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Case Report: Secondary Hypertension Associated with Aortic Coarctation in a 21-year-old Female Patient

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Abstract

Coarctation of aorta is a congenital vascular malformation which occurs as a discrete stenosis or as a long, hypoplastic aortic segment. It accounts for 5-8% of all congenital heart defects. In most cases it is diagnosed during infancy and childhood, while adult cases with aortic coarctation are rare. Clinical findings depend on the severity of the vascular lesion. Hypertension can be the only manifestation present and it may not become evident until adulthood.

In this case report, we present the diagnosis of aortic coarctation in a 21-year-old female patient detected during the evaluation of hypertension. Transthoracic echocardiography findings revealed a coarctation of descendent aorta with dimension of 5mm and a mean systolic gradient of 60mmHg, which was confirmed by CT angiography of aorta. It was managed by percutaneous balloon angioplasty with stent placement.

Although rare in adults, coarctation of aorta should be considered in differential diagnosis of secondary hypertension. Delayed diagnosis and management of aortic coarctation is associated with increased risk of serious cardiovascular complications and a high mortality rate.

Keywords: aortic coarctation, secondary hypertension, echocardiography, CT angiography

Introduction

Coarctation of aorta (CoA) is a congenital vascular malformation which occurs as a discrete stenosis or as a long, hypoplastic aortic segment. It accounts for 5–8% of all congenital heart defects and the prevalence of isolated forms is about 3 per 10,000 live births. The most commonly associated condition with aortic coarctation is bicuspid aortic valve (BAV -up to 85%), other lesions include aortic stenosis, mitral valve stenosis or complex congenital heart defects(1,2).

The clinical manifestations of CoA depend on the severity of the lesion and it may include headache, shortness of breath, abdominal angina, claudication, leg cramps, exertional leg fatigue, and cold feet. Generally, it is diagnosed during infancy and childhood, while some cases may go undetected until adulthood where the only manifestation is secondary hypertension. The

Vol. 6, No. 01; 2022

ISSN: 2581-3366

diagnosis of CoA is based on anamnesis, an adequate physical examination and imaging methods (1,2,3). There are many imaging modalities used to detect coarctation of aorta including echocardiography, computed tomography, magnetic resonance, cardiac catheterization with manometry and angiocardiography being the golden standard for the diagnostic procedure (1,3,4).

There are several options for management of coarctation of aorta, which include surgical treatment or percutaneous intervention. In general, there is no evidence-based standard of care and for the decision of the adequate treatment method. The most common criteria used to select the optimal treatment method are the age at presentation of CoA, the severity of the coarctation and/or associated defects(5,6)In native CoA with appropriate anatomy, stenting has become the treatment of first choice in adults in many centers (1).

In this case report, we present the diagnosis of aortic coarctation in a 21-year-old female patient detected during the evaluation of hypertension.

Case presentation

A 21 years-old female patient presented to our emergency room due to high blood pressure measured 195/110mmHg on the right arm and 190/110 mmHg on the left arm. She had a medical history of arterial hypertension in the past 2 years and was under treatment with a Ca-channel blocker in the last 2 months. She had no family history of cardiovascular diseases or other risk factors.

On physical examination, her body temperature was 36.5, heart rate=70bpm and respiratory rate =16/min. On auscultation normal heart sounds were audible with a systolic murmur at the interscapular area. The femoral pulses were palpable, but delayed compared to radial pulses bilaterally.

The ECG showed sinus rhythm with heart rate of 70 bpm, normal heart axis, normal morphology of QRS complex, without signs for LVH. Performed laboratory analysis were in the referent ranges. The chest radiography showed a normal cardiothoracic index, without signs for consolidation in lung parenchyma. In order to exclude the renal and suprarenal diseases as a source of arterial hypertension in our patient, kidney and adrenal glands ultrasound and renal doppler ultrasound were performed. The kidney and adrenal glands ultrasound revealed normal dimension of kidneys bilaterally, 105 x 53 mm with parenchyma up to 17 mm with normal structure of the parenchyma and no signs for congestion and calculosis were detected in the kidneys. The adrenal glands were with normal structure. Renal doppler ultrasound showed tardus-parvus pulse waves in both renal arteries and intra-parenchymal arteries with RI=0.41-0.49.

Vol. 6, No. 01; 2022

ISSN: 2581-3366

Transthoracic echocardiography findings revealed normal dimensions and volumes of heart chambers (LVEDd=50mm, LVEDs=30mm, RVd basal=25mm, LA=30mm, IVS=10mm, posterior wall of LV=8mm, EF=70%), bicuspid aortic valve and a coarctation of descendent aorta with dimension of 5mm, a mean systolic gradient of 60mmHg and a flow rate through that segment up to 4 m/s.

