Scientific Research Publishing

World Journal of Cardiovascular Diseases, 2022, 12, 463-471
https://www.scirp.org/journal/wjcd
ISSN Online: 2164-5337
ISSN Print: 2164-5329

Marfan Syndrome Complicated by Aortic Arch Aneurysm and Aortic Dissection: A Case Report from Congo

Solange Flore Ngamami Mongo[1,2], Christian Michel Kouala Landa[1,2], Franck Yannis Kouikani[1], Kivié Mou-Moué Ngolo Letomo[1], Rogue Pattern Bakekolo[1], Bertrand Fikahem Ellenga Mbolla[1,2]

[1]Department of Cardiology, University Hospital of Brazzaville, Brazzaville, Republic of the Congo
[2]Department of Doctoral Studies, Faculty of Health Sciences, Marien Ngouabi University, Brazzaville, Republic of the Congo
Email: mongongamamisolangeflore@gmail.com, ellenga_bertrand@hotmail.com, yannisfranck@yahoo.fr, ngololetom@gmail.com, back_patterne@yahoo.fr, koulalanda@gmail.com

How to cite this paper: Mongo, S.F.N., Landa, C.M.K., Kouikani, F.Y., Letomo, K.M.-M.N., Bakekolo, R.P. and Mbolla, B.F.E. (2022) Marfan Syndrome Complicated by Aortic Arch Aneurysm and Aortic Dissection: A Case Report from Congo. *World Journal of Cardiovascular Diseases*, **12**, 463-471.
https://doi.org/10.4236/wjcd.2022.1210048

Received: August 25, 2022
Accepted: October 28, 2022
Published: October 31, 2022

Abstract

Context and Aim: Marfan syndrome is a transmissible genetic disease of the connective tissue that is rarely encountered in Congo and in sub-Saharan African countries. Its cardiovascular complications can be life frightening. The management of that disease is still limited in our country because of a lack of technical capacity in cardiovascular surgery. The aim of this clinical report is to show the interest of echocardiography and especially angioscanner as the main technique in the diagnosis of the severity of this disease, elaborate a literature review, but also to highlight the difficulties encountered in the management of that affection in our countries. **Observation:** The authors report the medical observation of a 48-year-old adult with a history of cataract of the left eye and a subluxation of the lens for which he underwent surgery in 2016, without any etiology being found. He is a smoker at a rate of 6 packs yearly. He consulted for progressively worsening dyspnea and constrictive mediosternal pain. The clinical examination revealed a moderate alteration of the general state, apyrexia, a blood pressure of 140/90 mmHg, a SPO_2 of 97% in ambient air, a respiratory frequency of 32 cycles/min, signs of left ventricular insufficiency, a diastolic murmur of aortic insufficiency of intensity 4/6th, a long-limbed morphotype with a wingspan superior to the height and a kyphoscoliosis. Chest X-ray showed cardiomegaly with a cardiothoracic ratio of 58%, a highly dilated and uncoiled aorta, convexity of the left inferior arch, and venocapillary hypertension and a quiet alveolar-interstitial pulmonary oedema. The ECG was in sinus rhythm and showed a poor R-wave progression in anteroseptal leads. Echocardiography showed significant aortic root dilatation up to 72.6 mm and aortic regurgitation grade IV. Angioscanner showed a dissected aortic aneurysm and areas of emphysema located in

the lungs. The medical treatment was palliative with beta blocker and angiotensin II receptor antagonists, diuretics and analgesics. The patient is awaiting surgery. **Conclusion:** Marfan syndrome is a genetic disease of the connective tissue that can manifest itself by cardiovascular, pulmonary, orthopedic, ophthalmological and cutaneous signs. Echocardiography and especially angioscanner are the tools of choice for the diagnosis and follow-up of this condition. Surgery is reserved for serious complications of this condition.

Keywords

Marfan Syndrome, Heart Failure, Aortic Aneurysm, Aortic Dissection, Congo

1. Introduction

Marfan syndrome is a transmissible genetic disease of the connective tissue. It is transmitted in an autosomal dominant mode, and the responsible gene is carried by a non-sexual chromosome. The minimum incidence of births is about 1/9800 [1].

