

# The Hidden Diagnosis: Renal Aneurysm And AV Fistula Disguised As A Renal Cyst In In A Primigravida Pregnant Woman

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## Author Contributions

- Dr. Maryam Layth – conceptualization, manuscript preparation and drafting.
- Dr. Ahmed Al Sadi – data collection, analysis, and imaging interpretation.
- Dr. Hamdan Al Sadi – imaging interpretation and case presentation.
- Dr. Rashid Alsharhan – manuscript editing and second supervision.
- Dr. Ahmed Alkindi – primary supervision and final approval of the version to be published.

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## Disclosures

The authors affirm that they have no known financial interests or personal relationships that could have potentially influenced the work presented in this paper.

## Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. The patients understood that their anonymity would be preserved, and no identifiable information would be disclosed.

## Human And Animal Rights

Not applicable.

## ABSTRACT

Renal aneurysms are rare and uncommon findings with an incidence of 0.01%-0.1% in the general population, usually made incidentally with imaging obtained to evaluate unrelated pathologies. A true Renal artery aneurysm is defined as a dilated segment of renal artery. Arteriovenous fistula is caused by etiologies, including traumatic or iatrogenic injury or arterial dissection and infection/ inflammation. Our case is a young primigravida presented with gastroenteritis symptoms. For which ultrasound was done to exclude acute abdomen pathologies. Incidentally found to have a cyst and hydronephrosis. On follow up a repeat ultrasound was done uncovering a cyst mimicking Right renal aneurysm and arteriovenous fistula.

## CASE REPORT

### BACKGROUND

This case highlights the rare occurrence of multiple renal artery aneurysms (RAAs) and an arteriovenous fistula (AVF) seen in a young primigravida. The case is a clinical scenario that is not often featured in the literature. It underscores the challenges in diagnosing vascular abnormalities during pregnancy, where symptoms may overlap with typical physiological changes. It also contributes to the knowledge of renal artery aneurysms (RAAs) in younger patients and stresses the significance of early imaging and intervention to avoid complications such as rupture or renal impairment.

### HISTORY & CLINICAL DATA

An early 20s primigravida at 18 weeks gestation presented to the emergency department with severe generalized abdominal pain. She was diagnosed with gastroenteritis and dehydration and was treated conservatively with intravenous (IV) fluids and antiemetics. A follow-up ultrasound was performed to exclude acute abdomen, including kidney, ureter, and bladder (KUB) stones or hydronephrosis. It revealed right renal cysts and mild hydronephrosis. She has no past surgical history and has a known diagnosis of alpha thalassemia minor but is asymptomatic and does not require any medication. Her laboratory results

were unremarkable, with a creatinine level of 0.33 mg/dL, an estimated glomerular filtration rate (eGFR) of 148 mL/min/1.73 m<sup>2</sup>, and a C-reactive protein (CRP) level of 32.6 mg/L. Her hemoglobin (Hb) was 8, and hematocrit (HCT) was 25. At 26 weeks gestation, she returned with acute right flank pain, and a repeat ultrasound identified multiple aneurysms in the right kidney with mild renal pelvic dilatation. The patient was treated with coiling in a private hospital.

### IMAGING FINDINGS

Multiple hypoechoic rounded and tubular anechoic structures at the renal hilum (Figure 1).

On color Doppler sonography of the abdominal ultrasound, large fusiform hypoechoic aneurysmal dilation was observed, demonstrating bidirectional flow with a clear feeding artery and draining venous tributary, giving the characteristic yin-yang pattern in the lumen of the right accessory renal artery communicating with the right renal vein, forming an arteriovenous fistula (AVF) (Figure 2).

Computed tomography angiography (CTA) revealed multiple tortuous and dilated abnormal arteries arising from the right anterolateral aspect of the abdominal aorta at the level of L1, representing an accessory right renal artery with three aneurysmal dilations along its course (Figure 3).

The first aneurysm shows bilobed configuration arising at the artery origin and measures 3.5 x 3 x 3.8 cm.

The second aneurysm is large fusiform dilatation with early venous enhancement which is a rapid opacification of the draining veins during arterial phase. It is located at the right renal hilum and measures 8 x 5.8 x 5 cm.

The third is a fusiform aneurysm located at the level of the lower pole of the right kidney and measuring 4.5 x 5.2 x 5.6 cm. The artery appears to terminate at this aneurysm with no distal branches emerging and supplying the right kidney. The second and third aneurysms cause mass pressure effect on the right renal pelvis and proximal ureter resulting in hydronephrosis and thinning of the renal cortex.

