

Ongoing Blood Pressure Change in Both Upper Extremities: An Unusual Presentation of Aortic Dissection

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ABSTRACT

Aortic dissection is a critical condition requiring immediate assessment and management. Patients with this condition usually present with severe chest pain and high blood pressure. However, because of the variety of presenting symptoms and features, it is a challenge to identify this condition, and patients are frequently misdiagnosed. The potentially critical course of aortic dissection can result in tragedy. We present the case of a 46-year-old woman who initially presented with a light headache and sensory loss in her right upper limb. She had a medical history of hypertension without regular medication, and her blood pressure (BP) was 110/67 mmHg on arrival. Four days later, she was sent to the emergency department again because she experienced transient loss of consciousness lasting for a few minutes. Her BP was 94/57 mmHg in the right arm and 89/54 in the left arm. She was admitted to the hospital, and the pulses in both upper limbs were impalpable on the following day. Chest magnetic resonance imaging (MRI) was arranged, and subsequently, aortic dissection was diagnosed. The case presented with unusual characteristics, which increased the difficulty in immediate correct diagnosis.

Keywords: *Aortic Dissection, Blood Pressure, Pulseless Upper Extremities*

1. Introduction

Aortic dissection is a potential fatal condition and early diagnosis is critical to the prognosis. The management demands either surgical repair the dissected aorta or medical reduce arterial shear forces on the torn aortic site. Early diagnosis with minimal loss of time is the principle for prompt management. However, misdiagnosis remains an unresolved problem because of myriad and unpredictable clinical presentation. Widened mediastinum in a chest X-ray is a common finding. The initial symptoms usually present with severe and abrupt chest pain. Physical examination helpful in diagnosis is unstable blood pressure. Arterial hypertension is the most frequent presentation. Asymmetric pulses and varying blood pressure between different upper limbs are another indication of possible aortic dissection. Hemodynamic instability, shock, and syncope could be the less common manifestations in acute aortic dissection. We described a case of acute aortic dissection presenting with progressive decreased blood pressure detected in bilateral upper extremities. The unusual presentations without typical clinical

findings obscured the diagnosis. The possibility of diagnosis should be kept in mind to avoid catastrophe.

2. Case Report

A 46-year-old woman who experienced headache and right upper limb numbness for 4 hours was admitted to our emergency department. She denied having any chest, back, abdominal, arm, or leg pain. She had neither syncope nor dyspnea. No other symptoms were noted at this time. She had a history of hypertension that was not treated with regular medication. She was a non-smoker and had no prior surgeries. No other aspect of her medical history was significant.

Physical examination revealed that the patient had a comfortable appearance, and was mild obesity. The patient's vital signs were as follows: blood pressure (BP), 110/67 mmHg; pulse rate, 74 beats/min; respiration rate, 18 breaths/min; body temperature, 37°C. She was alert and conscious of time, people, and position. Cardiac auscultation revealed no murmur, gallops, or rubs. The lung sounds were clear during auscultation. The abdomen

was soft and non-tender with no masses during palpation. The results of other physical and neurological examinations were unremarkable. Chest radiography showed cardiomegaly but no other significant findings. The results of electrocardiography were unremarkable. A brain computer tomography (CT) scan was performed, but the result showed no abnormalities. The results of laboratory tests, including a complete blood count and cardiac enzyme, glucose, electrolyte, and renal function tests were normal. After consultation with a neurologist, a diagnosis of cerebrovascular disease was ruled out. The patient was initially recommended treatment for a tension migraine. After that, she was prescribed a medication and underwent follow-up at the outpatient department after observation.

Four days later, she was admitted to our emergency department again because of loss of consciousness. The episode lasted for 5 minutes in the early morning and culminated with spontaneous and full recovery. After recovering clear consciousness, the patient complained of dizziness and felt faint. At the second examination, her BP was 94/57 mmHg in the right arm and 89/54 in the left arm. Her pulse rate was 106 beats/min, respiratory rate was 20/min, and body temperature was 37°C. Cardiac, respiratory, abdominal, and neurological examinations did not reveal further abnormalities, except for sensory loss in the right upper limb. There were no significant changes in her chest radiographs and electrocardiographs in comparison with the previous findings. She was again recommended for admission to the inpatient unit.

On the following day, her BP was difficult to detect in the upper arms and both radial arteries were impalpable. When measured in the lower limbs, her blood pressure was 190/95 mmHg in the right leg and 198/98 mmHg in the left leg. The patient did not report any further complaints, and the sensation of numbness in her right upper limb improved. There was neither further syncope nor development of other neurological defects. The patient stated that she was now feeling fine.

