



## **Pacemaker Benefit in a Patient with Vasovagal Syncope with Asystole**

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors write, read and approved the final manuscript.*

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**Case Study**

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### **ABSTRACT**

A 49-year-old woman has had several episodes of syncope with pallor and diaphoresis since she was 13 years old. She had been diagnosed with rheumatic heart disease and was submitted to mitral and aortic valve replacement for mechanical prosthesis. She was submitted to a tilt table test with presyncope at the 2<sup>nd</sup> min, progressing to loss of consciousness and bradyarrhythmia followed by asystole. Due to persistent, asystole atropine was administered unsuccessfully. She underwent cardiac massage with recovery to sinus rhythm after 61.5 seconds, without sequelae. After about 2 h, when blood was collected for examination, she presented a new episode of consciousness loss with asystole and prompt response to heart massage. She was submitted to the implant of a dual chamber pacemaker. After a 36-month follow-up, she has not had any new episode of syncope.

**Keywords:** *Vasovagal syncope; cardiac pacemaker; asystole; head-up tilt test; rheumatic heart disease.*

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## 1. INTRODUCTION

The annual incidence of syncope is 6%, reaching up to 39.7 episodes per 1000 patients per year. It results in significant physical injury in 29% of cases and recurrence of 42% in two years. The most common cause of syncope is vasovagal, which is not associated with the risk of death, however it results in a poor quality of life, depression and fatigue [1,2]. Cardioinhibitory response occurs more frequently in young people and is the least frequent response to tilt table test, with a rate between 1% and 4% [3]. There are different electrocardiographic patterns for this response and an atrioventricular block occurs in 5% of cases [4]. In patients over 40 years old, recurrence of syncope after initial recommendations (increasing fluid intake and salt, avoidance of precipitating factors and exercise) is an indication of the cardiac pacemaker (PM) (Class IIb) [5].

## 2. PRESENTATION OF CASE

A 49-year-old female bakery attendant has come to consultation complaining of multiple episodes of syncope since she was 13 years old. These episodes occur during the standing position, moving from a sitting position to standing up abruptly, and were accompanied by pallor and diaphoresis. She observed that the episodes were also precipitated by venipuncture and at the sight of blood, however she denied trauma, twitching and/or mental confusion. She had urine release in one of the episodes but, was not able to quantify the number of events. Rheumatic heart disease with severe mitral stenosis and regurgitation associated to aortic regurgitation had been diagnosed since she was 16 years old. At that time, the patient wished to have children and refused mechanical prosthesis and anticoagulation, so she underwent surgery with bioprosthesis implantations in mitral and aortic positions in 1993. Bioprosthesis evolve to mitral regurgitation and aortic stenosis with an area of 0.8 cm<sup>2</sup> and she was submitted to a mechanical prosthesis implant in both positions in 2007. There was no change in the characteristics or frequency of syncopal episodes after surgery. She used losartan, warfarin, and IM benzathine penicillin every 21 days. She denied drinking alcohol and smoking. There was no family history of sudden death.

Because of the persistence of syncope after nutritional recommendations, aerobic and isometric exercises of members, the patient was referred for a tilt table test (TT).

On physical examination, she had blood pressure (BP) of 142/90 mmHg, heart rate (HR) of 76 beats per minute (bpm), apical cardiac impulse was not palpable and heart rhythm was regular. Prosthetic mitral and aortic heart sound, midsystolic murmur with rough quality grade II/VI was heard along the upper sternal border without irradiation. Breath sounds were normal.

