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Large renal artery aneurysm masquerading as renal cell carcinoma

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ABSTRACT

Renal artery aneurysms (RAAs) are rare. Diagnosis is typically incidental with most cases asymptomatic and detected on routine imaging. Rarely large saccular RAAs may appear to extend to the neighbouring renal parenchyma. Differentiating these from renal tumours can be difficult and subsequent investigation with biopsy may result in fatal rupture. Our case describes an RAA arising from the right renal artery masquerading as renal cell carcinoma (RCC). Emphasis is placed upon thorough radiological evaluation ensuring that RAA is considered and excluded from the differential diagnosis prior to biopsy or surgical intervention. The role of multidisciplinary input is also emphasised.

1. Introduction

Renal artery aneurysms are a rare entity. Estimated incidence upon autopsy is 0.09%.[1] Most cases are asymptomatic and incidentally diagnosed following radiographic work up of unrelated conditions. Incidental cases may be detected either on standard non contrast imaging of the abdomen or on a single portal-venous phase study. Appearing as well circumscribed, enhancing, homogenous lesions of soft tissue density, large saccular RAAs within close proximity of renal parenchyma may be incorrectly mistaken for RCC. Such a mistake would have disastrous consequences if needle biopsy or surgery for the mass was undertaken without establishing a diagnosis. Here we describe a large RAA having the appearance of RCC on initial computed tomography evaluation. We highlight the importance of considering RAA within the differential diagnosis and emphasise the utility of thorough radiological investigation and a high index of suspicion.

2. The case

A 64-year-year female presented with non-specific back and right flank pain radiating to the lower abdomen. Her history included gastro-oesophageal reflux, endometriosis, depression and prior hysterectomy. Family history included a ruptured aortic artery aneurysm for which her mother had died. Apart from mild tenderness at the right costovertebral angle physical examination was unremarkable. Bloods tests revealed mildly impaired kidney function with glomerular filtration rate of 56 ml/min/1.73 m^2 and creatine elevated to 102 ummol/L.

A two-phase computed tomography (CT) scan was organised to exclude obstructive renal calculi. Images in the pre contrast and portal-venous phase revealed a homogenous, well circumscribed lesion of soft tissue density, 7cm in diameter appearing to arise medially in the upper pole of the right kidney. Possible RCC was suspected. Searching for prior imaging a magnetic resonance imaging (MRI) of the spine performed a year ago for back pain also showed a smooth contoured lesion in the kidney appearing as a soft tissue lesion. Homogenous enhancement, lack of nodular or cystic structures coupled with regularity of peripheral contour on serial imaging necessitated renal duplex ultrasound to further define blood flow and assess for solid or cystic components. Urine cytology was also completed prior to possible biopsy or nephrectomy pending results of all tests.

At follow, up urine cytology showed benign urothelial cells. Renal ultrasound (US) with doppler revealed a hypoechoic, ovoid lesion with prominent vascular flow throughout (see Fig. 1A). RAA was then considered, and CT angiography organised. Fig. 1B displays a 7cm diameter, well circumscribed enhancing mass arising from the right renal artery. Pre contrast Hounsfield units (HU) were 50 and post contrast HU were 135. Contrast enhancement of the parenchyma of the lower pole of right kidney appeared compromised compared to the left kidney as shown in Fig. 1C.

The patient subsequently underwent digital subtraction angiography

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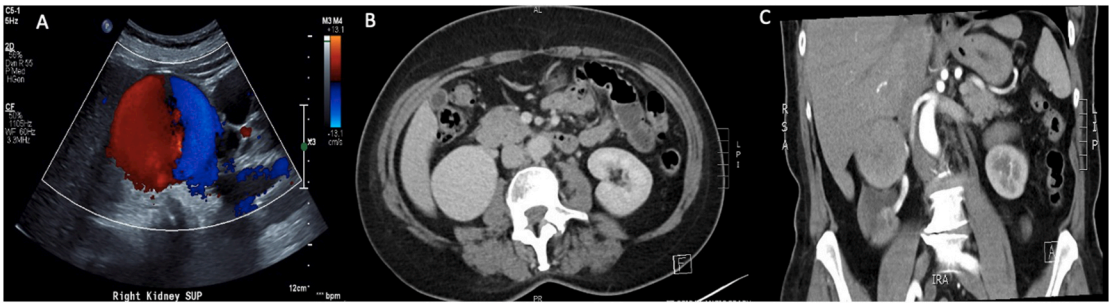

Fig. 1. A. US KUB with doppler displaying prominent vascular flow through a hypoechoic ovoid mass. Right kidney parenchyma is seen medial to the lesion.
B. Contrast CT showing a homogenous well circumscribed lesion of soft tissue density appearing to arise in the upper pole of the right kidney.
C. CT with contrast confirming an enhancing lesion appearing to arise from the right renal artery. Pre and post contrast HU of the lesion were 50 and 135 respectively. Note the prominent enhancement of the left kidney compared to the lower pole of the right.

