

## Aortic occlusion: five case reports

### *Aortik oklüzyon: Beş olgu sunumu*

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Aortic occlusion (AO) is a rare entity with high morbidity and mortality. In this article, we present five cases who were admitted to Emergency Department with various symptoms and diagnosed with AO of abdominal aorta. All five cases had overlapping symptoms. Medical history of all cases included atherosclerotic diseases such as coronary artery disease, cerebrovascular and peripheral artery disease. Four of the cases had complete occlusion of abdominal aorta, while one had 95% occlusion. Computed tomography remained an important tool for the diagnosis. All the cases had signs of mesenteric ischemia and died despite all efforts. As the aorta perfuses different systems and limbs, symptoms of AO may vary from patient to patient. Thus, it may be challenging for physicians to diagnose this disease. Although the diagnosis is based on early embolectomy or grafting and revascularization is ensured, mortality is inevitable in most of the cases. The differential diagnosis of AO should be considered in the patients with overlapping symptoms and a comprehensive physical examination with vascular components should be performed.

**Key words:** Aortic occlusion; computed tomography; emergency department.

Aortic occlusion (AO) is a rare disease of the aorta that affects not only the aorta but the organs and extremities that are perfused by it. Although the pathogenesis is mainly the thrombotic process, other causes have been defined in the literature. Signs and symptoms may overlap, and diagnosis can be challenging in some cases. Hence, early diagnosis is an important factor in reducing morbidity and mortality. In this report, we examined

Aort oklüzyonu (AO) nadir görülen, yüksek morbidite ve mortalitesi olan bir hastalıktır. Bu yazıda acil servise çeşitli semptomlarla başvuran ve abdominal AO tanısı konulan beş olgu sunuldu. Olguların tümünde çakışan semptomlar mevcuttu. Tüm olguların tıbbi geçmişlerinde koroner arter hastalığı, serebrovasküler hastalık ve periferik arter hastalığı gibi aterosklerotik hastalıklar vardı. Dört olguda abdominal aortun tam oklüzyonu saptanmışken, bir olguda %95 oklüzyon saptandı. Bilgisayarlı tomografi tanı için önemli bir araç idi. Tüm olgularda mezenter iskemi bulguları mevcuttu ve tedaviye rağmen tümü kaybedildi. Aort değişik sistemleri ve ekstremiteleri beslediği için, AO semptomları hastadan hastaya değişebilir. Bu nedenle hekimler tanı koymada zorluklar yaşayabilir. Embolektomi veya greftleme ile erken tanı konya ve revaskularizasyon sağlansa da, çoğu olguda mortalite kaçınılmazdır. Çakışan semptomlarla gelen hastalarda AO ayırıcı tanıda düşünölmeli ve vasköler muayene dahil kapsamlı bir muayene yapılmalıdır.

**Anahtar sözcükler:** Aort oklüzyonu; bilgisayarlı tomografi; acil servis.

a series of cases involving AO that presented with different symptoms, all with a mortal course.

### CASE REPORT

The patients in our report come from a 600-bed university hospital with approximately 65,000 emergency department (ED) visits annually and a 450-bed training and research hospital with approximately 175,000 ED



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visits annually. Patients diagnosed with AO over a five-year period are identified and summarized in Table 1.

**Case 1**– A 76-year-old man with a history of coronary artery disease (CAD) presented to the university hospital ED after he developed weakness in his lower extremities and urinary incontinence while walking. This rapidly progressed to total loss of motor and sensory function in a short period of time. His medical history consisted of hypertension and congestive heart failure (CHF).

Upon admission, he was mildly hypertensive with blood pressure of 158/113 mmHg, but his remaining vital signs were within the normal range. His cardiovascular examination revealed a loss of bilateral femoral and distal arterial pulses. His abdomen examination showed color change and hypothermia from the umbilicus to the lower extremities. His laboratory results showed hemoglobin levels of 9.9 mg/dl, platelet levels of 70.000/ml, lactate dehydrogenase of 1382 Units/l, and creatinine levels of 1.7 gr/dl. Abdominal computed tomography (CT) with intravenous contrast was performed to rule out acute abdominal aneurysm dissection and noted AO

of the abdominal aorta from the infrarenal level to the distal arterials with dilation of the small intestines and increased contrast uptake of the intestines (Figure 1).