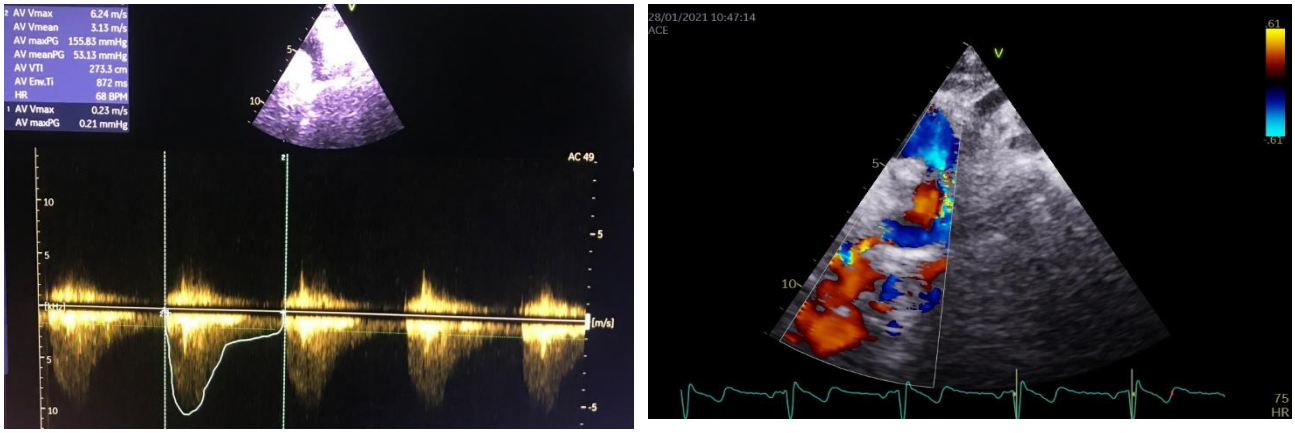

Figure 1. Transthoracic echocardiography findings for aortic coarctation

In order to confirm the diagnosis, the patient underwent a CT angiography of the aorta which showed a coarctation of the aorta just distal to the left subclavian artery in the post ductal segment, with length of 5mm and diameter of 1,1cm in that segment, accompanied by pre stenotic and post-stenotic dilatation of the aorta.

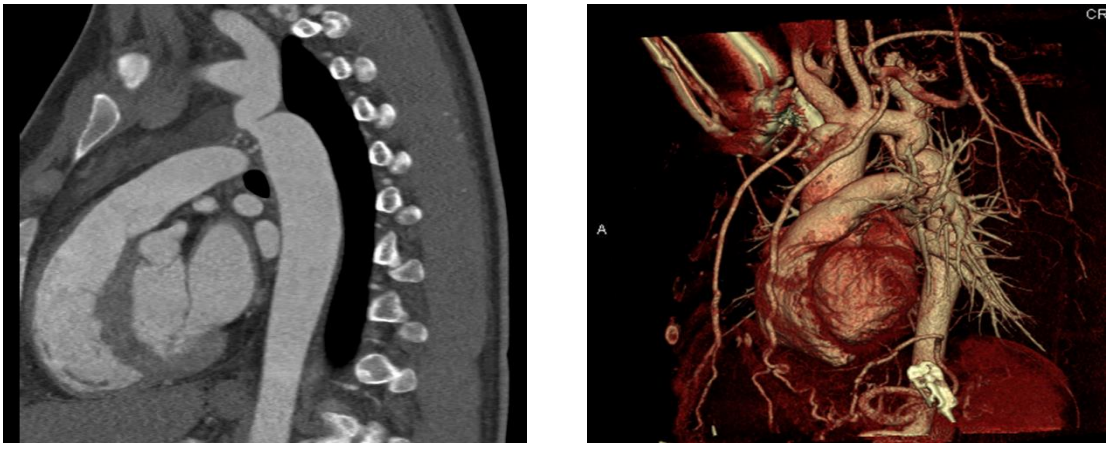

Figure 2. CT angiography of aorta showing coarctation distal to the left subclavian artery

Vol. 6, No. 01; 2022

ISSN: 2581-3366

Considering the presence of high blood pressure and high gradient of aortic coarctation, the patient underwent an interventional procedure, balloon angioplasty with stent implantation. The aortography was performed using 5 Fr pigtail catheter via right radial artery with findings for aortic coarctation just below the origin of the left subclavian artery. Anterograde crossing of aortic coarctation was performed with two balloon angioplasty using balloon catheter with diameter of 8/20mm. Then 12Fr introducer with covered CP stent (16/32mm) was inserted and the stent was positioned at the coarctation segment, with inflation of balloon the stent was fixed on the site. There were normal aortography and hemodynamic findings after stent implantation.

