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Case Report

Rescue of renal function after endovascular revascularization of acute aorto-renal bypass occlusion in a patient with solitary kidney: a case report [☆]

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ARTICLE INFO

Article history:

Received 23 February 2022

Revised 30 March 2022

Accepted 9 April 2022

Keywords:

Renal artery occlusion
Acute kidney injury, Endovascular aspiration thrombectomy, Solitary kidney, Aortorenal bypass, Revascularization

ABSTRACT

Renal artery occlusion represents an early diagnostic urgency to prevent kidney injury or, even more grave, kidney failure. However, diagnosis is often a challenge due to nonspecific and sporadic symptoms and signs, resulting in misdiagnosis, missed, or delayed diagnosis. The patient ought to be evaluated by a multidisciplinary team to select the best treatment.

We describe a 62-year-old man's case study. The patient had a left solitary kidney with an aortorenal artery bypass thrombosis. The renal function resumes 24 hours after the interventional radiology procedure. Based on our experience, revascularization of aortorenal artery bypass thrombosis may save renal function even after long ischemia times of over 24 hours.

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Introduction

Renal artery occlusion (RAO) is a rare clinical condition that may induce several symptoms. The RAO extreme case is renal insufficiency, which should be the consequence of bilateral occlusion or a solitary renal artery unilateral occlusion.

In particular, scientific literature reports RAO as the cause of 1%-5% of general population hypertension [1]. Atherosclerosis is the main cause of unilateral renal artery occlusion, about 60%-90% of the population, followed by fibromuscular dysplasia, between 10% and 30% of the population. Less common causes (about 10%) are thromboembolic disease, arterial dissection, infrarenal aortic aneurysm, vasculitis, type 1

[☆] Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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<https://doi.org/10.1016/j.radcr.2022.04.023>

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neurofibromatosis, retroperitoneal fibrosis [2]. Clinical presentation includes mainly abdominal or flank pain. Moreover, it could occur with atypical symptoms such as fever, nausea, uncontrolled hypertension, and hematuria [3]. Although, the outcome is worse in patients with a solitary kidney because renal artery occlusion leads to anuria and renal failure.

An ambitious challenge is the RAO diagnosis due to disease rarity and nonspecific signs and symptoms. RAO treatment includes medical therapy, open surgery, and endovascular revascularization. Timely diagnosis and treatment are essential to ensure renal survival and prevent permanent damage.

In this paper, an anuric renal failure patient is presented. The anuric renal failure is due to acute stent graft occlusion of the solitary kidney. The renal function is recovered after 24 hours, thanks to an endovascular aspiration thrombectomy treatment.

Case report

A 62-year-old man presented to the Emergency Department with anuria, diarrhea, and left-sided flank pain. The man's previous history was a dysplastic right kidney nephrectomy, due to recurrent infection. Moreover, 2 years before, he underwent an aortorenal artery bypass placement on the left kidney.

Laboratory tests showed a blood pressure of 200/100 mm Hg and a heart rate of 70 beats/min. Additionally, the result indicated alterations of creatinine serum concentration values, and BUN change (6.8 mg/dL, 356 mg/Dl, respectively versus the normal range of creatinine 1.1 mg/dL, BUN 20 mg/dL). Those outcomes suggested an acute ischemic kidney injury.

Duplex Doppler and Color Doppler should be the first lines of diagnostic techniques. However, due to the patient's intestinal gas, these techniques were revealed unsuitable for diagnostic functions.

To confirm the suspected diagnosis, computed tomography angiography (CTA) was performed. CTA revealed the left aortorenal graft occlusion in the arterial phase. Nevertheless, some renal collateral branches were patency, ensuring the presence of vital parenchyma (Fig 1).

Secondly, the selective left renal artery digital subtraction angiography (DSA) confirmed the occlusion of the aorto-renal artery graft.

Based on this diagnosis, it was decided to perform a recanalization procedure under local anesthesia and mild sedation. First, 5000 units of low-molecular-weight heparin were injected with an intra-arterial puncture. Then, the hydrophilic guidewire was pushed through the obstruction into the distal patent renal artery. Aspiration with a continuous vacuum pump-assisted allowed to achieve the endovascular thrombectomy. Despite the significant amount of thrombus removed, the DSA showed some endoluminal defects in the renal parenchymal arteries and a narrowing of the aortorenal artery bypass (Fig. 2).