### DISCUSSION

#### Etiology & demographics

Renal artery aneurysm (RAA) is more commonly observed in women during their sixth decade of life, while in men, it tends to appear up to a decade later. Women are more commonly afflicted with RAA, likely due to the high incidence of associated fibromuscular dysplasia. Although a minority of patients present with symptoms, and clinical exams may reveal hypertension, most patients lack traditional cardiovascular risk factors. One of the most common symptoms of RAA is hematuria and flank pain, which may result from pressure effects or rupture of the aneurysm. Pregnancy is thought to be associated with a higher rate of rupture secondary to increased vascular flow and

hormonal changes, resulting in the weakening of the vessel wall elastic tissue. RAA occurs in only 0.01%-0.1% of the population and is usually found incidentally. Renal arteriovenous fistula (AVF) is rare at less than 0.04% and is often acquired from procedures or trauma but can also be congenital.

#### Clinical & Imaging Findings

A young primigravida presented with multiple large renal artery aneurysms (RAAs) and an associated arteriovenous fistula (AVF) from an accessory right renal artery, posing a unique diagnostic challenge in which the AVF lacked normal vessel elasticity. Females outnumber males in such cases with a ratio of 3:1. The diagnostic journey for this case highlights the importance of a multimodal imaging approach when identifying complex vascular abnormalities. Initially, the aneurysms and AVF were misidentified as renal cysts with associated hydronephrosis, a common finding in pregnancy. The patient was initially asymptomatic but later developed flank pain, a rare symptom of renal artery aneurysms, occurring in 4%-23% of cases. Other possible concerns include abdominal pain and hematuria. Further imaging was required, including dedicated ultrasound for kidney, ureter, and bladder (KUB), computed tomography angiography (CTA), and magnetic resonance angiography (MRA). The MRA confirmed the vascular origin of the pathology by revealing a signal void in the previously seen structures on ultrasound. CTA provided detailed imaging of the aneurysm morphology and associated vascular anatomy. Both CTA and MRA ultimately provided a clearer view of the vascular anomalies, revealing multiple large aneurysms and an AVF originating from the accessory right renal artery. Since common risk factors such as hypertension, trauma, and hereditary vascular anomalies were absent in this young woman, her case represents a rare and challenging clinical scenario. It could also be mistaken for maternal physiologic hydronephrosis. Renal artery aneurysms can arise from idiopathic, mycotic, or traumatic causes but are often linked to underlying systemic diseases. The absence of clear etiological factors in this case underscores the importance of vigilant imaging and follow-up, especially during pregnancy. Increased vascular flow and hormonal changes can weaken vessel walls, raising the risk of rupture, although evidence supporting this risk remains limited.

#### Management & Follow-up

All procedural details are based on the patient's report, as the intervention was performed at another institution, and the original imaging was unavailable for review. Similarly, the follow-up post-procedure CT angiogram of the abdomen and pelvis was conducted at the same institution, making the images unobtainable.

Angiography revealed an abnormal accessory renal artery supplying two large aneurysms with direct drainage into the renal vein, consistent with an arteriovenous fistula (AVF). Selective angiography confirmed a high-flow shunt. Embolization was performed using helical coils within the aneurysms, followed by the deployment of a covered stent at the artery's orifice. Due to persistent flow, an MVP plug was placed, along with additional coils, to achieve complete occlusion. Final imaging confirmed

the successful exclusion of the AVF.

Postoperatively, the patient remained asymptomatic. Follow-up CT abdominal angiogram showed no residual aneurysm or contrast filling. Additionally, the patient reported no complaints during follow-up.

#### Differential Diagnosis

- Renal artery aneurysm (RAA) with arteriovenous fistula (AVF).
- Arteriovenous fistula (AVF) without renal artery aneurysm (RAA).
- venous varices

#### CONCLUSION

It highlights the incidental nature of these vascular abnormalities, illustrating the importance of detailed follow-up while emphasizing the need for a multidisciplinary approach, integrating radiology, obstetrics, and vascular specialists to ensure accurate diagnosis and safe management. It also addresses the potential challenges in differentiating between renal vascular lesions in pregnancy, where imaging options may be limited by safety concerns. Early recognition and tailored intervention are critical to optimizing outcomes for both the patient and the fetus.

