



Arterial hypertension revealing renal artery stenosis associated with renal artery aneurysm: about one case with literature review

A.Boudchich , H.Naanani, O.El Allam, S.Iyazidi, Y.Ettaoumi

ABSTRACT

Introduction: Renal artery aneurysm (RAA) is a rare clinical entity that have some predisposing factors, it may cause different complications.

Case report: We report the case of a 52-year-old woman, with treatment-resistant arterial hypertension, whose investigations led to the diagnosis of right renal artery stenosis associated with a hilar aneurysm. Endovascular treatment was attempted, but after failure, a right aorto-renal bypass was performed.

Conclusion: the aim of surgical treatment of renal artery aneurysm is to eliminate its thromboembolic complications, there is still no consensus on the management of this condition.

INTRODUCTION

Renal artery aneurysm (RAA) is a rare condition with an incidence of less than 0.1% that is usually discovered incidentally during imaging examinations for other medical conditions. (1) In recent years, the incidental diagnosis of RAA has increased due to the wider use of CT, MRI and angiographic imaging. (2)

Predisposing factors for the development of AAR include congenital vascular and connective tissue diseases, degenerative atherosclerotic processes of the arterial wall, inflammatory lesions and vascular trauma. (3)

PATIENT AND OBSERVATION

We report the case of patient aged 52 with severe arterial hypertension, treated since 2010, but which has severely worsened in recent months with the appearance of headaches, right back pain and asthenia.

She had been treated with calcium channel blockers, Alpha blockers, thiazide diuretics, which had maintained a blood pressure of 170/110mmHg mornings and evenings for 1 month.

A recent check-up revealed moderate renal insufficiency with creatinine increased from 74 to 120 micromole between July 2021 and October 2023 and glomerular filtration from 81 to 45 ml.

An ultrasound doppler showed no abnormality, whereas an CT scanner shows very tight stenosis of the distal right renal artery associated with an hilar aneurysm measuring 1,41cm ; with a decrease in the length of the right kidney to 9 cm and cortico-medullary reduction compared with the left kidney.



(A)



(B) *figure 1: CT scan demonstrating moderate truncal stenosis of the right renal artery and a hilar aneurysm, (A: Transversal view; B: sagittal view)*

The patient underwent selective arteriography of the right renal artery from several angles, showing moderate truncal stenosis of the right renal artery and a hilar aneurysm, the distal end of which appears to be very close to the inferior and superior pyelic branches. The placement of a covered stent carries the risk of covering one or both of the pyelic arteries. There is also a defect in the opacification of the lower pole of the right kidney, which indicates a probable old embolism. It should be noted that during the entire intervention, there was persistent refractory arterial hypertension at 190mmHg systolic arterial pressure despite three drugs. It was therefore decided to remove the endovascular material and not to treat this lesion endovascularly, but to consider secondary implantation of an aorto- right renal bypass.

The patient underwent ten days later, a thrombectomy of the right renal artery, and an aorta right renal artery bypass using a Gore-Tex 6mm armed prosthesis.



figure 2: Intraoperative pictures showing aorta right renal artery bypass using a Gore-Tex 6mm armed prosthesis.

Arteriographic monitoring showed good permeability of the aorto-renal bypass and distal renal branches, with poor visualization of the superior pole of the right kidney.

Post-operative follow-up was satisfying, with a considerable improvement in blood pressure, hypertension was perfectly controlled, as well as normal renal function with creatine at $59\mu\text{mol/l}$.

DISCUSSION

The prevalence of renal artery stenosis is probably less than 1% of patients with mild hypertension but can increase to as high as 10% to 40% in patients with acute, severe, or refractory hypertension. Several studies report the prevalence of unilateral stenosis (compared with bilateral stenosis) approximately from 53% to 80%. (4)

Initial treatment for renal artery stenosis is observation instead of revascularization when either stenosis is 50% to 80%, and scintigraphy findings are negative, or the degree of stenosis is less than 50%. The management which involves serial control every 6 months with duplex scanning, accurate correction of dyslipidemia, use of drugs that block platelet aggregation, may require three or more different drugs to control hypertension.[5] Preferably angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs) are used for the purpose. Unfortunately, these two classes of drugs can also lead to increased serum creatinine levels and hyperkalemia, limiting their utility. In such a case, calcium channel blockers are a potential replacement. Strict control of serum cholesterol, with the use of statins in the regimen.[6]

in our patient's case, the stenosis is moderate and caused by atherosclerosis, and the hypertension is refractory, necessitating the introduction of three drugs which could explain the moderate renal insufficiency.

Renal artery aneurysms are rarely symptomatic, although some non-specific signs (lumbago) have been reported. If there is the slightest suspicion, it is essential to carry out imaging: a CT scan and/or angiography which represent the best procedure for establishing the diagnosis [7]

In the present case, the aneurysm was discovered following refractory hypertension, hence the importance of exploring resistant hypertension despite tri therapy.

Hypertension can be caused by recurrent intrarenal thrombo-embolism or by late injury to the intrarenal blood vessels because of long-term hypertension (8)

A published data using stress renography have suggested that surgical cure of reno-vascular hypertension can be predicted. (9,10,11)

In patients with stress-mediated bilateral disturbance of renal hippuran transport during preoperative scintigraphy examination, postoperative cure of high blood pressure cannot be expected.

AARs are rare and the therapeutic options for repair are varied

The incidence of AAR has been described as between 0.1% (autopsy) and 1.3% (renal angiography), perhaps as a result of this low incidence, there is no consensus on therapeutic management and recommendations for intervention have not been made due to a lack of solid support .

While most would intervene in cases of rupture, dissection, size >2.0 cm, renovascular hypertension, localized symptoms such as flank pain and hematuria, distal embolization, and an aneurysm in a woman of childbearing age.

