Monozygotic twins with Marfan’s syndrome and ascending aortic aneurysm

Héctor Jorge Redruello*, Tomas Francisco Cianciulli a, Eduardo Fernandez Rostello, Barbara Recalde, Jorge Alberto Lax, Victorio Próspero Picone, Sandro Mario Belforte, Horacio Alberto Prezioso

Division of Cardiology and Cardiovascular Surgery, Hospitales del Gobierno de la Ciudad de Buenos Aires “Bernardino Rivadavia” and “Cosme Argerich”, Av. Alte. Brown 240 (C1155ADP), Buenos Aires, Argentina

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Abstract Marfan’s syndrome is a hereditary connective tissue disease, in which cardiovascular abnormalities (especially aortic root dilatation) are the most important cause of morbidity and mortality. In this report, we describe two 24-year-old twins, with a history of surgery for lens subluxation and severe cardiovascular manifestations secondary to Marfan’s syndrome. One of the twins suffered a type A aortic dissection, which required replacement of the ascending aorta, and the other twin had an aneurysmal dilatation of the ascending aorta (46 mm) and was prescribed medical treatment with atenolol and periodic controls to detect the presence of a critical diameter (50 mm) that would indicate the need for prophylactic surgery. © 2006 The European Society of Cardiology. Published by Elsevier Ltd. All rights reserved.

* Corresponding author. Department of Cardiology, Hospital del Gobierno de la Ciudad de Buenos Aires “Dr. Cosme Argerich”, Av. Alte. Brown 240 (C1155ADP), Buenos Aires, Argentina.
E-mail address: jredruello@hotmail.com.ar (H.J. Redruello).

a Researcher of the Secretary of Health, Government of the City of Buenos Aires.
Introduction

Marfan’s syndrome is an autosomal dominant connective tissue disease which mainly affects the eye and the musculoskeletal and cardiovascular systems. Its incidence in all races and ethnic groups is approximately 1 in 10 000–20 000 people.

Marfan’s syndrome is caused by a mutation in the fibrillin-1 (FBN1) gene, located on chromosome 15, which encodes for the extracellular matrix of a glycoprotein called fibrillin-1, but in 10% of cases, the mutation may occur in a different gene. Family history exists in 75% of the cases and approximately 25% of the cases arise by spontaneous mutation.

The main cardiovascular disorders are, in decreasing frequency, mitral valve prolapse (with or without mitral regurgitation), aortic regurgitation, aneurysm of the ascending aorta, of the aortic arch and the abdominal aorta.

The incidence of aneurysm is 65–76% of cases and represents the most important cause of sudden death since it is often complicated by dissection or rupture. Generally, these complications appear during the second or third decade of life and they may occasionally occur in members of the same family, although few familial cases have been published. In this report, we describe two twin brothers, with severe cardiovascular manifestations secondary to Marfan’s syndrome.

Case report

Case 1

The patient is a 24-year-old male with a history of lens subluxation and admission to the intensive care unit due to congestive heart failure — functional class III–IV dyspnea and edema of the lower limbs; he improved with diuretics and a low salt-diet and was discharged to continue the diagnostic work-up as an outpatient.

He consulted at the Cardiology Department of the Bernardino Rivadavia Hospital, where his physical exam revealed a tall and slender habitus (Fig. 1), normal facies and skin, hyperlax joints, asymmetric shoulders, hyperextension of the fingers and wrists, arachnodactyly (Fig. 2), ogival palate, pectus excavatum and kyphoscoliosis.

The cardiovascular exam revealed a bounding and rapid pulse, a diagonal beat with a displaced apical impulse at the sixth left intercostal space. Cardiac rhythm was regular, with decreased first and second heart sounds, a palpable third sound; a diastolic ++++/6 murmur with maximal auscultation in the aortic area and accessory Erb area. Blood pressure was 120/80 mm Hg.

The chest X-ray showed a vascular pedicle increased in height and width due to dilatation of the ascending and descending portions of the thoracic aorta, an increase in cardiothoracic ratio caused by dilatation of the left ventricle, non-congestive hila and lung fields without pathological images.

The electrocardiogram showed sinus rhythm, a heart rate of 75 bpm, a PR segment of 0.20 s, cardiac axis at +60°, left atrial enlargement, left ventricular hypertrophy, QS in V1 and V2 precordial leads and an incomplete left bundle branch block.

Transthoracic Doppler-echocardiography showed a type A aortic dissection with severe aortic regurgitation (Fig. 3), severe LV dilatation with global hypokinesis, severe systolic dysfunction and mild functional mitral regurgitation due to mitral ring dilatation.

