

## Subacute Aortic Dissection in a Patient with Nephrolithiasis and Back Pain

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### ABSTRACT

A 60-year-old man with previously known left-sided nephrolithiasis and arterial hypertension has been examined several times in an emergency department because of the pain in the lumbar area. During an examination, high blood pressure and increased creatinine levels have been verified, without adequate ultrasound of the right kidney. During an examination in our hospital, kidney ultrasound and color Doppler showed suspected infarction of the right kidney. MSCT angiography showed the infarction of the right kidney and the dissection of the descending aorta. The purpose of this article is to warn about the importance of expanded diagnostic procedures when an acute lumbar pain occurs, in order to exclude potentially fatal complications and to prevent lethal outcome.

**Keywords:** Nephrolithiasis; Arterial hypertension; Back Pain

### INTRODUCTION

Aortic dissection is characterized by the penetration of blood through the intimal tear, separation of the intima and media, and the formation of a false lumen, with or without communication. The inflammatory response to blood in the media leads to aortic dilation and rupture [1]. The most common cause is poorly controlled arterial hypertension. In classifying aortic dissection, both the Stanford and DeBakey classifications are applied. The DeBakey classification distinguishes three types of dissection (Type I involving the ascending and descending aorta, Type II involving only the ascending aorta, and Type III involving only the descending aorta), while the

Stanford classification distinguishes two types of dissection (Type A involving the ascending aorta and aortic arch, and Type B involving the aorta distal to the left subclavian artery). The Stanford classification is more commonly used due to its simplicity (two types) and association with treatment [2,3].

The frequency of acute aortic dissection is 6/100,000 per year, with an average age of onset being 63 years, and 65% of patients being male [4]. According to duration, they are classified as acute (up to 15 days), subacute (15 to 90 days), and chronic (more than 90 days). The most common clinical feature is chest pain (80%), characterized by sudden onset and sharp nature, while back pain (40%) and abdominal pain (25%) are less common. Other significant clinical manifestations include syncope, neurological symptoms, and renal insufficiency [5]. The most common complications are cardiac; acute aortic regurgitation is the second most common cause of death after dissection rupture [5]. Diagnostic techniques include echocardiography (transthoracic and transesophageal), MRI, and CT. When there is suspicion of aortic dissection, the simplest and quickest diagnostic approach is transthoracic echocardiography, although MRI and CT angiography are superior methods for depicting the extent of dissection and involvement of branches. It is worth noting that CT is the most commonly used imaging method due to its speed, availability, and high sensitivity, and it is preferred over MRI in hemodynamically unstable patients.

Treatment depends on the type of dissection. Stanford Type A dissections are urgently treated surgically, while Stanford Type B dissections are primarily treated conservatively (with analgesics, rhythm control therapy, and antihypertensives), except in cases of complications (dissection expansion, malperfusion, and signs of rupture), when TEVAR (Thoracic Endovascular Aortic Repair) is applied, involving sealing the tear and redirecting blood flow into the true lumen [6,7].

In uncomplicated type B aortic dissections, TEVAR does not show a clinical advantage compared to conservative treatment.

**Patient presentation:** A 60-year-old patient with known left-sided nephrolithiasis and long-standing arterial hypertension, a long-term smoker. The Emergency Department has repeatedly managed him for lumbar pain. In the treatment of arterial hypertension, the patient was receiving perindopril/amlodipine at a dose of 5/5 mg 2 × 1 tablet. The patient was initially hospitalized from September 18<sup>th</sup> to September 22<sup>nd</sup>, 2017, due to symptomatic left-sided nephrolithiasis at the Department of Urology of the General Hospital according to territorial affiliation. Due to elevated blood pressure values during hospitalization, a cardiologist was consulted, and hypertensive heart disease was echocardiographically verified, with normal systolic function, mild aortic regurgitation, and mitral regurgitation, as well as dilation of the ascending aorta up to 41 mm. Renal insufficiency was also noted (creatinine 152 µmol/L, urea 13 mmol/L, potassium 4.6 mmol/L), and outpatient examination of the urinary tract by CT was recommended. On October 1<sup>st</sup>, the patient was again examined in the Emergency Department of the General Hospital in his place of residence due to pain in the right lumbar region. The pain occurred suddenly during physical exertion; however, the patient reported it two days later due to its intensification. He complained of nausea but had no vomiting or dysuric symptoms and was afebrile.

