

# Ultrasound Combined with CTA in Diagnosis of Painless Aortic Dissection Combined with Carotid Artery Active Thrombosis: A Case Report

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## Abstract

**Background:** Aortic dissection (AD) is a relatively rare but dreadful illness, often accompanied by severe, sharp (or tearing) back pain or anterior chest pain, as well as acute hemodynamic compromise. Painless dissection has also been reported in rare cases and might be misdiagnosed due to its atypical symptoms leading to catastrophic outcomes. **Case presentation:** The patient was admitted to the hospital due to right limb weakness with speech inability for more than 10 hours. In the routine cardiac ultrasound examination, the avulsion intimal echo was found in the initial segment of the descending aorta. The rupture range was about 11 mm, and the lumen was separated into real and false lumen. Further computed tomography angiography (CTA) examination confirmed the major arterial dissection (De Bakey Type I). **Conclusion:** We report a case of painless aortic dissection with active carotid artery thrombosis diagnosed by ultrasound and CTA, and to improve the understanding of painless aortic dissection by reviewing relevant domestic and foreign literature.

## Keywords

Painless Aortic Dissection, Ultrasound, CTA, Carotid Artery Thrombosis

## 1. Introduction

Aortic dissection (AD) is a rapid and life-threatening aortic dissection of the acute aortic syndrome in which the intima of the aorta is ruptured and blood is torn from the intima into the middle layer of the blood vessels to separate the aortic wall, form a true and false cavity of a change [1]. This disease typically

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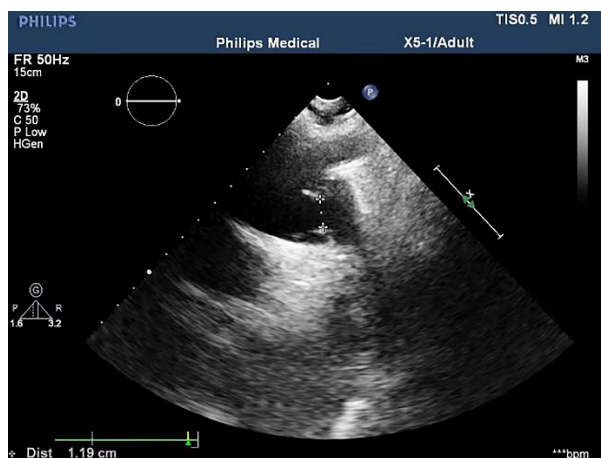
presents with a sudden onset and rapid progression, with approximately 90% of patients experiencing acute or persistent chest or back pain characterized by a tearing or cutting sensation [2]. Although abrupt onset thoracic pain is one of the most common symptoms in acute aortic dissection, there are still around 6.4% of painless aortic dissection patients [3]. The mechanism of painless aortic dissection remains incompletely clear. The innervated layer of the aortic artery is responsible for pain sensation, and the absence of chest pain may be attributed to the damage of innervation to the aorta resulting from the descending aortic dissection. Ischemic necrosis of nerves results from direct vascular compromise and can lead to specific classes of neurologic dysfunction [4]. Atypical symptoms of aortic dissection make accurate diagnosis difficult, especially in painless aortic dissections. A small number of patients lack typical pain and may have ischemic or hemorrhagic clinical manifestations, which are easy to be misdiagnosed or missed. Through this case report, we aim to emphasize the importance of promptly diagnosing a painless aortic dissection using ultrasound combined with computed tomography angiography (CTA).

## 2. Case Presentation

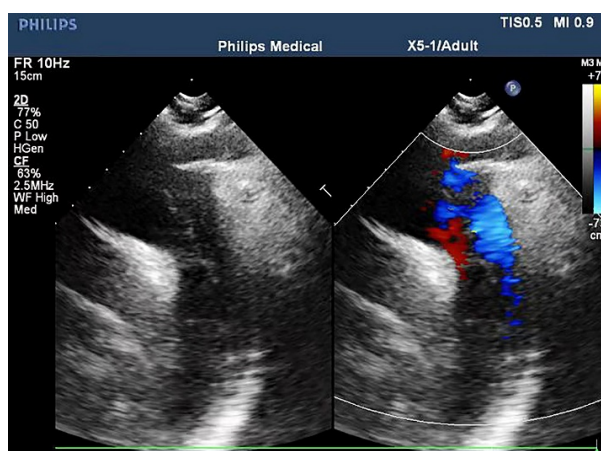
A 44-year-old male patient presented with a right limb weakness with a speech inability for more than 10 hours. His blood pressure was 220/150 mmHg, right upper limb muscle strength was 0 grade, muscle strength of right lower limb was 3 + grade and bilateral somatosensory sensation was normal. Brain computed tomography (CT) scan after admission: left temporal parietal lobe cerebral infarction. Diagnosis: 1) Acute cerebral infarction; 2) Grade 3 hypertension. After admission, the patients were given symptomatic supportive treatment, such as improving circulation, nourishing nerves, regulating lipids, and lowering blood pressure. After treatment, the patients had dysphoria, right limb weakness, and blood pressure was 205/125 mmHg.