A helical CT of the thorax performed with contrast injection confirmed the diagnosis and the patient was referred to the Department of Cardiovascular Surgery of the Argerich Hospital, where the combined surgery entailed replacement of the ascending aorta with a Dacron tube, aortic valve replacement with a mechanical SJM n°27 prosthesis and myocardial revascularization (venous bypasses to the left anterior descending and circumflex arteries due to dissection of both coronary ostia). The operation was performed with hypothermia of 17°C, clamping of the brachiocephalic and left common carotid arteries; perfusion of the central nervous system was achieved via the subclavian and right common carotid arteries.

Case 2

The patient is a 24-year-old male, with a history of surgery for lens subluxation and a spontaneous pneumothorax. The physical exam revealed a tall and slender habitus, kyphoscoliosis, ogival palate, hyperlax joints and arachnodactyly.

The cardiovascular exam showed an apical impulse in the fifth intercostal space, blood pressure of 110/60 mm Hg, a heart rate of 90 bpm and no jugular vein distension. Auscultation revealed preserved heart sounds (R1 and R2), a mesosystolic click and a mesosystolic murmur in the mitral area.

The ECG and chest X-ray were normal.

Transthoracic Doppler-echocardiography showed a non-dilated left ventricle, with preserved systolic function, aneurysmal dilatation (46 mm) of the ascending aorta (Fig. 4), and prolapse of both mitral
leaflets with minimal mitral regurgitation. The right heart chambers, aortic valve, tricuspid valve and pericardium were normal.

The patient was prescribed medical treatment with atenolol, 50 mg/day, and periodic controls with echocardiography to detect the presence of a critical diameter of the aortic root (50 mm) that would indicate the need for prophylactic surgery.

Discussion

In Marfan’s syndrome, the complications seen most often include prolapse of the mitral valve which may cause severe mitral regurgitation and the progressive dilatation of the aortic root, which may be complicated by dissection or rupture, the latter representing the most frequent cause of death.2

During childhood, the cardiovascular and musculoskeletal manifestations of Marfan’s syndrome are usually minor5 and patients remain asymptomatic until the second or third decade of life, in which the diagnosis is generally made. Otherwise, the vast majority of lens subluxation in patients with Marfan’s syndrome occurs in early childhood and its presence should prompt a search for Marfan’s syndrome.

Case 1 presented with a type A aortic dissection with severe aortic regurgitation and was referred for emergency surgery, which entailed replacement of the ascending aorta and the aortic valve with a bileaflet mechanical valve (SJM) and myocardial revascularization. Case 2 presented with an aneurysm of the ascending aorta (46 mm), which was managed with beta blockers and clinical follow-up.

There is generally no association between the severity of the ocular, skeletal and cardiovascular manifestations,6 but our twin patients had both undergone surgery for lens subluxation, had clear skeletal evidence of Marfan’s syndrome and severe cardiovascular abnormalities.
When Marfan’s syndrome is suspected, a family screening should be performed in order to confirm the presence of the disease and begin prophylactic treatment, to decrease cardiovascular mortality. The prophylactic use of beta blockers allows to delay or decrease the progression of the aortic dilatation, thus delaying the need for surgery.7,8

The parents and the sister of the cases presented in this report were normal; so the absence of antecedent of Marfan’s syndrome could represent a case of spontaneous mutation.

Echocardiography is the most relevant method for diagnosis and follow-up for these patients, while the other diagnostic methods are reserved (CT, MRI, catheterization) for cases in which the echo is suboptimal and does not provide adequate information. In our cases, echocardiography was essential for the decision making process and in Case 1, CT confirmed the aortic dissection and the patient was referred to surgery without the need for additional procedures.

Surgery is an elective indication in patients with an aneurysm of the ascending aorta that reaches a diameter of 50 mm,2,9,10 even in patients who are asymptomatic, due to the high risk of dissection and rupture. In the second case presented, treatment with beta blockers was initiated together with periodic 6-month follow-up, with the goal of detecting the appropriate timing for prophylactic replacement of the ascending aorta. Elective surgery carries a 2% surgical risk, while emergency surgery performed in patients with acute aortic dissection carries a mortality rate that is eight times higher.11

Recently, Gott et al.12 in a single center result which covers a more contemporary time frame from 1976 to 2000 reported no 30-day mortality among patients undergoing elective root repair. Because of the low risk of prophylactic aortic root replacement in Marfan’s syndrome and the devastating effects on short- and long-term survival after aortic dissection, Braverman13 suggests that prophylactic aortic root surgery can be considered when the Marfan aortic root exceeds 45 mm when there is a family history of aortic dissection or when there is a rapid growth of the aortic root (i.e., >5–10 mm/y).

Survival rate for patients with Marfan’s syndrome who have been operated is 50–70% at 10 years, but one of the main causes of morbidity is the need for reoperation due to distal dissection, infectious endocarditis or complications (hemorrhagic or thromboembolic) of the mechanical aortic valve. These two latter complications could be avoided with the use of an aortic homograft12 or a valve-sparing aortic root replacement.14

References