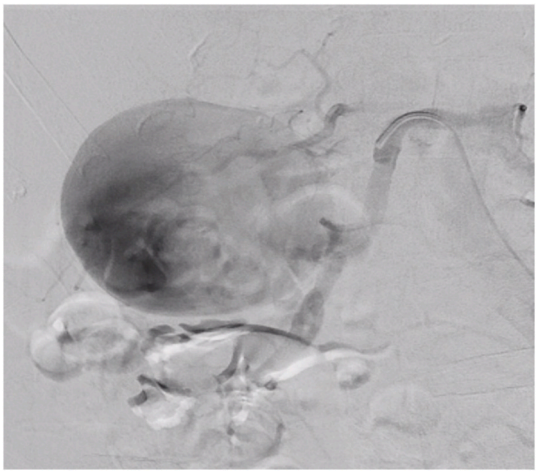

Fig. 2. DSA selective renal arteriogram confirming right renal artery aneurysm.

(DSA) and radioisotope renography. 3-Mercaptoacetyltriglycine (MAG 3) scan showed a right kidney reduced in size compared to the left and split renal function of 84% on the left and 16% on the right. DSA of the renal arteries displayed a large RAA. Selective right renal arteriogram is shown below (Fig. 2).

The patient underwent endovascular stenting of the aneurysm and a 7 × 5cm Viabahn Stent was placed. Post procedural CT angiography showed a thrombosed aneurysm with a patent stent traversing the right renal artery across the neck of the aneurysm (Fig. 3A). No endoleak was noted. Interestingly, the lower pole of the right kidney demonstrated ongoing reduced enhancement suggestive of ischemia. This is consistent with pre procedural findings on angiography suggesting that embolic phenomena had resulted in infarction of renal parenchyma, a known complication of RAA.

Follow up occurred at three weeks with a repeat duplex US. US revealed no flow within the thrombosed aneurysm (Fig. 3B).

3. Discussion

RAA is defined as a dilated segment of renal artery twice the diameter of normal, containing all three layers of the vascular wall. Epidemiological studies show strong female predominance and congenital associations such as fibromuscular dysplasia.[1]

Most cases are asymptomatic. Symptoms such as flank pain and haematuria may occur while hypertension is the most common clinical finding. Acute rupture may result in uncontrolled, intractable hypotension and haemorrhagic shock.[1] Risk of rupture is relatively low compared to aneurysms of the other main vessels However factors such as blood pressure and aneurysmal size are linearly proportional to rupture risk. Mortality of rupture is reported at 10%.[1]

Complications include thrombosis compromising flow to the kidney, embolism, with subsequent renal infarction and urinary obstruction secondary to extrinsic compression. Intervention with endovascular stenting is indicated in cases of rupture, high risk of rupture, ongoing symptoms, intractable hypertension, or large diameter (>2cm). Nephrectomy may be indicated if hemodynamically unstable.[1]

To date two cases of RAA mimicking neoplastic renal masses have been reported in the literature while two presentations with pseudoaneurysm have also been described.[2–5] Unfortunately both radical and partial nephrectomy have been performed where pre-operative

