ISSN: 2149-2018

Applied Medical Research, 2021
VOL 8, NO. 1, PAGE 1 – 4
DOI: doi.org/10.47363/AMR/2021(8)206

CASE REPORT

Open Access

Acute Renal Infarcts from Spontaneous Intra-Renal Dissection: Case Series with a Review of Literature

Karan Daga[1], Benjamin SY Chua[2] and Manish Taneja[2]

[1]The University of Manchester, Faculty of Biology, Medicine and Health. United Kingdom

[2]Vascular and Interventional Centre. Singapore

ABSTRACT

Introduction: To explore the causes and management of renal infarction from pathologies such as renal artery fibromuscular dysplasia and spontaneous dissection. It is a rare occurrence and often misdiagnosed in clinical practice.

Methods: We present four patients, between 30-50 years of age, who have no underlying cardiac conditions, hypertension or diabetes mellitus. They presented with abdominal/loin/flank pain due to spontaneous renal artery dissection and were treated with endovascular stents. Two patients had renal artery fibromuscular dysplasia, confirmed by CT angiogram.

Results: All four patients recovered fully from the operation, with no post-operative complications noted. These patients were post-operatively managed medically with anti- platelet therapy for two years and have not experience any post-procedural complications at their 24-month follow up.

Conclusion: Classically visceral artery dissection can be managed by antiplatelet therapy alone, however fibromuscular dysplasia can cause spontaneous dissection with renal infarcts and this requires urgent treatment with endovascular stents. Further research is needed on the post-procedural medical management guidelines.

Advances in Knowledge: Renal artery fibromuscular dysplasia is a rare pathology which is commonly reported in literature to affect in females, whereas we present four young male patients. Additionally, all patients were treated with endovascular stents, as opposed to angioplasty.

ARTICLE HISTORY

Received June 20, 2021
Accepted June 26, 2021
Published July 30, 2021

KEYWORDS

Renal Infarction, Spontaneous Dissection, fibromuscular Dysplasia

Introduction

Renal infarcts are known to form due to cardio-embolic phenomena with occlusion of renal arteries.[1] It can also occur due to aortic disorders such as atheromas or aortic dissection [1]. The incidence of spontaneous primary renal or intra-renal dissection causing acute ischaemic renal infarcts is extremely rare [1,2]. Moreover, due to the non-specific presentation of renal infarcts it is often misdiagnosed [3]. We report our experience in 4 patients presenting with acute pain and renal infarcts. Primary spontaneous intra-renal segmental artery dissection was seen in two of the patients, whilst the other two patients had spontaneous fibromuscular dysplasia with dissection and renal infarcts.

Case 1

A 33-year-old male of Lebanese origin presented with a six hour history of sudden left loin pain. He had no known history of cardiac disease or hypertension, diabetes, trauma or smoking. A CT-scan showed left lower pole renal infarct (Figure 1). The left kidney was larger than the right kidney. An angiogram showed no evidence of fibromuscular dysplasia. There was a left lower pole segmental intra-renal artery dissection (Figure 2). This was treated with a drug eluting stent; 3.5 mm by 15mm (Figure 3). The patient's pain completely resolved immediately after the procedure and he was discharged from hospital after a 2 days stay.

Figure 1: CT scan shows left lower pole hypo-perfusion in keeping with acute renal infarct.

Contact Karan Daga ✉ karandagaib@gmail.com The University of Manchester, Faculty of Biology, Medicine and Health, United Kingdom

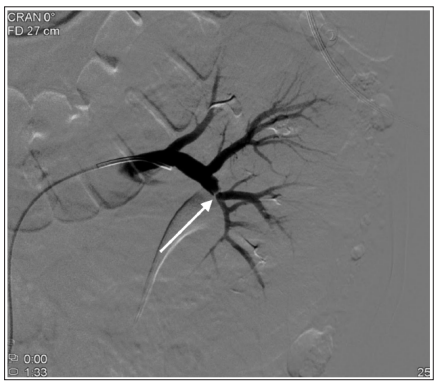

Figure 2: Angiogram shows left lower segmental renal artery dissection flap with near total occlusion.

Figure 3: Post stenting angiogram shows established arterial flow to the lower pole of the left kidney.