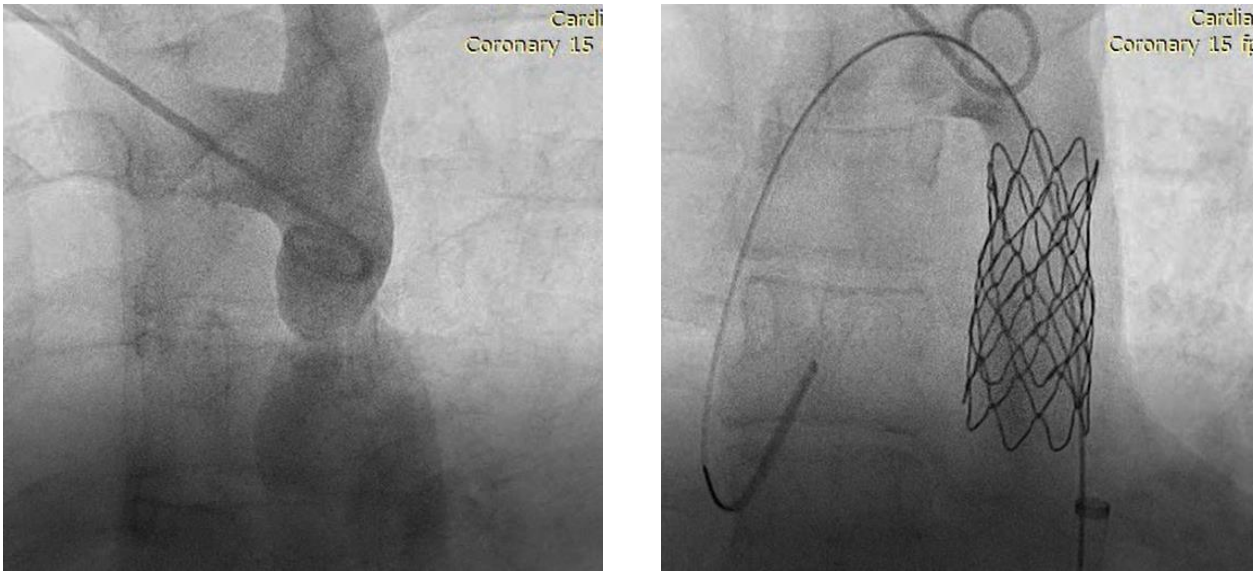

Figure 3. Percutaneous balloon angioplasty with stenting

The patient was discharged two days after the intervention with recommendation for follow-up examination after 7 days. For medical treatment, tbl. acetylsalicylic acid 100mg, tbl. amlodipine 5mg once daily were prescribed.

After one year of follow up, our patient is in a good clinical condition and regulated blood pressure without antihypertensive treatment.

Discussion

Coarctation of aorta is a rare congenital vascular lesion which is generally diagnosed in early life, but in some cases, it may not become evident and treated until adulthood (1,4). The condition can be asymptomatic or it can be manifested only with a murmur or hypertension, as it is presented in our case report.

Aortic coarctation is diagnosed with a medical history of the patient, physical examination and imaging methods. There are many imaging modalities used to detect the condition including

Vol. 6, No. 01; 2022

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echocardiography, computed tomography, magnetic resonance, catheterization manometry and angiography (4). Echocardiography, in the first line, provides useful information important for differential diagnosis of the coarctation of aorta and its early diagnosis. In this case, transthoracic echocardiography was performed as a first line imaging method from which we concluded that the aortic coarctation is the source of hypertension in our 21 years- old patient. Furthermore, the diagnosis was confirmed by CT angiography of the aorta.

