

Acute Aortic Occlusion in a Critically Ill Adult Presenting to the Emergency Department

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Abstract

Acute Aortic Occlusion (AAO) is a rare, life-threatening event so far described mainly in small-scale series. The most common causes of AAO are large saddle emboli to the aortic bifurcation, in-situ thrombosis of an atherosclerotic aorta, and occlusion of previous surgical reconstruction. We present the case of a 52-year-old female with rheumatic heart disease, ischemic cardiomyopathy with restricted left ventricular function, atrial fibrillation, and previous cardioembolic stroke, who was brought to the Emergency Department (ED) with sudden-onset dyspnea and lower backache radiating to both the legs. On arrival at the ED, the patient was electively intubated and mechanically ventilated in view of hypoxia and altered mental status, attributed to respiratory failure secondary to acute cardiogenic pulmonary oedema. The secondary survey revealed absence of bilateral femoral and popliteal artery pulsations. A computed tomography (CT) aortogram showed a complete lumen occlusion thrombus in the infra-renal region of the abdominal aorta at the level of L3-L4 lumbar vertebrae. An emergency embolectomy was performed successfully, following which the patient was started on heparin infusion and managed in the Intensive Care Unit (ICU). In the ICU, she suffered a torsade-cardiac arrest, with return of spontaneous circulation (ROSC) following rapid defibrillation. She was extubated on Day 3. Three weeks later, she was discharged from the hospital. At the time of discharge, she had developed ischemic lumbosacral radiculoplexus neuropathy, for which neuro-rehabilitation was advised. In our case report, we would like to highlight the following key points: 1) The importance of a detailed secondary survey in the Emergency Department (ED). 2) An inter-disciplinary approach to a complex syndrome that ensures the highest probability of a good outcome.

Keywords

Acute Aortic Occlusion, Aortoiliac Occlusive Disease, Acute Thrombosis

1. Introduction

Acute aortic occlusion (AAO) is a relatively rare vascular emergency. The actual incidence of AAO is unknown, but has been variously reported to be 1% to 4%. Risk factors for thrombosis include hypertension, tobacco smoking, and diabetes mellitus; heart disease and female gender are associated with embolism [1] [2].

Patients who present with this disorder have a classical history and physical examination consistent with occlusion of the distal aorta and resultant ischemia to the distal tissues. Time is of the essence in dealing with these patients. It is of primary importance that physicians realize that, only by ensuring prompt surgical management can a mortality rate of less than 50 percent be expected [3].

The importance of a secondary survey has been well established in trauma management. The purpose of a secondary survey is to evaluate and treat injuries often missed during the primary survey, especially in critically ill patients. [4] Bearing in mind that a focused secondary survey is helpful for prioritizing continued evaluation and management, we believe that its principles are extremely useful beyond the applications of trauma, and in critical medical management as well.

We present the case of a 52-year-old female with acute aortic occlusion who presented to us with acute pulmonary oedema and heart failure. She was resuscitated and managed successfully by a structured inter-disciplinary approach. In our case report, we show that a detailed secondary survey is vital in order to avoid critical near-misses.

2. Case Summary

A 52-year-old female was brought to the Emergency Department (ED) with symptoms of sudden-onset shortness of breath and diaphoresis associated with lower back pain radiating to both legs.

She had a background of rheumatic heart disease with severe mitral stenosis (awaiting mitral valve replacement), coronary artery disease with a stent in the left anterior descending artery, chronic heart failure, and prior cardio-embolic stroke with chronic atrial fibrillation. Her home medications comprised of diltiazem, amiodarone, clopidogrel, aldactone, and torsemide. She was also on warfarin, alternating between 5 mg and 2.5 mg per day. Her recent INR was 2.9.

On arrival, she had a blood pressure of 140/70mm Hg, heart rate of 74 beats per minute (regular), respiratory rate of 38 breaths per minute, and oxygen saturation of 65% on room air. Her random blood sugar was 308 mg/dl, and her Glasgow Coma Scale was E4V5M6. Her core body temperature was 36.8 Celsius.

Secondary survey revealed scattered bilateral biphasic lung crepitation with occasional rhonchi; heart sounds were normal with an early diastolic murmur; distal pulses (femoral, posterior tibial, dorsalis pedis) were absent on both lower limbs. Bilateral radial and brachial artery pulsations were present. There was no blood pressure differential between the arms.

She was placed on non-invasive ventilation (NIV), and started on a furose-

mide infusion. A bedside portable radiograph of the chest showed pulmonary interstitial edema (**Figure 1**).

An urgent cardiology consult was taken, and the plan for an emergent computed tomography (CT) aortogram was made. Her rapid antigen test was negative for SARS CoV-2.

Due to severe orthopnea, initial attempts were made to test the patient's compliance with lying supine in order to conduct the CT. Despite titrated sedation with midazolam, the patient was unable to tolerate the NIV while being in a recumbent position.

With a down-time of 50 minutes in the ED, it was decided that the patient be placed on invasive ventilation in order to conduct the imaging study. Rapid sequence intubation (RSI) was performed safely, and the patient was initiated on invasive mechanical ventilation.

CT aortogram showed complete lumen occlusion thrombus in the infra-renal region of the abdominal aorta at the level of L3 - L4 lumbar vertebrae (**Figure 2**). There was no flow in bilateral common iliac, external and internal iliac arteries.

An emergency thrombo-embolectomy was performed by a vascular surgeon, with immediate inflow reestablished in both femoral arteries, followed by successful tissue reperfusion (**Figure 3**).



