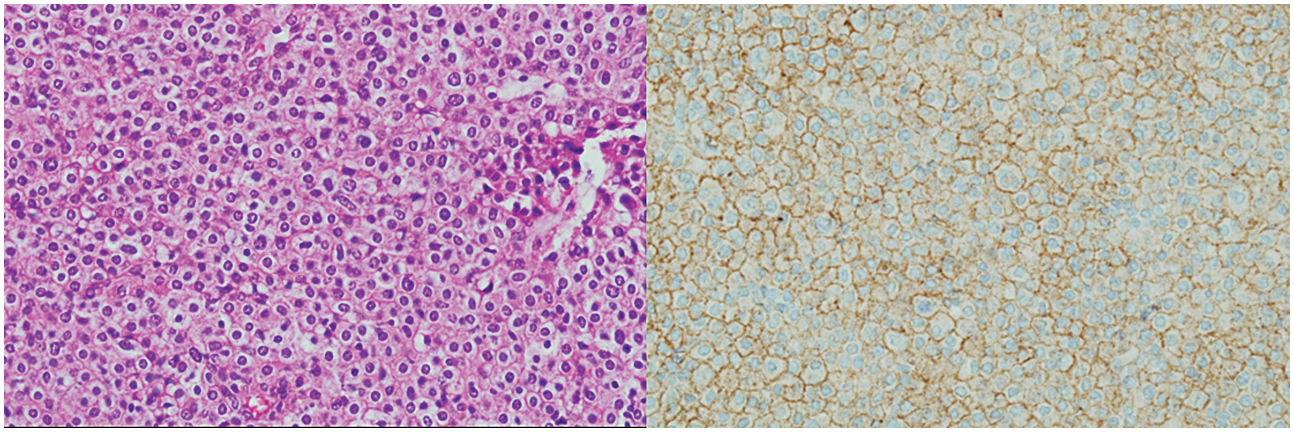

Figure 2. Left, Tumor cells exhibited uniform round nuclei with clear-to-eosinophilic granular cytoplasm (hematoxylin-eosin, × 400). Right, Tumor cells demonstrated diffuse strong positivity to CD34 (immunostaining).

hypokalemia was not present until approximately 6 months prior to diagnosis, when she discontinued ARB treatment for pregnancy planning.

One of the most important physiological determinants of potassium excretion is serum aldosterone concentration. Aldosterone secretion is influenced by the renin-angiotensin system. Renin acts on angiotensinogen to form angiotensin I, which is then converted to angiotensin II by angiotensin-converting enzyme. Angiotensin II stimulates the release of aldosterone from zona glomerulosa cells in the adrenal gland. Angiotensin converting enzyme inhibitors and ARBs increase serum potassium levels by interfering with angiotensin II-mediated stimulation of aldosterone secretion from the adrenal gland and by decreasing renal blood flow and glomerular filtration rate in certain patient populations.[7] On the basis of this mechanism, we hypothesized that our patient's serum potassium level was maintained within the normal range because the effects of ARB treatment on renin-angiotensin system offset secondary hyperaldosteronism caused by reninoma.

In summary, we report a case of reninoma with delayed diagnosis in a patient taking an ARB. We suggest that the diagnosis of reninoma can be complicated by the use of drugs that affect the renin-angiotensin system because such drugs can mask hypokalemia related to reninoma.

CONFLICT OF INTEREST

None declared.

ACKNOWLEDEMENTS

This work was supported by a 2-Year Research Grant of Pusan National University.

REFERENCES

1. Acelajado MC, Calhoun DA. Resistant hypertension, secondary hypertension, and hypertensive crises: diagnostic evaluation and treatment. Cardiol Clin. 2010;28:639-54.
2. Conn JW, Cohen EL, Lucas CP, et al. Primary reninism. Hypertension, hyperreninemia, and secondary aldosteronism due to renin-producing juxtaglomerular cell tumors. Arch Intern Med. 1972;130:682-96.
3. Squires JP, Ulbright TM, DeSchryver-Kecskemeti K, Engleman W. Juxtaglomerular cell tumor of the kidney. Cancer. 1984;53:516-23.
4. Min KO, Kwon HJ, Ahn SJ, et al. Juxtaglomerular cell tumor of the kidney: a case report. J Korean Med Sci. 2001;16:233-6.
5. Mete UK, Niranjan J, Kusum J, Rajesh LS, Goswami AK, Sharma SK. Reninoma treated with nephron-sparing surgery. Urology. 2003;61:1259.
6. Wong L, Hsu TH, Perlroth MG, Hofmann LV, Haynes CM, Katznelson L. Reninoma: case report and literature review. J Hypertens. 2008;26:368-73.
7. Palmer BF. Managing hyperkalemia caused by inhibitors of the renin-angiotensin-aldosterone system. N Engl J Med. 2004;351:585-92.

Correspondence to:
Soo Bong Lee, MD, PhD
Division of Nephrology, Department of Internal Medicine,
Pusan National University Yangsan Hospital,
Beomeo-ri, Mulgeum-eup, Yangsan, 626-770
Gyeongsangnam-do, South Korea
Tel: +82 55 360 2371
Fax: +82 55 360 1605
E-mail: sbleemd@pusan.ac.kr

Received February 2016
Revised May 2016
Accepted May 2016