

# Marfan syndrome: case report and review

Ivan De Paz<sup>1</sup>

## Abstract

A 28 year old female with prior medical history of cardiac arrhythmia came for assessment due to increasing dyspnea for 8 months. The patient had family history of heart disease, and presented with clinical features of Marfan syndrome. An echocardiogram revealed mild aortic regurgitation and aortic root dilation. She was started on beta blockers and referred to cardiothoracic surgery for assessment and specialized follow up.

## Key words

Dyspnea, cardiac arrhythmia, Marfan syndrome, aortic regurgitation

## Resumen

Paciente femenina de 28 años de edad, con historia clínica previa de arritmia cardíaca, vino para evaluación debido a una disnea en aumento durante 8 meses. La paciente tenía antecedentes familiares de enfermedades cardíacas, y características clínicas del síndrome de Marfan. Un ecocardiograma reveló regurgitación aórtica leve y dilatación de la raíz aórtica. Se le inició tratamiento con beta bloqueadores y se emitió para el servicio de cirugía cardiotorácica para evaluación y seguimiento especializado.

## Palabras clave

Disnea, arritmia cardíaca, síndrome de Marfan, regurgitación aórtica

## ■ INTRODUCTION

Marfan syndrome (MFS) is an autosomal dominant condition with a reported incidence of 1 in 3000 to 5000. Clinical presentations range from a severe infantile form to individuals who are only mildly affected. The diagnosis of Marfan syndrome in familial and sporadic cases is based on the presence of characteristic manifestations, particularly aortic root dilation/dissection and ectopia lentis, as well as other systemic features including skeletal findings, mitral valve prolapse, dural ectasia, pneumothorax, and skin striae. Although many clinicians view the disorder in terms of classic ocular, cardiovascular, and musculoskeletal abnormalities, manifestations also include involvement of the lung, skin, and central nervous system. A case is presented making emphasis on the importance of applying an adequate medical history and performing a meticulous physical examination which can solely lead to diagnose a condition that could have a marked reduction in life expectancy when diagnosed later in life.

## ■ CASE REPORT

The patient, a 28 year-old female, had been well, until 4 years prior to assessment, when she started with sudden onset dyspnea that was usually self-limited and not related to exertion. Two months later, the dyspnea was associated with self-limited episodes of palpitations. In one particular epi-

sode she required administration of intravenous treatment, in order to control her symptoms. After feeling improvement, she was removed from all medication. Eight months prior to assessment, due to resting dyspnea, the patient's relatives advised her to seek medical attention once more.

## FAMILY HISTORY

The patient's 41 year-old sister also experiences undetermined cardiac arrhythmia. Their mother died at age 61, due to an apparent myocardial infarction. According to the patient, the mother had features of Marfan syndrome, but died undiagnosed.

## ORTHOPEDIC HISTORY

She suffered left hand fracture when she was a child

## ALLERGIES

No known allergies

## HIGH RISK BEHAVIOR

The patient does not smoke. She started drinking alcohol at age 24; approximately 4 beers in 3 months.

On examination the patient appears comfortable. Her height is 179 cm, weight 60 kg, and body mass index, 18.7. The ocular exam shows divergent strabismus. There is no evidence of jugular venous distention in the neck. The thorax shows pectus carinatum. The heart has regular rate and rhythm, s1,s2; no murmurs; blood pressure, 110/80 mmHg; pulse,

<sup>1</sup> MD Internal Medicine Specialist Northern Regional Hospital, Orange Walk Town. E mail: drivandepaz.mejia@yahoo.com



Figure 1. Thumb Sign



Figure 3. Arachnodactyly



Figure 2. Wrist sign



Figure 4. Striae on lumbar region

Table 1. Laboratory findings

White cell count		Blood chemistry		Urianalysis	
White blood cells	4.3 $10^3/\text{mm}^3$	FBS	78mg/dl	Protein	Negative
Hemoglobin	14.5g/dl	Creatinine	1.0mg/dl	Glucose	Negative
Hematocrit	43%	Total protein	7.6g/dl	Ketones	Negative
Platelets	166 $10^3/\text{mm}^3$	Albumin	4.9g/dl	WBC	1 X hpf*
				RBC	0 x hpf
				Bacteria	Few

\*hpf - high power field

82 beats per minute.