#### TEACHING POINT

This case emphasizes the importance of considering vascular pathology, particularly for a young pregnant patient with nonspecific presentation. Illustrating the importance of performing doppler even when it looks like a simple case of hydronephrosis, it could be an aneurysm in disguise.

#### QUESTIONS

1. What is the typical definition of a renal artery aneurysm?

- A) A dilated segment of the renal artery with a diameter exceeding twice that of a normal renal artery
- B) A dilated segment of the renal artery involving only the outer arterial wall layers
- C) A dilated segment of the renal artery with a diameter exceeding 1.5 times that of a normal renal artery (applies)
- D) A congenital defect of the renal artery causing stenosis
- E) An arterial condition always associated with hypertension

**Explanation:** The definition of a renal artery aneurysm (RAA) is a dilated segment of the renal artery with a diameter exceeding 1.5 times that of a normal segment. It involves all three arterial wall layers. A renal artery aneurysm (RAA) is defined as a dilated segment of the renal artery with a diameter that is more than 1.5 times the diameter of a normal renal artery.

2. Which of the following are potential symptoms of renal artery aneurysms?

- A) Hypertension (applies)
- B) Hematuria (applies)

- C) Renal infarction (applies)
- D) Severe respiratory distress
- E) Asymptomatic presentation (applies)

**Explanation:** Symptoms of renal artery aneurysms (RAAs) can include hypertension, hematuria, renal infarction, or an asymptomatic presentation. Symptomatic RAAs can cause hypertension, pain, hematuria, and renal infarction, while asymptomatic RAAs may seem benign.

3. What imaging modality is essential for distinguishing vascular anomalies such as renal artery aneurysms and arteriovenous fistulas from renal cysts?

- A) Plain abdominal X-ray
- B) Doppler ultrasound (applies)
- C) Computed tomography angiography (applies)
- D) Magnetic resonance imaging (MRI)
- E) Magnetic resonance angiography (applies)

**Explanation:** Doppler ultrasound, computed tomography angiography (CTA), and magnetic resonance angiography (MRA) are highlighted as essential imaging modalities for diagnosing vascular anomalies such as renal artery aneurysms (RAAs) and arteriovenous fistulas (AVFs). Doppler ultrasound initially identified the vascular abnormality, and CTA and MRA confirmed the diagnosis and provided detailed views. The diagnostic journey for this case emphasizes the importance of utilizing a multimodal imaging approach.

4. What factors increase the risk of renal artery aneurysm rupture during pregnancy?

- A) Increased vascular flow (applies)
- B) Hormonal changes (applies)
- C) Use of anticoagulants
- D) High creatinine levels
- E) Weakening of vessel wall elastic tissue (applies)

**Explanation:** During pregnancy, increased vascular flow and hormonal changes can weaken the vessel wall's elastic tissue, resulting in further weakening and increasing the risk of renal artery aneurysm (RAA) rupture.

5. Which of the following are predisposing factors for renal artery aneurysms?

- A) Fibromuscular dysplasia (applies)
- B) Trauma (applies)
- C) Arteriosclerosis (applies)
- D) Iatrogenic injury from surgical procedures (applies)
- E) Iron deficiency anemia

**Explanation:** Predisposing factors for renal artery aneurysms (RAAs) include fibromuscular dysplasia, trauma, arteriosclerosis, and iatrogenic injuries. Other predisposing factors are arteriosclerosis, fibromuscular dysplasia, congenital kidney malformations, and iatrogenic injuries from surgical renal interventions.