Case 2

A 47-year-old male, from a middle eastern origin, presented to accident and emergency with severe left flank pain that woke him from sleep, after midnight. There was no history of any underlying medical condition, specifically, no evidence of cardiac disease or hypertension, diabetes, trauma or smoking. A CT scan, including CT angiogram, showed a left upper pole renal infarct (Figure 4a). The angiogram showed bilateral duplicated renal arteries. There was evidence of focal fibromuscular dysplasia in the upper pole renal artery on the left side, associated with dissection and distal embolism in the renal artery distribution (Figure 5). This was treated with an endovascular approach; three overlapping stents were placed along the whole length of the dissected renal artery with preserved flow to the kidney established (Figure 4b). He recovered well and was discharged from hospital three days later.

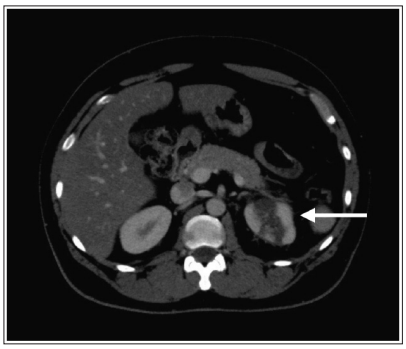

Figure 4a: CT scan prior to the placement of the stent, showing the renal infarct

Figure 4b: CT scan shows near complete resolution of renal infarct on follow up

Figure 5: Left renal angiogram showing the dissection flap originating near the beginning of the renal artery and spanning to its bifurcation

Case 3

A 35-year-old male, of middle eastern origin, presented to accident & emergency with sudden, severe right upper back pain. There were no risk factors for vascular disease and there was no underlying cardiac conditions or hypertension, diabetes, trauma or smoking. A CT scan showed a right upper pole renal infarct. CT angiogram and a catheter angiogram showed focal right renal artery fibromuscular dysplasia with dissection and distal embolisation to upper pole renal artery. This was treated with three overlapping stents along the entire length of the renal artery (Figure 6). Right renal blood flow was completely re-established. The patient recovered and was discharged from hospital four days later. Follow up scan showed less than 10% deficit in the renal function.

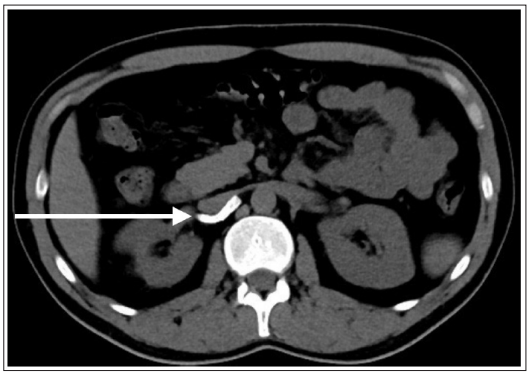

Figure 6: CT scan shows a sequel of right renal infarct with stents shown outlining the treated right renal artery

Case 4

A 37-year-old male, of Filipino origin, presented with severe left abdominal pain. The patient had no risk factors for vascular disease, such as hypertension, diabetes, trauma or smoking. A CT showed left lower pole renal infarct. A CT angiogram and a subsequent catheter angiogram showed an intra-renal artery dissection, with a normal left renal artery. This was treated with a single stent to re-establish flow. The patient recovered well and was discharged from hospital two days later.

Discussion

Renal infarcts are a rare cause of acute abdominal pain. Primary renal infarcts are known to occur as a result of cardio-embolic disease. The primary source of infarcts in this select group of patients is a thrombus or clot in the heart [3]. Renal dissection or infarcts secondary to type B aortic dissections are well documented [4]. This occurs as a tear in the aortic wall encroaches on the lumen of the renal arteries, with extension of the tear into the artery, or thrombosis secondary to the tear itself [4]. Occasionally, atheromas from the proximal aorta can cause acute renal infarcts.

Spontaneous segmental intra-renal artery dissections are extremely rare, with mostly isolated case reports or small series published [5]. They can be associated with fibromuscular dysplasia or may be isolated [5]. The cases we present suggest that spontaneous dissection may be a phenomenon in young patients, with the left renal artery more commonly affected than the right. Moreover, all four patients we present are males, between 30 and 50 years of age, which are novel findings, compared to existing literature. Renal artery fibromuscular dysplasia commonly presents in females, often with poorly controlled hypertension. The patients we present have no history of diabetes mellitus, atrial fibrillation, hypertension, marfanoid appearances, vasculitis or extra-renal malformations.