Local intra-arterial thrombolysis (urokinase 100.000 IU diluted in 50 mL of saline) was infused (Fig. 3). A covered balloon expanding stent was inserted. Finally, selective right renal artery DSA proved patency in most intraparenchymal renal arteries (Clip 1).

The patient was monitored by blood pressure assessment, 24-hour urine collection, and serum creatinine and azotemia value. On the ninth day after treatment and diuretic stimulation, the patient's condition was enhanced with an improvement in urinary output and a constant decrease in serum level of creatinine until the 11th-day follow-up. Due to the stability of clinical conditions and the recovery of renal function (normal diuresis 2500 mL, plasma level of creatinine 3.42 mg/dL, and BUN 50 mg/dL), the patient was discharged from the hospital dialysis free.

Discussion

CTA is widely recognized as the best technique to diagnose the cause of acute kidney failure adequately. However, one of the CTA main concerns is the iodinated contrast agents used because they could worsen kidney function. Iso-Osmolar Contrast Mean is advised to prevent contrast-induced - AKI because it is less nephrotoxic. Moreover, new generation CT and DSA with high-definition detectors permit us to obtain optimum diagnostic imaging using a lower contrast medium [4].

Another debated topic concerns the time for revascularization after the onset of anuria. The maximum time to revascularize was usually 3 hours [5]. Instead, our patient underwent successful revascularization of the ischemic kidney with the recovery of renal function to baseline 6 days after aortorenal bypass occlusion.

Dame et al. treated successfully 5 to 8 patients affected by acute renal occlusion. They applied surgical revascularization on average 12 h to 3 weeks after the oliguria. They demonstrated patency of distal renal artery branches supporting the renal function restoration [6].

The latter studies reported that the time between occlusion and revascularization does not play a critical role in the procedure success and varies from hours to months. Due to the collateral circulation, the nephron viability can persist and preserve the renal function. The renal collateral network includes peripelvic, periureteric, and capsular arterial branches [7].

Despite no existing guidelines related to the perfect time to start treatment, early diagnosis, and treatment reduce the risk of ischemic injury [3,8].

There are several options for renal artery occlusion management, depending on the symptoms, the degree of stenosis, and the extent of the kidney damage. It includes medical treatment, surgery, and endovascular revascularization. Medical therapy reduces the risk of progressive ischemic nephropathy and includes antihypertensive drugs, statins, and platelet inhibition [9]. Surgical treatments include laparotomic access and thrombectomy or open surgery employing hepatic-splenorenal bypass placement [10]. Endovascular therapy consists of intra-arterial thrombolysis and mechanical thrombectomy.

In our patient, we treated the complication of aortorenal artery bypass. The surgical approach failed, so interventional radiological treatment was the only alternative to avoid dialysis. Although there was prolonged ischemia after the onset of AKI signs and the diagnosis of aortorenal bypass thrombo-

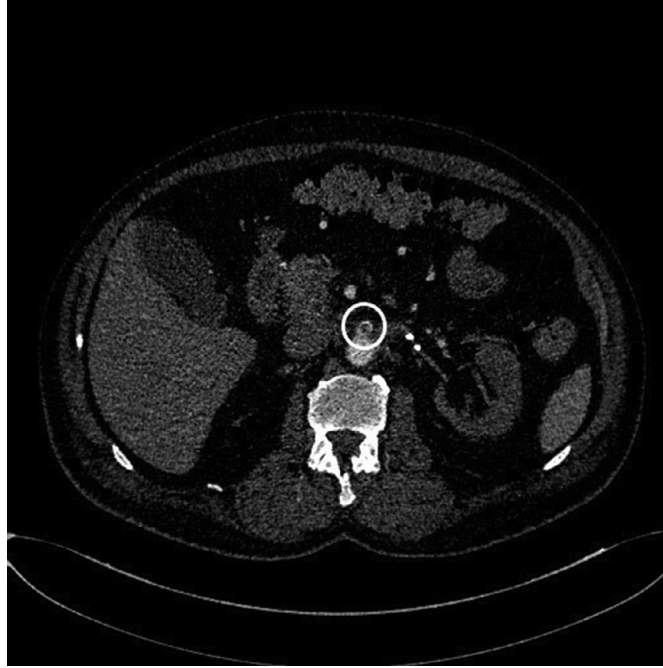


Fig. 1 – Computed tomography angiography shows the origin of the thrombosed aortorenal bypass (circle).

