SCIENTIFIC LETTER

AORTIC LEFT VENTRICULAR TUNNEL. A CASE REPORT OF EARLY PRESENTATION

Authors:
Norberto Berber [1],
Ignacio Lugones

[1] *Cardiovascular Surgery Unit. Hospital General de Niños Dr. Pedro de Elizalde, Buenos Aires, Argentina*

Correspondence:
Norberto Berber
Hospital General de Niños Dr. Pedro de Elizalde
Av. Manuel Montes de Oca 40
(C1270AAN) CABA, Buenos Aires, Argentina

Tel: +54 113347-4992
E-mail: nfberber@icloud.com

ABSTRACT

The aorto ventricular tunnel is a rare congenital malformation, consisting of the communication between the left ventricle (90% of cases) and the aorta, leading to the paravalvular level above the aortic ring. It usually occurs in childhood and is clinically manifested with signs of severe aortic insufficiency and heart failure. Surgery is the appropriate treatment for this pathology. We present a patient with early clinical manifestations of aortic left ventricular tunnel, in which we successfully performed the surgical treatment by direct closure.

Keywords: *Aortic ventricular tunnel; Aortic insufficiency; Congestive heart failure*

Received: 10/25/2021 Accepted: 11/18/2021

INTRODUCTION

Aorto-ventricular tunnel is a rare congenital malformation consisting of a paravalvar communication between the aorta and the left ventricle (in over 90% of cases), or between the aorta and the right ventricle[1].

The usual clinical presentation is characterized by cardiac failure and marked cardiomegaly in a presentation that mimics severe aortic insufficiency[2]. The very low incidence of this pathology in the general population makes it difficult to diagnose; a thorough clinical evaluation and complementary methods are required for a correct treatment.

CLINICAL CASE

Patient with a left aorto-ventricular tunnel of early presentation (2 months of age and 5 kg of weight), in whom interventricular communication associated to dilated myocardiopathy was suspected. At admission the patient presented signs of cardiac insufficiency with bounding pulses and a systo-diastolic murmur was audible at the aortic focus. The thorax x-ray showed marked cardiomegaly and a wide superior mediastinum shadow.

A color Doppler ultrasound was performed, which led to the diagnosis of left aorto-ventricular tunnel [3]. The tunnel had a proximal opening in the left ventricle, with 5 mm diameter, close to the aortic valve ring, and a 7 mm distal opening in the ascending aorta, distal to the sinotubular junction. The trajectory of the tunnel was between the right and left coronaries. The aortic ring had a diameter of 10 mm (z-score +2), with a severely dilated ascending aorta and mild aortic insufficiency *(Figure 1)*.

Diagnosis was complemented with a computerized angiotomography with digital reconstruction.

Once the diagnosis was established, reparative surgery was performed. The thorax was approached under general anesthesia to proceed to median sternotomy followed by extracorporeal circulation using aortic bicaval cannulation. Under mild hypothermia the aorta was clamped and Del Nido antegrade cardioplexia was administered. The tunnel did not involve any of the coronaries (with normal trajectory) nor did it affect the aortic valve that appeared intact. The proximal hole of the tunnel was inside the left ventricle, 2 mm below the aortic ring *(Figure 2)*. The direct closure technique was used, starting with the proximal hole, in which a circular suture was performed with polypropylene 5-0. Then, the distal hole was closed in the same way. After completing closure, it was confirmed that the aortic valve presented no deformities or structural alterations. The intraoperatory transesophagic echocardiogram evidenced correct closure of the tunnel.

FIGURE 1. Color Doppler echocardiography. References: **A.** Left ventricular tunnel leading to severe aortic paravalvular insufficiency. **B.** Intact, competent aortic valve.

