

A 56-year-old man with coarctation of the aorta with refractory hypertension

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Abstract

A 56-year-old man was admitted to our hospital for a complain of headache with a history of one week. He had a history of hypertension for more than 30 years, but his blood pressure was not well controlled with medication. After admission, it was found that his blood pressure of the lower limbs was obvious lower than that of the upper limbs. Further chest CT examination revealed that his descending aorta was severely stenosis with calcification, which may be account for his high blood pressure in upper limbs. After careful evaluation of the patient's condition, we finally adopted interventional therapy and achieved good results. After operation, the patient's upper limbs blood pressure returned to normal, and the blood pressure gradient difference between the upper and lower limbs disappeared.

A 56-year-old man with coarctation of the aorta with refractory hypertension

Coarctation of the aorta

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Abstract A 56-year-old man was admitted to our hospital for a complain of headache with a history of one week. He had a history of hypertension for more than 30 years, but his blood pressure was not well controlled with medication. After admission, it was found that his blood pressure of the lower limbs was obvious lower than that of the upper limbs. Further chest CT examination revealed that his descending aorta was severely stenosis with calcification, which may be account for his high blood pressure in upper limbs. After careful evaluation of the patient's condition, we finally adopted interventional therapy and achieved good results. After operation, the patient's upper limbs blood pressure returned to normal, and the blood pressure gradient difference between the upper and lower limbs disappeared.

Key words aorta; coarctation; hypertension;

Introduction

This patient was admitted to our hospital due to a complain of headache with 1 week. One week ago, the patient had a headache without any obvious causes, with no fever, no nausea and vomiting, and no syncope. After admission, the blood pressure of his extremities was checked as follows: left upper limb,180/110 mmHg; right upper limb, 185/106 mmHg; left lower limb, 100/65 mmHg; and right lower limb,105/70 mmHg. Heart

rate, 75 beats/min; body temperature, 36.6 ; respiratory rate, 15 breaths/min; arterial oxygen saturation on room air, 99%. The height is 173cm, the weight is 78kg, and the body mass index is 26.1kg/m². The patient's laboratory test results are as follows: total cholesterol is 6.5mmol/L, triglyceride is 3.2mmol/L, and uric acid is 526umol/L. He had a history of hypertension for more than 30 years, and his blood pressure was poorly controlled with medication. He denied having a family history of hypertension, and denied a personal history of drug abuse and promiscuity. These were no obvious abnormalities in cervical vascular ultrasound. Echocardiogram showed mild to moderate regurgitation of his aortic valve, with a regurgitation area of 4.5cm². Chest CT showed (Figure 1) that the descending aorta was stenosis with calcification. On the basis of these findings, a clinical diagnosis of coarctation of the aorta (CoA) was made.

Discussion

Clinical Discussion

The patients had been diagnosed with hypertension for more than 30 years, but no further examination was conducted to explore the causes of hypertension. The patient usually takes metoprolol, nifedipine, and captopril tablets to lower his blood pressure, and the blood pressure is controlled at 145-180/70-110mmHg. His poor blood pressure control did not attract enough attention from himself and clinicians. This patient came to our hospital because of clinical symptom of headache, and he took the initiative to request hospitalization. Since the resident checked his blood pressure of the extremities and found the pressure gradient difference between the upper and lower extremities, a further chest CT examination was made and found his aorta was stenosis. He eventually received interventional treatment, and his blood pressure returned to normal postoperative.

CoA is a congenital narrow of the aortic lumen¹. The typical CoA is located at the distal end of left subclavian artery and can be before or after the ductus arteriosus. A few cases can also occur between the left common carotid artery and the left subclavian artery. According to the location and scope of the coarctation, aortic coarctation is divided into pre-ductus arteriosus type (infant type) and post-ductus arteriosus type (adult type). The clinical incidence of infant type is about 10%, but since congestive heart failure occurs earlier, early surgical treatment is required. If surgery is not performed in time, most children will die in infancy. Adult type is located at the distal of the arterial duct ligament and is mostly limited stenosis. This type is more common, accounting for about 90% clinically, and patients often have no symptoms. Only a few complained of headache, cold legs, and intermittent claudication. On physical examination, high blood pressure in the upper limbs will be found, and systolic murmurs can be heard beside the sternum. If patients of this type do not undergo surgery, they often die from congestive heart failure, bacterial endocarditis, spontaneous aortic rupture and intracranial hemorrhage.