During the examination, uncontrolled arterial hypertension (BP 240/120 mmHg) and creatinine (130 µmol/L) were detected, while ultrasound revealed an 8 mm stone in the lower third of the left kidney, with a normal urinary tract, while the right kidney was not described in the findings. With the administration of

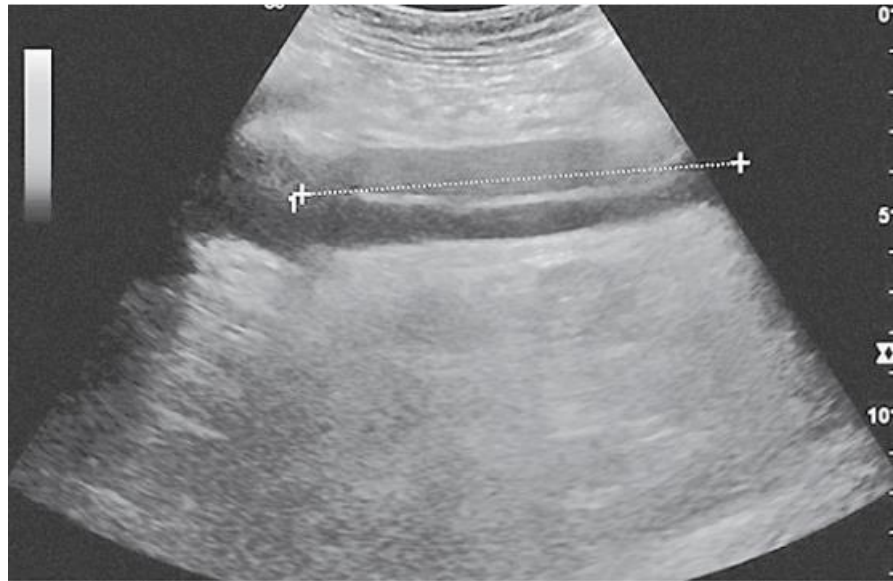
antihypertensive and analgesic therapy, the pain regressed, and the blood pressure was regulated during observation.

The next day, the patient presented to the Emergency Urology Clinic of the Clinical Hospital Center Zagreb due to pain in the right lumbar region. Obstructive uropathy was ruled out by ultrasound, but during the examination, he also reported sharp chest pain, leading to consultation with a specialist in internal medicine. Elevated blood pressure (177/113 mmHg) was measured, and the creatinine value showed a mild increase compared to the previous day (from 130  $\mu\text{mol/L}$  to 178  $\mu\text{mol/L}$ ). Ultrasound findings of the upper abdomen and kidneys showed no changes compared to the previous examination (also without a detailed description of the right kidney), and due to an increase in inflammatory parameters, empirical therapy with ciprofloxacin was initiated, and the patient was referred to our institution for hospitalization.

The follow-up abdominal ultrasound performed upon admission to the Nephrology Department showed a normal urinary tract of both kidneys, but an extremely hyperechoic structure of the parenchyma was observed on the right, along with an increased diameter of the abdominal aorta (31 mm), raising suspicion of the presence of a thrombus in the aneurysmatically expanded abdominal aorta and infarction of the renal vein. Color Doppler ultrasound of the renal veins and aorta (Figure 1) raised suspicion of aortic dissection from the level of the renal arteries to the bifurcation and in the proximal segment of the right common iliac artery, with described flow through the right kidney being significantly reduced with altered spectra, while on the left side, Doppler spectra were preserved, showing low resistance. Contrast-enhanced CT angiography of the aortic arch (Figure 2) showed dissection of the thoracic aorta in the descending part about 8 cm from the origin of the left subclavian artery; the dissection extends into the celiac trunk and the upper mesenteric artery, which arises from the true lumen, as well as the left renal artery, while the right renal artery arises from the false lumen. The dissection terminates in the pelvic arteries at the bifurcation of the common iliac artery. In the results of the performed laboratory tests, we highlight creatinine values of 256  $\mu\text{mol/L}$ , along with elevated inflammatory parameters. During admission to the Department of Intensive Cardiac Care, blood pressure values were measured at 150/90 mmHg on the right arm, 160/90 mmHg on the left arm, with a pulse rate of 65/min. Arterial pulsations were normal, symmetrically palpable to the extreme periphery on both upper and lower extremities, and the patient complained of right lumbar pain.