Subsequently, sonography and Doppler scan of her upper extremities were performed under the impression of peripheral vascular obstruction. The results showed bilateral patent radial arteries with normal compressibility. Carotid Doppler was performed, and it revealed increased intimal thickness without marked plaque formation. In addition, both subclavian arteries were invisible, the left common carotid artery was completely occluded, and inverted flow was noted in the left external carotid artery. Echocardiography showed good left ventricle contractility. Neither pericardial effusion nor significant valvular regurgitation was found. Under the impression of aortoarteritis, chest magnetic resonance imaging (MRI)

was performed. The results showed aortic dissection with an intimal flap from the orifice of the left common carotid artery. The left common carotid artery and left subclavian artery were almost occluded. A possible intimal flap in the right innominate artery with high-grade stenosis of the right subclavian artery was also demonstrated (**Figure 1**). A CT scan was arranged to evaluate the abdominal aorta for surgical management, and the results showed similar findings. It showed aortic dissection from the transverse site, and the dissection extended to the level of the celiac trunk. There was an intimal flap in the right innominate artery and a small amount of dense fluid collected in the pericardial space (**Figure 2**). The disease was in progression, and the patient received surgical intervention on the following day. After confirmed the diagnosis, surgical repair with aortic aneurysmectomy was performed and a synthetic graft was interposed between aortic root and aortic arch. Another two grafts between ascending aorta graft to right brachiocephalic artery and to left common carotid artery were placed. Then the other graft was interposed between ascending aorta and distal aortic arch. Valvuloplasty with aortic annulus placcation was performed finally. And the patient was discharged after ascending aorta total repair with stable condition.

3. Discussion

Acute aortic dissection is a potentially fatal condition requiring immediate assessment and treatment. Immediate surgical intervention is the treatment of choice for dissection originating in the ascending aorta, and early diagnosis is critical to the prognosis. Acute onset of chest pain is the most common initial presentation. Classical symptoms include an abrupt, severely painful tearing or ripping sensation in the chest or substernal area, which sometimes radiates to infrascapular, mid-back, or abdominal sites. However, pain may be absent or intermittent in aortic dissection, and, because of the myriad and unpredictable possible clinical presentations, misdiagnosis remains an unresolved problem.

The clinical presentation of this condition may include symptoms and signs secondary to organ system involvement [1]. The presentations may be diverse and numerous, including neurological, cardiovascular, and gastrointestinal manifestations. Neurologic symptoms are frequently associated with thoracic aortic dissection, which may be a clue to early diagnosis [2]. Although most of the neurological symptoms are associated with chest pain, painless aortic dissection may present with neurologic symptoms. The common neurologic presentations in dissecting aortic aneurysm include acute stroke or peripheral ischemic neuropathy. Among these, stroke is the most common presentation. Acute stroke may develop when

