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Case Report OMICS International

Angio-embolization of a Large Renal Artery Aneurysm: A Case Report and Literature Review

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Abstract

We report a rare case of a large 7.8 cm renal artery aneurysm with subsequent successful endovascular coil embolization. A 54-year-old lady presented with a 3-day history of gross hematuria. Computed tomography (CT) angiogram revealed a large 7.8 cm right renal artery aneurysm, which was successfully embolized with endovascular coils. 1-month and 12-months surveillance showed preservation of renal function with decreasing aneurysm size. Endovascular coil embolization of large renal artery aneurysm is a safe and viable treatment modality. Literature review demonstrates good treatment outcomes, with technical success rates of >90% and complication rates of <10%.

Keywords: Endovascular; Angio-embolization; Renal artery aneurysm

Introduction

Renal artery aneurysms (RAA) are rare, with a cited incidence of less than 1% [1]. Prior to the advent of endovascular techniques, open surgical repair was considered the conventional method of treatment for RAA. However, recent years has seen a growing trend towards safe and successful endovascular treatment in experienced hands. We present the case of a successful coil embolization of a 7.8 cm right renal artery aneurysm, and a brief review of the literature.

Case Report

Patient is a 54-year-old Chinese lady, non-smoker, with a past medical history of hypertension and hyperlipidemia. She presented with a 3-day history of persistent right sided flank pain, associated with suprapubic discomfort and gross hematuria. She denied any constitutional symptoms (fever, loss of appetite or loss of weight), or other urinary tract symptoms (dysuria or polyuria).

On physical examination, the patient was alert, afebrile, mildly hypertensive (blood pressure: 152/72) and not tachycardic (heart rate: 54 bpm). Her abdomen was soft and non-tender. Renal punch was negative bilaterally. An indwelling urinary catheter was inserted and mild hematuria was noted. Full blood count and coagulation profile was normal. Serum creatinine was normal at 81 μmol/L while the other electrolytes were normal. Urinalysis revealed an elevated white cell count of 40 cells/μL, and an elevated red cell count of >225 cells/μL. There were no casts, crystals, bacteria or yeast cells seen.

CT angiogram (Figures 1 and 2) revealed a bi-lobulated configuration of a right saccular renal artery aneurysm, most likely arising from a segmental branch. The main renal artery was seen wrapping around the aneurysm. There was a single renal artery with no significant anatomical variation. The aneurysm measured 7.8 cm in the largest axial dimension and compressed on the right renal pelvis and pelvi-ureteric junction, resulting in moderate hydronephrosis.

There was no active extravasation to suggest rupture or active bleeding. Left kidney and urinary bladder were unremarkable. Management options were discussed with the patient, which included endovascular embolization versus open repair. Pros and cons of either options were explained clearly and the patient opted for endovascular intervention. The procedure was performed under local anesthesia in the angiology suite.

Figure 1: Pre-operative CT angiogram showing a large 7.8 cm right renal artery aneurysm (axial view).

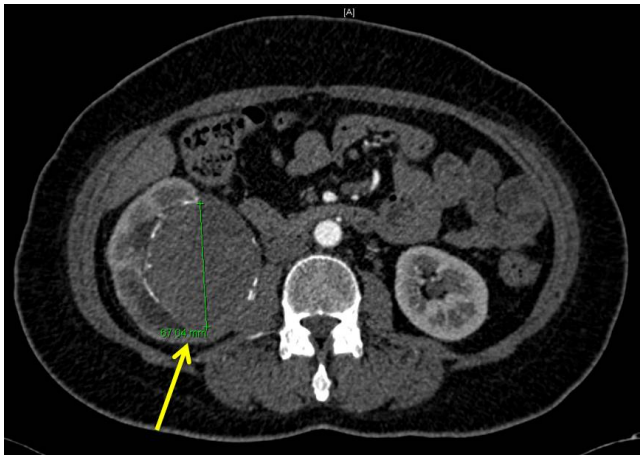

Figure 2: Pre-operative CT angiogram showing a large right renal artery aneurysm (axial view).

During the procedure, angiogram revealed a large saccular aneurysm arising from the mid polar segmental artery of the right renal artery (Figure 3). The single feeding artery was hypertrophied and there were no arteriovenous communication or extravasation. The rest of the arterial branches were normal and there no other aneurysms were detected. A 5Fr Cobra catheter (Terumo Corp, Tokyo, Japan) was advanced over a conventional 0.035-inch hydrophilic standard guidewire (Terumo Corp, Tokyo, Japan) into the feeding branch of the mid polar segmental artery. A Progreat microcatheter (Terumo Corp, Tokyo, Japan) was then advanced coaxially into the aneurysm neck. Four 6 mm × 14 cm and one 3 mm × 14 cm Nester coils (Cook Medical, Indiana, USA) were used for embolization, with subsequent complete occlusion of the feeding artery and no further filling of the aneurysm sac (Figure 4). The rest of the renal vasculature was well preserved.

