

**Case Report****Renal Artery Aneurysm Presenting with Hematuria****A. Qarro, M. Ghadouane, Y. Elharrech, R. Zaini, A. Ameer and M. Abbar***Urological Clinic, Military Hospital Mohamed the Fifth, Rabat, Morocco***ABSTRACT**

Renal artery aneurysm is a relatively uncommon form of renovascular disease. Early diagnosis by appropriate imaging is essential in order to avoid emergency nephrectomy for rupture. We report a 78 year old man who presented with gross hematuria. Doppler ultrasound and CT showed aneurysm of the right renal artery. Because of hemodynamic instability, right nephrectomy was performed with a good outcome.

**Key Words:** Renal artery, aneurysm, treatment

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**INTRODUCTION**

Renal artery aneurysm (RAA) is a localized dilatation of the artery secondary to weakness of the arterial intima and media. Most RAAs are small (1–2 cm) and unilateral. The etiology of RAA is either congenital or acquired. The malformation is usually diagnosed by Doppler ultrasound, computerized tomography or renal angiography<sup>1</sup>. We report a patient who presented with macroscopic hematuria secondary to RAA.

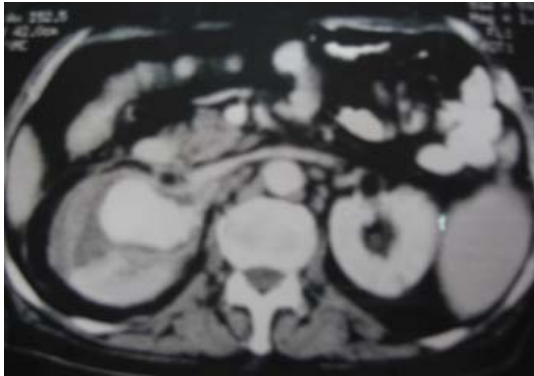
**CASE REPORT**

The patient, a 78-year old man, presented with total, macroscopic hematuria for 10 days. Physical examination revealed right lumbar fossa tenderness. Abdominal ultrasound revealed right hydronephrosis with a lesion in the hilum of the kidney measuring 52mm in diameter and communicating with the renal pedicle. Doppler ultrasound showed enlargement of the right renal artery (52-44 mm) with atheroma and calcification, compatible with a saccular aneurysm of the right renal artery. There was no arterialisation of venous flow in the kidney.

Contrast-enhanced computerized tomography revealed a large right kidney with subcapsular hematoma. There were two lesions showing enhancement after IV contrast injection, compatible with intra-renal aneurysm of the right renal artery (Fig. 1). The nephrogram phase of the right kidney was hypodense. During follow-up there was aggravation of the hematuria with hemodynamic instability which required urgent nephrectomy. Pathologic study of the operative specimen showed aneurysmal dilatation of the renal artery communicating with the excretory system, with necrosis and pyelonephritis. Postoperative recovery was good.

**DISCUSSION**

RAA is uncommon. Rouppe (1770) described the first case in a sailor who died after a fall on his right flank. Autopsy revealed a large false aneurysm with rupture. Rouppe stated that RAA accounts for nearly 20% of all visceral aneurysms<sup>1,2</sup>. The incidence of RAA varies according to the way of diagnosis, from 0,009 % in an autopsy study to



**Fig. 1:** CT scan shows intrarenal aneurysm of the right renal artery.

0.1-1.5 % in patients with hypertension who underwent arteriography<sup>1</sup>. The incidence was 0.3% in patients who underwent aortography, and 1.5% in a series of kidney donors<sup>3</sup>.

Poutasse has classified these malformations into saccular, fusiform, dissecting, false and intrarenal aneurysms<sup>4</sup>. On average, patients' age ranged from 40–60 years. Extraparenchymal aneurysms predominate, comprising approximately 85% of RAA, and the rest (15%) are intraparenchymal. Of the extraparenchymal type, 70% are saccular, 20% fusiform and 10% dissecting. Of patients with RAA, 20% present with bilateral and 30% with multiple aneurysms. RAA occurs equally in men and women, although ruptures are more common in reproductive-aged women.

Most often, RAA is asymptomatic. Sometimes patients present with hypertension, hematuria, lumbar pain and, rarely, a palpable mass. They may present with hemorrhagic shock and pain due to dissection, thrombosis, renal infarct, rupture or bleeding into the excretory system with hematuria<sup>1,3</sup>. Factors predisposing to complications are hypertension, pregnancy, absence of calcification of the wall, and diameter >1.5 cm<sup>1,3</sup>. During pregnancy the risk of rupture is increased due to increased blood flow, intra-abdominal pressure and vascular changes secondary to increased steroid production. Rupture may cause mortality for both mother and foetus<sup>5,6</sup>.

RAA can be secondary to Takayasu arteritis, fibro-muscular dysplasia, Kawasaki di-

sease, polyarteritis nodosa, tuberculosis, neurofibromatosis, or Ehlers-Danlos syndrome<sup>7</sup>. RAA may appear as a vascular complication after kidney transplantation. It occurs in less than 1% of recipients, but can cause hypertension, renal dysfunction and even graft loss<sup>8</sup>. Mycotic RAA may be secondary to immunosuppression after renal transplantation<sup>9</sup>.

