Case Report

Calcified Renal Artery Aneurism in the Right Kidney Causing Hypertension

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ABSTRACT. The renal artery aneurysm (RAA) is defined as a renal artery segment that is two-fold dilated than normally. It is very rare in children and often asymptomatic. However, it can cause severe hypertension (HTN) and kidney failure. Herein, we report a 14-year-old boy who with RAA which was presented with back pain. His medical history was remarkable for essential HTN that was refractory to antihypertensive medications. Plain abdominal radiography revealed calcification at the right flank area. On computed tomography images, calcification surrounding the right renal artery was detected. Selective renal angiography showed totally occluded right renal artery segment. Calcified RAA was detected on the operation and removed. Two months after, blood pressure was under control, but there was no functioning right kidney on DMSA. We think that clinicians should keep in mind RAA in the differential diagnosis of treatment-resistant HTN and use other radiologic methods even if Doppler is normal.

Introduction

Renal artery aneurysm (RAA) is very rarely seen in children. It is defined as a segment of the renal artery that is two-fold dilated than normally.1 Although it is often asymptomatic, 30% of patients may have uncontrolled hypertension (HTN), shock, abdominal and flank pain, thrombosis, and hematuria.2 It can be easily overlooked. Herein, we report a patient with severe HTN due to calcified RAA in the right kidney.

Case Report

A 14-year-old boy who had been followed with essential HTN for four years, presented with a two months history of back pain. He ignored trauma. On admission, blood pressure (BP) was 170/100 mm Hg, but the physical examination was otherwise unremarkable. We
could not control his BP with multiple anti-
hypertensive medication including amlodipine,
enalapril, and doxazosin. His medical history
of the past four years revealed that he suffered
from headache and was diagnosed with essen-
tial HTN with normal renal functions and
radiologic evaluation, including Doppler ultra-
sonography (USG) of kidneys.

On admission, urinalysis, liver, and renal
function tests were normal. Plain abdominal
radiography revealed a calcification measuring
approximately 3 cm at the level of the right
renal artery (Figure 1).

Renal Doppler USG documented decreased
arterial blood flow in the right kidney with an
abnormal Doppler waveform, which was sug-
gestive of unilateral renal artery stenosis. To
clarify the calcified lesion, an abdominal com-
puted tomography (CT) scan was performed.
On CT images and 3-dimensional (3D) recon-
struction view, calcification surrounding the
right renal artery (Figure 2) was detected.
They also showed a small right kidney.

Selective renal angiography (SRA) was
performed, and it showed that the right renal
artery also originated from the abdominal
aorta as two separate segments. Stenotic seg-
ments and dilatations were observed at the
distal section of the upper renal artery segment
which was not suitable for balloon dilatation
because of the small diameter. It was seen that
the lower segment of the right renal artery
provided most of the renal blood supply
(Figure 3).

Since DMSA renal scan revealed a split renal
function of 71.34% on the left and 29.68% on
the right (Figure 4) and he had flank pain and
uncontrolled HTN, he underwent surgical
repair. Retroperitoneal space was reached under
general anesthesia with right flank position
and flank incision. Renal hilus were identified
by appropriate dissection. It was seen that two

Figure 1. Plain abdominal radiography. This
revealed a calcification at the level of the right
renal artery.

Figure 2. Computed tomography (a) and 3-dimensional reconstruction view (b). These revealed a
calcification surrounding the right renal artery.
renal arteries originating from the abdominal aorta with 1 cm interval provided blood supply to the upper and lower poles of the kidney. However, it was seen that the lower branch from these renal arteries was completely calcified, and the upper branch had calcifications 1 cm after separation from the aorta. The upper renal artery was cut at 1 cm distance from the aortic root and at the level of the renal hilus. A 6 mm wide 5 cm long vessel graft was placed. The normal portion of the lower renal artery at the level of renal hilus was connected by end-side anastomose in this graft. When the clamps were opened, the renal blood supply was normal, and the operation was terminated. Intraoperative Doppler examination performed after the operation showed that the perfusion of the right kidney was decreased. The resistivity index was 0.47–0.57. However, his BP returned to the normal

Figure 3. Selective renal angiography views. (a) Two segments of the renal artery were seen branching 1 cm apart from the abdominal aorta (b) Stenotic segments and dilatations at the distal section of the upper renal artery segment. (c) The lower renal artery segment.

Figure 4. Renal cortical scintigraphy. This revealed split renal function of 71.34% on the left and 29.68% on the right kidney.
value of his age within a couple of days and doxazosin was stopped. Two months after surgery, his BP was under control with enalapril and amlodipine, but there was no functioning right kidney on DMSA.

Informed consent was obtained from the patient’s guardian for the publication of the text and the use of the images.

Discussion

Although renal parenchymal and vascular diseases are the leading causes of pediatric HTN, especially in early childhood, primary HTN is commonly seen in adolescent. At the first admission of our patient, he did not have any abnormal physical examination findings and laboratory abnormality, suggesting renal vascular disorders. Renal Doppler ultrasound was also normal. Therefore, he was diagnosed and followed as primary HTN.

RAA is a very rare pathology with an estimated incidence of 0.09% on autopsy studies. It is classified as true or pseudo aneurysm based on the pathogenesis. While diseases such as fibromuscular dysplasia and connective tissue diseases causing thinning in the wall of the vein often cause true aneurysm, inflammation, infection, and periarterial hematoma secondary to penetrating trauma may result in pseudoaneurysm. We could not get any history of trauma and detect symptoms or signs resembling vasculitis and connective tissue disease. There were no angiographic findings compatible with fibro-muscular dysplasia.

Pediatric RAA is often asymptomatic but occasionally can emerge with clinical symptoms such as uncontrolled HTN, shock, abdominal and flank pain, thrombosis, hematuria, and kidney failure. The accompanying stenosis is the main reason of HTN in patients with RAA. Kinking or torsion of the arteries and distal parenchyma embolization result in HTN in those patients. In our patient, calcified RAA led to stenosis and caused uncontrolled HTN.

The diagnosis of RAA is difficult unless it is symptomatic. Renal Doppler USG is a commonly used noninvasive tool. However, it may miss the diagnosis because of its nature of highly user-dependent. Spiral CT, 3D, contrast-enhanced, magnetic resonance angiography (MRA), or digital subtraction arteriography (DSA) can be used for diagnosis. Angiography remains the gold standard for diagnosing of aneurysms within the renal arterial tree. In the case presented here, renal Doppler USG missed RAA the first visit, and we reached exact diagnosis at last visit using CT and SRA in addition to renal Doppler USG.

The indications for interventional treatment of RAA remain controversial. In adult patient, treatment is indicated for symptomatic, enlarging, dissecting aneurysms or aneurysms larger than 2 cm, but there is no upper size limit for it in children. Endovascular treatment is the most preferred method in hypertensive and patients having risk for rupture. In our case, we first planned to perform balloon dilation and stenting of narrowed segment of the renal artery. Unfortunately, it was seen that the vessel was completely obstructed and the size of the vessel was not suitable for dilatation. Therefore, we decided to give him a chance for surgery to protect the residual renal function of the right kidney. Although his BP returned normal a couple of days after surgery, DMSA scan demonstrated non-functioning right kidney two months after surgical procedure.

In conclusion, RAA in children is a rare entity, and it can cause severe HTN and kidney failure secondary to renal artery stenosis. We think that clinicians should keep in mind RAA in the differential diagnosis of treatment resistant HTN and use other radiologic methods such as BT, MRA, and DSA even Doppler USG is normal.

Conflict of interest: None declared.

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