Letter to the Editor

Occult aortic dissection

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Introduction

Aortic dissection is caused by a tear in the aortic lining, in which blood passes through the rupture of the intima into the middle layer of the arterial wall, resulting in stratification of the aortic wall (1). Hypertension, aortic atherosclerosis, hereditary vascular disease, infection, trauma, and pregnancy are all high-risk factors for aortic dissection. According to the location and involvement of aortic dissection, Stanford's method divides aortic dissection into type A and type B, while that of DeBakey divides aortic dissection into type I, II, or III according to the origin, extent, and degree of anatomical involvement (2). Aortic dissection is a disease with high mortality, so early clinical diagnosis, rapid imaging examination, and active treatment are key to a good prognosis. The typical clinical symptoms of patients with aortic dissection include persistent, unbearable, and severe pain, mainly located in the chest, back, and abdomen. However, in the previous literature, there are few reports of occult aortic dissection. Because the clinical symptoms of this particular disease do not include obvious pain but rather syncope, chest tightness, dyspnea, lower limb numbness, or limb paresis, a clinical diagnosis is difficult and treatment may be delayed, leading to rapid aggravation of the disease with a variety of complications, and ultimately death (3). Among patients with previously untreated aortic dissection, mortality increases by 1% to 2% for each hour of delay after onset (4). Therefore, timely diagnosis is essential for successful treatment. Here, we present a rare case of an occult aortic dissection.

Case presentation

The patient was a 26-year-old man who was admitted to Huainan Oriental Group General Hospital because of left lower limb paralysis and shortness of breath for 1 day after sedentary behavior a week prior. Physical examination showed no obvious deformity of the spine and no radiating pain in the lower limbs, but there was evident pain in the spinous process of the L4/5 and L5/S1 vertebrae, limitation of movement, slightly decreased skin sensation in the left anterior medial leg and dorsum of the foot, and suspicious positive straight leg raising test results. A magnetic resonance imaging (MRI) scan of the hip joint showed extensive abnormal signals in the soft tissue of the left hip, the lateral upper part of the thigh, and the perineum, with hyperintensity on T2-weighted imaging (T2WI) and hypointensity on T1-weighted imaging (T1WI), which were likely infection. The clinical diagnosis was "sepsis soft tissue infection, acute myelitis, and rhabdomyolysis". After anti-infection, liver-protection, and blood-purification treatment, the patient developed shortness of breath, and oxygenation could not be maintained even after oxygen inhalation. The patient was then transferred to the First Affiliated Hospital of Anhui Medical University for further treatment since the condition gradually aggravated. The laboratory test results showed the following: (hypersensitive) C-reactive protein level, 200.00 mg/L; white blood cell count, 35.98×10^9/L;

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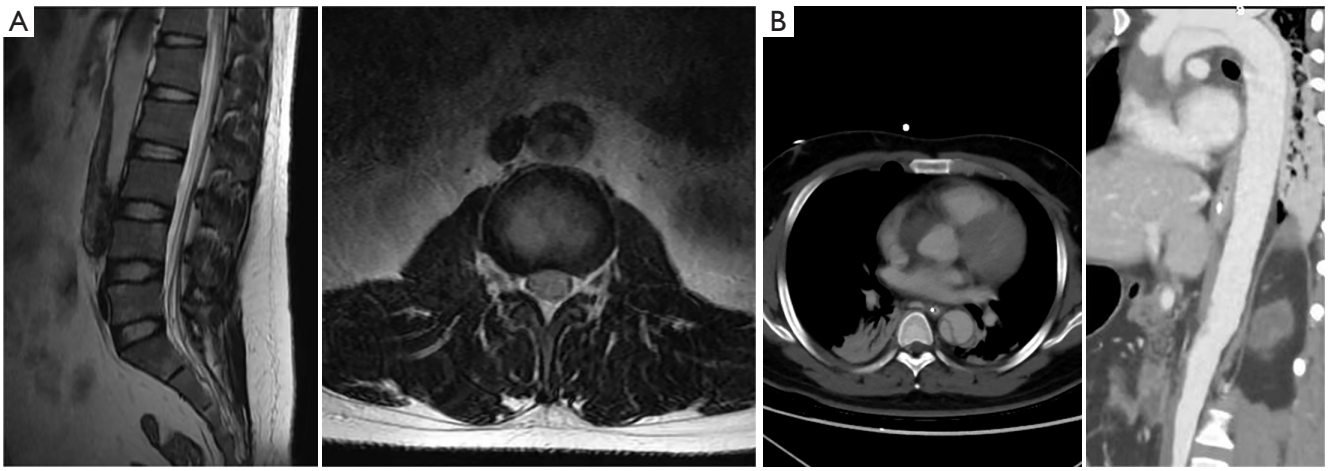

Figure 1 Occult aortic dissection. MRI showed stratification in the descending aorta, with high flow signal in the false lumen and low flow signal in the true lumen in the aorta (A). CT MPR reconstruction showed a double-lumen shadow of the aorta, with both the true and false lumen being filled with contrast agent (B). MRI, magnetic resonance imaging; CT MPR, computed tomography multiple planar reformation.