This incidence is probably underestimated in fact the diagnosis is not always suspected due to the plurality of its signs. The diagnosis of Marfan syndrome relies on a set of defined clinical criteria (the Ghent nosology) [2] [3]. It takes into account, in particular, osteoarticular signs (size, length of limbs, sternum), cardiovascular signs (dilation of the aorta, aortic dissection) and ophthalmological signs (subluxation of the lens, cataract) [4] and pulmonary signs.

In black patients, aortic dissection complicating Marfan disease remains rare. The most common clinical manifestation in this case is chest pain and heart failure [2]. In Congo Brazzaville, two ancient scientific works have been carried out on aortic dissection they integrated high blood pressure complication and Marfan disease as etiology [4] [5].

Thus, we propose a recent and complex case of Marfan syndrome and a review of the literature of this rare pathology highlighting the cardiovascular, orthopedic, pulmonary and ophthalmological manifestations.

2. Observation

A 48-year-old single man, father of 3 children, living in Brazzaville, with an history of smoking at a rate of 06 packs yearly was referred to the cardiology department B of the University Hospital of Brazzaville for the management of a progressively worsening dyspnea and intense constrictive mediosternal thoracic pain, of sudden onset, with an irradiation of the pain all along the neck the left arm and the back for 3 days. At the age of 41, he was diagnosed a cataract and lens subluxation for which he underwent surgery in 2016 without any specific etiology being sought.

On clinical examination, the vital signs were: apyrexia at 37.2˚C; respiratory

rate of 30 cycles/min; BP: 140/90 mmHg; heart rate: 84 bpm; SPO_2: 98% on room air; weight: 74 kg; height: 1.80 m; BMI = 22.8 kg/m^2; waist circumference: 65 cm. The rest of the examination showed a thorax of abnormal configuration; pectus excavatum; kyphoscoliosis; regular heart sounds with a soft high-pitched early diastolic murmur best heard at the right upper sternal border with an irradiation all along the left edge of the sternum, of intensity 4/6th, B2 is decreased.

The pleuropulmonary examination revealed crackles at the pulmonary bases.

The osteoarticular and skin examination showed: a long limbed morphotype with a wingspan: 204 cm and a height: 180 cm, that is to say a ratio of 1.13; kyphoscoliosis; dolichostenomelia; arachnodactyly; ligamentary hyperlaxity; the presence of a wrist and thumb sign; limitation of the rotation movements of the multidirectional trunk; the distance of the finger to the ground: 50 cm and a shober index of 17 cm. Stretch marks on the shoulders and lower back.

Paraclinical examinations:

Chest X-ray (**Figure 1**) revealed a disruption of the anatomical configuration of the heart; cardiomegaly with a cardiothoracic ratio of 58%; a very wide and uncoiled aorta; alve-olar-interstitial opacities in both lungs.

The electrocardiogram (**Figure 2**) was in sinus rhythm; and showed: normal PR; a poor R-wave progression in anteroseptal leads.

Echocardiography (**Figure 3**) revealed dilation of the left cavities with LVEDD: 65.3 mm; LV ejection fraction 55%; aortic root dilatation: 72.6 mm in diameter; and aortic leak-age grade IV.

Angioscan (**Figure 4-6**) showed:

1) Aorta: dystrophic and ectasitic physiform aneurysm of the aortic arch with two channels separated by a hypodense membrane suspicious of a type I aortic dissection, diameter of the aortic arch: 65.7 mm.