Currently, treatments for CoA include interventional management and open surgery². Interventional management has become the first choice for treatment of CoA³. It is mainly through the implantation of a covered stent in the aortic cavity, which helps reduce the elastic retraction of blood vessels, thereby reducing the incidence of postoperative restenosis. The covered stent can also increase the strength of the blood vessel wall and help reduce the formation of aneurysms. After careful analysis of this patient's aortic coarctation, we first implanted a long covered stent to cover the whole lesion, and then implanted a covered cheatham-platinum (CP) stent. Fortunately, the operation was successful. The pressure gradient difference of the two ends of stenosis was disappeared, and the effect was satisfactory.

Imaging Discussion

Echocardiography can determine the location, length and degree of the stenosis, and can determine whether there is an intracardiac deformity. Other non-invasive examinations, such as CT, MRI, can clarify the location, scope, and collateral circulation of the lesion. The advantages of aortic CTA include the following⁴. 1) show the location and extent of aortic coarctation and the length of coarctation; 2) determine whether it is combined with intracardiac malformations; 3) show the formation of collateral circulation; 4) determine whether there is any change in rib bones.

The patient's CTA examination showed (Figure 1): the descending aorta was severely stenosis with calcification, the lesion was located 3-cm away from the left subclavian artery, there were two constriction rings, the scope of the lesion was limited, and no obvious collateral circulation was seen. Preoperative angiography (Figure 2) confirmed that this case was an adult type of aortic coarctation. The pressure gradient difference between the two ends of the constriction was more than 80mmHg, and the minimum diameter of the stenosis was less than 70% of the normal diameter. Postoperative angiography (Figure 3) showed that the stenosis of the constricted section was significantly reduced, there was no pressure difference at both ends of the constricted section, the covered stent is properly positioned and the expanded diameter is satisfactory.

Pathologic discussion

CoA is mostly located at the distal end of the origin of the left subclavian artery in the aortic arch, and it is often a limited lesion⁵. The pathological change of aortic coarctation is that the posterior wall of the aorta protrudes into the ridge-like protrusion in the aortic lumen, causing the local aortic lumen to form an eccentric stenosis, which is sunken relative to the outer wall of the aortic ridge-like protrusion.

The hemodynamic changes caused by the obstruction of blood flow at the aortic constriction isthmus have the following three conditions⁵. 1. The proximal end of the aortic constriction is hypertension. The blood pressure of the upper limbs is much higher than that of the lower limbs. Hypertension causes the left ventricular load to increase, and leads to arteriosclerosis and cerebral hemorrhage. 2. Insufficient blood supply to the distal aorta of the constriction and low blood pressure can caused to renal ischemic failure and acidosis. 3. The establishment of collateral circulation, the internal thoracic arteries, scapular arterioles, vertebral arteries and intercostal arteries become thicker and larger. In this case, the arterial calcification in the constricted aorta is obvious, but the collateral circulation is not abundant. During the operation, intravenous infusion of antihypertensive drugs should be used to prevent abnormal hypertension.

Conclusions

Adult patients with CoA often have no symptoms. They usually come to the hospital for the treatment due to high blood pressure in the upper limbs, lack of pulse or weak pulsation in the lower limbs during physical examination. This patient went to our hospital to check the blood pressure of the extremities due to clinical symptoms and found that there was a pressure difference between the upper and lower extremities. A further chest CT was performed to confirm the aortic coarctation. In clinical work, careful physical examination by clinicians is very important, which can reduce missed or misdiagnosed and even save patients' lives.

Conflict of interest All authors declare that there is no conflict of interest.

Informed consent statement: Informed consent and ethical approval were waived for this report, which contains no patient identifiable data.

Data availability statement : All data used during this study can be shared.

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Figure legends

Figure 1. Chest CTA showed severe coarctation of the aorta with severe calcification. The constricted

segment was far from the left subclavian artery. The length of the constricted segment was about 3 cm. Two constricted rings were seen, and no obvious collateral circulation was formed.

Figure 2. Preoperative aortic angiography showed that the aorta was narrowed, the degree of narrowing was about 70%, the distal end of the narrowing was expanded, and the pressure difference between the two ends of the narrowing was 80mmHg.

Figure 3. Postoperative angiography showed that the pressure difference at both ends of the aortic coarctation dropped to 0 mmHg. The covered CP stent has a good shape and a proper location.