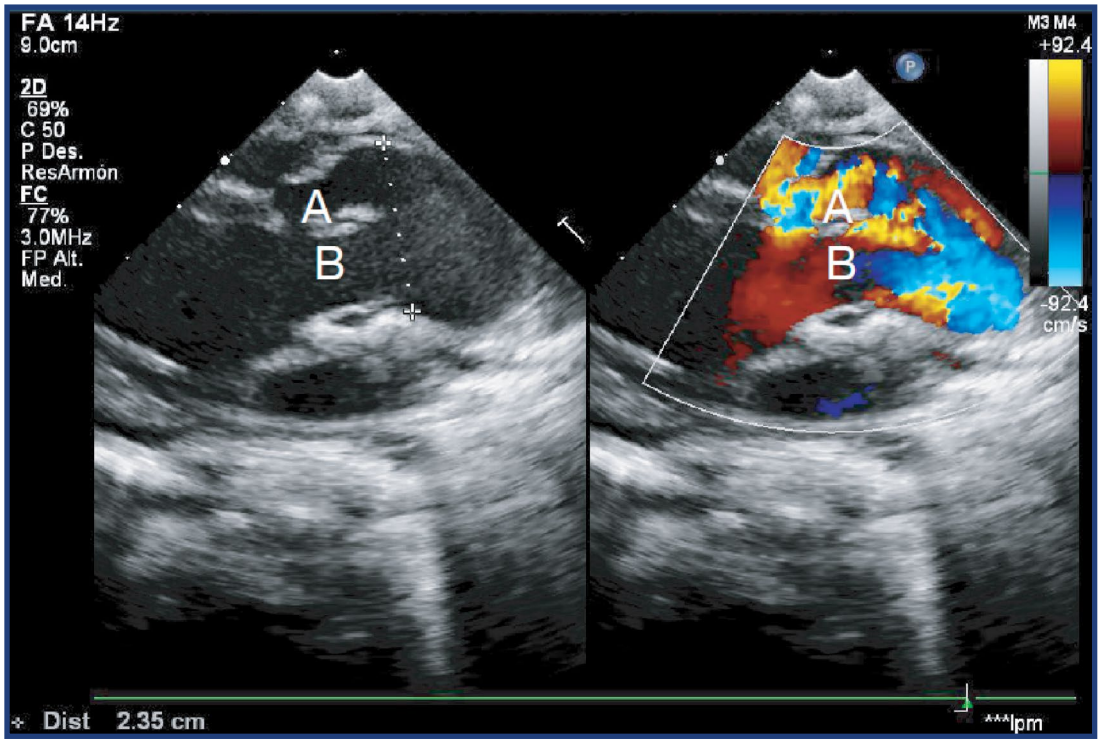
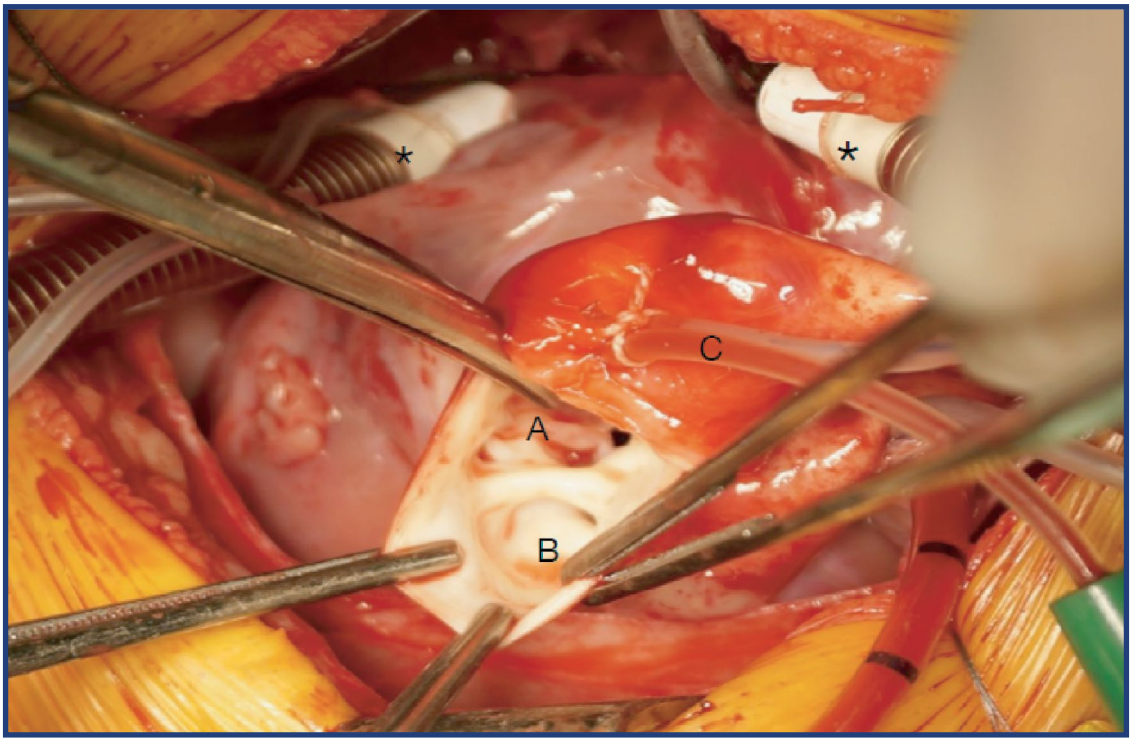