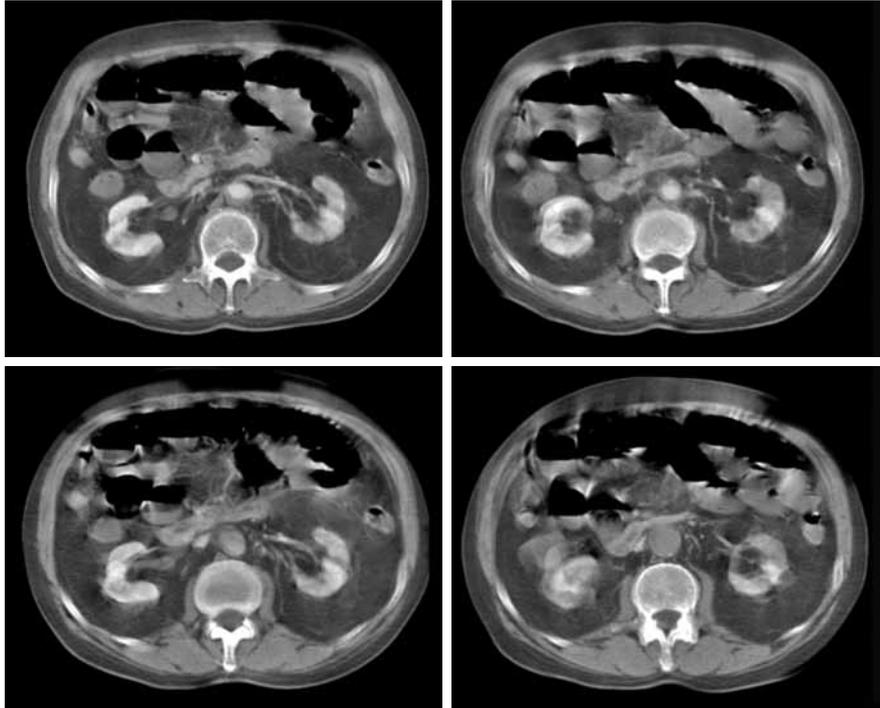
Cardiovascular surgery was consulted for assessment and management, and the patient was taken to the operating room. Intraoperatively, ischemic intestinal disease was determined, and general surgery was performed with a subtotal small and large intestinal resection. He was followed up in the intensive care unit (ICU) and developed hypotension; therefore, he was given positive inotropics over the next few hours. He developed asystole in the second day of his ICU course and he remained unresponsive to resuscitation.

**Case 2**– A 43-year-old woman with a history of CAD, CHF, and two embolectomies after acute upper extremity arterial occlusion was admitted to the university ED with severe lower extremity pain and mottling of the abdominal and lower extremity skin. Coumadin and diuretics were used as daily medication.

**Table 1. Summary of patient characteristics**

| No | Sex/age | Presenting ED complaint   | Past medical history  | Physical findings   | CT findings   | Management  | Outcome         |
|----|---------|---|---|---|---|---|-----------------|
| 1  | M/76    | Weakness of lower extremities while walking, urinary incontinancy               | Hypertension and congestive heart failure                                       | Loss of bilateral femoral and distal pulses, color change and hypothermia from umbilicus to lower extremities | Total occlusion of abdominal aort from infrarenal level to distally with dilation of small intestines and increased contrast uptake of intestines | Subtotal small and large intestinal resection   | Deceased in ICU |
| 2  | F/43    | Severe lower extremity pain with mottling of abdominal and lower extremity skin | Coronary artery disease, congestive heart failure and peripheral artery disease | Absent bilateral extremity pulses, discoloration of abdomen   | AO from the outlet of truncus celiacus, infarction of spleen, bilateral renals with ischemic changes of mesenters                                 | Embolectomy of abdominal aorta and left femoral artery, femoral to femoral artery bypass grefting | Deceased in ICU |
| 3  | M/60    | Numbness of lower extremities and unable to walk                                | Cerebrovascular disease   | Mottling of umbilicus and below, paralysis of lower extremities with pain                                     | Total occlusion of intrarenal abdominal aorta   | Followed conservatively   | Deceased in ICU |
| 4  | M/80    | Abdominal pain and hemochezia   | Coronary artery disease and dementia  | Pulsative mass in epigastric region, hemochezia   | 95% occlusion of infrarenal aorta with aneurysm   | Followed conservatively   | Deceased in ICU |
| 5  | M/68    | Left lower extremity pain with paleness and motor-sensory loss                  | Peripheral and coronary artery disease  | Pain, paleness with motor-sensory loss of left extremity  | Total occlusion of infrarenal abdominal aorta and ischemic changes of mesenters   | Followed conservatively   | Deceased in ICU |

ED: Emergency department; CT: Computed tomography; AO: Aortic occlusion; ICU: Intensive care unit.



**Figure 1.** Computed tomography of patient demonstrating lack of blood flow in abdominal aorta with dilation of intestines and air-fluid levels consistent with mesenteric ischemia.

