

# Significant Improvement in Clinical Symptoms After Successful Percutaneous Revascularization of Chronic Total Renal Artery Occlusion: Case Report

## Kronik Renal Arter Total Oklüzyona Uygulanan Başarılı Perkütanöz Girişim Sonrası Klinik Semptomlarda Belirgin İyileşme

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**ABSTRACT** We present a case with a history of resistant hypertension who was referred to our hospital for further evaluation. Patient had complaints of severe headache and dyspnea which were likely secondary to his high blood pressure. On further evaluation patient was found to have chronic total occlusion of renal artery. Based on the observations in the current literature we elected to proceed with percutaneous revascularization of occluded renal artery. Patient's blood pressure decreased and his symptoms improved significantly soon after revascularization procedure. We believe that revascularization in chronic total occlusion of renal artery can add at least symptomatic benefit to medical treatment in carefully selected patients with certain clinical features such as resistant hypertension, congestive heart failure symptoms and renal dysfunction.

**Key Words:** Renal artery obstruction; renal insufficiency; hypertension, renal

**ÖZET** Olgumuz, dirençli hipertansiyon öyküsü olan ve bu nedenle ileri tetkik ve tedavi amaçlı hastanemize yönlendirilmiş bir vaka sunumudur. Hastada dirençli hipertansiyona bağlı olduğu düşünülen, şiddetli baş ağrısı ve belirgin nefes darlığı mevcut olup, yapılan tetkiklerinde kronik renal arter total oklüzyonu tespit edilmiştir. Yakın dönem literatürler ışığında hastaya perkütanöz yaklaşımla kronik total tıkalı renal artere revaskülarizasyon planlandı. Perkütan revaskülarizasyon hemen sonrası, hastanın kan basıncında belirgin düşüş ve semptomlarında iyileşme saptandı. Özenle seçilmiş dirençli hipertansiyon, kalp yetersizliği ve renal disfonksiyonu olan kronik renal arter total oklüzyonu tespit edilmiş hastalarda perkütan renal revaskülarizasyon alternatif bir tedavi seçeneği olabilir.

**Anahtar Kelimeler:** Renal arter tıkanıklığı; böbrek yetmezliği; hipertansiyon, renal

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Chronic total renal artery occlusion (CTO) is associated with coronary artery disease, renal failure, increased mortality, resistant hypertension and its optimal treatment has not been fully clarified yet. The role of the interventional approach has been investigated.

### CASE REPORT

A 59-year-old male patient with a history of coronary artery disease (status post right coronary artery stent implantation) and resistant hypertension presented to our outpatient clinic with severe headache. He was on maximum dose of multiple antihypertensive medications (ramipril 10 mg,