neutrophil percentage, 78.10%; absolute neutrophil count 28.08×10^9/L; creatine kinase isoenzyme concentration, 867 μ/L; and creatine kinase, concentration 28,800 μ/L. In order to clarify the diagnosis, lumbar MRI was performed. The MRI sequences used in the spine imaging included sagittal T1WI and T2WI as well as axial T2WI sequences. Lumbar MRI plain scan examination of the spinal cord did not produce obvious abnormal signals in lumbar spine, but abnormal signals were found in the medulla spinalis at the T8–T10 level. More importantly, it was found that the blood flow in the abdominal aorta was stratified, and there was a clear boundary of high and low mixed signals in the arterial cavity (*Figure 1A*). Aorta dissection was thus considered. In order to clarify our evaluation, the computed tomography angiography (CTA) was recommended, and the results confirmed that our diagnosis was correct. The patient had type I of DeBakey aortic dissection from the ascending aorta to left femoral artery (*Figure 1B*), which was highly dangerous and required surgical treatment. However, due to the patient's serious infection posing a serious risk for the operation, surgical treatment was recommended to be conducted only after the infection could be controlled, with strict follow-up attention focus on blood pressure management. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this article and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

Aortic dissection is a large vessel disease with acute onset, rapid progression, and high mortality. Therefore, prompt and accurate diagnosis is essential. The most common onset age of aortic dissection is around 65 to 75 years old, with an annual incidence of approximately 0.035% (5). The pathogenesis is very complex. Hypertension, atherosclerosis, hereditary vascular disease, aortic inflammatory disease, infection. and trauma are the risk factors of aortic dissection (1). The initial symptom is mainly a persistent and severe "tearing" or "knife cutting" pain in the chest, back, or abdomen. However, for occult aortic dissection, a potential presentation of acute aortic syndrome (AAS) could be shortness of breath (6). Therefore, timely and accurate diagnosis of AAS is essential. With the development of medical imaging technology, the diagnosis of AAS has been greatly improved (7). Ultrasound examination is a commonly used imaging technique, but it is limited in the diagnosis of dissection and cannot intuitively show the location of intimal tears. Although magnetic resonance angiography can accurately show aortic dissection, it involves a slow imaging speed, and a relatively greater number of contraindications limit its clinical applicability. CTA is routinely used in clinical practice due to its fast

imaging speed, wide scanning range, and high accuracy (8). However, the diagnosis of occult aortic dissection is still unclear and difficult due to atypical clinical symptoms. Aortic dissection presenting only with spinal cord ischemia without any clinical symptoms in the chest is extremely rare (with an incidence of less than 1%). Delayed diagnosis and treatment will lead to aortic rupture and endanger the patient's life (9). Patients with this particular condition show lower limb paresis potentially resulting from aortic dissection involving the spinal artery, which in turn could lead to spinal cord infarction (10).

In MRI, liquid tissues with different flow characteristics will show differing signal intensities and produce different contrasts between the surrounding tissues; this is the so-called flow effect. This type of imaging is generated due to the phase difference of the image, which is caused by the blood being subjected to radiofrequency pulse excitation and a gradient magnetic field, with the image of different gray scaling obtained by computer reconstruction (11). Experience from previous studies has shown that MRI can be used as the initial imaging examination in cases of clinically suspected aortic dissection, and the information provided by MRI is sufficient to manage many cases, but there are few reports of aortic dissection that are not clinically suspected (12,13). In the fast spin echo sequence, the high-speed blood flow shows a low signal, the slow blood flow shows a high signal, and the blood flow in normal aorta is a fast and low signal. In active aortic dissection, a false lumen is formed due to arterial intimal tear. The intima and membrane separation appear under the impact of blood flow. The blood flow in the false lumen is slow, leading to high signal, while the blood flow in the true cavity is fast, leading to a low signal. The intercostals arteries that supply the spinal cord are issued directly by the thoracic aortic blood vessels. The lumbar arteries which provide the blood supply to the lower segment of the spinal cord constitute the abdominal aorta. Once aortic dissection involves the above vessels and affects the blood supply of the corresponding spinal cord segment, ischemia of corresponding spinal cord segment will occur, leading to paraplegia. In this case, the occurrence of this indicated that occult aortic dissection was a possibility.

Limitations

Some aspects regarding the pathogenesis of the disease in the patient remain unclear. First, the patient was relatively young, so the possibility of Marfan syndrome or other connective tissue disorders should be considered. However, the patient only had aortic dissection, and no family history of Marfan's syndrome or abnormalities in other systems. Therefore, Marfan syndrome could not be immediately diagnosed. However, factors associated with connective tissue disease have not been tested yet, which requires further examination. Second, the patient underwent lumbar MRI examination, which unexpectedly revealed abnormal signals in the medulla spinalis at the T8–T10 level, which could be indicative of spinal infarction or myelitis. Thoracic MRI examination was then suggested. However, due to the patient's poor condition, thoracic MRI examination was not conducted successfully. Third, due to the limited scanning scope, the dissecting flaps were not directly identified on lumbar MRI image. Finally, subsequent prognosis of the patient could not be determined since the patient's guardians requested the patient be discharged.

Conclusions

In this study, MRI plain scan technology without the use of contrast agents combined with clinical manifestations was able to accurately diagnose occult aortic dissection and thus represents a new diagnostic method for clinical radiologists which may help clinicians manage difficult-to-determine cases.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://qims.amegroups.com/article/view/10.21037/qims-23-1636/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this article and accompanying images. A copy of the written consent is available for review

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