She was normotensive and tachycardic with a heart rate of 110 per minute. On physical examination, the lower extremity pulses were diminished, and a total motor and sensory deficit of both lower extremities was noted. Discoloration of her abdomen was seen on inspection, and it was tender in all quadrants on palpation. Her laboratory results showed creatinine levels of 2.1 mg/dl, lactate dehydrogenase of 3428 Units/l, and an international normalized ratios (INR) of 2.79. Computed tomography with intravenous contrast showed total AO from the outlet of the truncus celiacus and infarction of the spleen and the bilateral renals with ischemic changes of the mesenteries.

Both the cardiovascular and general surgery departments were consulted for further evaluation. The patient was taken to the operating room, and an embolectomy of the abdominal aorta and the left femoral artery was performed with femoral-to-femoral artery bypass grafting. While the patient was being followed up in the ICU, acute renal failure (ARF) developed, and hemodialysis was applied twice. On the fourth day of her ICU stay, she developed asystole and was unresponsive to resuscitation.

**Case 3**– A 60-year-old man with a diagnosis of ARF and in need of hemodialysis was transferred from a local hospital to the training and research hospital ED. His

past medical history included cerebrovascular disease (CVD) that left him hemiplegic and semi-mobile. He had a sense of numbness in his lower extremities and had been unable to walk for four days. He was taken to a local hospital where he consulted with the neurology department and was diagnosed with recurrent CVD. He was discharged home with a dose increment of antiaggregant therapy. After he developed mottling of the abdominal skin below the umbilicus and paralysis of his lower extremities with severe pain, he was taken to the same hospital and was diagnosed with ARF and transferred to the training and research hospital ED for hemodialysis.

His vital signs were within the normal range upon admission. His physical examination showed mottling of the lower extremities to the level of the umbilicus and a motor and sensory deficit with absent pulses of the femoral arteries. He also had a tender abdomen with a loss of bowel sounds. His rectal examination was normal, and his laboratory results showed acute renal failure with hyperkalemia. An abdominal CT with intravenous contrast was performed to rule out AO, and it showed thrombosis starting from the infrarenal segments with normal renal contrast uptake.

The cardiovascular surgery department was consulted about this patient, and he was transferred to that department. Due to the patient's poor condition

and advanced clinical status, his operation was precluded, and he was taken to the ICU for follow-up. During his ICU stay, he developed hypotension and was given positive inotropics. On the seventh day, cardiopulmonary arrest occurred, and the patient died despite resuscitation.

**Case 4–** An 80-year-old man was presented to the training and research hospital ED after having acute abdominal pain with bloody stools for one day. He stated that his pain was constant and diffuse and he added that it started 12 hours prior to his admission. His medical history consisted of CAD and dementia.

His vital signs were normal upon admission. On physical examination, his abdomen was nontender without any acute abdominal signs. A pulsatile mass was present in the epigastric region, and his femoral and distal pulses were present. A digital examination of the rectum showed hematochezia. His alanin-transferase and aspartate-transferase levels were 118 and 91 IU/ml respectively, and the remaining biochemistry results along with the hemogram were within normal limits. Computed tomography with intravenous contrast of the thorax and abdomen was planned for a possible abdominal aorta aneurysm, and it showed multiple pulmonary masses consistent with local metastasis of lung cancer and an abdominal aorta aneurysm with 95% occlusion of the infrarenal aorta. Although the junction of the celiac truncus with the aorta had normal perfusion, mesenteric infarction wasn't excluded, and the general and vascular surgery departments were consulted.

Due to his advanced stage and age, surgery was precluded, and the patient was hospitalized in the ICU for supportive care. In the following days, his clinical situation deteriorated, and the patient was lost after six days in the ICU.

**Case 5–** A 68-year-old man who had been diagnosed with peripheral artery disease and CAD was admitted to the ED with severe pain of his left lower extremity and paleness after long-distance walking. He stated that he also had motor and sensory loss in the same extremity. His medical history included poorly controlled hypertension, CAD, and peripheral artery disease, and he had smoked for 40 years.

His vitals were normal upon admission. His medical examination showed paresthesia, paresis, and absent pulses of the left lower extremity. Arterial Doppler ultrasonography (USG) showed an absence of blood flow in the left popliteal and distal arteries. The rest of his physical examination was normal, and he was diagnosed with acute peripheral artery occlusion and underwent surgery.

The patient had femoropopliteal grafting, and his circulation was restored after the operation. On the second postoperative day, while being followed up and being intubated in the ICU, he had an episode of atrial fibrillation and was successfully treated with cardioversion. While being extubated one day later, he had similar symptoms in both lower extremities with mottling of the abdominal skin and diffuse abdominal pain. His biochemistry showed acute renal failure secondary to rhabdomyolysis secondary to hypoperfusion of the lower extremities. Computed tomography with intravenous contrast showed occlusion of the infrarenal aorta with ischemic changes of the mesenteries. Due to the advanced stage of the disease, surgery was precluded, and hemodialysis was applied twice. Multiple organ failure developed in the fourth day, and the patient was lost despite resuscitation.