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FIGURES

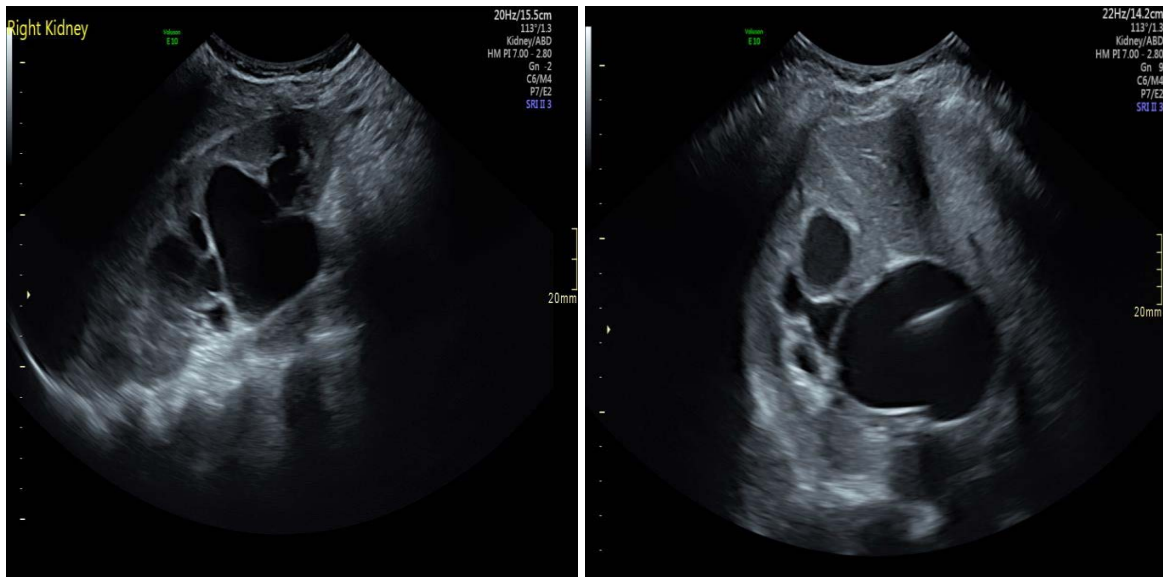


Figure 1: Multiple hypoechoic rounded and tubular anechoic structures at the renal hilum.