The focus in management of renal artery dissection and fibromuscular dysplasia is to prevent loss of renal function and relieve pain. Interventional management options include surgery, angioplasty or endovascular stent placement. Stenting was the treatment option taken for all of the patients and the intervention itself had no immediate post-procedural complications. All patients had a complete recovery from pain almost immediately after the stent was placed, with none of the patients complaining about pain more than two days after.

Compared to traditional surgical intervention, there are several advantages of stenting for renal artery pathologies, including renal artery fibromuscular dysplasia, stenosis, spontaneous dissection and so on. This is chiefly due to the fact that it is less invasive. Misra, et al. reported a 30-day mortality rate of 1.2% (n=13) out of a total of 1,052 patients for renal artery stenting [6]. In comparison, Modrall, et al. reported a mortality rate of 10.0% for a surgical approach [7]. Furthermore, recent advances in drug-eluting stents have had a noticeable improvement in efficacy. We used a drug-eluting stent in our patient (case 1) for two main reasons: (1) the patient needed a smaller diameter stent as the dissection was in the distal renal artery branch and (2) a drug-eluting stent was used with the premise of a better long-term patency. In a study comparing drug-eluting stents (n=175) to bare metal stents (n=163), Bradaric, et al. found the in-stent restenosis rate to be 18.6% in the bare metal stents group and 7.2% in the drug-eluting stents group.[8] These advances in safety and efficacy favour stenting in comparison to surgery.

Stent placement, incombination with medical treatment, has been shown to have lower complications than medical treatment alone. In a study by Zeller, et al. complications of congestive heart failure, myocardial infarction and stroke were common in both groups, although they had an incidence of 5.3% in medical treatment group compared with 2.9% in the stent and medical treatment group.[9] However, due to the lack of long-term data, literature on stents are limited. Zeller, et al. had limitations in their study as only 86 of their intended 300 patients were included and their primary endpoint was at 12 months [9].

Stent placement for renal artery dissection is not without risk of complications: risk of further renal infarction, renal artery rupture, need for haemodialysis or blood transfusions, surgical intervention for stenting-related complications and deep vein thrombosis [10,11]. Moreover, patients require anti-coagulants post-procedure. In a study of 179 percutaneous transluminal renal artery stent placement procedures, Ivanovic, et al. reported that major complications occurred in 8.4% of procedures [10]. They reported a 30-day mortality rate of 1.1%, however, these deaths were not definitively caused by the procedures [10]. Additionally, reintervention of a previously deployed stent could lead to renal artery thrombosis [11].

There is no definitive data or protocol as to what would be the right anti-coagulant treatment regime in these patients [3,12]. Specifically, the patients we have described have had no history of hypertension and no underlying cardiac disease. All patients that we presented received dual anti-platelet medication for six months, followed by single anti-platelet for two years. Since there was an absence of atheromatous disease and as the dissection flaps had completely healed, it was decided to stop anti-platelet therapy after two years in all patients, with the exception of one patient who is still on medication as he presented less than two years ago. All the four patients are still under follow-up with no adverse outcome from the anti-platelet therapy and have continued to progress well. All patients have sustained patency of their endovascular stents.

Another treatment alternative for renal artery fibromuscular dysplasia is balloon angioplasty, which is often the primary choice for uncomplicated cases. Renal artery fibromuscular dysplasia often presents with poorly controlled hypertension and is four times more common in females than males [13]. In such settings, renal artery stenting is reserved for failed cases of balloon angioplasty. Angioplasty is said to be a safer and less drastic method, compared to stenting [13]. The principal reason for treatment in common cases of renal fibromuscular dysplasia is the inadequately controlled hypertension, as loss of kidney function is less likely [13]. Our patients present with spontaneous acute renal artery dissections with infarcts related to renal artery fibromuscular dysplasia. Based on endovascular treatments

of dissection in other areas of the body, such as the aorta, it was decided to proceed with stenting, rather than performing angioplasty and repeated monitoring, to save the kidney and for better long-term patency. The current literature agrees that renal artery stenting should be the first choice for symptomatic renal artery fibromuscular dysplasia, possibly with acute dissection, to avoid repeated endovascular procedures [14].

