Cambridge City Publishers

Case Reports in Clinical Cardiology Journal

Case Report | Vol 4 Iss 1

An Older Heart than Expected

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Received: January 02, 2024; **Accepted:** January 29, 2024; **Published:** February 05, 2024

Abstract

We present a rare case of aortic stenosis in a patient with adult progeria precluded for both surgical replacement (due to frailty and risk of endocarditis) and percutaneous approach (because of peripheral arterial disease). It is the first case of adult progeria with aortic stenosis treated through transapical access.

Keywords: Adult progeria; Werner syndrome; Severe aortic stenosis; Transapical approach

Introduction

Werner syndrome or “adult progeria” is a rare syndrome characterized by early aging resulting in premature development of disorders associated with senescence such as peripheral arterial disease or cardiac pathologies that include ischemic and valvular heart disease [1]. We present the case of a young man, 48 years of age, suffering from adult progeria and severe symptomatic degenerative aortic stenosis whose frailty and peripheral arterial disease contraindicated both open-heart surgery and percutaneous approach therefore a transapical access was chosen and performed successfully.

Case Presentation

Patient Description

This is the case of a 48-year-old man suffering from adult progeria diagnosed when he was 24 years old. His grandparents were first cousins and his sister was also affected. He presented several complications associated to premature aging: arterial hypertension, type II diabetes mellitus, dyslipidaemia and advanced peripheral arterial disease with chronic ulcers in lower limbs, even requiring plastic surgery.

Case History

He was under cardiological follow-up due to severe asymptomatic aortic stenosis with preserved ejection fraction and without pulmonary hypertension. Our patient was brought to emergency department because of a sudden transient loss of consciousness while he was walking.

Physical Examination Result

He denied prodromes and fully recovered remaining hemodynamically stable and asymptomatic upon arrival. He was a cachectic man (170 cm, 48 Kg, body surface area of 1.5 m2) with typical features of adult progeria (Figure 1). He presented a systolic heart murmur with Gallavardin phenomenon and dry necrosis involving distal zone of both feet.

Result of Pathological Tests and Other Investigations

Blood tests revealed only mild anaemia and electrocardiogram showed sinus tachycardia, right axis deviation and high voltages accompanied by secondary repolarization abnormalities. Pulmonary embolism was ruled out with pulmonary computed tomography. Transthoracic echocardiogram (Figure 2) showed moderate LV hypertrophy and ejection fraction of 52%. Aortic valve was severely calcified with and area of 0.39 cm2 (0.25 cm2/m2), estimated by continuity equation. Peak transvalvular velocity was 4.9 m/s and peak and mean gradients were 95 and 58 mmHg, respectively, with aortic index of 0.12, all consistent with severe aortic stenosis. Moderate regurgitation was also present. Coronary angiography revealed only mild diffuse atherosclerosis involving the left anterior descending artery.

Computed tomography showed enough distance between the aortic valve plane and coronary ostia with normal dimensions of the aortic annulus and ascending aorta. Femoral arteries exhibited reduced dimensions with minimal diameters under 4.5 mm, unfavourable for transfemoral access (Figure 3). Suboptimal size of axillary, subclavian and carotid arteries for percutaneous access was also present.

Treatment Plan

The case was discussed by the Heart-Team including vascular surgeons who determined that the dry necrosis involving both feet required bilateral amputation. However, in absence of signs of infection, since the vital prognostic was determined by aortic valve disease, an agreed decision was made to postpone the amputation until after the heart valve intervention.

Expected Outcome of the Treatment Plan

Considering the risk of endocarditis due to repeated bacterial colonization of lower limb ulcers together with his frailty, a percutaneous valve approach was jointly decided, prior broad-spectrum antibiotic coverage. Finally, he underwent transapical transcatheter aortic valve implantation, which was uneventful. Postprocedural echocardiography revealed normal LV systolic function and normal prosthetic function and gradients.

Actual Outcome

The patient experienced satisfactory recovery, being discharged a few days after the procedure. Ten months later, amputation of both lower limbs was carried out uneventfully, as planned.

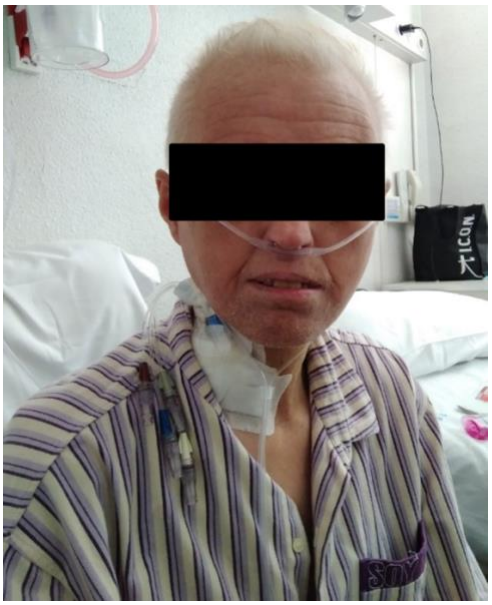

Figure 1: Patient's physical characteristics with typical features of adult progeria. "Bird-like" facies, aged appearance, premature greying and loss of the hair, short stature and cachexia.