Renal doppler sonography is a very useful imaging method used during the diagnostic evaluation of secondary hypertension. When tardus-parvus wave patterns in bilateral renal or intrarenal arteries are detected, bilateral renal artery stenosis, aortic stenosis or aortic coarctation should be considered. To differentiate between coarctation of aorta and bilateral renal artery stenosis, the pulse wave of the aorta should be checked, which is superior to the renal artery. Findings for tardus-parvus patterns of aortic pulse wave during doppler sonography should raise the suspicion of aortic valve stenosis or aortic coarctation (7,8). In our case, doppler sonography of renal arteries showed tardus-parvus pulse waves in both renal arteries and intra-parenchymal arteries with RI=0.41-0.49, which proved to be an indirect sign for aortic coarctation as a reason of the secondary hypertension.

Methods used for the treatment of coarctation of aorta include surgical repair of coarctation or percutaneous balloon angioplasty with or without stent placement, and medical therapy (6). According to the European Society of Cardiology 2014 guidelines for the diagnosis and treatment of aortic diseases, in native coarctation of the aorta with appropriate anatomy, balloon angioplasty with stenting has become the treatment of first choice in adults (1). Indications for intervention in coarctation of the aorta are; all patients with a non-invasive pressure difference >20 mmHg between upper and lower limbs, regardless of symptoms but with upper limb hypertension (>140/90 mmHg in adults), pathological blood pressure response during exercise, or significant LVH should have intervention (class IC). According to 2008 American College of Cardiology/American Heart Association guidelines for adults with congenital heart disease, intervention for coarctation is recommended when peak to peak coarctation gradient is greater than or equal to 20 mmHg, or peak to peak coarctation gradient less than 20 mmHg, in the presence of anatomic imaging evidence of significant coarctation with radiologic evidence of significant collateral flow (class IC) (9). Considering the recommendations, our patient underwent balloon angioplasty with stenting.

Without treatment, the mean life expectancy of patients with aortic coarctation is 35 years and according to Campbell's report, most of them died from a cardiovascular event reaching the age of 50 years (4, 6, 10). The several complications that lead to reduced life expectancy in patients with untreated aortic coarctation are systemic hypertension accelerated coronary heart disease, aortic dissection, stroke and congestive heart failure (9).

Vol. 6, No. 01; 2022

ISSN: 2581-3366

Conclusion

In conclusion, although rare in adults, coarctation of aorta should be considered in differential diagnosis of secondary hypertension. Delayed diagnosis and management of aortic coarctation is associated with increased risk of serious cardiovascular complications and a high mortality rate.

References

ESC guidelines on the diagnosis and treatment of aortic diseases, European Heart Journal (2014) 35, 2914–2915

Baumgartner H, Bonhoeffer P, Groot NMSD, Haan FD, Lionis C. Esc guidelines for the management of grown-up congenital heart disease. Eur Heart J. 2010;31(23):2931–34.

Dijkema EJ, Leiner T, Grotenhuis HB. Diagnosis, imaging and clinical management of aortic coarctation. Heart. 2017; 103:1148–55.

Weijian Luo, Jilin Li, Xiaojun Huang,Xiangna Cai. Late diagnosis of coarctation of the aorta in a 44-year-old male: a case report.BMC Cardiovascular Disorders.2020. Accessed:https://bmccardiovascdisord.biomedcentral.com/articles/10.1186/s12872-020-01753-1

Marc G Cribbs. Coarctation: A Review. US Cardiology Review. Accessed: https://www.uscjournal.com/articles/coarctation-review

R Jurcut, A M Daraban, A Lorber, D Deleanu, M S Amzulescu, C Zara, B A Popescu, C Ginghina. Coarctation of the aorta in adults: what is the best treatment? Case report and literature review.Journal of Medicine and Life.Epub 2011 May 25.Accessed: https://pubmed.ncbi.nlm.nih.gov/21776305/

Yun-Hwa Jung, Kwan-Wook Kim, Dae-Yoon Kim, Chul-Seung Lee.A Case of Coarctation of the Aorta Diagnosed by Tardus-Parvus Renal Doppler Flow Patterns.The Korean Journal of Internal Medicine 2011;26(2):216-217. Accessed:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3110857/

Tarzamni MK, Nezami N, Ardalan MR, et al. Serendipitous diagnosis of aortic coarctation by bilateral parvus et tardus renal Doppler flow pattern. Cardiovasc Ultrasound. 2007; 5:44. Accessed:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2211282/

Warnes CA, Williams RG, Bashore TM, Child JS, Connolly HM, Dearani JA. ACC/AHA 2008 Guidelines for the Management of Adults with Congenital Heart Disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (writing committee to develop guidelines on the management of adults with congenital heart disease). Circulation. 2008; 118:714–833. Accessed: https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.108.190811

Campbell M. Natural history of coarctation of aorta. Heart. 1970;32(5):633–40.