Figure 1. Antero-posterior radiograph of the chest showing increased cardiac silhouette size and “third mogul” sign indicating enlargement of the left atrial appendage. Features of pulmonary interstitial and alveolar edema are noted.



Figure 2. Thoracic and abdominal aorta computed tomography coronal view showing complete occlusion of the infra-renal abdominal aorta.

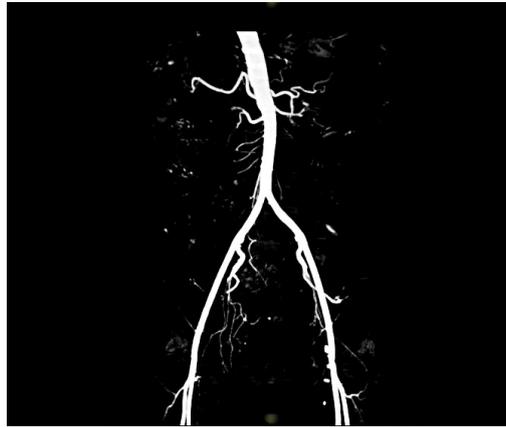


Figure 3. Reestablished luminal inflow as seen in both femoral arteries, following femoral thrombo-embolectomy.

The patient was shifted to the Intensive Care Unit (ICU), and started on a heparin infusion. In the ICU, she had pulseless polymorphic ventricular tachycardia (TdP), which responded to rapid defibrillation, and intravenous magnesium.

She was extubated on post-operative day (POD) 3. Serial clinical examinations revealed good pulsations of bilateral posterior tibial and dorsalis pedis arteries. However, progressive motor weakness was noted over both legs, for which a neurology consult was sought. Nerve conduction study (NCS) showed features suggestive of ischemic radiculoplexus neuropathy; neuro-rehabilitation was initiated.

On POD 10, the patient started running a fever along with the development of a productive cough with purulent sputum, and occasional wheezing. Sputum cultures were sent, and antibiotics were commenced in the regimen of piperacillin/tazobactam and teicoplanin for one week. Her symptoms gradually improved. She was transferred to the ward on day 15. Her subsequent clinical course in the hospital remained uneventful.

She was discharged on Day 25. Follow-up was advised in order to plan for her mitral valve replacement surgery at the earliest.

3. Discussion

Aortoiliac occlusive disease (AIOD), also known as Leriche syndrome, is a variant of peripheral artery disease affecting the infra-renal aorta and the iliac arteries. Though progressive in nature, and not rare by itself, the acute limb-threatening form of AIOD is seldom seen, and even harder to diagnose [5] [6].

Acute thrombosis is the most common cause of acute aortic occlusion (AAO) and usually results from end-stage atherosclerotic aortoiliac disease in association with low flow states secondary to cardiac dysfunction or dehydration. Emboli can also be the source of acute occlusion, more frequently originating from the heart in patients with a history of arrhythmia, myocardial infarction, endocarditis, or cardiac tumours. [7] In our patient, chronic heart failure with restricted ejection fraction, coupled with severe mitral stenosis and chronic atrial fibrilla-

tion, were high risk factors for an embolic phenomenon resulting in critical limb ischemia.

Despite surgical intervention, acute abdominal aortic occlusion has a high mortality rate of approximately 50% [8]. A delay in treatment can predispose to the development of limb ischemia, compartment syndrome, thrombus propagation to renal and mesenteric arteries, reperfusion syndrome, limb loss, and even death [9] [10].

The current understanding of acute aortic occlusion is largely based on case series and reports from several decades ago. John W. Bell reported a case of acute thrombosis of the subrenal abdominal aorta in 1967 [11]. Dossa *et al.* conducted a retrospective review in 1994 of 46 consecutive patients with AAO during a 40-year period. In their study, they noted that AAO remains a serious vascular emergency with significant morbidity and mortality, even when recognized promptly; though survivors have a reasonable long-term outcome [12]. In a 2013 prospective study by Crawford *et al.* to report the current etiology of AAO, 29 patients were identified between 2005 and 2013. All occlusions involved at least the bilateral common iliac arteries. Aortoiliac thrombosis was felt to account for 76% of the AAO cases and embolic occlusion in two (7%) cases. In 17%, etiology of the AAO was indeterminate. Both patients with embolic aortic occlusion were found to have a left ventricular thrombus on transthoracic echocardiography; one had a history of atrial fibrillation but was not on anticoagulation. [13]

In our case, it is unique to note that the patient had been compliant with prophylactic anticoagulation. She had denied history of claudication, and considering her predominant respiratory presentation to the ED, it was likely that the diagnosis of critical limb ischemia was missed, if not for a detailed secondary survey and assessment of the symmetry of peripheral pulses.

It is our belief that prompt assessment, rapid stabilization, and an inter-disciplinary approach to such complex and relatively rare disease entities can significantly help reduce morbidity and mortality.

4. Conclusions

- In patients predisposed to aortoiliac occlusive disease, there may be no prior history of claudication, a harbinger of critical limb ischemia. It is imperative that the Emergency Physician always conducts a thorough secondary survey, including the assessment of peripheral pulse symmetry.
- A multimodal inter-disciplinary approach to a critically ill adult is key to good clinical outcomes; in our case, a specialized yet inclusive modality of teamwork comprising the emergency physician (resuscitator), cardiologist, vascular surgeon, intensivist, neurologist, and neuro-physiatrist.

5. Consent

The authors of this article attest to the fact that patient identification has been kept entirely confidential and with complete anonymity. In the absence of in-

formed consent, the primary author (also identified as the head of department) takes full responsibility to maintain confidentiality and autonomy of the patient described in this clinical case report.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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