Treatment with antihypertensive drugs was initiated, initially parenterally, and then orally after regulating blood pressure values, along with beta-blockers for heart rate control and opioids. Two urine cultures that were obtained resulted in sterile findings. During a multidisciplinary consultation involving cardiologists, radiologists, and vascular surgeons, it was decided to continue conservative treatment for the patient with analgesics, antihypertensive drugs, and beta-blockers. According to the recommendations for treating Stanford type B aortic dissection, the patient's overall condition improved with the applied conservative therapy. Laboratory findings showed a decrease in serum creatinine levels (209  $\mu\text{mol/L}$  at discharge) and a decrease in inflammatory parameters, and the patient remained hemodynamically stable throughout the hospitalization.

The follow-up MSCT angiography confirmed a stable finding. The patient, in good general condition, was transferred to a specialized institution for the treatment of chronic diseases, with a recommendation for therapy to control blood pressure, pulse, and pain.



**Figure 1:** Color doppler ultrasonography of renal veins and aorta.



**Figure 2:** MSCT angiography of aorta.

## **DISCUSSION**

The patient presents with multiple risk factors for cardiovascular diseases such as long-standing arterial hypertension, smoking history, age, and gender. Initial examination revealed echocardiographic changes in the left ventricle consistent with hypertensive heart disease, and uncontrolled hypertension is considered the most common cause of aortic dissection. Previously known in the medical history is left-sided nephrolithiasis; however, during the same period when the patient was evaluated for left lumbar region pain, right lumbar pain also emerged after strenuous physical activity. The patient was examined several times in the Emergency

Department, and abdominal ultrasound did not describe the right kidney, nor was there a clear reason why it was not visualized. During evaluation, altered renal function parameters were monitored, along with a trend of increasing serum creatinine levels, occasional chest pain, and extremely high blood pressure values. Upon arrival at our institution, the abdominal ultrasound was repeated, raising suspicion of a thrombus in the aneurysmally expanded abdominal aorta and infarction of the renal vein.

Color Doppler ultrasound confirmed suspicion of the aforementioned event, prompting contrast-enhanced CT angiography of the aortic arch, revealing dissection of the thoracic aorta extending to the pelvic arteries, with the right renal artery arising from the false lumen. Although the clinical presentation of aortic dissection typically features sudden, tearing chest pain, it is important to note that in a smaller percentage of cases, similar pain may occur in the back and abdomen. Painless aortic dissections are rare. We must also not overlook atypical presentations of aortic dissection such as neurological symptoms (paraplegia, ischemic limb neuropathy), syncope, mesenteric ischemia, respiratory and renal insufficiency. It's worth mentioning that the disease is more common in men, although prognosis is worse in women, likely due to atypical presentation and delayed diagnosis. In the physical examination, attention should be paid to pulse deficits, differences in blood pressure between extremities, diastolic murmurs over the aorta, and possible presentation as limb plegia. In our patient, according to the degree of dissection, we opted for conservative treatment with analgesics, rhythm control therapy, and antihypertensive medications.

## CONCLUSION

In cases of aortic dissection, as a medical emergency, it is crucial to establish an early diagnosis to initiate timely treatment. However, this is sometimes not possible, as in this case where the patient had previously known nephrolithiasis, and the clinical presentation suggested nephrocolic. We believe that this patient case report is educational as it has shown that, in addition to sepsis as an acute event in patients with nephrolithiasis, cardiovascular risk factors (arterial hypertension, smoking, age, gender) should also be considered. Furthermore, in the presence of intense and suddenly occurring lumbar pain, along with an increase in serum creatinine and ultrasound findings of a hyperechoic central reflection of the kidney, investigations should be expanded to consider the possibility of renal infarction. Ultrasound is an accessible, non-invasive examination in the differential diagnosis of lumbar pain, which the clinician, taking into account age, comorbidities, and expected vascular morphology, must utilize before establishing an accurate diagnosis, especially in emergency situations where one wrong step in the diagnostic algorithm can be fatal. We deem it necessary that, in addition to abdominal pain, ultrasound be part of the diagnostic algorithm even in cases of lumbar pain not necessarily accompanied by fever or urinary symptoms.

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