Radiology Case Reports 18 (2023) 4235–4238

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Distal aortic arch dysplasia accompanied by multiple aneurysms in adult: A case report and review of the literature ☆

Hongmao Chen, MD[1,*], *Zongxiang Yin, MD*[1], *Guiyun Yang, MD, Yanan Hu, MD, Nianbin Tang, MD*

Department of Ultrasound Diagnostics, Sunshine Union Hospital, Affiliated Teaching Hospital of Weifang Medical University, Weifang, Shandong Province, China

ARTICLE INFO

Article history:
Received 11 July 2023
Revised 27 August 2023
Accepted 1 September 2023

Keywords:
Aortic arch
Aneurysm
Abnormal origin of left subclavian artery

ABSTRACT

Because of the high blood flow and high pressure, the aortic arch, which sends out 3 branches including the innominate artery that separates the right common carotid artery and the right subclavian artery, the left common carotid artery, and the left subclavian artery, is an important blood vessel supplying the brain and spinal cord, so the risk of aneurysms in this area is very high. The main risk is that the rupture can cause massive bleeding; the secondary is that some aortic arch lesions can cause insufficient blood supply to the brain or spinal cord. If early diagnosis can be detected, it could be treated completely with minimally invasive or open surgery. Therefore, especially for this kind of patient, the significance of treatment is great, and better results can be obtained through treatment. Here is a 48-year-old female patient with dysplasia of the distal aortic arch, multiple aortic parietal aneurysms, and abnormal origin of the left subclavian artery, which originates from the tortuous and twisted aorta.

Introduction

The most common cause of aortic arch aneurysms is atherosclerosis, apart from cystic myonecrosis, trauma, and infection. Aneurysms caused by syphilitic aortitis are rare. After the aneurysm grows, it can compress adjacent mediastinal organs such as the vena cava, innominate vein, pulmonary artery, trachea, bronchus, lung, and left recurrent laryngeal nerve. If the aneurysm perforates into the pulmonary artery or systemic vein, it forms an arteriovenous fistula, which can cause heart failure and death due to the large shunt volume.

☆ Competing Interests: We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our works; there is no professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled.

* Corresponding author.
E-mail address: chmxxx@163.com (H. Chen).

[1] Zongxiang Yin and Hongmao Chen contributed equally to the manuscript.

https://doi.org/10.1016/j.radcr.2023.09.002

Case presentation

A 48-year-old female patient was admitted to the hospital due to head distention, paroxysmal numbness of the right limbs, edema of both lower limbs, nausea, no vomiting for more than a month, and progressive aggravation for one day. The blood pressure of the right upper arm was 164/60 mmHg, and that of the left upper arm was 130/55 mmHg. There were no disorders of consciousness or limb movement. Since the onset, she has been no abnormality in spirit, diet, poor sleep, and no significant change in weight. No diagnosis and treatment were performed outside the hospital. After admission, there were no significant abnormalities in blood lipids, blood glucose, liver function, and renal function, and no significant abnormalities were found in the results of a plain magnetic resonance scanning (MRI) and diffusion-weighted magnetic resonance imaging (DWI) of the brain.

An ultrasound examination of the carotid artery was performed to improve the diagnosis. The scan showed no significant abnormalities in the bilateral common and internal carotid arteries inner diameter, intima-media, and blood flow