It is best to treat renal infarcts as soon as possible. The kidney is estimated to survive ischemia for 60-90 minutes [12]. As our patients presented in an acute setting, we decided to proceed with endovascular intervention immediately. Our primary aim was to salvage the viable, but at-risk kidney, as we were treating in an acute setting. We propose to treat these patients with renal infarcts and spontaneous dissection as an emergency as soon as a diagnosis is made.

Conclusion

In conclusion, spontaneous intra-renal dissection is a rare cause of acute renal infarcts. It is often misdiagnosed and hence this condition should be borne in mind when coming across patients of a young age with no cardiac cause for the presentation. Symptoms can include abdominal, upper back and flank pain. A CT and/or a CT angiography can be performed to effectively demonstrate the extent of the condition and endovascular stenting was the preferred treatment option for our patients. There is a need to establish a protocol for the best anti-platelet treatment regime in these patients for a better long term outcome.

References

[1] Saeed K. Renal Infarction. Int J Nephrol Renovasc Dis. 2012; 5: 119-123.

[2] Lopez VM, Glauser J. A case of renal artery thrombosis with renal infarction. J Emerg Trauma Shock. 2010; 3: 302.

[3] Decoste R, Himmelman JG, Grantmyre J. Acute renal infarct without apparent cause: A case report and review of the literature. Can Urol Assoc J. 2015; 9: E237-E239.

[4] Li L, Zhuang SJ, Qi SH, Cui JS, Zhou JW, Zhu H, et al. Acute Thoracic Aortic Dissection (Stanford Type B) Complicated with Acute Renal Failure. Case Rep Vasc Med. 2013; 2013: 693435.

[5] Renaud S, LerayMoraguès H, Chenine L, Canaud L, Vernhet-Kovacsik H, Canaud B. Spontaneous renal artery dissection with renal infarction. Clin Kidney J. 2012; 5: 261-264.

[6] Misra S, Khosla A, Allred J, Harmsen WS, Textor SC, McKusick MA. Mortality and renal replacement therapy after renal artery stent placement for atherosclerotic renovascular disease. Journal of Vascular and Interventional Radiology. 2016; 27: 1215-1224.

[7] Modrall JG, Rosero EB, Smith ST, Arko III FR, Valentine RJ, Clagett GP, et al. Operative mortality for renal artery bypass in the United States: results from the National Inpatient Sample. Journal of vascular surgery. 2008; 48: 317-322.

[8] Bradaric C, Eser K, Preuss S, Dommasch M, Wustrow I, Langwieser N, et al. Drug-eluting stents versus bare metal stents for the prevention of restenosis in patients with renovascular disease. EuroIntervention: journal of EuroPCR in collaboration with the Working Group on Interventional Cardiology of the European Society of Cardiology. 2017; 13: e248-e255.

[9] Zeller T, Krankenberg H, Erglis A, Blessing E, Fuss T, Scheinert D, et al. A randomized, multi-center, prospective study comparing best medical treatment versus best medical treatment plus renal artery stenting in patients with hemodynamically relevant atherosclerotic renal artery stenosis (RADAR)–one-year results of a pre-maturely terminated 233study. Trials. 2017; 18: p.380.

[10] Ivanovic V, McKusick MA, Johnson III CM, Sabater EA, Andrews JC, Breen JF, et al. Renal artery stent placement: complications at a single tertiary care center. Journal of vascular and interventional radiology. 2003; 14: 217-25.

[11] Funaki B. Renal Ostial Angioplasty and Stenting. Part 2: Pitfalls and Complications. InSeminars in interventional radiology Thieme Medical Publishers. 2009; 26: 151-158.

[12] Komolafe B, Dishmon D, Sultan W, Khouzam RN. Successful aspiration and rheolytic thrombectomy of a renal artery infarct and review of the current literature. Canadian Journal of Cardiology. 2012; 28: 760-e761.

[13] Gottsäter A, Lindblad B. Optimal management of renal artery fibromuscular dysplasia. Therapeutics and clinical risk management. 2014; 10: 583.

[14] Edem E, Aksoy MN, Pabuccu MT, Tatlı E. Endovascular treatment of renal artery stenosis due to fibromuscular dysplasia-Is stent implantation underused in this circumstance? Heart views: the official journal of the Gulf Heart Association. 2016; 17: 69.