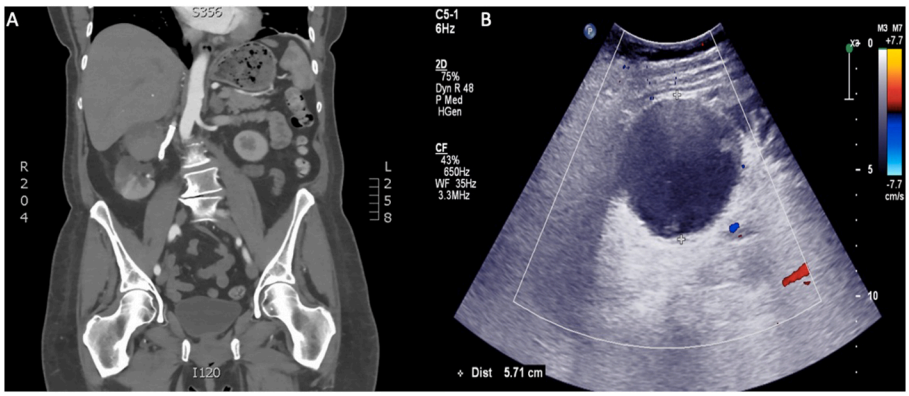

Fig. 3. A. Post procedural angiogram. Stented right renal artery is patent with influx of contrast into aneurysm. See heterogenous mass suggestive of thrombus formation within aneurysm.
B. US duplex three weeks following discharge. No flow is noted within the thrombosed aneurysm while flow to right kidney via the renal artery is intact.

radiological diagnosis of RCC was later proved incorrect on pathological analysis.[2,5] Whilst typically not standard practice, in this case US duplex was ordered to further clarify the architecture of the lesion and blood flow. As a non-invasive means of further structural clarification when a high index of suspicion is exercised for lesions not entirely consistent with RCC US duplex is recommended as a further problem solving tool.[4]

US doppler is the initial step in diagnosis of RAA with subsequent CT angiography or MRI required to further define the size, location, and characteristics of the aneurysm. DSA is considered the gold standard.[1] Multidisciplinary management including input from nephrology, radiology, vascular and urological teams ultimately directs management. In our case, we highlight the importance of multidisciplinary management, noting that nephrectomy was avoided and the patient received successful endovascular intervention.

4. Conclusion

Modern medicine has afforded medical professionals a wealth of radiological options when investigating suspicious lesions identified on imaging. Despite their rarity, large RAAs may mimic RCCs on radiological analysis and clinicians must consider the diagnosis as part of a broad differential. Here, we emphasise the importance of thorough radiological workup of renal lesions suggestive of RCC prior to definitive biopsy and/or nephrectomy. The consequences of incomplete evaluation of such ambiguous radiological findings may be disastrous.

Declaration of competing interest

- Written informed consent was obtained from the patient's family for publication of this case report and the accompanying images.
- The authors declare no conflict of interest.
- Approval of the research protocol by an Institutional Reviewer Board: N/A
- Registry and the Registration No. of the study/trial: N/A

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References

1. González J, Esteban M, Andrés G, Linares E, Martínez-Salamanca JI. Renal artery aneurysms. *Curr Urol Rep*. 2014 Jan;15(1):376. https://doi.org/10.1007/s11934-013-0376-z.PMID:24363127.
2. Osako Y, Tatarano S, Nishiyama K, et al. Unusual presentation of intraparenchymal renal artery aneurysm mimicking cystic renal cell carcinoma: a case report. *Int J Urol*. 2011 Jul;18(7):533–535. https://doi.org/10.1111/j.1442-2042.2011.02775.x.Epub.2011.May.16. PMID: 21569110.
3. Vitale V, Di Serafino M, Vallone G. Renal artery aneurysm mimicking a solid parenchymal lesion. *J Ultrasound*. 2013 Jun 4;16(3):131–134. https://doi.org/10.1007/s40477-013-0021-1. PMID: 24432164; PMCID: PMC3771572.
4. Campbell SP, Rowe SP, Gorin MA, Allaf ME. Renal pseudoaneurysm mimicking local cancer recurrence after partial nephrectomy. *Urol Case Rep*. 2016 Dec 30;11:1–3. https://doi.org/10.1016/j.eucr.2016.10.011. PMID: 28083472; PMCID: PMC5219613.
5. Inci K, Cil B, Yazici S, et al. Renal artery pseudoaneurysm: complication of minimally invasive kidney surgery. *J Endourol*. 2010 Jan;24(1):149–154. https://doi.org/10.1089/end.2009.0342.PMID:19954351.

Abbreviations:

RAA: Renal artery aneurysms
RCC: Renal cell carcinoma
US KUB: Ultrasound kidneys ureters bladder
US: Ultrasound
CT: Computed Tomography
MAG 3: 3-Mercaptoacetyltriglycine
DSA: Digital subtraction angiography
MRI: Magnetic Resonance Imaging
HU: Hounsfield units