

Case Report / Olgu Sunumu

## Successful extracorporeal cardiopulmonary resuscitation for aortic occlusion with myxoma detachment: A case report

*Miksoma kopmasının eşlik ettiği aort oklüzyonunda başarılı ekstrakorporeal kardiyopulmoner resüsitasyon: Olgu sunumu*

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### ABSTRACT

Myxoma is the most common type of primary cardiac tumors and is usually benign and asymptomatic, although it has been reported with fatal complications due to extracardiac manifestations. Extracorporeal cardiopulmonary resuscitation, a rescue therapy for cardiac arrest, yields favorable outcomes, only if complications have a reversible origin. Herein, we report the first case of abdominal aortic occlusion due to total myxoma detachment who was successfully treated with extracorporeal cardiopulmonary resuscitation.

**Keywords:** Cardiopulmonary resuscitation, extracorporeal membrane oxygenation, myxoma.

Myxoma is the most common primary cardiac tumor, accounting for 50 to 75% of all cardiac tumors.<sup>[1]</sup> This type of tumors usually show thromboembolic clinical manifestations, mainly in the cerebral artery and distal limbs. However, unusual extracardiac clinical manifestations of these tumors have been reported.<sup>[1]</sup> Myxoma is predominantly asymptomatic, and dyspnea and chest pain account for most of the reported symptoms. Peripheral embolization, including stroke, has been reported in about 10% of cases.<sup>[2]</sup> Among the extracardiac complications associated with myxoma, aortic occlusion has rarely been reported.<sup>[3]</sup>

### ÖZ

Miksoma primer kalp tümörlerinin en sık görülen türü olup, genellikle benign ve asemptomatiktir; bununla birlikte, ekstrakardiyak belirtilere bağlı ölümcül komplikasyonlar ile birlikte bildirilmiştir. Kardiyak arreste bir kurtarma tedavisi olan ekstrakorporeal kardiyopulmoner resüsitasyon, komplikasyonlar yalnızca geriye döndürülebilir özellikte ise, olumlu sonuçlar verir. Bu yazıda, ekstrakorporeal kardiyopulmoner resüsitasyon ile başarılı bir şekilde tedavi edilen total miksoma kopmasına bağlı ilk abdominal aort oklüzyon olgusu sunuldu.

**Anahtar sözcükler:** Kardiyopulmoner resüsitasyon, ekstrakorporeal membran oksijenasyonu, miksoma.

The use of extracorporeal cardiopulmonary resuscitation (ECPR) has often been shown to save the lives of patients under cardiac arrest; however, a study reported that the difference between ECPR use and non-use was not statistically significant.<sup>[4]</sup> In addition, patients who died despite ECPR often had irreversible organ injuries, when the cause of cardiopulmonary resuscitation (CPR) was not treated in advance.<sup>[5]</sup> Herein, we report the first case of cardiac arrest in the operating room due to total abdominal aortic occlusion (AAA) caused by myxoma detachment which was unable to be diagnosed preoperatively and successfully treated with ECPR.

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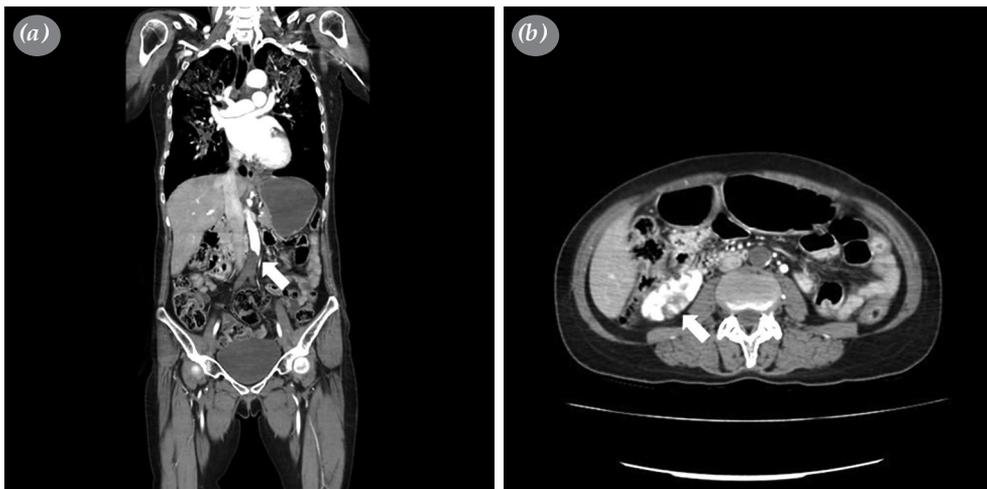
## CASE REPORT