The diagnosis may be confirmed with Doppler ultrasound, arteriography or spiral CT imaging. CT angiography and 3-dimensional reconstruction allow accurate pre-interventional planning by defining the precise size and location of the aneurysm, the presence of calcification, thrombosis or dissection. Magnetic resonance angiography (MRA) with gadolinium enhancement and 3-dimensional reconstruction can produce images similar in quality to those obtained with arteriography. Imaging studies can also differentiate between fibro-muscular dysplasia and pseudo-aneurysm, which may occur after kidney biopsy, penetrating (stab or gunshot) renal trauma, percutaneous nephrostomy or nephrolithotomy, endopyelotomy, ureteroscopy or endoscopic fulguration of upper urinary tract transitional cell carcinoma<sup>10-14</sup>. Renal artery pseudo-aneurysm may present many years after the injury. In cases of hematuria, flank pain and CT showing a tumour in the renal hilum, the patient should be questioned about previous abdominal trauma, as pseudo-aneurysms can rupture many years after the causative injury<sup>14</sup>.

Endovascular treatment of RAA involves a stent graft placed under angiographic control across the neck of the aneurysm to exclude it from the circulation and preserve distal flow<sup>15,16</sup>. The stent is placed via a percutaneous femoral approach<sup>17</sup>. Angiography, which confirms the diagnosis, allows selective embolization of pseudo-aneurysms arising from interlobular arteries inside the parenchyma of the kidney<sup>18-20</sup>. It is minimally invasive, safe, effective for control of haemorrhage from a pseudo-aneurysm, and specifically indicated in patients with haemodynamic instability<sup>19,22,23</sup>.

Surgery to prevent rupture is indicated for aneurysms >1.5cm in diameter, those asso-

ciated with pregnancy, and when the size of the aneurysm has increased on sequential angiography<sup>3</sup>. The objective of surgery is patch angioplasty using autologous saphenous vein, internal-iliac artery graft or prosthetic material<sup>24</sup>. It can be performed in vivo to reduce ischaemic time<sup>3,25</sup> or ex vivo, especially for intrarenal aneurysms, with auto-transplantation in the iliac fossa<sup>3,25-29</sup>. RAA resection and reconstruction have been guided by a robot-assisted laparoscopic approach<sup>30</sup>. Nephrectomy is indicated for multiple intrarenal aneurysms, renal atrophy, infarct or prior failed revascularization, and may be inevitable for ruptured RAA<sup>3,28</sup>. The prognosis after rupture of RAA has improved in the last few decades, but rupture during pregnancy still carries a high mortality rate (56% for the mother and 78% for the fetus)<sup>6</sup>.

RAA is rare, and often incidentally discovered during imaging. The treatment of choice is endovascular (angio-embolization or stent grafting under angiographic control). Follow-up with angiography is recommended to avoid emergency nephrectomy for rupture of RAA.

