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AORTIC COARCTATION AND SYSTEMIC HYPERTENSION

***Youssef Lamghari, Sarra Ouzzaouit, Samia Laklalech, Pr Latifa Oukerraj, Pr Ibtissam Fellat, Pr Mohamed Cherti**

Department of Cardiology B, Ibn Sina Hospital, Rabat, Morocco.

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***Corresponding Author: Youssef Lamghari**
Department of Cardiology B, Ibn Sina Hospital, Rabat, Morocco.
Email Id: you.lamghari@gmail.com,

ABSTRACT

Aortic coarctation is a congenital malformation diagnosed at birth through the systematic palpation of the femoral pulses. Several mild forms may go unnoticed and only manifest in adulthood. It involves a narrowing of the aorta beyond the left subclavian artery, and it is most often seen in individuals with hypertension.

INTRODUCTION

Aortic coarctation is a relatively common malformation, accounting for 6 to 8% of congenital heart defects, and it ranks fifth among the most common congenital heart malformations, with an estimated incidence of 1 in 2,900 live births. Some rare cases of aortic coarctation are only diagnosed in adulthood, often following secondary hypertension, with weak or even imperceptible femoral pulses. Cardiac Doppler ultrasound and angiography are the two essential examinations for establishing the diagnosis. The usual treatment for aortic coarctation is surgical.

KEYWORDS: Arterial hypertension- Aortic coarctation**.**

CLINICAL CASE

This is a young patient, 25 years old, with no cardiovascular risk factors and no significant medical history, who presents to the emergency department with the onset of severe helmet-like headaches over the past few days, worsening with the occurrence of vomiting.

Upon admission, the clinical examination reveals a patient who is breathing normally and has a hypertensive peak in both limbs, measuring 270/210 mmHg on the left and 255/200 mmHg on the right. The cardiovascular examination shows a rough, harsh 4/6 systolic murmur at the

aortic area, radiating to the neck vessels, associated with absent femoral pulses on both sides. An electrocardiogram shows sinus rhythm with a heart rate of 70 bpm, without secondary repolarization disturbances, and with left ventricular hypertrophy (Sokolow index of 39 mm). A transthoracic echocardiogram shows moderate hypertrophy of the left ventricular walls, with no global or segmental kinetic disturbances and preserved left ventricular function, without signs of dilation of the ascending aorta.

The neurological examination is unremarkable, and an emergency cerebral angiography shows signs of hypertensive encephalopathy without ischemic or hemorrhagic signs. Immediate management was initiated with the administration of Loxen via a self-pulsing syringe to control and lower blood pressure. A thoracic angiography was then performed, revealing a coarctation of the aorta located 39 mm from the origin of the left subclavian artery.

The patient underwent emergency surgery, with the placement of a stent at the site of the coarctation, resulting in a straightforward postoperative course without complications. A follow-up cardiac consultation at 3 months and then at 6 months showed well-controlled and stable blood pressure at 120/80 mmHg with 5 mg of amlodipine, and a follow-up angiography at one year shows the stent in place.

DISCUSSION

Aortic coarctation is a common congenital heart disease, often associated with other cardiac and vascular malformations. It was first recognized by Johann Friedrich Meckel in an 18-year-old woman at the Royal Academy of Sciences in Berlin, with a second case presented in 1971 by Mr. Paris, who described the autopsy of a 50-year-old woman whose thoracic arteries were thicker and more tortuous than normal. Morgagni's study in 1760 demonstrated a poor clinical prognosis, with a mean age of death at 34 years and a mortality rate of 75% at a median age of 46 years, according to well-documented autopsy studies.

In infants, clinical symptoms begin to manifest about a week after birth, characterized by poor feeding, growth retardation, and dyspnea. A notable physical examination finding is the absence or delay of the femoral pulse. Cardiac auscultation may reveal signs related to the persistence of the ductus arteriosus with a right-to-left shunt at the descending thoracic aorta, which can present with cyanosis, aortic stenosis, or ventricular septal defect. This highlights

the importance of prenatal diagnosis despite a high number of false positives, as well as postnatal diagnosis through non-invasive imaging methods, primarily echocardiography.

In children and young adults, symptoms manifest as headaches and epistaxis, with clinical examination revealing systemic hypertension associated with a typical aortic coarctation murmur in the left infraclavicular fossa, radiating backward toward the left scapula. Coarctation typically results in localized narrowing, most often at the aortic isthmus. Other, much rarer locations have been described, such as coarctation of the descending thoracic aorta, which accounts for 0.5 to 2% of all coarctations, and that of the abdominal aorta.

The ECG may show abnormalities consistent with left ventricular hypertrophy, as seen in our case. Transthoracic echocardiography is a valuable examination for diagnosis, confirming ventricular wall hypertrophy and analyzing the suprasternal view to visualize the aortic arch and the proximal descending aorta. Color Doppler imaging in the suprasternal view can highlight flow turbulence at the site of narrowing, while continuous Doppler can calculate the pressure gradient across it. Transthoracic echocardiography also helps clarify left ventricular function and associated lesions (such as aortic bicuspid valve, supravalvular stenosis, ventricular septal defect, subaortic stenosis, etc.).

However, it should be complemented by angiography or MR angiography, which provide greater sensitivity for morphological evaluation and better define the relationship of the stenosis with surrounding structures. These latter examinations are the preferred methods in adults.

The treatment of aortic coarctation involves dilating or removing the narrowed segment. Two therapeutic options are available: surgical intervention requiring the removal of the coarctation segment and direct anastomosis of the normal aorta, or interventional catheterization using balloon angioplasty and stenting (covered and uncovered). The choice between surgery and angioplasty requires a multidisciplinary discussion among congenital cardiologists, interventional cardiologists, and cardiac surgeons.