2) Lungs: area of emphysema located on the apico-ventral and apico-dorsal

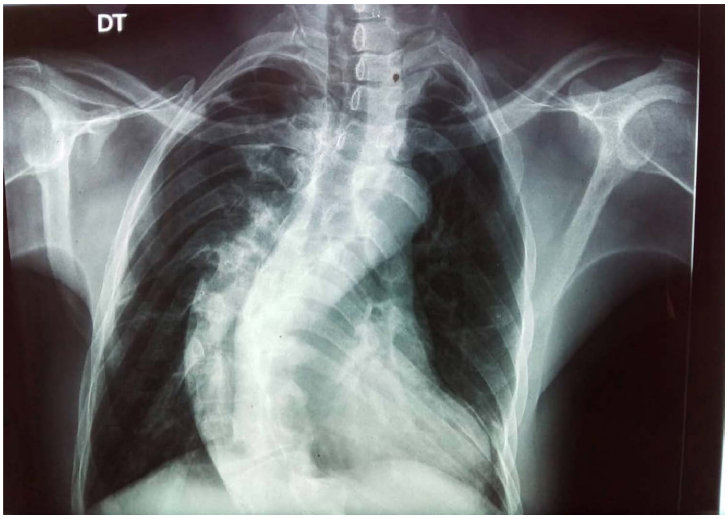

Figure 1. Frontal chest radiograph: disruption of the anatomical configuration of the heart; cardiomegaly (TCR = 58%); very wide and uncoiled aorta kyphoscoliosis.

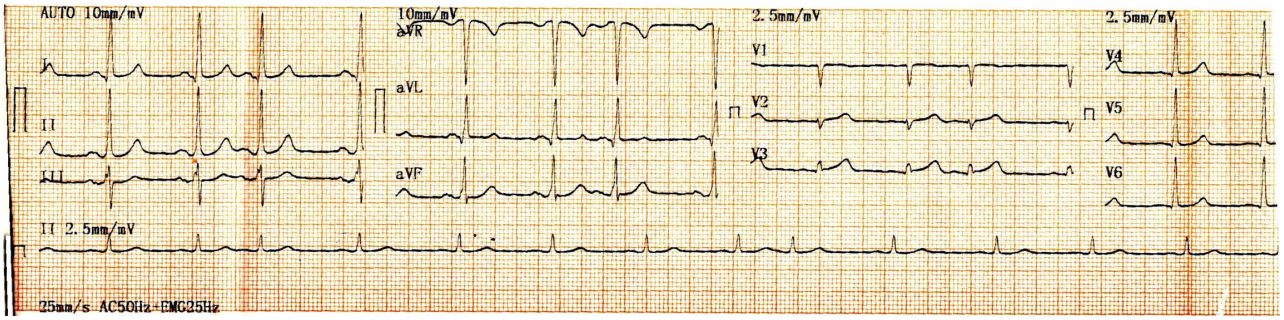

Figure 2. Electrocardiogram (ECG) sinus rhythm delayed anteroseptal R wave progression.

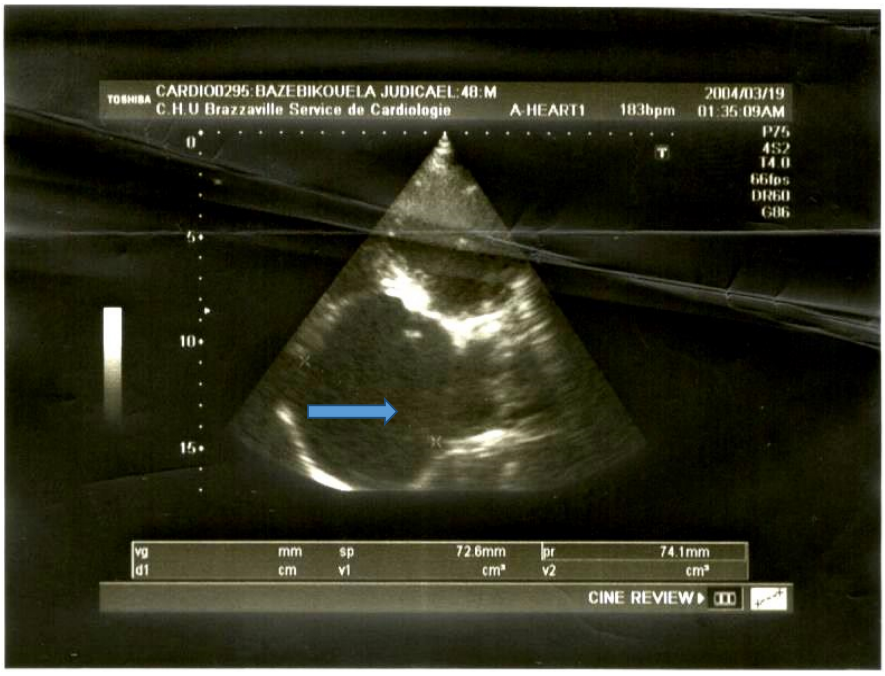

Figure 3. Cardiac echocardiography (parasternal long-axis section): aortic aneurysm, aortic root diameter 72.16 mm.