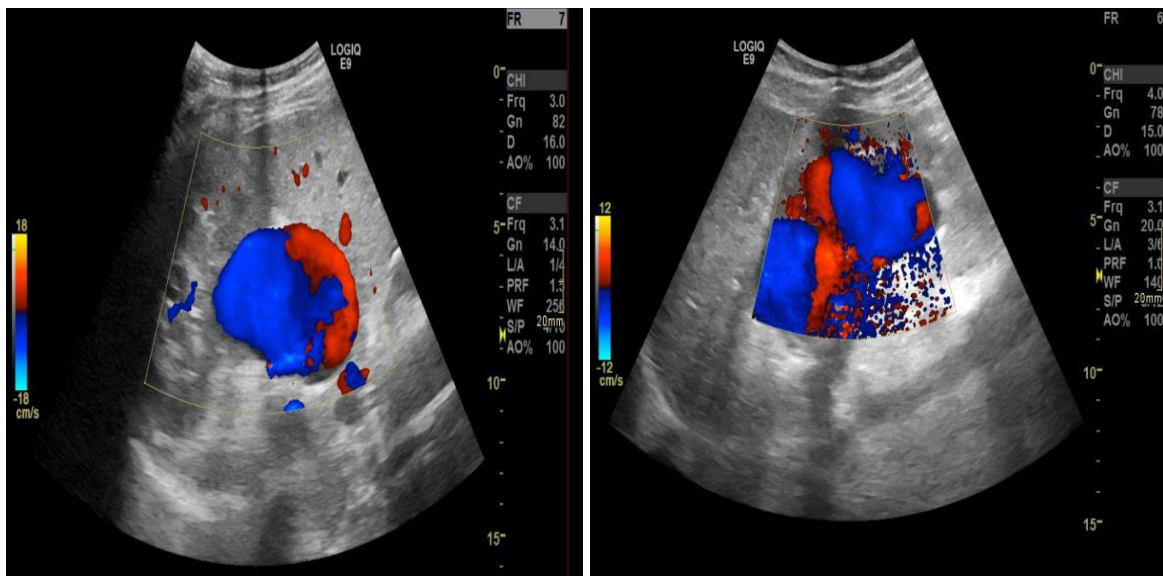
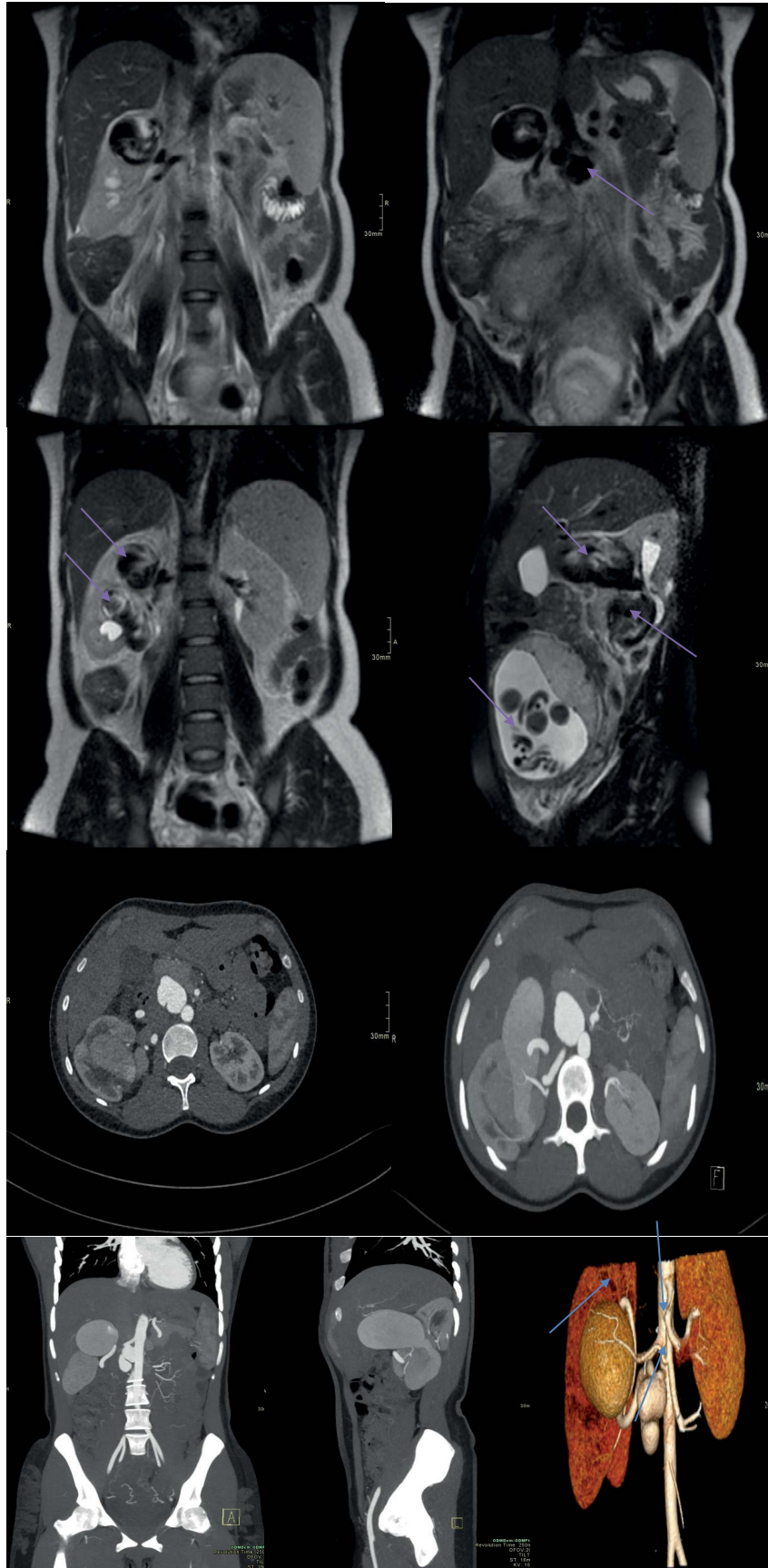


Figure 2: Color Doppler sonography of the abdominal ultrasound, large fusiform hypoechoic aneurysmal dilation was observed, demonstrating bidirectional flow with a clear feeding artery and draining venous tributary.





**Figure 3:** CTA and MRA shows multiple tortuous and dilated abnormal arteries, representing an accessory right renal artery with three aneurysmal dilations along its course.

**KEYWORDS**

*Renal Artery Aneurysm (RAA), Arteriovenous Fistula (AVF), Multimodal Imaging, Doppler Ultrasound, CT Angiography (CTA), MR Angiography (MRA), Pregnancy-Associated, Vascular Pathology, Accessory Renal Artery, Yin-Yang Pattern*

**ABBREVIATIONS**

AVF = ARTERIOVENOUS FISTULA  
RAA = RENAL ARTERY ANEURYSM  
CT = COMPUTED TOMOGRAPHY  
MRI = MAGNETIC RESONANCE IMAGING  
US = ULTRASOUND  
CTA = COMPUTED TOMOGRAPHY ANGIOGRAPHY  
KUB = KIDNEY, URETER, AND BLADDER

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