CONCLUSION

Aortic coarctation should be screened for at an early age, even in the neonatal period, through systematic palpation of the femoral pulses and should be operated on early in the first months of life. In young individuals, it should be considered in the presence of any hypertension

associated with diminished femoral pulses. The contribution of cardiac echodoppler, angiography, or MR angiography has revolutionized and simplified the choice of management, whether by surgery or interventional catheterization, in order to minimize late complications.

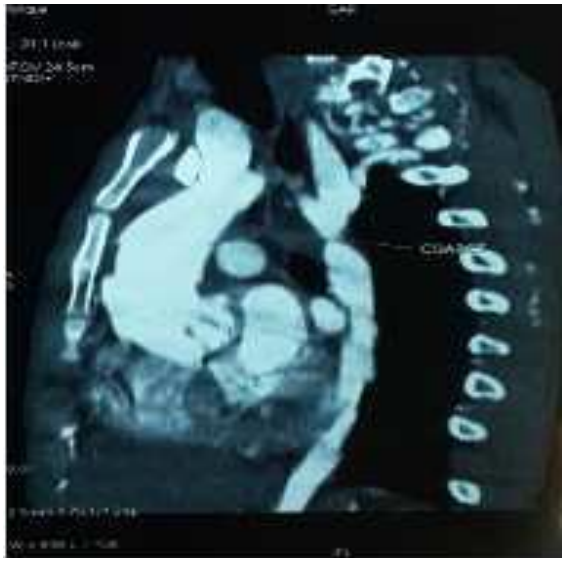

Figure 1: Angiography showing an isthmic aortic coarctation [1].

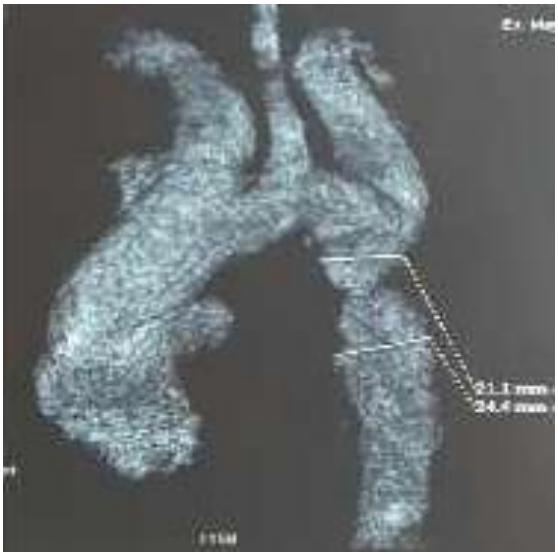

Figure 2: 3D reconstruction of the isthmic aortic coarctation [1].

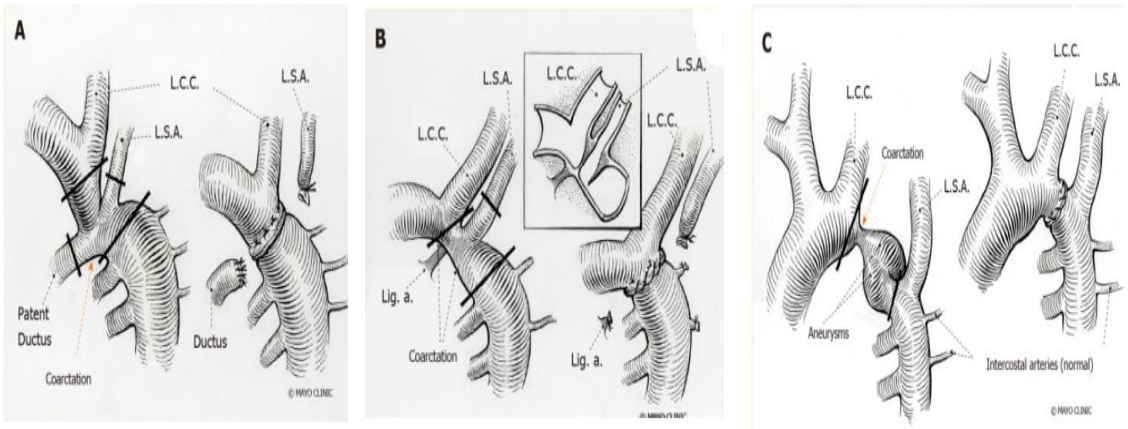

Figure 3: Surgical repair of an aortic coarctation [16, 17]

A - End-to-end anastomosis with resection of the coarctation segment followed by direct suture anastomosis of the cut ends with associated patent ductus arteriosus.

B - End-to-end anastomosis of a coarctation without associated patent ductus arteriosus.

C - End-to-end anastomosis of a coarctation with associated aneurysm.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Author contribution

- MB: Study concept, Data collection, Data analysis, writing the paper.
- RL: Study concept, Data collection, Data analysis.
- RF: Study concept, Data analysis, writing the paper.
- NM: Supervision and data validation
- IA: Supervision and data validation
- AB: Supervision and data validation
- All authors reviewed the final manuscript.

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Statement of informed consent

The authors confirm that written consent for the submission and publication of this case, including images, has been obtained from the patients in line with the Committee on Publication Ethics (COPE) guidance.

Availability of Data and Materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Consent for publication

Written informed consent was obtained from the patients for publication of this cases report.

Provenance and peer review

Not commissioned, externally peer-reviewed.

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