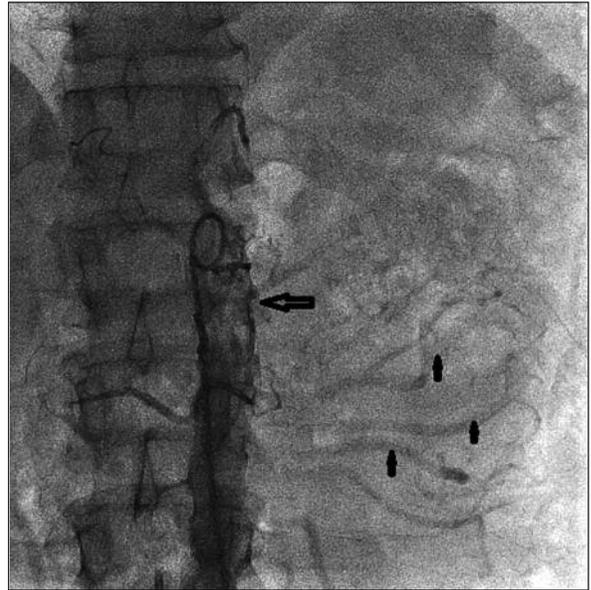
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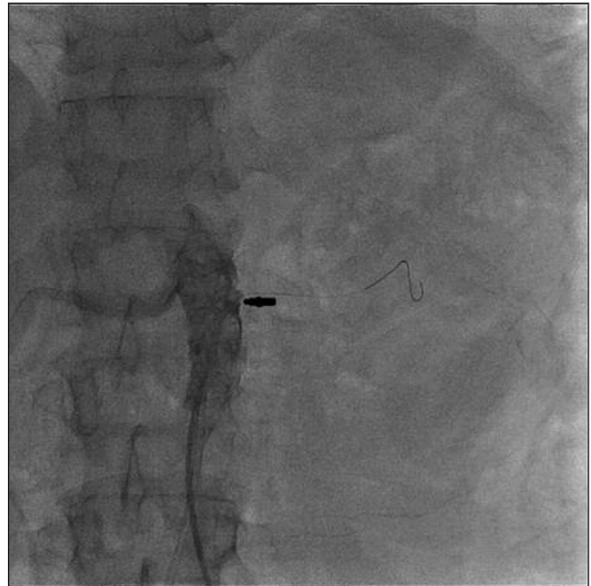
amlodipin 10 mg, nebivolol 5 mg, doxazosin 4 mg and thiazide diuretic 25 mg) at the time of presentation. His review of systems was negative for cardiac, pulmonary and neurologic symptoms except for severe headache and dyspnea. His blood pressure was 200/110 mmHg in both arms and pulse rate was 76/minute and regular. Laboratory work-up revealed mild renal dysfunction (creatinine 1.4 mg/dL and GFR: 69 ml/min/1.73 m<sup>2</sup> calculated by MDRD formula). Abdominal ultrasound imaging with doppler revealed decreased left kidney size (9.7x4 cm) and increased parenchymal echogenicity with no blood flow. Therefore, patient was thought to have left renal artery stenosis and he had renal angiography done which revealed left renal artery total occlusion with collateral blood flow (Figure 1a).

Due to existing mild renal dysfunction with parenchymal damage, severe headache, recent history of congestive heart failure symptoms and uncontrollable blood pressure, after a detailed discussion with the patient regarding the treatment options and obtaining informed consent, we elected to proceed with percutaneous renal revascularization. Patient was hydrated well before the procedure and low dose isoosmolar radiocontrast agent was used. Left renal artery was cannulated with guiding renal artery catheter. Cross-IT 100 guide wire and 1.25\*10 mm blue medical CTO balloon was used to cross the CTO lesion (Figure 1b). After crossing the lesion, guide wire was exchanged to soft wire. Balloon was inflated at 12 atm. pressure successively 2 times. Blood flow to the distal renal artery observed and subsequently Boston Express Vascular SD 5\*15 mm renal stent was deployed at 8 atm pressure very successfully extending 1 mm to aorta from renal artery ostium (Figure 1c).

Renal function was followed up closely and creatinine level was 1,2 mg/dL at discharge. Renal artery blood flow was within normal limit on Doppler US examination. Medical treatment was regulated (ramipril 5 mg, amlodipin 5 mg, nebivolol 5 mg, and thiazide diuretic 12.5 mg) and continuous ambulatory blood pressure recording was obtained 2 weeks after the procedure which revealed mean blood pressure of 135/80 mmHg. On



**FIGURE 1a:** Left renal artery is totally occluded (inside the white arrow indicate the stump) and distal blood flow occurs via collaterals (black arrows).



**FIGURE 1a:** Left renal artery cannulated with guiding renal artery catheter (white arrow indicate the stump). Cross-IT 100 guide wire crossing the chronic total occlusion lesion (black arrow).

second month follow up visit blood pressure was 130/80 mmHg and computed tomography (CT) angiogram revealed patent renal arteries with complete relief of headache and heart failure symptoms (Figure 2a, b). Although this is not based on any consensus report we opted to follow up with CT angiogram.