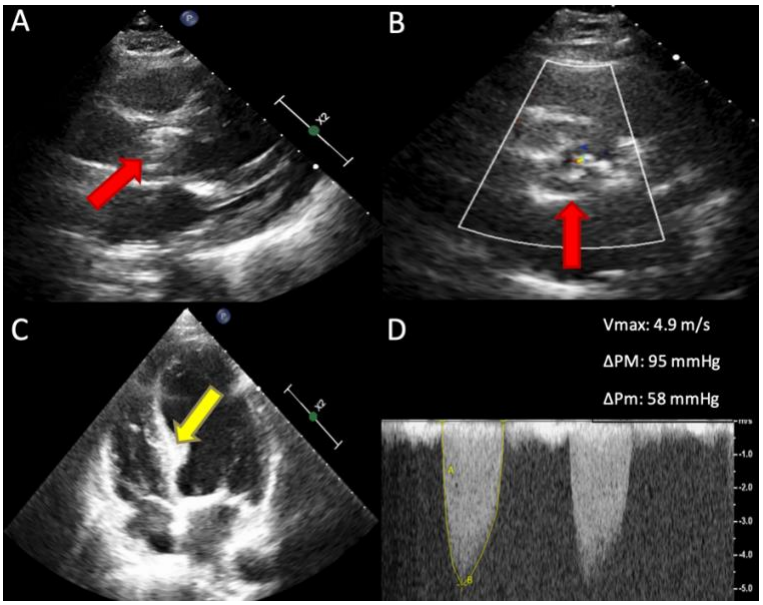

Figure 2: Transthoracic echocardiogram showing severe aortic valve calcification (red arrow) and significant septal hypertrophy (yellow arrow). **(A):** Parasternal long-axis; **(B):** Parasternal short-axis; **(C):** Apical four-chambers; **(D):** Continuous-wave Doppler of aortic valve showing severe stenosis. **Vmax:** Peak transvalvular velocity; **ΔPM:** Maximum pressure gradient; **ΔPm:** Mean pressure gradient.

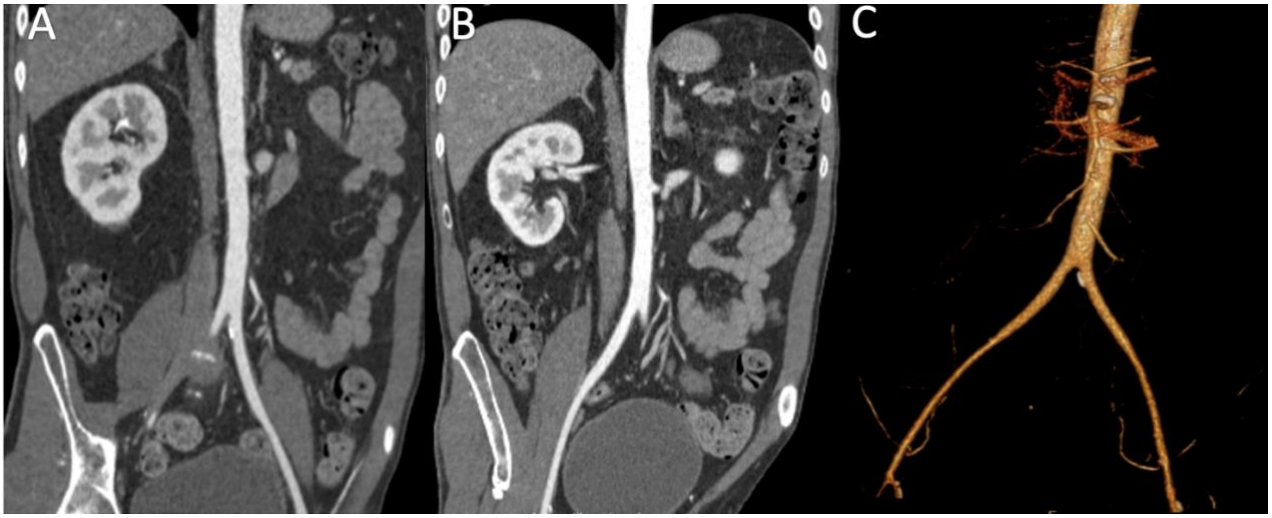

Figure 3: CT angiography of lower limbs. **(A):** Left aortoiliac axis; **(B):** Right aortoiliac axis; **(C):** Three-dimensional reconstruction of the whole aortoiliac axis. Only mild signs of atherosclerosis are observed but the diffusely reduced vascular dimensions result unfavourable for percutaneous access.