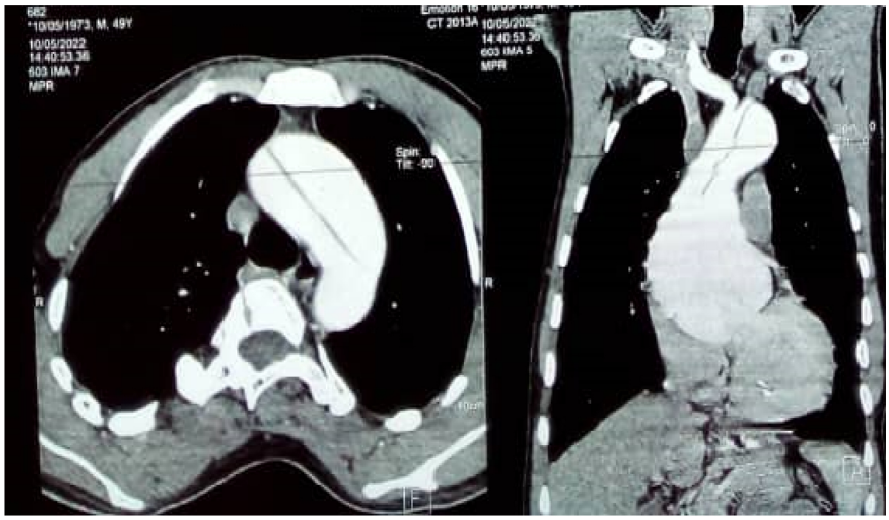

Figure 4. Thoracic angioscan: dissected physiform aneurysm of the aortic arch.

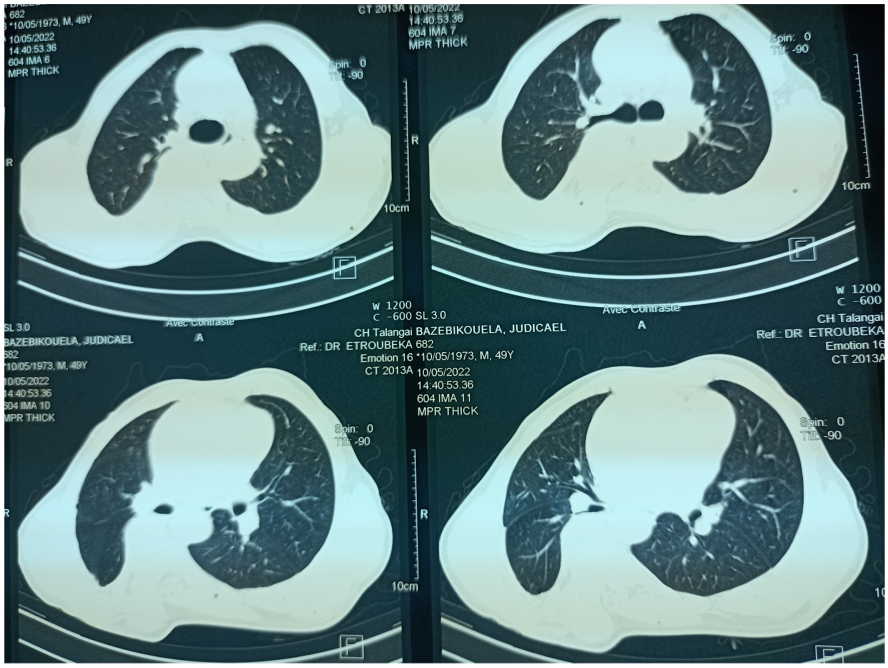

Figure 5. Thoracic angioscan: visualization of bronchial dilatations.

segments of the right and left upper lobes of the lung with a centro-lobular appearance.

Biology showed: Normal cardiac enzymes; normal blood count with Hb: 12 g/dl; inflammatory syndrome with SV: 40 mm. Renal function was normal with a creatinemia level: 11.7 mg/l and a GFR: 85.8 ml/min.

Histology and genetic: testing was not performed due to lack of adequate technical facilities.

