

## Percutaneous treatment of renal embolism in a patient with flank pain

### Yan ağrısı olan bir hastada renal embolinin perkütan tedavisi

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#### Abstract

Renal arterial embolism is caused by distal embolization from a cardiac source in the settings of apical aneurism or atrial fibrillation. The clinical presentation of renal arterial embolism can change. Diagnosis is generally delayed due to non-specific symptoms and can be made using duplex ultrasound, contrast enhanced computed tomography, gadolinium enhanced magnetic resonance imaging or renal artery angiogram. The traditional treatment for renal arterial embolism has been anticoagulation and open surgery. In parallel with advances in endovascular technology, percutaneous intra-arterial thrombolysis and mechanical thrombectomy have been used to treat renal arterial embolism. The decision to perform thrombolysis in renal arterial embolism should be individualized to different patients and all the contraindications, both absolute and relatives, should be taken into account. Complications of endovascular treatment of renal arterial embolism include distal embolization, arterial rupture, cardiac events and death. In this paper we present a case about renal embolism treated by endovascular treatment.

**Keywords:** Renal embolism, percutaneous treatment, thrombolytic treatment, atrial fibrillation, cardiac thrombus, computed tomography.

#### Öz

*Renal arteriyel emboli apikal anevrizma veya atriyal fibrilasyon zemininde kalp kaynaklı distal embolizasyonla meydana gelir. Renal arteriyel embolinin başvuru şekilleri değişiklik gösterebilir. Tanı müphem semptomlardan ötürü genelde gecikmeli konular ve dubleks ultrasonografi, kontrast bilgisayarlı tomografi, gadolinyumlu manyetik rezonans görüntüleme veya konvansiyonel renal anjiyografi ile konulabilir. Renal tromboembolinin geleneksel tedavisi antikoagülasyon ve açık cerrahi yöntemlerdir. Endovasküler teknolojiye paralel olarak perkütan intraarteriyel tromboliz ve mekanik trombektomi de kullanılmıştır. Tromboliz uygulama kararı hasta bazında değerlendirilmeli; trombolizin mutlak ve mutlak olmayan kontraendikasyonları göz önünde bulundurulmalıdır. Distal embolizasyon, arteriyel rüptür, kardiyak problemler ve ölüm endovasküler tedavinin komplikasyonları arasında yer alır. Biz bu yazıda endovasküler yöntemle tedavi edilen bir renal arteriyel emboli olgusunu ele aldık.*

**Anahtar Sözcükler:** Renal emboli, perkütan tedavi, trombolitik tedavi, atriyal fibrilasyon, kardiyak trombus, bilgisayarlı tomografi.

#### Introduction

Renal arterial embolism is caused by distal embolization from a cardiac source (1). The clinical presentation of renal arterial embolism is versatile (2). Diagnosis is generally delayed due to non-specific symptoms and can be made using duplex ultrasound, contrast enhanced computed tomography, gadolinium enhanced magnetic resonance imaging or renal artery angiogram (2-3).

The treatment modalities include both surgical and endovascular approaches (1-3). We present a case about renal embolism treated by percutaneous approach.

#### Case Report

A 64-year old male was admitted to our emergency service with a history of pain over the right flank region for several hours. He had anterior myocardial infarction and percutaneous coronary intervention to the left anterior descending coronary artery. His medical history also included a left ventricle apex thrombus and permanent atrial fibrillation, and he was anticoagulated with warfarin. On the physical examination, his general health situation was moderate. On electrocardiogram,

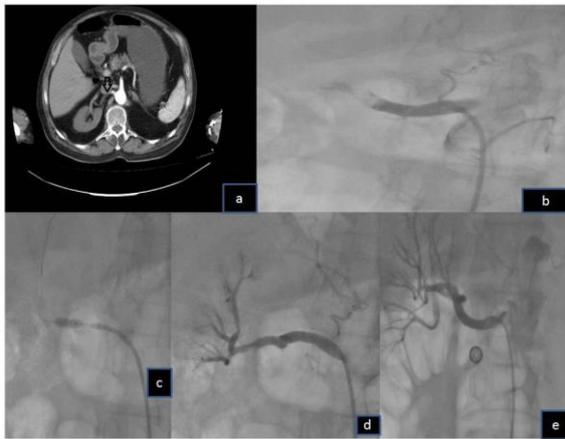
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rhythm was atrial fibrillation with a rate of 120 beat per minute, Q waves were detected at pre-cordial V1 to V4 derivations. Blood pressure was 170/90 mmHg. Blood test results at admission revealed the following; white blood cell count (WBC) 15.200/mm<sup>3</sup>, lactate dehydrogenase (LDH) >953 U/L, blood urea nitrogen (BUN) 42 mg/dL, creatinine (Cre) 1,5 mg/dL, and international normalization ratio (INR) for anticoagulation effectiveness was at subtherapeutic level of 1.4. Transthoracic echocardiography showed an apical aneurism with a 1.4 cm x 1.3 cm sized thrombus and a low left ventricle ejection fraction with mild mitral and tricuspidal regurgitation. A contrast enhanced spiral computed tomography (CT) was performed for a definitive diagnosis.