The natural history of asymptomatic aneurysms is unclear and the results of treatment are poorly characterized. (7,10)

We chose to treat the patient because of hypertension resistant to medication, and the development of renal insufficiency, even though the renal artery stenosis was moderate, and the aneurysm was less than 2cm.

Open surgery is considered the primary/first choice of treatment, with success rates of 93%-100% in terms of freedom from occlusion and survival rates of 90% at 10 years. Although some reported cases have shown a higher risk of death within thirty days due to complications such as intraoperative and postoperative bleeding, there is no evidence in the literature of significant differences in short-term and long-term mortality rates with an endovascular approach, [11], [12], [13], [14].

Endovascular treatment performed with coils, onyx embolization or using a stent graft with or without adjunctive aneurysm embolization showed success rates of 83–100% and variable complication rates of 13–60%. (14, 15, 16, 17, 18, 19)

In our patient's case, endovascular treatment was tried first, but the risk of damaging a pyeliac artery was too high, so we opted for the safest option.

CONCLUSION

AAR is a rare entity and is often diagnosed following an incidental finding on imaging after an investigation for arterial hypertension or renal failure. The main reason for surgical resection of an AAR is to eliminate the source of the thromboembolism and thus avoid subsequent vessel damage leading to hypertension and loss of renal function. Whether treated endovascularly or by open surgery.

REFERENCES

- (1) Orion KC, Abularrage CJ. Renal artery aneurysms: movement toward endovascular repair. *Semin Vasc Surg* 2013; 26: 226-32.
- (2) Cohen JR, Shamash FS. Ruptured renal artery aneurysms during pregnancy. *J Vasc Surg* 1987; 6: 51-9.
- (3) Al-Katib S, Shetty M, Jafri SM, Jafri SZ. Radiologic Assessment of Native Renal Vasculature: A Multimodality Review. *Radiographics*. 2017 Jan-Feb;37(1):136-156
- (4) Fournier T, Sens F, Rouvière O, Millon A, Juillard L. [Management of atherosclerotic renal-artery stenosis in 2016]. *Nephrol Ther*. 2017 Feb;13(1):1-8.
- (5) Ricco JB, Belmonte R, Illuminati G, Barral X, Schneider F, Chavent B. How to manage hypertension with atherosclerotic renal artery stenosis? *J Cardiovasc Surg (Torino)*. 2017 Apr;58(2):329-338.
- (6) Henke PK, Cardneau JD, Welling TH, et al. Renal artery aneurysms: a 35-year clinical experience with 252 aneurysms in 168 patients. *Ann Surg* 2001; 234: 454-62; discussion 462-3.
- (7) Henricksson C, Bjorkerund S, Nilson AE, et al. Natural history of renal artery aneurysm elucidated by repeated angiography and pathoanatomical studies. *Eur Urol* 1985;11: 244-248.
- (8) MARTIN RS, MEACHAM PW, DIETSHEIM JA, MULHERIN JL JR, EDWARDS WH. Renal artery aneurysm: selective treatment for hypertension and prevention of rupture. *J Vasc Surg* 1989; 9: 26- 34.
- (9) LORIOS JH, ALLENBERG JR, HuPP T, STRAUSS LG, SCHMIDLIN P, IRNGARTINGER G, WAGNER R, MUKHOPADHYAY C. Predictive value of exercise renography for presurgical evaluation of nephrogenic hypertension. *Hypertension* 1987; 10: 280-286.
- (10) Hageman JH, Smith RF, Szilagyi DE, et al. Aneurysms of the renal artery: problems of prognosis and surgical management. *Surgery* 1978;84:563-571.
- (11) WP English, JD Pearce, TE Craven, DB Wilson, MS Edwards, J Ayerdi, et al. Surgical management of renal artery aneurysms *J Vasc Surg*, 40 (1) (2004), pp. 53-60
- [12] EM Marone, D Mascia, A Kahlberg, C Brioschi, Y Tshomba, R. Chiesa Is open repair still the gold standard in visceral artery aneurysm management? *Ann Vasc Surg*, 25 (7) (2011), pp. 936-946
- (13) P Tesson, G Hauptert, M Ammi, M Daligault, X Papon, B Enon, et al. Surgery of renal artery aneurysms: a monocentric retrospective study *Ann Vasc Surg*, 64 (2020), pp. 17-26
- [14] T Laurin, O Borghese, J Branchereau, G Karam, L Brisard, T LE Corvec Single centre experience in open and endovascular treatment of renal artery aneurysms *Ann Vasc Surg*, 79 (2022), pp. 17-24
- (15) V.I. Patel, M.F. Conrad, C.J. Kwolek, et al. Renal artery revascularization: outcomes stratified by indication for intervention *J Vasc Surg*, 49 (2009) 1480e1489
- (16) U.M. Bracale, M. Porcellini, L. del Guercio, et al. Embolization of a symptomatic pseudoaneurysm developing after transplant nephrectomy, *Intern Med*, 52 (2) (2013), pp. 291-292
- (17) Z. Zhang, M. Yang, L. Song, et al. Endovascular treatment of renal artery aneurysms and renal arteriovenous fistulas *J Vasc Surg*, 57 (3) (2013), pp. 765-770
- (18) J. Sedat, Y. Chau, J. Baque Endovascular treatment of renal aneurysms: a series of 18 cases *Eur J Radiol*, 81 (12) (2012), pp. 3973-3978
- (19) U.M. Bracale, D. Narese, I. Ficarelli, et al. Stent-assisted detachable coil embolization of wide-necked renal artery aneurysms *Diagn Interv Radiol*, 23 (1) (2017), pp. 77-80