The diagnosis of Marfan syndrome was made and retained on clinical and para-clinical arguments according to the Ghent diagnostic criteria [4], following the evolution of the criteria adopted by the Berlin consensus conference in 1986:

- **Cardiovascular signs:** major signs (dilatation of the ascending aorta, aortic dissection); minor signs (heart failure, aortic insufficiency);
- **Osteoarticular and skin signs:** (pectus escavatum, wrist and thumb sign; upper to lower segment ratio = 1.13; kyphoscoliosis, ligament hyperlaxity; stretch marks on shoulders and lower back);
- **Ophthalmologic signs:** subluxation of the lens; cataract;
- **Pulmonary sign:** dilatation of the bronchi;

Medical treatment:

Bed rest in half sitting position; salt-free diet; Furosemide 60 mg/day; Kaleorid 1800 mg/d; Losartan 50 mg cp/d; Enoxaparin 0.4 ml/d; Atenolol 50 mg/d; tramadol 100 mg/d.

The evolution is marked by the regression of chest pain and signs of left heart failure after 15 days of treatment.

Due to the lack of cardiovascular surgery in our country, an emergency medical evacuation file has been initiated and is in progress.

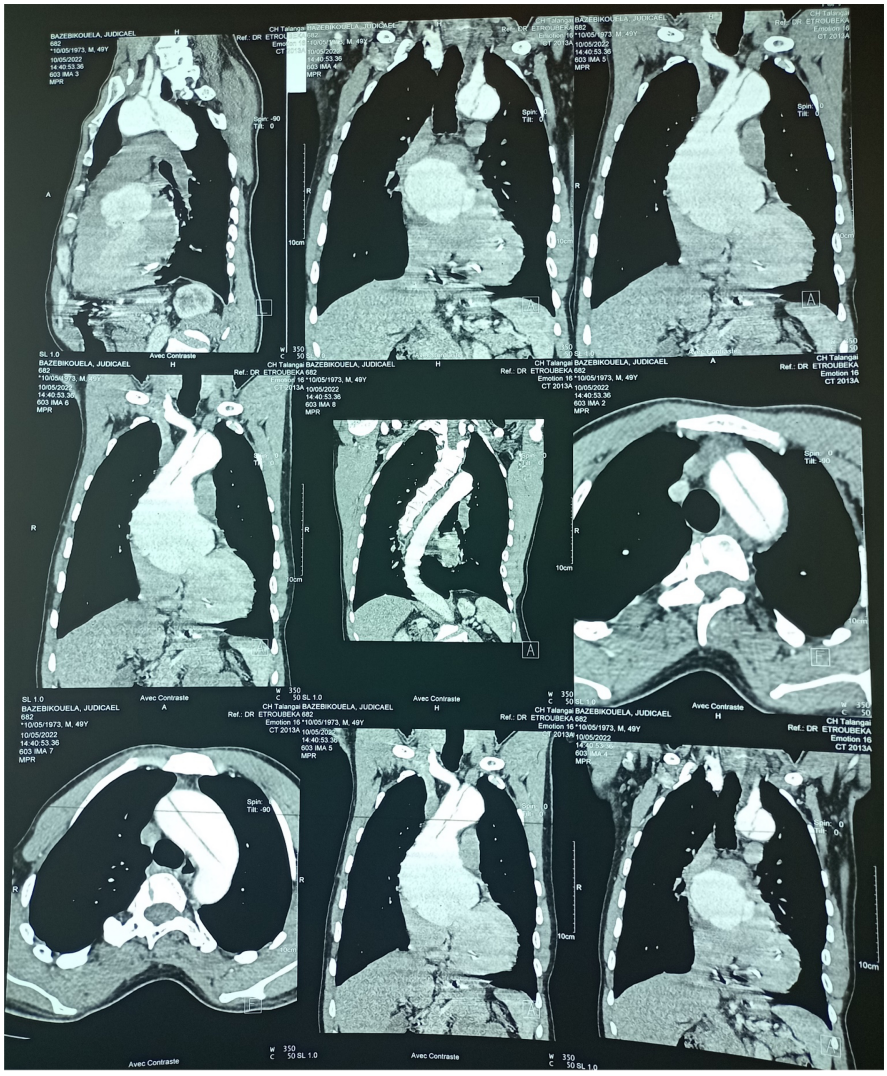

Figure 6. Thoracic angioscan: visualization of an aortic aneurysm and dorsolumbar kyphoscoliosis.