**Figure-1.** a. CT shows the obstructed right renal artery with thrombus (Arrow indicates the renal arterial obstruction caused by thrombus). b. Renal angiographic image of the obstructed right renal artery. The flow was disrupted. c. Balloon angioplasty procedure. d. After the thrombolytic administration and balloon angioplasty, the flow was achieved in the right renal artery. e. The control renal angiography revealed the renal artery patency and not obstructed flow.

Occlusion of the right renal artery was detected (Figure-1a) and also showed the left ventricular apical thrombus. Afterwards we informed the patient about the angiography procedure and possible treatment modalities. The patient signed the enlightened confirmation form. Emergency renal angiography revealed the right renal artery was occluded with a thrombus (Figure-1b). On emergency condition, we engaged a 7F renal guiding catheter in the right renal artery ostium, and then a 5F Judkins Righ (JR) diagnostic catheter was advanced through that renal guiding catheter to extract thrombus mechanically with manual aspiration. Some parts of the thrombus were aspirated. In an attempt to recanalize the renal artery, 10 mg of recombinant tissue plasminogen activator was directly administrated into the renal artery. Subsequently

a bolus dose of tirofiban was infused selectively into the renal artery. This resulted in improvement of antegrade flow but incomplete recanalization. So, we performed a balloon angioplasty with a 3.0 mm x 20 mm semi-compliant balloon (Figure-1c), distal embolic protection was not used during the procedure, and there was no evidence of distal embolization in complete angiography (Figure-1d). After the percutaneous procedure, administrative dose of tirofiban was infused for 12 hours. Abdominal pain disappeared and urine output remained adequate. Forty-eight hours later, angiographic follow-up confirmed the complete lysis of the thrombus in the right renal artery (Figure-1e). No renal and hemorrhagic complication was observed and the patient was discharged a week later on warfarin with a therapeutic level of INR and acetylsalicylic acid. One month later, serum creatinine level was detected as 1.0 mg/dL, follow-up duplex ultrasound confirmed a widely patent renal artery without hemodynamically significant stenosis. The patient is being followed currently without any problems.

#### Discussion

Renal arterial embolism is a relatively rare condition (1) caused by distal embolization from a cardiac source in the settings of apical aneurism or atrial fibrillation (2). Other risk factors include heart failure, valvular disease and hypercoagulable states (1). The clinical presentation of renal arterial embolism can change. Some patients present with acute abdominal or flank pain and elevated blood pressures (1). Others present with subacute symptoms, poorly controlled chronic hypertension and worsening renal function (3). Diagnosis is generally delayed due to non-specific symptoms and can be made using duplex ultrasound, contrast enhanced computed tomography, gadolinium enhanced magnetic resonance imaging or renal artery angiogram (2,3).

The traditional treatment for renal arterial embolism has been anticoagulation and open surgery (1-3). Open surgical revascularization includes open embolectomy and/or aorto-renal bypass (1-3). Although effective in restoring renal function, open surgery can be associated with significant morbidity and mortality (1,2). In parallel with advances in endovascular technology, percutaneous intra-arterial thrombolysis and mechanical thrombectomy have been used to treat renal arterial embolism. Intra-arterial thrombolysis for treatment of renal artery embolism was first reported in 1981 (4). Since then, multiple reports have been published describing successful percutaneous thrombolysis in the treatment of renal arterial embolism and renal arterial thrombosis (5). Bleeding is the most catastrophic complication of intra-arterial thrombolysis and severe complications including intracranial bleeding and hemorrhagic stroke have occurred in up to 6% of

patients (6). The decision of performing thrombolysis in renal arterial embolism should be individualized to different patients, and all the contraindications both absolute and relatives should be taken into account.

Also percutaneous rheolytic thrombectomy has been used (7) and more recently rheolytic pharmacomechanical thrombectomy has been used to treat acute renal arterial embolism (8). We extracted thrombus mechanically with manual aspiration through the 5F JR diagnostic catheter in the engaged 7F renal guiding catheter. We selected that modality as we could not obtain rheolytic mechanical thrombectomy device easily on emergency conditions in our institution. Therefore, we used manual aspiration, and then we infused 10 mg of tPA and tirofiban intra-arterially into the right renal artery. The flow ameliorated but incompletely. We performed balloon angioplasty. Balloon angioplasty has been used adjunctively during percutaneous thrombectomy of renal arterial embolism (7).

Complications of endovascular treatment of renal arterial embolism are reported to occur in up to 3% of cases (9) and include distal embolization, arterial rupture, cardiac events and death. The renal parenchyma does not tolerate distal embolization (1, 7). Efforts to minimize this complication during renal arterial interventional procedures are important particularly in patients with impaired renal functions. Pharmacological thrombolysis may have a limited effect. So, glycoprotein 2b/3a inhibitors like tirofiban infusion (10) may be adjunctive role for limiting distal embolization just like in our case.

In conclusion, renal arterial embolism is rare but can be related with a high risk of loss of renal parenchyma. Percutaneous interventions including intra-arterial thrombolysis and mechanical thrombectomy like thrombus aspiration with balloon angioplasty can be used effectively to treat renal arterial thromboembolism.

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