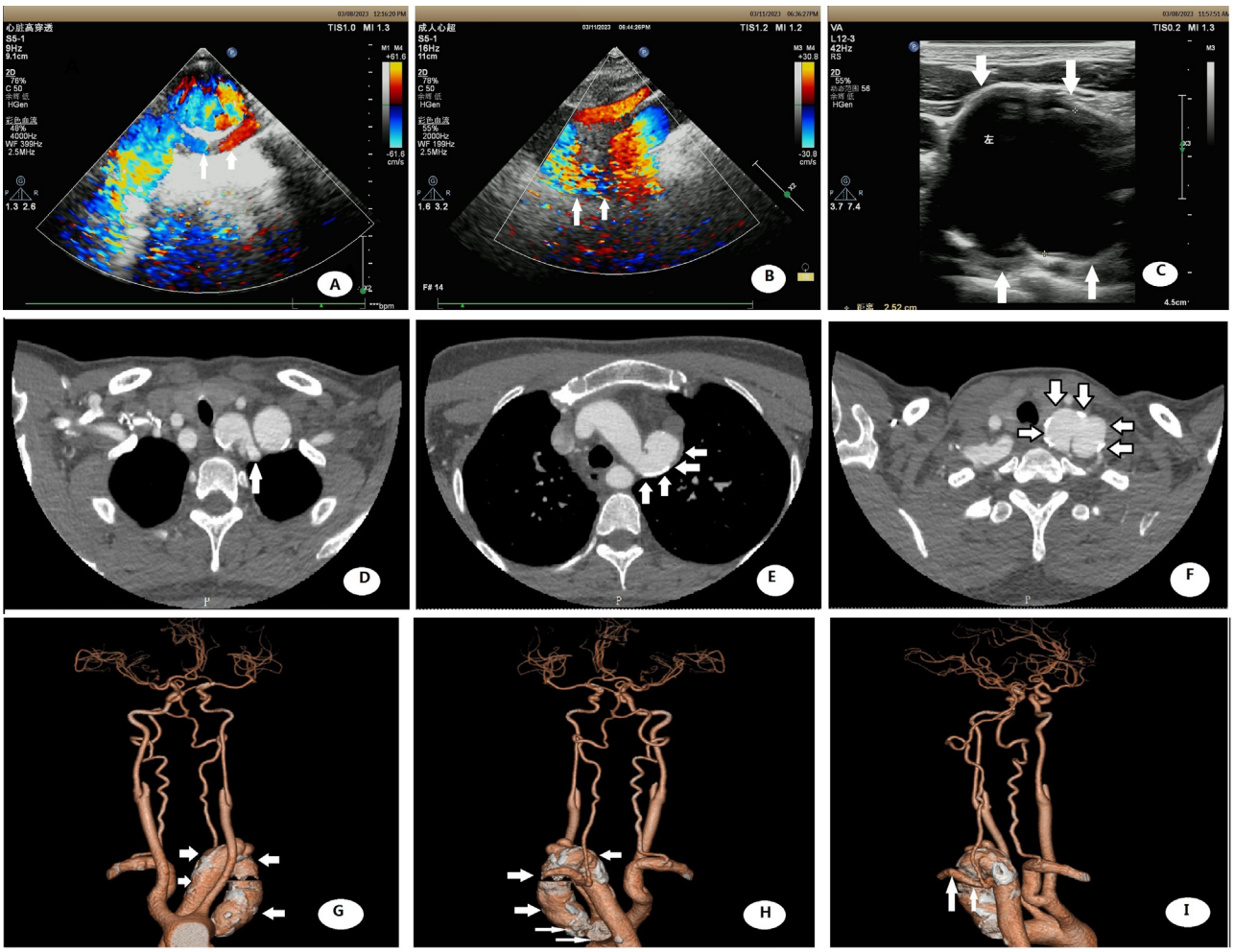

Fig. 1 – Dysplasia of the distal arch of aorta accompanied by multiple aneurysms. (A) From the distal end of the aortic arch to the left neck turn back, the whole process was neoplastic expansion, and the left subclavian artery could be seen from the lower part of the turning point (white arrow). (B) The turning point where the distal end of the aortic arch reversed upward (white arrow). (C) The distal aortic arch curved upward to the left neck and turned back, forming an aneurysm with atherosclerotic plaque attached to the wall (white arrow). (D) The origin of the left subclavian artery could be seen from the distal end of the aortic arch to the descending part of the cervical reentry (white arrow). (E) The position of tortuous upward turned in the distal segment of aortic arch (white arrow). (F) The turning point where the distal end of aortic arch bent upward to the left neck and turned back, and an aneurysm was formed (white arrow). (G) From the front view of the neck CTA, the distal segment of the aortic arch twisted and turned up to the left neck, and then turned back down to continue to the descending aorta (white arrow). (H) Looking behind the neck CTA, the distal end of the aortic arch twisted and went up to the left neck, and then turned back to the descending aorta (white arrow). (I) From the right back of the neck CTA, the distal end of the aortic arch twisted upward, and then turned to the descending aorta, from which the left subclavian artery could be seen (white arrow).