3. Discussion

In 1896, Antonin Bernard-Jean Marfan, a pediatrician at the Hospital for Sick Children and professor at the Faculty of Medicine of the University of Paris, was the first to identify the symptoms of Marfan's disease in a 5-year-old girl with long and disproportionate limbs [7]. Today, Marfan syndrome is a genetic disease of the connective tissue with autosomal dominant transmission. The gene responsible is carried on a non-sex chromo-some, which explains why this condition affects both sexes without distinction. The responsible gene carries a deleterious mutation, which is why a parent of a kid with Marfan syndrome has an estimated 50% risk of being affected by the syndrome. Cases have been described in which the parents are free of the syndrome and a mutation has occurred spontaneously in the egg or sperm after its formation [8]. This phenomenon, which occurs in about one in 10,000 births, still represents one third to one quarter of Marfan individuals.

The gene codon fibrillin 1 (called FBN1) essential protein of the connective tissue of chromosome 15 is incriminated in the Marfan syndrome [9] [10]. Fibrillin 1 allows the or-ganization of elastin fibers constituting the extracellular matrix of connective tissue, whose role is to ensure the support of organs. A mutated fibrillin 1 leads to a poor quality connective tissue that is less dense than normal.

The extracellular matrix that makes up connective tissue is found in every organ in the body. This is why the manifestations of Marfan syndrome affect several organs. Other mutations have been identified, notably the mutation of the TGFBR2 and TGFBR1 gene, is also incriminated in patients with Marfan syndrome [11] [12]. New genes for this disease are still being discovered, especially since its pathogenesis remains complex.

In the literature, the age of discovery of the disease varies among patients. Many characteristics of Marfan depend on the patient's age when the disease is first diagnosed [13] [14]. Some authors have reported cases from the neonatal period. Our patient was 48 years old, male, with no family history of cardiovascular disease. However, familial forms have been frequently described in the literature.

The circumstances of discovery are diverse, because this syndrome is rich in clinical signs and the clinical manifestations are not of the same intensity in all carriers. Some neonatal forms remain very disabling while other forms appear at an advanced age of the patient's life; each patient may present a clinical picture of his own. Nevertheless, there are frequent symptoms that together suggest the diagnosis of this condition according to the Ghent diagnostic criteria, in particular cardiovascular, osteoarticular, pulmonary and ophthalmologic involvement.

Cardiovascular signs are the main threat to the vital prognosis of patients, as the weakening of the aortic wall with dilatation of the root of the aorta is often complicated by aortic dissection, which darkens the vital prognosis of patients [14] [15]. The dilation of the aorta causes aortic regurgitation which is responsible for heart failure, this dilation of the aorta is the most frequent cause of morbidity and mortality in Marfan's disease.

The ophthalmological signs include lens subluxation and cataract, which can threaten blindness. The pulmonary signs observed in our case are probably aggravated by the fact that the patient is a smoker.

The evolution is variable from one subject to another. It depends on the precocity of the diagnosis and the rigor of the management. We can state without a doubt that our patient was diagnosed with advanced Marfan syndrome with serious cardiovascular and osteoarticular complications, which darkens his vital prognosis. The recommendations are based on a long term using beta blockers [10], wearing of corset brace and corrective lenses. Surgery is reserved for severe forms [15].

4. Conclusion

Marfan syndrome is a genetic disease of connective tissue that can manifest itself

by cardiovascular, pulmonary, orthopaedic, ophthalmological and cutaneous signs. It is rarely encountered in Congo and sub-Saharan Africa. Echocardiography and especially the angioscanner represent the main tools used for the diagnosis of gravity and the follow-up of this condition. The cardiovascular complication of that affection represents a life frightening situation especially in our countries because of the lack of technical capacity in cardiovascular surgery.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Dean, J.C.S. (2007) Marfan Syndrome: Clinical Diagnosis and Management. *European Journal of Human Genetics*, **15**, 724-733. https://doi.org/10.1038/sj.ejhg.5201851

[2] De Paepe, A., Devereux, R.B., Dietz, H.C., Hennekam, R.C. and Pyeritz, R.E. (1996) Revised Diagnostic Criteria for Marfan Syndrome. *American Journal of Medical Genetics*, **62**, 417-426. https://doi.org/10.1002/(SICI)1096-8628(19960424)62:4<417::AID-AJMG15>3.0.CO;2-R

[3] Maumenee, I.H. (1981) The Eye in Marfan Syndrome. *Transactions of the American Ophthalmological Society*, **79**, 684-733.