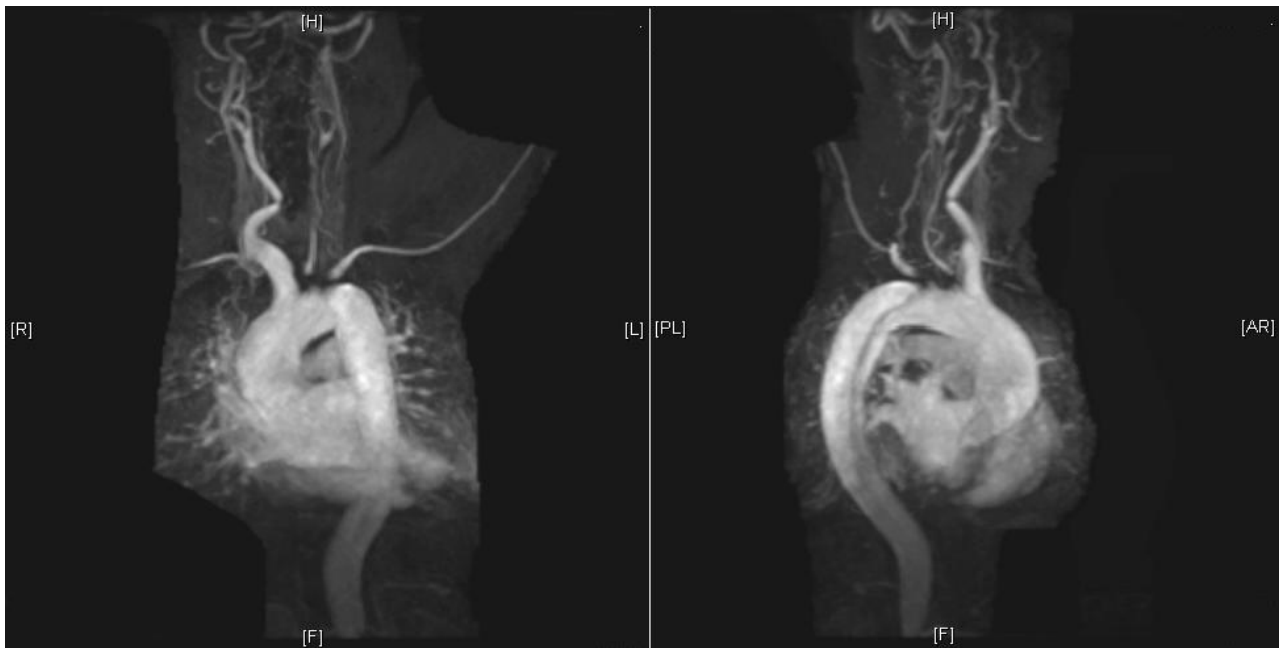


Figure 1. Chest magnetic resonance imaging (MRI) showed aortic aneurysm with an obvious intimal flap near the orifice of the left common carotid artery. The left common carotid artery and left subclavian artery were almost occluded. A possible intimal flap in the right innominate artery with high-grade stenosis of the right subclavian artery was also demonstrated.

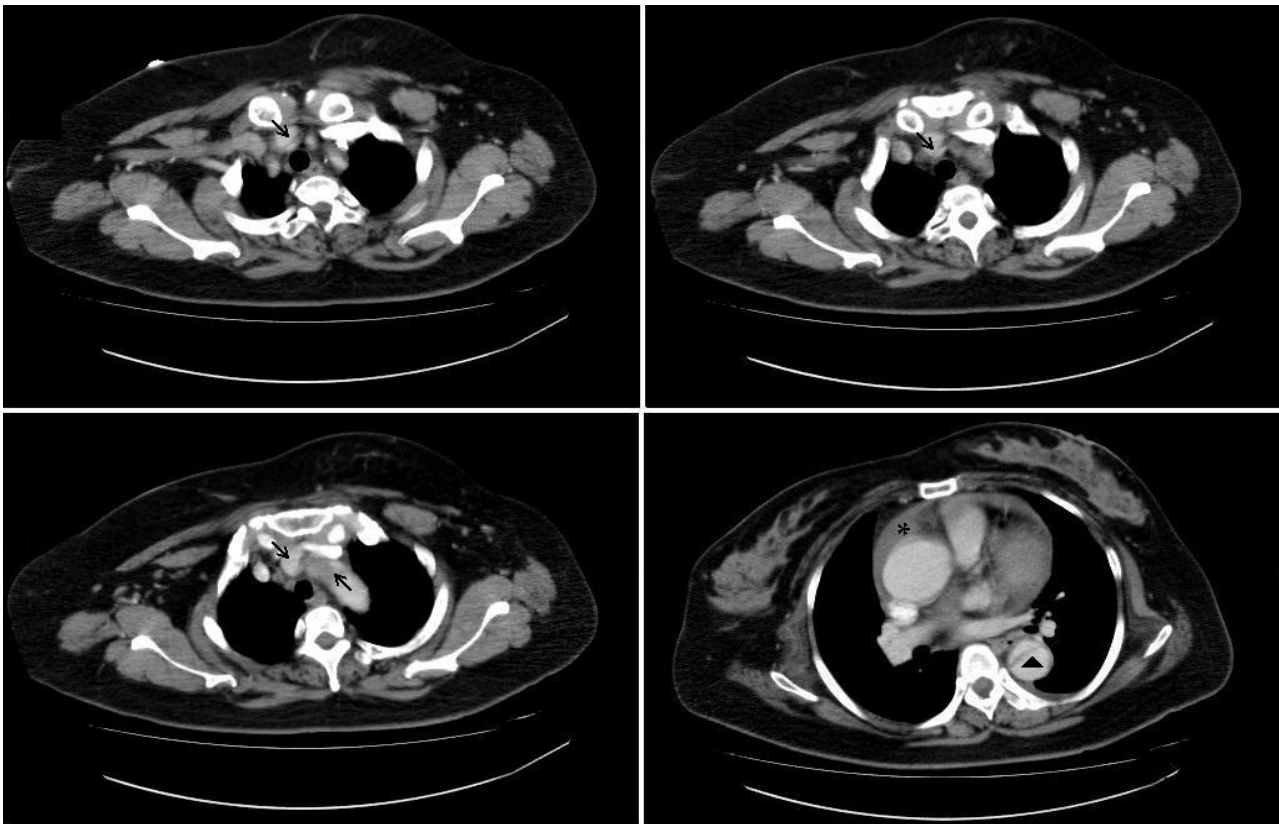


Figure 2. Chest computer tomography (CT) demonstrated an intimal flap near the orifice of the right innominate artery, which extended into it (arrow). The dissecting aortic aneurysm extended to the descending aorta near the celiac trunk (arrowhead). Pericardial effusion was also demonstrated (*).

