



Trauma and reconstruction

## Contained rupture of a left renal artery aneurysm: Report of a case

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### ABSTRACT

Ruptured renal artery aneurysms are uncommon. Although the increased use of endovascular technologies, controversy persists over the management. Contained rupture may be more difficult to diagnose, hence delay the management. We report a case of contained rupture of renal artery aneurysm treated with selective embolization prior to nephrectomy.

### 1. Introduction

Arterial aneurysms are defined as focal, isolated dilatation of all three layers of the arterial wall that measured >1.5 times the diameter of the disease-free proximal adjacent arterial segment.<sup>1</sup> Renal artery aneurysms (RAAs) occur in approximately 0.1 % of the general population.<sup>2</sup> However, with the widespread use of vascular imaging and workup for hypertension, the incidence of RAAs has increased lately.<sup>3</sup> In 2015, Klausner and colleagues published a study of the contemporary management of RAAs and only three ruptures were identified in 865 RAAs.<sup>4</sup> Ruptured RAAs are uncommon and mainly occur in patients with risk factor such as pregnancy and diameter >20 mm. Contained rupture may be more difficult to diagnose, and thus leads to delayed management. We present a case of contained rupture of RAA managed with selective embolization prior to nephrectomy.

### 2. Case presentation

A non-smoking 47-year-old male consulted for intermittent gross hematuria and left flank pain evolving for three months. The patient was on medication for diabetes (metformin) and had a history of urethral stricture. There was no fever and the blood pressure was normal. The physical examination revealed a painful left flank mass on palpation. Laboratory tests showed anemia (hemoglobin 7.3 g/dL), a total white blood cell count of 19 160 with neutrophil predominance, an elevated C-reactive protein level of 253 mg/L, and normal kidney function. Cyto-bacteriological examination isolated *Escherichia coli*, which was

sensitive to amikacin and chloramphenicol. Abdominal computed tomography angiography showed a 37 × 15 mm ruptured aneurysm (Fig. 1), with a perirenal hematoma measuring 101 × 106 × 107 mm (Fig. 2).

The diagnosis of ruptured left renal artery aneurysm in a context of infection was confirmed. The patient received emergency blood transfusion, antibiotics, and surgery was performed by lombotomy a few hours later. However, during exploration, a renal compartment shieldling was found and the nephrectomy could not be initially performed. Hence, selective embolization prior to surgery was performed. A few days later, the patient underwent a left nephrectomy through a median laparotomy. Surgical exploration showed an inflamed and burst left kidney, with a necrotic lower pole and multiple blood clots with a presence of pus (Fig. 3). Bacteriological examination of the pus isolated *Escherichia coli*. After surgery, the patient was in intensive care unit for four days. The postoperative period was uneventful and the patient was discharged on postoperative day 9. After a 34-months follow-up period, the patient was asymptomatic et maintained a normal kidney function.

### 3. Discussion

RAAs are rare with an estimated incidence of 0.1 % in the general population.<sup>2</sup> This incidence is underestimated by autopsy series (<0.01–0.09 %) whereas angiographic studies may overestimate it (0.3–2.5 %).<sup>2,3</sup> Klausner and colleagues presented a multi-institutional study of the management of RAAs. They collected a total of 865 RAAs in 760 patients at 16 institutions.<sup>4</sup> Comorbidities associated with RAAs,

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in order of frequency, as identified by Klausner and colleagues, include hypertension, hypercholesterolemia, smoking, diabetes mellitus, coronary artery disease, chronic obstructive pulmonary disease, and connective tissue disorder (Ehlers-Danlos syndrome, Marfan syndrome).<sup>4</sup> The same authors found that most patients (75 %) were asymptomatic, with the aneurysm discovered incidentally, and 25 % presented with symptoms such as difficult-to-control hypertension, flank pain, hematuria and abdominal pain. In our case, the patient was on medication for diabetes and consulted for gross hematuria and flank pain, as described in the literature.

Computed tomography angiography is the diagnostic tool of choice, followed by magnetic resonance imaging, ultrasonography, and catheter-based arteriography.<sup>2,3</sup> Angiography detects and characterizes aneurysms (size, neck diameter and type).<sup>5</sup> The topographic classification of RAAs distribute them into type I (aneurysms located in the main renal artery), type II (aneurysms located in the hilum), and type III (intrarenal aneurysms).<sup>6</sup> Non-contrast enhanced magnetic resonance angiogram is recommended to establish the diagnosis of RAAs in patients with increased radiation exposure risk or renal insufficiency, and also in children, women child bearing potential and contraindications to angiography.<sup>2</sup> In our case, the computed tomography angiography findings confirmed the diagnosis.

Ruptured RAAs can be life-threatening, with a mortality of approximately 10 % in the general population. Contemporary rupture rates are estimated at 3–5 %.<sup>2</sup> Klausner and colleagues identified three ruptured RAAs for an overall rupture rate of 0.3 %. All ruptured RAAs were >30 mm and the rate of rupture among RAAs >30 mm was 18 %.<sup>4</sup> Due to common hemodynamic instability, most ruptures are diagnosed at the time of presentation.<sup>7–9</sup> Keys risk factors of rupture are pregnancy, diameter >20 mm, and increase in sac dimension faster than the average growth.<sup>10</sup> In our case, hemodynamic stability and intermittent symptoms evolving for three months suggest that the rupture was contained and explain delayed diagnosis. The risk factor found were the size and the infection.