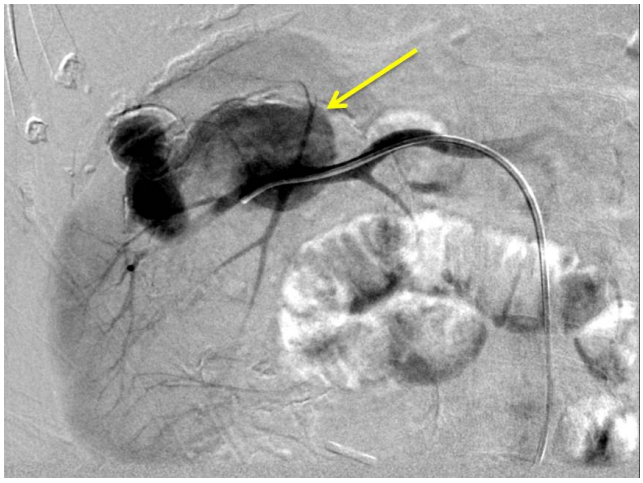

Figure 3: Pre-embolization angiogram showing right renal artery aneurysm.

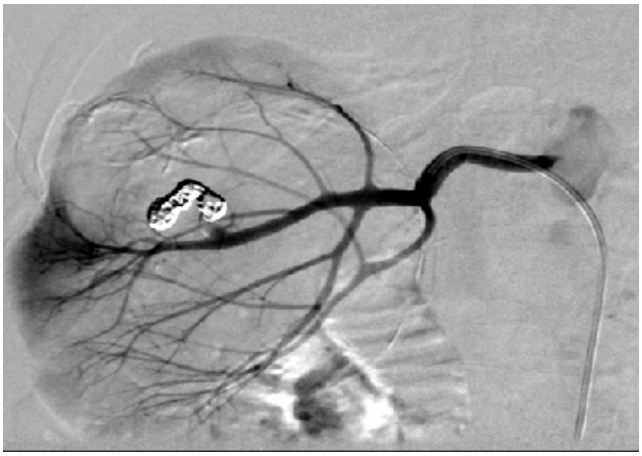

Figure 4: Post-embolization showing patent renal artery with no aneurysmal flow.

The patient had an uneventful post-procedure recovery and was discharged 2 days later with no rise in serum creatinine levels and improving gross hematuria. At review one month after discharge, the patient was well with no further complaints of hematuria or right flank pain. 1-month surveillance CT angiogram (Figure 5) showed a reduction in the aneurysm sac from 7.8 cm to 6.8 cm, with 12-months scans showing further decrease in size to 5.4 cm (Figure 6). Her renal function was normal at follow-up.

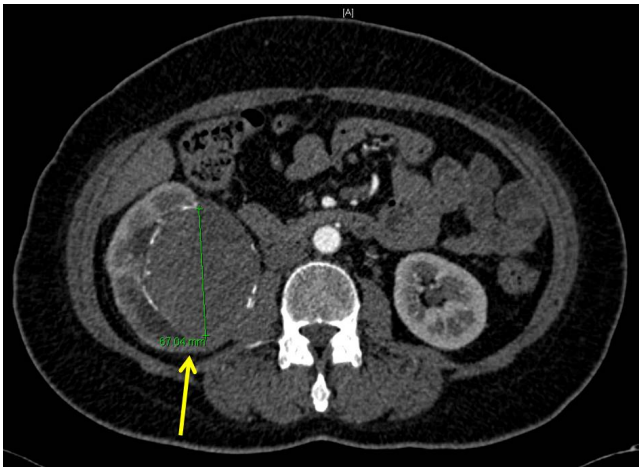

Figure 5: 1-month surveillance CT angiogram showing no aneurysmal flow and a decrease in size to 6.7 cm.

Discussion

Renal artery aneurysms are a rare disease with an incidence of less than 1%, and are typically found incidentally during imaging [1,2]. Indications and optimal method of repair of RAAs are controversial. Indications for repair generally include a size of >2 cm, those in women of childbearing age, ruptured aneurysms, localized symptoms, dissection, and refractory hypertension [1,3]. Open surgical repair is typically considered the standard of care for RAA, and surgical

interventions include anerysmectomy, primary aneurysmorraphy, bypass grafting, extracorporeal reconstruction with reimplantation or autotransplantation, and nephrectomy [2].