The lungs have adequate bilateral breath sounds, no rales, no wheezing; oxygen saturation is 99%. The abdomen is soft; there are no organomegalies. The extremities are symmetric, mobile and appear longer than usual. The arm span to height ratio is 1.01. The fingers have positive thumb and wrist sign and show arachnodactyly (figures 1,2,3). She has

flat feet. The skin has striae on the lumbar region (figure 4) After anamnesis and physical examination, the findings were suggestive of Marfan syndrome. An electrocardiogram showed sinus rhythm rate of 70 beats per minute and incomplete right bundle branch block.

Transthoracic echocardiography was performed. The parasternal long axis view revealed mild aortic regurgitation

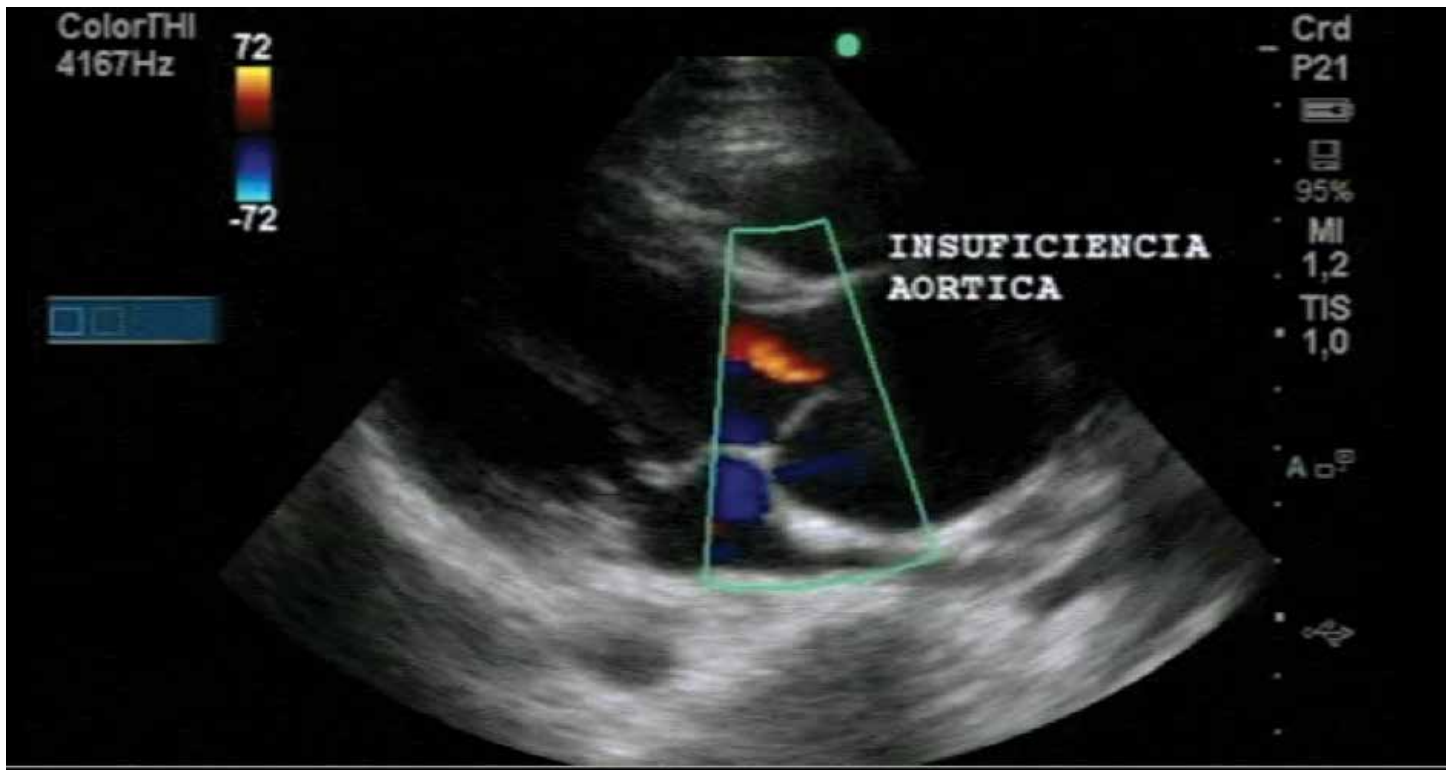


Figure 5. Mild aortic regurgitation

# The Association of R



The members of this association are : Dr. Yelina Gough, Dr. Irma Hoy, Dr. Morena Ramos, Dr. Silvia Parrales, Dr Virginia Smith (President), Dr. Bernabe Carillo (Treasurer), Dr Julio Diaz (Vice President), Dr. Bosco Davila, Dr. Javier Reyes, Dr. Maximiliano Riverol, Dr. Raymundo Silva.

(figure 5). The left ventricular ejection fraction was preserved (79%) and the aortic root diameter was 49 mm.

#### ■ REVIEW OF MARFAN SYNDROME (MFS)

Marfan syndrome is an autosomal dominant disorder of connective tissue. While most individuals have an affected parent, 25 percent or more of probands have Marfan syndrome as the result of de novo mutation. Most patients with typical Marfan phenotype harbor mutations involving gene FBN1, encoding the connective tissue protein fibrillin-1. In a minority of cases (less than 10 %) with typical Marfan phenotype, no mutation is identified in FBN1.

#### ■ DIAGNOSIS

The diagnosis of MFS in familial and sporadic cases is based upon the presence of characteristic manifestations, which are included in the revised Ghent nosology (see below), particularly aortic root dilation/dissection and ectopia lentis, as well as other systemic features including skeletal findings, mitral valve prolapse, dural ectasia, pneumothorax and skin striae.

In the presence of a family history of MFS, the existence of any one of the following criteria is diagnostic:

- Ectopia lentis
- Systemic score  $\geq 7$  points

- Aortic criteria (aortic diameter  $Z \geq 2$  above 20 years-old,  $Z \geq 3$  below 20 years, or aortic root dissection)

#### Systemic score

The revised Ghent nosology includes the following score for grading systemic features:

- Wrist and thumb sign: 3 points, or wrist or thumb sign: 1 point
- Pectus carinatum deformity, pectus excavatum or chest asymmetry: 1 point