FIGURE 2. Surgical view of the left aorto-ventricular tunnel through a transverse aortotomy at the leve l of the sinotubular junction. References: **A:** aortic valve and *ostium* of the right coronary artery. **B:** aortic tunnel, aortic opening, it is possible to identify the trajectory and the ventricular hole. **C:** ascending aorta with cardioplegia cannula. ***:** venous drainage cannula (bicaval).



COMMENTS

The aorto-ventricular tunnel is a rare entity with an incidence of approximately 0.001% of congenital cardiopathies. It consists of an aortic paravalvular communication, just above the sinotubular junction, related on the one had with the origin of the right coronary artery, and on the other with the left ventricle (in 90% of cases). Its etiology is unknown, and to date approximately 150 cases have been reported in English language bibliography since the first description by Levy et.al. in 1963[1].

Reparative surgery is the treatment of choice and must be performed soon after establishing the diagnosis, even if the patient presents mild symptoms, in order to avoid greater dilation of the left ventricle, the aortic root and the aortic ring. Currently there are two repair techniques. The first is direct closure of both tunnel openings through an aortotomy, using underlying tissue to support the sutures. The second option is using synthetic patches (ePTFE, Dacron, etc.) to occlude both openings. It is possible to perform a ventriculotomy to access the ventricular opening of the tunnel if necessary[4]. So far none of the techniques has shown superiority in terms of effectiveness or risk of complications. In spite of the good results reported in different publications, some complications have been described, mostly related to aortic valve lesions[5].

Conflicts of interest

The authors have no disclosures to declare.

REFERENCES

1. Levy MJ, Lillehei CW, Anderson RC, Amplatz K, Edwards JE. Aortico-left ventricular tunnel. Circulation 1963;27:841-53.

2. Okoroma EO, Perry LW, Scott LP 3rd, McClenathan JE. Aortico-left ventricular tunnel: clinical profile, diagnostic features, and surgical considerations. J Thorac Cardiovasc Surg 1976;71:238.

3. Fripp RR, Werner JC, Whitman V, Nordenberg A, Waldhausen JA. Pulsed Doppler and two-dimensional echocardiographic findings in aortico-left ventricular tunnel. J Am Coll Cardiol 1984;4:1012.

4. Horvath P, Balaji S, Skovranek S, Hucin B, de Leval MR, Stark J. Surgical treatment of aortico-left ventricular tunnel. Eur J Cardiothorac Surg 1991;5:113-7.

5. Serino W, Andrade JL, Ross D, de Leval M, Somerville J. Aortico-left ventricular communication after closure. Later postoperative problems. Br Heart J 1983;49:501-506.