## DISCUSSION

Aortic occlusion of the abdominal aorta occurs infrequently, but morbidity and mortality rates are high. Because of its rarity, a real incidence rate is unclear. Atherosclerosis is the most common cause of this entity, and either thrombosis, an embolism, or both are the main pathologies of AO, as was the case in our patients. Except for case 1, our patients had been previously diagnosed and had been treated for atherosclerotic diseases of the CVD, CAD, or peripheral artery diseases.

Other causes besides atherosclerosis have been defined in the literature. The platinum-based, anti-cancer drug cisplatin has been accused of inducing both venous and arterial thrombosis, and in the literature, we found at least one patient who developed AO after undergoing cancer therapy with this drug.<sup>[1]</sup> Hypercoagulable states, such as hyperhomocysteinemia, can also be the underlying cause while spontaneous AO may be rare. However, it can cause morbidity in such a patient.<sup>[2]</sup> In addition, heparin-induced thrombocytopenia has been accused of arterial and venous thrombosis, and cases involving this entity after treatment with heparin have been discussed in the literature.<sup>[3]</sup>

In ED settings, the Heimlich maneuver can be a lifesaving procedure for foreign body aspiration, but complications due to injury of the intraabdominal and intrathoracic organs as well as the aorta can occur. It is possible that inadvertent malposition of the hands may result in trauma to the atherosclerotic abdominal aorta, and four cases have been described in the literature.<sup>[4-7]</sup>

Patients with AO typically present with numbness and loss of motor control of their lower extremities with mottling of the skin in the abdominal area and lower extremities. Three of our patients had typical symptoms

of lower extremity acute peripheral artery occlusion present at the time of admission, whereas the last patient developed this after cardioversion. It is possible that in this case that cardioversion caused the peripheral embolization. The fourth patient's 95% occlusion and possible collateral circulation of the lower extremities might have prevented the development of acute artery occlusion symptoms.

With the involvement of mesenteric artery occlusion, all patients had developed mesenteric ischemia along with acute abdominal pain. All of our cases, except for case 4, had mesenteric ischemic disease as a result of occlusion of the mesenteric arteries and, therefore, had a tender abdominal examination. Having been diagnosed with mesenteric ischemia during the cardiovascular surgery, only one of the patients had an extensive intestinal resection, but unfortunately this procedure did not affect the outcome. Computed tomography scans with intravenous contrast showed thickening of the intestinal walls with dilation. As for the mesenteric ischemia, only the first case had an extensive intestinal resection performed by general surgery, but this had no effect on the outcome.

Management of AO patients can be challenging. As in our third patient, misdiagnosis of a new cerebrovascular event led to a delayed diagnosis, and the patient did not have the opportunity for an operation due to the advanced stage of his disease. This led to severe ischemia of the intestines and lower extremities, which ended as rhabdomyolysis followed by acute renal failure. Emergency department physicians play an important role in the management of AO patients since they need to perform a complete vascular examination on patients with a neurological deficit or signs of mesenteric ischemic, evaluate differential diagnoses, and divert them to a cardiovascular specialist if AO is suspected.

We were only able to find two case series of AO in the literature.<sup>[8,9]</sup> In a 48-patient series, the most common symptoms were limb ischemia, followed by acute abdomen, spinal cord compression-like symptoms, and acute onset hypertension.<sup>[8]</sup> Infrarenal thrombosis was found in 37 of 39 cases who underwent angiography. Despite early intervention, the overall mortality rate was 52%.

Aortic occlusions need immediate vascular treatment to salvage the affected organs and extremities in the adult patient population. In a retrospective series of patients who were operated on for AO, Surowiec et al.<sup>[9]</sup> found that early diagnosis and surgery improves patient outcome. In a 33-patient series, the mortality rate was 21%, and the most common form of morbidity was cardiac diseases.<sup>[9]</sup> Although all the patients were fully heparinized postoperatively, seven patients experienced

rethrombosis. Unlike this series, delayed prognosis resulted in serious morbidity in all our cases, which was followed by death. In our study, only the second case had the chance for vascular surgery. A thrombectomy with femoral-to-femoral grafting was conducted, but the delayed diagnosis caused the loss of the patient.

Aortic occlusion is a rare entity presenting with mixed clinical signs and symptoms. Emergency Department physicians must keep in mind that it is a highly mortal or morbid disease which not only affects the aorta, but the organs and extremities that are perfused by the aorta, thus identifying it can be challenging. Prompt diagnosis and treatment is essential for this group of patients; therefore, physicians need to perform a complete physical examination with vascular components in patients with overlapping symptoms and be aware of AO in the differential diagnosis.

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