Infected aneurysms are rare with the widespread use of antibiotics. The most common responsible pathogens are *Salmonella*, *Staphylococcus* and *Streptococcus* species.<sup>11</sup> In our case, *Escherichia coli* was found both in urines and pus. These findings suggest a preexisting urinary tract infection in a patient with history of urethral stricture and diabetes.

According to the contemporary literature,<sup>2,12</sup> indications for RAAs intervention include rupture, size >30 mm, and size <30 mm with any of the following: hypertension, pregnant female or female child bearing age, deteriorating renal function, flank pain, dissecting aneurysms causing stenosis, patients with single kidney, intrarenal

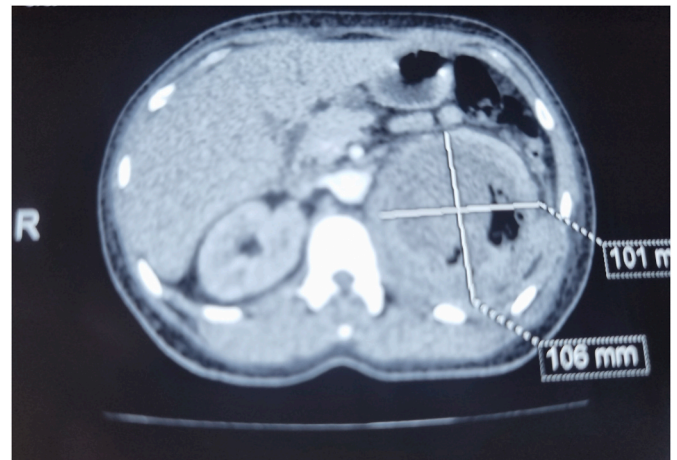


Fig. 2. Axial section of the abdominal CT scan showing a perirenal hematoma measuring 101 × 106 × 107 mm.

thromboembolism, or infarction. Selective coil embolization is the most widely performed technique and is feasible in all three types of aneurysm.<sup>6,13</sup> In many cases, renal salvage and renal reconstruction may not be feasible, and thus nephrectomy should be considered.<sup>2</sup> In our case, we performed selective embolization to stop the bleeding prior to nephrectomy. Our patient survived and was asymptomatic with a normal kidney function in a 34-months followed-up period.

#### 4. Conclusion

Due to the widespread use of cross-sectional imaging in other diseases and workup for hypertension, aneurysms are being discovered incidentally, and thus treated before rupture. Contained rupture may be difficult to diagnose due to the common hemodynamic stability. Therefore, clinicians must consider the possibility of ruptured renal artery aneurysm when encountering a patient with gross hematuria and flank pain.

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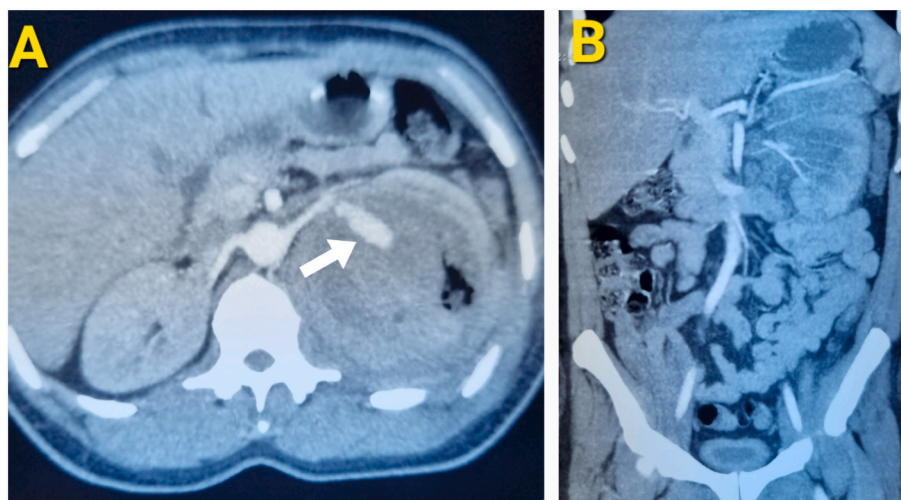


Fig. 1. (A) axial section and (B) coronal section of the abdominal CT angiography showing a 37 × 15 mm ruptured aneurysm (arrow).



**Fig. 3.** Postoperative photograph showing a burst kidney with multiples blood clots.

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

#### CRedit authorship contribution statement

**Ibrahima Cissé:** Writing – review & editing, Writing – original draft, Software, Methodology, Data curation, Conceptualization. **Modou Ndiaye:** Visualization, Validation, Methodology, Investigation. **Mbaye Thiam:** Supervision, Resources. **Oumar Gaye:** Validation, Supervision. **Mouhamed Diallo:** Resources, Investigation. **Papa Ahmed Fall:** Validation, Supervision.

#### Declaration of competing interest

The authors report no declarations of interest.

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