A 56-year-old woman was referred to our hospital after undergoing intubation for respiratory distress that proceeded rapidly after the onset of dyspnea. The patient had a 10-year history of arterial hypertension. Her arterial systemic blood pressure and heart rate were 110/60 mmHg and 136 bpm, respectively. Thoracic and abdominal computed tomography (CT) revealed pulmonary edema. Subsequently, thrombotic occlusion was observed in the abdominal aorta below the level of the inferior mesenteric artery (IMA), and acute multifocal infarctions were detected in the spleen and kidney (Figure 1). In the emergency department, cardiac enzyme test results were normal, while electrocardiography showed sinus tachycardia. The bilateral femoral pulses were weak but palpable, and the skin was pale and wet with normal sensory and motor functions. After intubation was performed for respiratory distress, her blood pressure was maintained in the sedated state. As rapid treatment could affect the prognosis, we decided to remove the thrombus surgically, considering that there were no other abnormalities. The patient was transferred to the operating room; however, she developed sudden cardiac arrest after the induction of general anesthesia. Chest compressions were performed for four min and recovery of spontaneous circulation (ROSC) was achieved.

The operation continued after the patient recovered, and the thrombus was quickly removed by Fogarty arterial embolectomy using a 5-Fr catheter with inguinal incisions. The femoral artery approach

was used to avoid abdominal incision, as the patient's health condition was not stable. However, 30 min after ROSC and 10 min after thrombus removal, cardiac arrest occurred again, and the decision to initiate extracorporeal membrane oxygenation (ECMO) therapy was made. The ECMO setup used a venoarterial configuration (VA-ECMO), and a 6-mm polytetrafluoroethylene conduit was used to extend the left femoral artery with 6-0 Surgipro suture for the insertion of the perfusion cannula. Perfusion and drainage cannulas were inserted into the left femoral artery and vein, respectively. No distal perfusion catheter was inserted. The arrest-to-ECMO time was 35 min. After ECMO, the patient's vital signs stabilized, and the patient was transferred to the intensive care unit. The thrombus was approximately 5.5 cm and had a mucoid appearance according to a macroscopic examination performed by the pathologist.

Immediately after the operation, two-dimensional echocardiography revealed an ejection fraction of 20% with no other structural abnormalities. On the postoperative Day 1, we performed thoracic and abdominal CT evaluations of the remnant thrombus, but found no other lesions (Figure 2). On the postoperative Day 7, a tracheostomy was performed. The ECMO weaning was successful on the postoperative Day 16, and normal cardiac function was observed on follow-up two-dimensional echocardiography. The patient was transferred to the ward and discharged after 52 days of postoperative hospitalization. The patient was followed for 12 months, and no complications were reported. The biopsy



**Figure 1.** Computed tomography images in the initial diagnostic period. **(a)** Occlusion of abdominal aorta (white arrow) (coronal view). **(b)** Multiple renal infarctions (white arrow); occlusion of abdominal aorta (transverse view).



**Figure 2.** Computed tomography images on postoperative Day 1. (a) ECMO drain catheter (black arrow); perfused aorta after surgery (white arrow) (coronal view). (b) ECMO drain catheter (black arrow); perfused aorta after surgery (white arrow) (transverse view).

ECMO: Extracorporeal membrane oxygenation.