## REFERENCES

1. Nguinkeu BN, Eucher P, Vandenbossche P, Lacrosse M, Van Cangh PJ, Lorge F. Ruptured renal artery aneurysm: a rare cause of macroscopic haematuria. *Progrès en urologie* 2002, 12, 454-458.
2. Von Ronnen JR. The Roentgen diagnosis of calcified aneurysms of the splenic and renal arteries. *Acta Radiol (Sokh)* 1953; 39: 385-400.
3. Ortenberg J, Novick AC, Straffon RA, Stewart BH. Surgical treatment of renal artery aneurysms. *Brit J Urol* 1983, 55, 341-346.
4. Poutasse EF. Renal artery aneurysm. *J Urol* 1975; 113: 443-49.
5. Soliman KB, Shawky Y, Abbas MM, Ammary M, Shaaban A. Ruptured renal artery aneurysm during pregnancy, a clinical dilemma. *BMC Urol* 2006, 6: 22.
6. Pliskin MJ, Dresner ML, Hassell LH, Gusz JR, Balkin PW, Lerud KS, Larson AW. A giant renal artery aneurysm diagnosed post-partum. *J Urol.* 1990; 144: 1459-1461.
7. Matsubara K, Matsumoto K, Kameyama K, Obara H, Kitajima M. Large renal artery aneurysm in Takayasu arteritis. *J Vasc Surg.* 2006 Nov, 44(5): 1107-9.
8. Asztalos L, Olvaszto S, Fedor R, Szabo L, Balazs G, Lukas G. Renal artery aneurysm at the anastomosis after kidney transplantation. *Transplant Proc.* 2006 Nov; 38(9): 2915-8.
9. Fujikata S, Tanji N, Iseda T, Ohoka H, Yokoyama M. Mycotic aneurysm of the renal transplant artery. *Int J Urol* 2006 Jun; 13(6): 820-3.
10. Sharma AK, Suni S, Rowlands P, Bakrar A. Pseudo-aneurysm with severe hematuria in renal allograft after renal biopsy treated by percutaneous embolization. *Nephrol Dial Transplant* (2002) 17: 934-935.
11. Cantasdemir M, Adaletli M, Cebi D, Kantarci F, Selcuk ND, Numan F. Emergency endovascular embolisation of traumatic intra-renal arterial pseudo-aneurysms with N-Butyl Cyanoacrylate. *Clin Radiol*, 58(7), July 2003, 560-565.
12. Voiculescu A, Brause M, Engelbrecht V, Sandmann W, Pfeiffer T, Grabensee B. Hemodynamically relevant hematuria several months after biopsy of a kidney graft: an unusual cause. *Clin Nephrol*, 2003 Mar; 59 (3): 217-21.
13. Miller DC, Faerber GJ. Arterial pseudo-aneurysm complicating endoscopic fulguration of upper urinary tract urothelial carcinoma. *Urology*, 58(5), November 2001, page 799.
14. Lindekleiv H, Haro S, Nordhus K, Eggen T, Due J. Renal artery pseudo-aneurysm secondary to blunt trauma nine years earlier: case report and review of the literature. *Scand J Urol Nephrol.* 2008 Apr 15:1-4.
15. Malacrida G, Dalainas I, Medda M, Nano G, Inglese L. Endovascular treatment of a renal artery branch aneurysm. *Cardiovasc Intervent Radiol* 2007 Jan-Feb; 30(1): 118-20.
16. Gagnon RF, Kintzen G, Thérasse E. Endovascular treatment of a renal artery aneurysm and stenosis due to fibromuscular dysplasia. *Nephrol Ther.* 2008 Jun 9
17. Henry M, Polydorou A, Frid N, Gruffaz P, Cavet A, Henry I, Hugel M, Rüfenacht DA, Augsburg L, De Beule MD, Verdonck P, Bonneau M, Kang C, Ouared R, Chopard B. Treatment of renal artery aneurysm with the multilayer stent. *J Endovasc Ther.* 2008 Apr; 15(2):231-6]
18. Jebara VA, El Rassi I, Achouh PE. Renal artery pseudo-aneurysm after blunt abdominal trauma. *J.Vasc Surg* 27 (1998), pp. 362-65.
19. Fisher RG, Ben-Menachem Y, Whigham C. Stab wounds of the renal artery branches: Angiographic treatment by embolization. *Am.J.Roentgenol* 152 (1989), pp.1231-1235.
20. Miller DC, Foraner A, Faerber GJ. Successful angio embolisation after renal artery pseudo-aneurysms after blunt abdominal trauma. *Urology*, volume 598, Issue 3, March 2002, page 444.
21. Lau KY, Kan WK, Hou SM, Roebuck DJ, Fung WT. Embolisation of a renal artery pseudo-aneurysm in

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- a patient with renal malrotation and chronic aortic dissection. *Ann Acad Med Singapore*.2002 Jan; 31(1): 107-10.
22. Ikeda O, Tamura Y, Nakasone Y, Iryou Y, Yamashita Y. Nonoperative management of unruptured visceral artery aneurysms: treatment by transcatheter coil embolization. *J Vasc Surg*. 2008 Jun; 47(6):1212-9.
  23. Gutta R, Lopes J, Flinn WR, Neschis DG. Endovascular embolization of a giant renal artery aneurysm with preservation of renal parenchyma. *Angiology*. 2008 Apr-May; 59(2): 240-3.
  24. Fechner G, Hauser S, Müller SC. Renal autotransplantation combined with direct pyelocystostomy for a doubled renal artery aneurysm of a stone forming kidney. *Eur Urol*. 2008 Aug; 54 (2):457-9.
  25. Folkert O, Belzer MD, Salvatiena O, Alphonse MD, Palubinskas MD, Stoney RJ. Ex vivo renal artery reconstruction. Annual Meeting of the American Surgical Association. Quebec City, Quebec, May 7-9, 1975.
  26. Hayakawa K, Aoyagi T, Ohashi M, Ishikawa H, Hata M. Surgical treatment for an idiopathic renal arteriovenous fistula with a large aneurysm. *Int J Urol*.2001 Jan; 8(1): 26-8.
  27. Ramamoorthy LS, Vasquez JC, Taft PM, Mc Ginn RF, Hye RJ. Nonoperative management of acute spontaneous renal artery dissection. *Ann Vasc Surg* 2002; 16; 157-162.
  28. Thomas AA, Shields WP, Hamdi KM, Cuppo JA, Kickey DP. Renal artery aneurysm treated with ex vivo repair and auto-transplantation. *Surgeon* 2006 Aug; 4(4): 245-7.
  29. Pulli R, Dorigo W, Troisi N, Pratesi G, Innocenti AA, Pratesi C. Surgical treatment of visceral artery aneurysms: a 25-year experience. *J Vasc Surg*. 2008 Aug; 48(2):334-42.
  30. Luke P, Knudsen BE, Nguan CY, Pautler SE, Swinnimer S, Kiari R, Kapoor A. Robot-assisted laparoscopic renal artery aneurysm reconstruction. *J Vasc Surg* 2006 Sep; 44(3): 651-3.