On the third day of admission, the cardiac color ultrasound was performed: At the beginning of the aorta of the descending aorta (**Figure 1**), the range of the rupture was about 11 mm, separating the lumen into two real and false cavities (**Figure 2**). Conclusion: Aortic dissection. Neck vascular ultrasound: the anterior wall of the left common carotid artery is uniformly thickened, about 2.8 mm thick. A range of about 44 × 8 mm echoes was seen in the left common carotid artery (**Figure 3**), moving back and forth with the vascular beat, and no obvious blood flow signal was seen in the lumen. Ultrasound considerations: heterogeneous thickening of the left common carotid artery, possible dissection; active thrombosis of the left common carotid artery. Emergency CTA showed that the distal ascending aorta showed a double lumen with multiple breaks, a small true lumen, and a large false lumen (**Figure 4**); the head-arm stem originated from the true lumen, the left common carotid artery originated from the false lumen, and the distal vessels showed no development; the left subclass artery originated from the false lumen, and the starting lumen also showed double lumen changes

(Figure 5). CTA consideration: aortic dissection (De Bakey Type I) involving the origin of the left subclass artery, left total cervical origin from the false lumen, and distal vessels. The diagnosis of aortic dissection was clear.



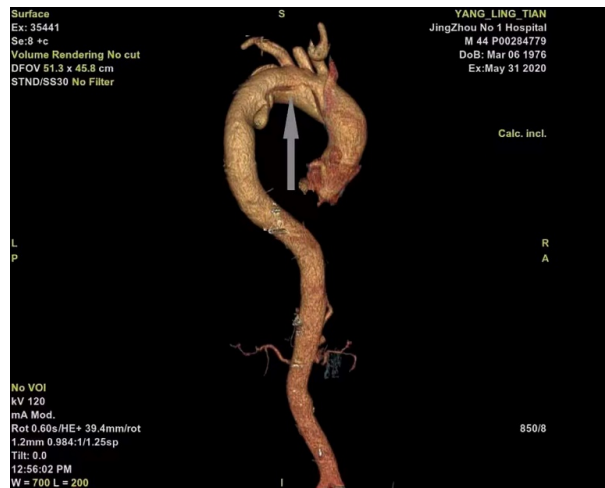
**Figure 1.** Break of the descending aortic dissection.



**Figure 2.** True and false two cavities of descending aortic dissection.



**Figure 3.** Active thrombus of the left common carotid artery.



**Figure 4.** Site of the aortic arch tear (arrows).



**Figure 5.** CTA of the chest of the internal view of the aortic dissection. Arrows showed the extent of the flap.

To seek further treatment, the patients and their families went to the higher-level hospital for treatment, follow-up revealed that the patient had undergone “Endovascular graft exclusion plus ascending aorta-right brachiocephalic trunk, left common carotid artery, and subclavian artery bypass graft”. The patient’s right nasolabial groove is shallow. The tongue extends to the right. The muscle strength of the right upper limb was grade 3, and the muscle strength of the right lower limb was grade 4. The distal muscle tone of the right upper limb is grade 2. The patient still has poor right-limb movement and poor speech.

### 3. Discussion

Aortic dissection is a relatively rare acute and critical disease in clinical practice. The typical symptoms are sudden acute, tearing chest and abdominal pain and

the pain extending downward with the tear site can be wandering [5]. Physical examination often shows hypertension, bilateral pulse asymmetry, chest, and abdominal vascular murmur, etc. [6]. There are other non-specific manifestations such as sudden disturbance of consciousness, limb mobility disorders, paraplegia, limb pain, and so on. The incidence of painless aortic dissection is low. For painless patients, clinicians often have insufficient knowledge, low vigilance, and lack of careful physical examination and painless aortic dissection without specific biomarkers, routine laboratory tests are of little help in the diagnosis of aortic dissection, leading to misdiagnosis and missed diagnosis [7].

Active thrombus in the left common carotid artery is the main cause of cerebral infarction. The patient had a history of hypertension but poor blood pressure control. Patients with no chest pain are more likely to have a clinically aortic dissection attack. The patient was admitted to the hospital with “Right limb weakness and inability to speak for more than 10 hours”. The diagnosis of cerebral infarction was clear, so the physical examination could be easily extended to the nervous system, such as muscle strength and pathological signs. It is difficult to consider whether the auscultation has chest or abdominal murmurs, whether the blood pressure difference in both upper limbs or bilateral pulse symmetry. This is also why painless aortic dissection is missed [8].

At present, it is considered that an ultrasound examination is a rapid, accurate, and simple diagnostic method that can be performed in the emergency department, which is an easy and highly successful diagnostic technique for evaluating aortic dissection. It can provide valuable information for the clinic quickly [9]. In patients with suspected aortic dissection, ultrasound examination of the heart and great arteries should be performed as early as possible. The advantage of ultrasound is that it can judge the vascular flow filling, flow direction, and flow rate change by color Doppler, non-invasive and repeated real-time dynamic observation, and the diagnosis of active vascular thrombosis is clear. However, because the sternum blocks the ultrasound beam, the distal end of the ascending aorta, the lower end of the descending aorta, and the thoracic aorta are usually difficult to display and CTA can completely display the ascending, arched, and descending segments of the aorta, therefore, the sensitivity and specificity of ultrasound aortic dissection are not as good as that of CTA [10]. CTA represents the gold standard test to detect aortic dissections; however, the atypical presentation may delay using this resource if the diagnosis is not suspected [11]. So, ultrasound combined with CTA can more accurately diagnose aortic dissection, comprehensively evaluate the condition of major vessels, and provide more comprehensive information for clinical practice.

## 4. Conclusion

Our case contributes to the evidence that the prototypical tearing chest pain radiating to the back is not always present in an acute AD. Ultrasound is portable, rapid, accurate, and cost-effective in the diagnosis and follow-up of AD. Com-

puted tomography has high sensitivity and specificity for diagnosing aortic dissection, and CTA is a reliable way to confirm the diagnosis of painless AD. Therefore, ultrasound combined with CTA can more accurately diagnose aortic dissection, provide more comprehensive information for clinical practice, and help patients get treatment in time.

## Consent for Publication

Written informed consent was obtained from the patient for publication of this Case Report and any accompanying images.

## Conflicts of Interest

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

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