the aortic dissection extends to the innominate artery or common carotid arteries. Other clinical manifestations, such as transient cerebral hypoperfusion caused by altered cerebrovascular flow, may present as syncope [3]. As for spinal cord ischemia and peripheral nerve involvement, paraplegia is the most common neurologic symptom caused by obstruction of spinal arteries; this symptom has been described in several case reports [4-6]. Spinal cord ischemia and ischemic peripheral neuropathies are more commonly associated with distal aortic dissection. The aortic dissections in most of these cases were located in the abdominal aorta and resulted in injury to the lower extremities. Possible manifestations of these injuries include transverse myelitis, progressive myelopathy, anterior spinal cord syndrome, paraplegia, and quadriplegia [6-9]. Painless dissecting aorta with ischemic peripheral neuropathy in upper limbs is very rare and is often ignored or misdiagnosed. Clinical presentations are varied and may result in neurologic symptoms, including paresthesia in the limbs, hoarseness of voice, and Horner syndrome [10,11]. The possible mechanisms underlying these symptoms include neuronal ischemia caused by obstruction of the branch artery, compression caused by the expansion of the false lumen, and leakage of the aortic dissection aneurysm.

Aortic dissection may also result in symptomatic ischemia, which most commonly occurs in a lower extremity [12,13]. Clinicians should consider the possibility of aortic dissection in patients presenting with abrupt onset of chest pain and sudden loss of pulse in a lower extremity. However, the symptomatic ischemia caused by aortic dissection is not limited to the lower extremities. One previous report described a case of acute aortic dissection in which the patient experienced numbness and paleness in the right arm, which was caused by acute occlusion of the right subclavian artery [14]. The pathologic mechanism in that case was similar to that in our case, but the 2 cases had different clinical manifestations. In our case, right arm numbness without blood pressure differentials and without the clinical features of ischemia obscured the initial diagnosis. The value of different blood pressure assessed between bilateral upper extremities believed to be clinically significant is greater than 10 mm Hg in systolic blood pressure [15]. Asymmetric pulses and varying blood pressures between different upper limbs are strong indicators of possible aortic dissection. Other possible condition included coarctation aorta involving aortic arch, inflammatory aortitis as syphilitic aortitis, aortic arch syndrome, supraaortic aortic stenosis, and subclavian steal syndrome [16-20]. Comparing the blood pressure values in both upper extremities is important determination in the diagnosis of pathology involving the aortic arch or upper-extremity

arteries. In fact, asymmetric blood pressures are the most specific physical signs of aortic dissection and have been reported in 38% of patients with aortic dissections [21]. Aortic dissection involving both subclavian arteries is rare, and it is extremely rare when the clinical manifestation includes absent pulses in both upper extremities and lacks neurologic defects.

Most patients with aortic dissection present with hypertension; however, hemodynamic instability with the clinical features of circulatory shock may also be a sign of aortic dissection. Hypotension and shock in acute aortic dissection are secondary to acute severe aortic regurgitation, low cardiac output because of cardiac tamponade, aortic rupture, or left ventricular systolic dysfunction with coronary artery involvement [22,23]. Echocardiography did not reveal any special condition in our case, and this obscured the diagnosis. Fortunately, the true diagnosis was confirmed by MRI, and a prompt surgical intervention was arranged without any problems.

Emergent surgical repair is indicated to avoid life-threatening events when aortic dissection involving ascending aorta. The standard operation for type A dissection is to perform an ascending aortic replacement with open distal hemi-arch anastomosis. Residual aortic aneurysm with gradually enlargement in patients who had previously undergone ascending aortic repair had been noted [24,25]. Using an open total arch/elephant-trunk approach or hybrid endovascular approaches provide a method to compress the false lumen in distal descending thoracic aorta [26]. Preliminary showed hybrid arch procedures have benefit in elderly and high risk patients, but, this benefit is not as pronounced in younger [27-29]. Further outcome data will be necessary in the future. In our case, after the surgical procedure, she was discharged under stable condition and kept follow-up at out-patient department.

4. Conclusions

The case demonstrated the uncommon clinical evolution of aortic dissection. The most distal intimal tear in a dissecting aortic aneurysm where the blood is presumed to return to the circulation (reentry tears) or multiple intimal tears without interarms blood pressure differences may occur in the cases of aortic dissection. Knowledge of the clinical manifestations and the possible involvement of aortic arch vessels are the critical factors in diagnosis. Early blood pressure measurement of other extremities and image study are indicated to assist the diagnosis of this condition.

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