velocity. A large blood vessel was found in the lower part of the left neck, with the widest internal diameter of about 25 mm and a length of about 42 mm. The intima-media of this area was coarse and thickened, with multiple plaques visible, with the largest being about 17.2 × 2.4 mm (strong echo). The cross-section showed that the upper part of the thick blood vessel was blind, with several large bulges, and no abnormal blood vessel branches and blood flow into the periphery were found in the peripheral scan. It seemed to be separated into 2 lumens by the downward scanning from the blind end, and the separation structure was not displayed. The blood flow was mixing and alternating red and blue, and the left subclavian artery originated from the left posterior side of the descending lumen, with an internal diameter of about 6.1 mm and a peak velocity of 85 cm/s. And the coarse blood vessel continued to extend to the rear of the sternum. Scanning from the transverse arch of the aorta in the superior sternal fossa, the inner diameter of the arch was 29 mm. After separating the brachiocephalic artery and the left common carotid artery, a large blood vessel was seen in the distal segment into the descending part of the arch. Color Doppler flow imaging showed that the blood flow deviated from the direction of the probe was blue, and the flow rate was about 92 cm/s. No obvious abnormalities were found when scanning the inner diameter, blood flow velocity and blood flow direction of the ascending aorta, thoracic aorta and abdominal aorta. Ultrasound indicated abnormal blood vessels in the left lower neck; angiography was recommended.

Later, head and neck computed tomography angiography (CTA) was performed. The results showed that the distal part of the wall of the aortic arch ran upward from the back of the left thorax and up to the neck. The lower edge of the C-7 vertebral body horizontally folded inward and turned downward to continue to be the thoracic aorta. Diffuse calcified plaque attached to the wall could be seen in the tortuous turning segment of the aorta. Three nodular bulges could be seen in the tortuous top segment of the aorta. There was no abnormality in the origin of the brachiocephalic artery and the left common carotid artery. The left subclavian artery originated from the tortuous turning segment of the aorta. Conclusions: (1) distant tortuous and lengthy changes of the aortic arch, considering abnormal development; (2) multiple nodular protrusions and multiple aneurysms in the convoluted top segment of the aorta; (3) the left subclavian artery originates from the tortuous aorta (Fig. 1).

Discussion

Aortic arch diseases mainly include coarctation of the arch, breaking of the arch, right aortic arch, aortic dissection, abnormal aortic branches, right subclavian artery vagus, etc. Others, such as left and right carotid artery co-trunk, double brachiocephalic trunk, right vertebral artery from the aortic arch, etc. The total incidence rate of the variation type is less than 1%, which is a rare type and is mostly seen in case reports [1]. Developmental abnormalities of the distal aortic arch accompanied by descending aortic stenosis are common in reports [2,3].

In this patient, it is rare that the distal end of the aortic arch meanders upward in the neck and then turns back downward to continue to the descending aorta (from which the left subclavian artery emanates) with multiple aneurysms. Its aneurysm may be related to congenital factors such as dysplasia or absence of smooth muscle in the middle layer of the arterial wall or may be related to acquired factors such as hemodynamic effects and atherosclerosis. The protruding aneurysm of the aorta may compress surrounding tissues, and the deformation or damage of the related blood vessels, trachea, nerves and other structures can result in corresponding pathological and physiological changes. In severe cases, they can rupture and endanger life. So it is important to diagnose this kind of case correctly and early and to benefit from improving prognosis.

Conclusion

In this manuscript, distal aortic arch dysplasia with multiple aneurysms can be found by using ultrasound and angiography CT together and diagnosed accurately earlier. If the diagnosis can be detected in the earlier phase, the patient should be treated completely with minimally invasive or open surgery. Therefore, especially for this kind of patient, the significance of treatment is great, and better results can be obtained. So it is important to use ultrasound and angiography CT together for earlier diagnosis of this disease.

Patient consent

The patient has seen a version of the manuscript to be submitted and to be published and she gave her consent for his image or other information relation to her to be reported in the above named manuscript for consideration of publication in the *Radiology Case Reports (RCR)*.

The patient understands that protected health information such as identification number, billing information, address, will not be published and that efforts will be made to conceal her identity. However, diagnostic or medical imaging may be published.

The patient understands that the material may be published in the *Radiology Case Reports (RCR) Journal*. As a result, she understands that the material may be seen by the general public. She understands that she may revoke consent at any time before publication, but once the information has been published revocation of the consent is no longer possible.

REFERENCES

[1] Popieluszko P, Henry BM, Sanna B, Hsieh WC, Saganiak K, Pękala PA, et al. A systematic review and meta-analysis of variations in branching patterns of the adult aortic arch. J Vasc Surg 2018;68(1):298–306.

[2] Delis KT, Gloviczke P. Middle aortic syndrome: from presentation to contemporary open surgical and endovascular treatment. Perspect Vasc Surg Endovasc Ther 2005;17(3):187–203.

[3] Patel RS, Nguyen S, Lee MT, Price MD, Krause H, Truong VTT, et al. Clinical characteristics and long-term outcomes of midaortic syndrome. Ann Vasc Surg 2020;66:318–25.