**FIGURE 1c:** Renal stent (black arrow) was placed successfully extending 1 mm to aorta from renal artery ostium.



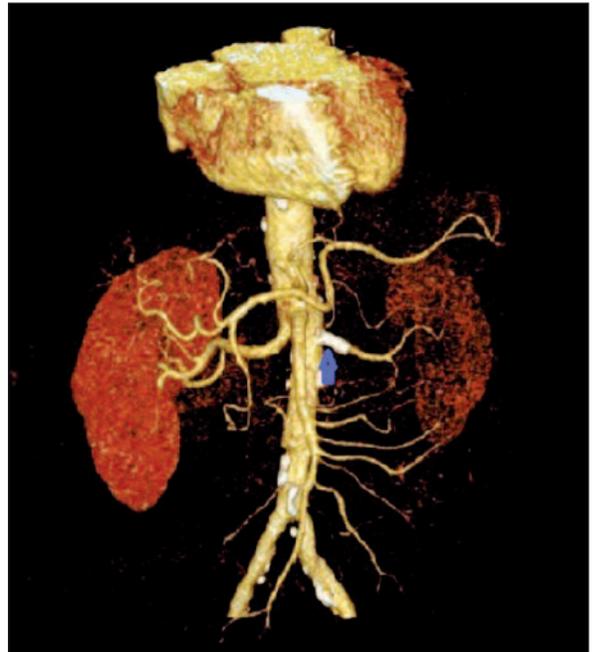
**FIGURE 2a:** Computed tomography angiogram shows patent left renal artery with a stent (black arrow).

## DISCUSSION

Major clinical finding of renal artery stenosis (RAS) are resistant hypertension, unexplained renal failure and, flash pulmonary edema. Increased risk of coronary vascular disease in atherosclerotic RAS can be explained by increased activation of renin-angiotensin-aldosterone system and sympathetic

nervous system, decreased GFR and concurrent atherosclerosis in the all vascular bed.<sup>1,2</sup> Risk of mortality and morbidity is increases with RAS. Medical treatment is the first choice in renal artery stenosis. ACE inhibitors and calcium channel blockers are effective in the treatment of hypertension in the presence of RAS.<sup>3</sup> The potential physiological benefits of renal stent placement include reperfusion of the ischemic kidney, resulting in a reduction in the stimulus to renin production, which decreases angiotensin and aldosterone production, there by decreasing peripheral arterial vasoconstriction and preventing hypervolemia.<sup>4</sup> Recently two randomized controlled trials (ASTRAL and STAR) revealed that revascularisation of renal artery stenosis do not have additional benefit on mortality and morbidity but cause decrease in antihypertensive drug dosages and slows the renal function deterioration.<sup>5,6</sup> Whom and when should have revascularization in RAS has not been specifically addressed in previous studies. These questions are being addressed by two ongoing randomise controlled trials (RADAR and CORAL).<sup>7,8</sup>

Wykrzykowska et al reported a case with refractory hypertension and congestive heart fail-



**FIGURE 2b:** Computed tomography angiogram shows patent left renal artery with a stent (blue arrow).

ure showed significant symptomatic improvement after percutaneous revascularization of unilateral chronic total occlusion of renal artery and stabilization of renal function.<sup>9</sup> Chandra et al. also reported successful percutaneous revascularization of unilateral chronic total occlusion of renal artery leading to improvement in renal function and blood pressure control of a patient with accelerated refractory hypertension and renal function deterioration.<sup>10</sup> In the present case, we performed a percutaneous revascularization of chronic total occlusion of renal. Patient's

headache was diminished and his blood pressure was under better control with decreased number and dosages of medications after the revascularization procedure.

We believe that, renal revascularization can add benefit to medical treatment in carefully selected patients with certain clinical features mentioned above. But still well designed studies are needed to have more accurate information regarding the optimal timing and benefits/harms of revascularization in chronic total occlusion of the renal artery.

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