- Hindfoot deformity: 2 points, plain flat foot: 1 point
- Pneumothorax: 2 points
- Dural ectasia: 2 points
- Protrusio acetabuli: 2 points
- Reduced upper segment/lower segment ratio and increased arm span/height and no severe scoliosis: 1 point
- Scoliosis or thoracolumbar kyphosis: 1 point
- Reduced elbow extension ( $\leq 170$  degrees with full extension): 1 point
- Facial features:  
At least three of the following five features:
  - Dolichocephaly (reduced cephalic index or head width/length ratio) enophthalmos, downslanting palpebral fissures, malar hypoplasia, retrognathia): 1 point.
  - Skin striae: 1 point

# Radiologists of Belize



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*Some of the main objectives of the Association are :*

- 1. To foster the development of Radiology and Diagnostic imaging, a medical specialty necessary for the diagnosis and treatment of illnesses that utilizes X-rays, ultrasound, and all forms of radiation of the electromagnetic spectrum, as well as other forms of energy for diagnostic imaging.*
- 2. To assess and cooperate with national and foreign, public and private educational and health organizations in the implementation and development of programs to achieve optimal scientific, ethnic and academic quality in the formation of educational programs in radiology for continuous medical education.*
- 3. To promote the public attention to the radiological medical sector and its importance in the development of the country, of medicine and consequently promote all actions that allow the profession to occupy its place within the various sectors of medicine in the country.*
- 4. To stimulate and monitor the practice of Radiology that is practiced under optimal, ethical medical conditions and that the technological scientific knowledge is within the norms of occupation and radiographic security existent in the country.*
- 5. To offer collaboration and monitoring in order to ensure that all the public and private institutions of diagnostic imaging offer services by qualified specialists in installations properly equipped by machines that guarantee quality and comply with the norms of Biosafety.*
- 6. To program and organize scientific meetings, seminars and symposiums and aim to have exchange of information with the other medical specialties.*
- 7. To promote scientific publications along with the Medical Magazines already existent.*

- Myopia >3 diopters: 1 point
- Mitral valve prolapse (all types): 1 point

Application of diagnostic criteria in young people (< 20 years-old), particularly in those with sporadic disease requires special care, since additional clinical features may subsequently emerge.