[4] Bouramoue, C., Kimbally-Kaky, G., Nkoua, J.L., Le Feuvre, C. and Vacheron, A. (2001) Aortic Dissection among Blacks. Analysis of Six Congolese Cases. *Annales de Cardiologie et d'Angéiologie*, **50**, 133-141. https://doi.org/10.1016/S0003-3928(01)00010-5

[5] Kouala Landa, C.M., Ellenga Mbolla, B.F., Mongo-Ngamami, S.F., Makani, B.-K., Bakekolo, R.P., Ikama, M.S. and Kimbally-Kaky, S.G. (2017) Aortic Dissection in Sub-Saharan Africa: Difficulty of Management in Country without Cardiac Surgery. Clinical Case in Congo-Brazzaville. *Rwanda Medical Journal*, **74**, 14-16.

[6] Sociétémédicale des hopitaux de Paris (1896) Bulletins et Mémoires de la Société Médicale des Hôpitaux de Paris. Volume 13, Masson.

[7] Marfan and Related Syndromes. https://www.fondation-groupama.com

[8] Mizuguchi, T. and Matsumoto, N. (2007) Recent Advances in Genetics of Marfan Syndrome, and Marfan-Associated Disorders. *Journal of Human Genetics*, **52**, 1-12. https://doi.org/10.1007/s10038-006-0078-1

[9] Biggin, A., Holman, K., Brett, M., Bennetts, B. and Ades, L. (2004) Detection of Thirty Novel FBN1 Mutations in Patients with Marfan Syndrome or Related Fibrillinopathy. *Human Mutation*, **23**, Article No. 99. https://doi.org/10.1002/humu.9207

[10] Kainulainen, K., Karttunen, L., Puhakka, L., Sakai, L. and Peltonen, L. (1994) Mutations in the Fibrillin Gene Responsible for Dominant Lens Ectopia and Neonatal Marfan Syndrome. *Nature Genetics*, **6**, 64-69. https://doi.org/10.1038/ng0194-64

[11] Matyas, G., Arnold, E., Carrel, T., Baumgartner, D., Boileau, C., Berer, W. and Steinmann, B. (2006) Identification and *in Silico* Analyses of Novel TGFBR1 and TGFBR2 Mutations in Marfan Syndrome Disorders. *Human Mutation*, **27**, 760-769. https://doi.org/10.1002/humu.20353

[12] Lipscomb, K.J., Clayton-Smith, J. and Harris, R. (1997) Evolution of the Phenotype of Marfan Syndrome. *Archives of Disease in Childhood*, **76**, 41-46. https://doi.org/10.1136/adc.76.1.41

[13] Joseph, K.N., Kane, H.A., Milner, R.S., Steg, N.L., Williamson, M.B. and Bowen, J.R. (1992) Orthopedic Aspects of the Marfan Phenotype. *Clinical Orthopaedics and Related Research*, **277**, 251-261. https://doi.org/10.1097/00003086-199204000-00031

[14] Bouzerda, A., Bendriss, L. and Khatouri, A. (2018) Large Aneurysms of the Subclavian and Right Axillary Arteries Relevant to Marfan Disease. *Blood Thrombosis Vessels*, **30**, 137-139.

[15] Wang, Z.J., Greason, K.L., Pochettino, A., *et al*. (2014) Long-Term Outcomes of Survival and Freedom from Aortic Root or Valve Reintervention after Surgery for Acute Ascending Aortic Dissection. *The Journal of Thoracic and Cardiovascular Surgery*, **148**, 2117-2122. https://doi.org/10.1016/j.jtcvs.2013.12.059