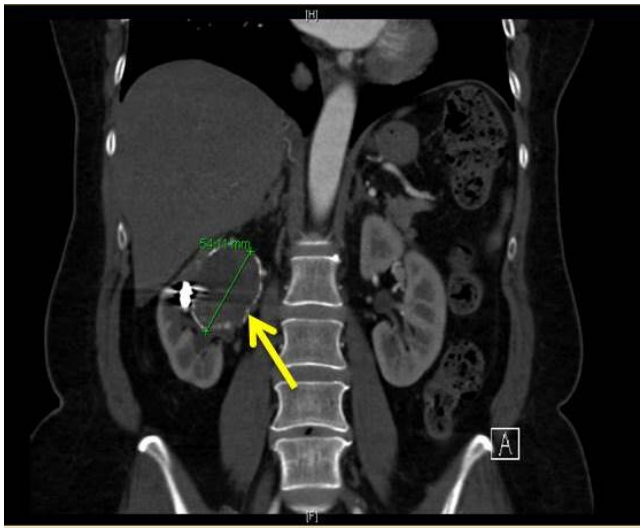

Figure 6: 12-months surveillance CT angiogram showing no aneurysmal flow and a decrease in size to 5.4 cm.

However, there have also been an increasing number of reports espousing the use of laparoscopic repair of RAAs. In recent years, the advent of endovascular repair also now represents a safe and alternative approach in selected patients. Literature review (Table 1) demonstrates good treatment outcomes of endovascular repair of RAA, with technical success rates of >90% and complication rates of <10%, which is comparable to that of open repair [1-10].

The general aim of endovascular repair is to exclude the RAA from high intra-arterial pressure, [3] without causing renal artery thrombosis or loss of major branch vessels that can result in a significant impairment in renal function. Endovascular techniques fall into two main categories–either transcatheter embolisation or exclusion through the use of stent grafts. Rundback et al proposed an angiographic classification system based on the treatment options for different types of RAA [11].

Type I RAAs are saccular and arise from either the main renal artery trunk or proximally from a large segmental artery, and are treated with stent grafts or stent/balloon assisted coil embolisation. Type II RAAs are fusiform and arise from either the main renal artery trunk or proximal segmental arteries, and are treated with surgery. Type III RAAs are intraparenchymal RAAs arising from small segmental/accessory arteries, and are treated with coil embolisation. In addition, Hallout et al also described requirements for successful embolization of renal artery aneurysms, which include a narrow aneurysm neck, and a small to medium sized aneurysm in the proper anatomic location [12].

Author (Year)	Number of RAA	Endovascular treatment	Outcomes
Paschalis (2008)[4]	3	All coil embolization	100% technical success rate
			No complications
Ikeda (2008)[5]	7	All coil embolization	100% technical success rate
		1 – additional stent graft	2/7 (29%) developed kidney infarcts due to migration of packing coils into native artery
Hislop (2009)[2]	91	NA	1.1% in-hospital mortality
			11% total complication rate (renal 2.2%, hemorrhagic 8.8%)
Morita (2012)[6]	2	All coil embolisation	100% technical success rate
			No complications
Kerim (2012)[7]	8	5 – coil embolization	100% preserved renal function
		2 – stent graft	100% clinical improvement in symptomatic patients
		1 – trunk artery occlusion	87% technical success rate – failure in 1 patient with aneurysm re-expansion > treated with covered stent
			4/8 (50%) – clinically silent branch occlusion with limited <25% ischemic parenchymal loss
Zhang (2013)[8]	9	7 – coil embolization	100% technical success rate
		1 – stent graft	3/9 (33%) post embolization syndrome
		1 – both	2/9 (22%) partial renal infarcts without renal insufficiency
Tsilimparis (2013)[9]	24	19 – coil embolization	96% technical success rate

		4 – stent graft	17% total complication rate
			9.1% renal impairment (30% reduction in glomerular filtration rate)
			0% mortality
Li (2015)[10]	6	5 – coil embolization	80% technical success rate in selective coil embolization with no significant renal function loss – failure in 1 patient with aneurysm relapse)
		1 – trunk artery occlusion	Trunk artery occlusion – ischemic parenchymal loss with mild kidney atrophy
Buck (2016)[1]	1082	NA	1.8% in-hospital mortality
			10.5% total complication rate (cardiac 2.2%, peripheral vascular 0.6%)

Table 1: Literature review of endovascular management of renal artery aneurysms.

Our patient had a renal artery aneurysm fed by one segmental branch vessel with a narrow neck, which did not appear to be perfusing a significant amount of renal parenchyma (hence a Type III RAA based on the Rundback et al classification). As a result, she was an ideal candidate for selective endovascular embolization.

Conclusion

Endovascular coil embolization of large renal artery aneurysm is a safe and viable treatment modality.

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