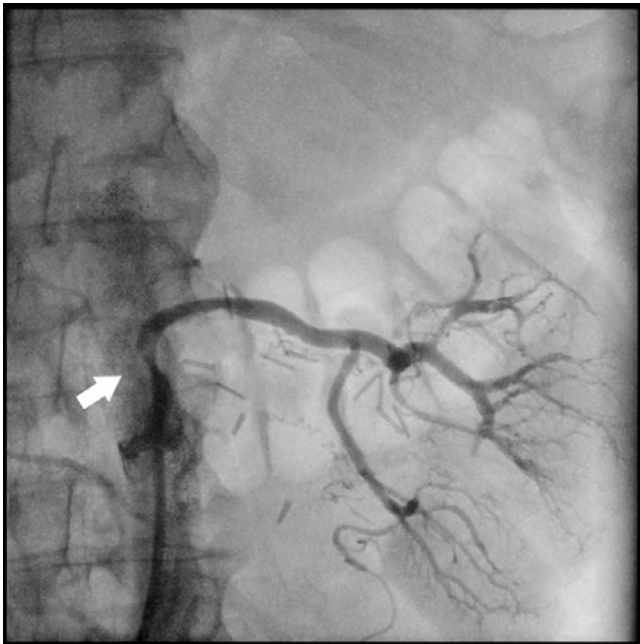


Fig. 2 – Angiography shows a narrowing of the aortorenal arterial bypass (arrow) after aspiration thrombectomy.

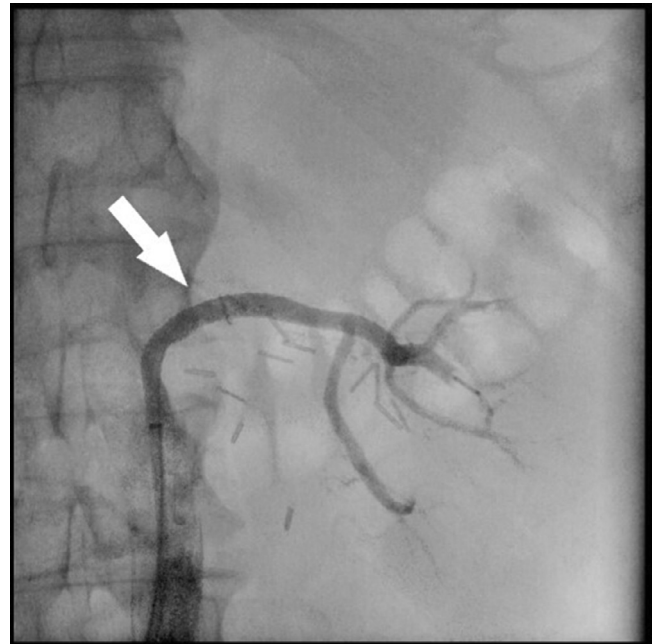


Fig. 3 – Angiography shows the patency of the aortorenal arterial bypass (arrow) after lysis.

sis, after 24 hours, the renal function was established, and the dialysis was avoided.

According to the latest recommendations, the interventional procedure should be considered the first-line therapy to save the kidney, especially in patients with long-standing renal artery stenosis [11].

Conclusion

In patients with aortorenal bypass occlusion, the first-line revascularization therapy should be the endovascular approach with aspiration thrombectomy, local lysis, and stent-graft placement.

In conclusion, with regard to patients with aortorenal bypass occlusion, the endovascular approach with aspiration thrombectomy, local lysis, and stent-graft placement should be the first line of revascularization therapy.

Authors' contributions

All authors have participated in the conception and design of the study, data collection, and interpretation, as well as the writing of the manuscript. The final version of the manuscript has been approved by all the authors.

Patient consent statement

Written consent has been obtained.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.radcr.2022.04.023](https://doi.org/10.1016/j.radcr.2022.04.023).

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