Discussion

Werner Syndrome, also known as "adult progeria", is a rare autosomal recessive hereditary syndrome with a prevalence of 1:380,000-1:1,000,000 inhabitants [1,2]. In Japan, there are approximately 2,000 patients with WS, which accounts for two-thirds of all cases globally [3]. It was originally described by Otto Werner in 1904, although the term "Werner syndrome" was first used in 1934 by Oppenheimer and Kugel. Genetic mechanisms were discovered in 1996 by Yu et al. [2].

WS is caused by a mutation in the WRN gene, located in chromosome 8p11-12, which encodes one of the five RecQ helicases in humans. The main theory supports that the disorders are triggered by the impairment of telomer maintenance [2].
Individuals are phenotypically normal at birth and during childhood. The syndrome can be recognizable between 20 and 30 years of age [1]. It consists of premature aging with typical features: bilateral cataracts (99%), short stature (95%), premature greying and thinning of scalp hair (100%) and characteristic skin disorders (96%) such as subcutaneous atrophy or "bird-like facies". More than 91% of the affected individuals present the 4 cardinal signs [2].

Deep ulcers on elbows and, especially, on Achilles tendons are almost pathognomonic. They are refractory to conventional treatments and often require amputation. Characteristic changes in their voice are common as well [2]. Diagnostic approach is based on the presence of the main features and is achieved by molecular exams [2]. Death occurs prematurely at an age of 47-54 years due to cancer or myocardial infarction caused by extensive atherosclerosis [2]. In other cases, life expectancy is marked by heart valve disease [4]. Literature on aortic stenosis and its treatment in these patients is very scarce. To the best of our knowledge, only 7 cases have been reported between 1994 and 2022 [3]. Some authors opted for transcatheter femoral valve replacement, despite a low surgical risk according to the scores [4]. Others, however, chose homograft implants [5], while others decided on mechanical valves [6]. Recently, Sumiyoshi R et al reported an aortic replacement through a mini-thoracotomy approach [3]. It is difficult to assess the frailty of these patients due to the lack of validated scores and the low extrapolability of the common geriatric and surgical ones.

Aortic stenosis is the most common valvular disease, with surgical replacement as the traditional treatment [7]. However, since its introduction at the beginning of the 21st century, TAVI, especially via femoral approach, has become an alternative in high or intermediate risk patients, and even in some cases as the only option [7]. European guidelines recommend TAVI as the first choice in patients ≥75 years or in those who are high risk or unsuitable for surgery. They recommend surgical replacement in younger patients who are at low risk for surgery or in patients who are operable and unsuitable for transfemoral TAVI. They leave the remaining patients to the criterion and decision of the Heart Team [8].

Other accesses, such the transapical, have been used, especially for patients with reduced vascular dimensions [7]. TAVI, with its different approaches, represents an opportunity for the treatment of aortic stenosis not only in general population, but also in WS patients. Since there is no cure for WS, clinical management must be focused on treating manifestations, preventing secondary complications and screening for acquired diseases [2].

Conclusion

This is the first case reported in literature of severe aortic stenosis in a patient with adult progeria successfully treated with transapical transcatheter aortic valve implantation.

Learning Points

A patient suffering from adult progeria who developed severe symptomatic aortic stenosis:

1. To be able to identify specific comorbidities associated with progeria before deciding any surgical intervention on patients presenting this condition.
2. To choose the best approach for aortic stenosis intervention in patients with progeria considering their frailty, technical difficulties and possible complications based on a joint decision of a multidisciplinary "Heart Team".

REFERENCES

1. Chen L, Oshima J. Werner Syndrome. J Biomed Biotechnol. 2021; 13: 46-54.
2. David A, Vincent M, Arrigoni PP, et al. Werner syndrome: Clinical features, pathogenesis and potential therapeutic interventions. Ageing Res Rev. 2017; 33: 373-378.
3. Sumiyoshi R, Morita H, Kusadokoro S, et al. A patient with Werner's syndrome who underwent aortic valve replacement through minimally invasive cardiac surgery. Ann Thorac Cardiovasc Surg. 2022.
4. Masada K, Kuratani T, Maeda K, et al. Transcatheter aortic valve replacement in a patient with Werner syndrome. J Card Surg. 2017; 32: 414-415.
5. Carrel T, Pasic M, Tkebuchava T, et al. Aortic homograft and mitral valve repair in a patient with Werner's syndrome. Ann Thorac Surg. 1994; 57: 1319-1320.
6. Handa K, Fukui S, Shirakawa Y, et al. Aortic valve replacement with annular patch enlargement for a patient with Werner's syndrome and severe aortic stenosis. J Cardiothorac Surg. 2020; 17: 15.
7. Howard C, Jullian L, Joshi M, et al. TAVI and the future of aortic valve replacement. J Cardiac Surg. 2019; 34: 1577-1590.
8. Vahanian A, Beyersdorf F, Praz F, et al. 2021 ESC/EACTS Guidelines for the management of valvular heart disease Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS). Eur Heart J. 2022; 43: 561-632.