## CLINICAL MANIFESTATIONS OF MFS

### Aortic disease

Aortic root disease, leading to aneurysmal dilation, aortic regurgitation, and dissection, is the main cause of morbidity and mortality in Marfan syndrome. Undiagnosed and untreated MFS is frequently associated with aortic dissection. The degree of aortic disease also has implications for women who would like to become pregnant and for management during pregnancy.

### Cardiac disease

Mitral valve prolapse (MVP) is frequently identified in patients with MFS (eg, 40 and 54 percent in two series of MFS patients)

### Skeletal findings

Individuals with MFS have excess linear growth of the long bones and joint laxity. Patients with MFS are taller than predicted by their genetic background.

### Arachnodactyly

Patients with MFS typically have arachnodactyly with positive thumb and wrist signs. A positive thumb sign indicates that the entire distal phalanx protrudes beyond the ulnar border of a clenched fist with or without the assistance of the patient or examiner to achieve maximum adduction. A positive wrist sign means that the top of the thumb covers the entire fingernail of the fifth finger when wrapped around the contralateral wrist.

### Hindfoot valgus

It occurs with forefoot abduction and lowering of the mid-foot and should be evaluated from anterior and posterior views.

### Abnormal US/LS and arm span/height

Individuals with MFS have disproportionately long extremities in comparison to the length of the trunk (dolichostenomelia), so the upper segment to lower segment (US/LS) ratio is decreased and the arm span to height ratio is increased.

### Ocular abnormalities

Annual ophthalmologic evaluation is recommended for all patients with MFS. Urgent assessment is recommended for patients with sudden change in vision. Ectopia lentis occurs in 50 to 80 % of MFS patients.

### Dural ectasia

It results from enlargement of the spinal canal owing to progressive ectasia of dural and neural foramina and to ero-

sion of vertebral bone. This abnormality usually involves the lumbosacral spine and was identified in 63 and 92 % of patients with MFS in case series using CT and MR scanning, respectively.

### Pulmonary disease

Some patients with MFS develop emphysematous changes with lung bullae, predominantly in the upper lobes, which can predispose to spontaneous pneumothorax (contributing two points to the systemic score).

## MFS MANAGEMENT

High-intensity exercise, involving bursts of activity (eg, sprinting), or activities likely to cause marked increase in blood pressure (eg, weight lifting or weight training) should be avoided.

Beta blockers decrease myocardial contractility and pulse pressure and may also improve the elastic properties of the aorta, particularly in patients with an aortic root diameter < than 40 mm.

In adults with MFS, yearly sonographic measurement of aortic root diameter is recommended as long as the diameter is < 45 mm, more frequent monitoring is recommended if the aortic root diameter is  $\geq 45$  mm or if the aortic diameter shows rapid change ( $\geq 0.5$  cm/year) or if there are concerns regarding heart or valve function.

For patients with MFS, elective aortic repair is associated with reduced mortality when compared to urgent or emergent

repair. Elective surgical intervention should be considered when an adult has an aortic root diameter of  $\geq 50$  mm and a child has a disproportionately rapid increase in aortic diameter when compared to the rate of increase in body surface area even if the diameter is  $\leq 50$  mm.

## ■ DISCUSSION AND CONCLUSIONS

Measurement conventions for aortic diameter differ for echocardiography as compared to computed tomography (CT) or magnetic resonance imaging (MRI) and the measurement conventions may also differ from one institution to another.

CT and cardiac magnetic resonance measure external aortic diameter, whereas echocardiography measures internal aortic diameter. The surgery for elective aortic root diameter is usually planned on CT/MRI data, and it should be performed ideally on an elective basis.

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