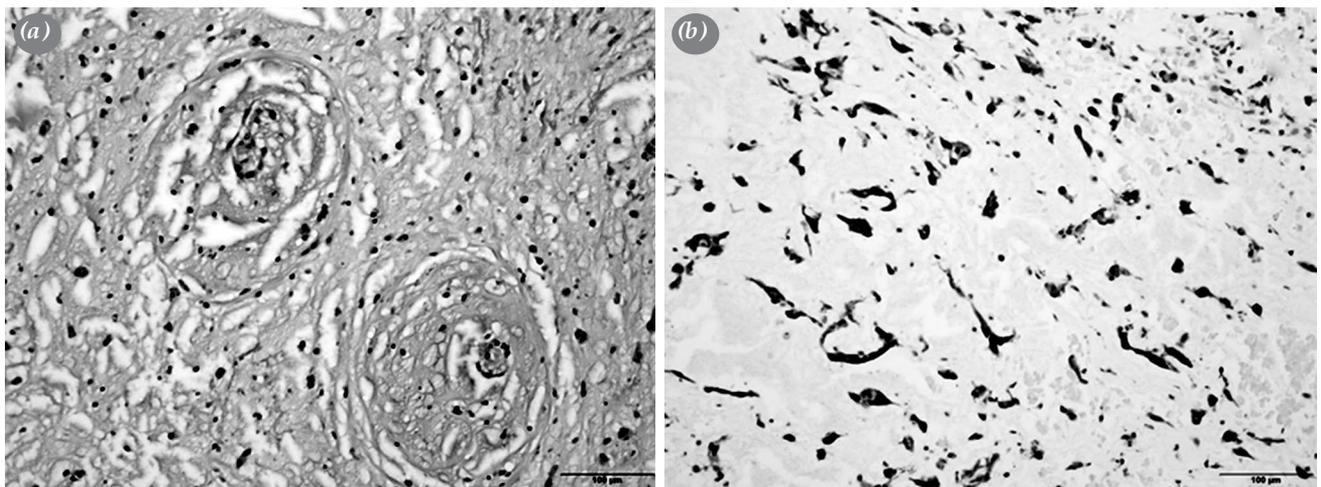
results obtained during the patient's hospitalization indicated a myxoma (Figure 3). A written informed consent was obtained from the patient.

## DISCUSSION

Myxoma is a common disease which typically manifests as a cardiac tumor.<sup>[1]</sup> However, it is difficult to make an initial diagnosis of myxoma in patients without risk factors; therefore, myxoma is diagnosed in patients with exacerbated conditions and complications. In the literature, there is only one available report that described a case of pulmonary edema caused by a myxoma-related embolic event,

similar to our case.<sup>[6]</sup> The case in the aforementioned report was caused by a sudden increase in afterload which can be explained by the gradual progression of AAO, leading to an increase in the left ventricular filling pressure and acute heart failure presenting as pulmonary edema.<sup>[6]</sup>

Cardiac arrest occurred twice in our patient. The first event appeared to be a vasoplegic feature, while we were attempting general anesthesia, and the patient responded relatively quickly to conventional CPR with ROSC. However, the second event was assumed to be deterioration progressing to cardiac arrest with a reduced blood pressure and an increased afterload



**Figure 3.** Histopathological examination. (a) Histology of cardiac myxoma (×200). (b) Immunohistochemistry with calretinin immunostaining (×200).

which was exacerbated by the retrograde Fogarty embolectomy in the early surgical phase. Our patient was healthy just a few hours before the event, and she reported no any hemodynamic consequences such as dyspnea, heart failure, or syncope prior to visiting the hospital. The diagnosis of myxoma was made solely on the basis of the postoperative histopathology findings. We believe that the AAO occurred at the level of the IMA; therefore, gastrointestinal symptoms such as abdominal pain were not severe in our patient, unlike that in the other reported case.<sup>[7]</sup>

There is currently insufficient evidence regarding the applicability of ECPR for cardiovascular disease in adults; however, the use of ECPR surely lends support to patients in a critical condition.<sup>[4,8]</sup> A rapid response by the ECMO team results in better outcomes in cardiac arrest patients.<sup>[8]</sup> In particular, ECPR is usually helpful in patients with complications of a potentially reversible origin, similar to that in our patient.<sup>[8]</sup> Besides, the cardiac arrest occurred in the operating room; thus, we had access to effective CPR. Therefore, ECPR is a reasonable treatment option in patients with cardiac arrest, when it can be provided in a relatively short time.<sup>[4]</sup>

The VA-ECMO was initiated using the femoral artery and vein in our case due to the sudden nature of the cardiac arrest. In general circumstances, retrograde perfusion by VA-ECMO could be hazardous, since it could lead to stroke with peripheral embolization; however, we had no alternative technical option (e.g., axillary artery or central cannulation by sternotomy) at that time, and the CPR to ECMO time exceeded 35 min. Despite these difficulties encountered in the operating room, the patient survived. Our case represents a relatively uncommon extracardiac manifestation of myxoma. In a similar situation, the possibility of unexpected embolic events due to myxoma leading to rapid deterioration and heart failure, and eventually pulmonary edema and cardiac arrest, should be considered.

In conclusion, extracorporeal membrane oxygenation is a life-saving treatment for refractory cardiopulmonary arrest. To the best of our knowledge, this is the first reported case of survival after extracorporeal cardiopulmonary resuscitation for acute abdominal aortic occlusion due to myxoma without other complications.

#### **Declaration of conflicting interests**

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