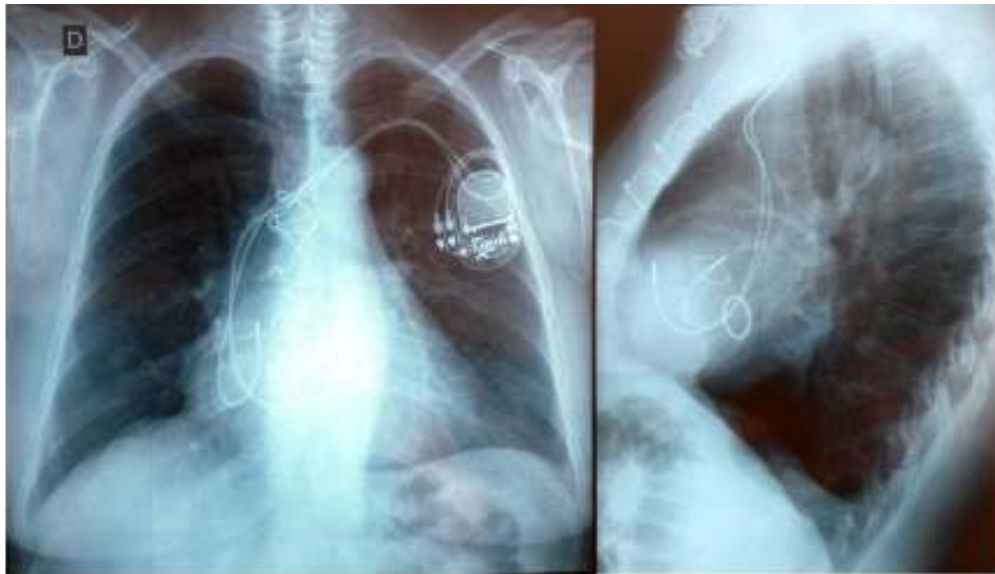
Complementary exams: 1) ECG: sinus rhythm, PR interval 160 ms, QRS axis +75 degrees, QT interval 400 ms and QTc 450 ms, no intraventricular conduction disturbance; 2) transthoracic echocardiogram: left ventricular ejection fraction of 55%, mechanical prosthesis in the mitral and aortic position with normal function; 3) normal biochemical blood tests results including acute rheumatic fever test; 4) no obstructive lesions on coronary angiography; 5) no pauses or intraventricular conduction disturbance on 24-hour Holter monitoring.

After an overnight fast, the patient underwent the TT at 7:30 h in a special room. The tilting table was electrically driven and equipped with footplate support. A peripheral intravenous cannula was placed before testing to administer IV fluid. BP and HR were monitored. After at least 20 minutes in the supine position, the subject was tilted to an upright position up to 70°. At the 2nd min of tilt, she presented presyncope that evolved to consciousness loss and bradyarrhythmia followed by asystole observed on the monitor (Fig. 1A). The systolic blood pressure was 130 mmHg. Patient in asystole was immediately placed in the supine position, and thereafter an intravenous dose of atropine 0.5 mg was administered. Due to cardiac arrest, cardiopulmonary resuscitation was started and sinus rhythm was recovered after 61.5 seconds (Fig. 1B). She recovered consciousness without deficits with BP 144/90 mmHg and HR of 84 bpm. Oxygen was administered by nasal cannula 2 l/min (98% oxygen saturation) and the patient was taken to the Emergency Room. When blood was collected for tests after about 2 h, she presented a new episode of unconsciousness with cardiac arrest in asystole sensed by the cardiac monitoring. There was prompt response to cardiopulmonary resuscitation.

Because of recurrent reflex syncope by asystole, she underwent implantation of dual chamber PM (Fig. 2). After a 36-month follow-up, she had no new episode of syncope.



**Fig. 1. Electrocardiographic tracing of three consecutive leads (V1 and modified V5 and D3) shows the evolution of Mobitz I 2<sup>nd</sup> degree atrioventricular block to advanced heart block (A). Tracing full disclosure shows asystole of 13.7 seconds with two beats of ventricular escape, followed by interference by external cardiac massage, with recovery of sinus rhythm after 61.5 seconds of asystole with loss of consciousness (B)**



**Fig. 2. Posteroanterior and lateral chest radiographs show disk mechanical valves prosthesis in mitral and aortic position, pacemaker generator, atrial and ventricular electrodes**

### 3. DISCUSSION

Since the 1990s, studies have been published on the use of PM in patients with syncope cardioinhibitory response. Randomized uncontrolled studies have shown a reduction in the recurrence of syncopal episodes, but two of these studies (VPS and SYDIT) [6,7] were stopped early, because they may have overestimated the influence of PM. With the advent of double-blind randomized studies (VPS II, SYNPACE), [8,9], the benefit of PM that was demonstrated in previous studies was attributed to a placebo effect and to the vasodepressor component of syncope, since there was no significant reduction in syncope episodes [10,11].

The ISSUE-3 study (Third International Study on Syncope of Uncertain Etiology), randomized, double-blind, placebo-controlled trial in 29 centers, included 511 patients, aged 40 or older, with three or more episodes of syncope by asystole documented in loop event recorder in the last two years. This study demonstrated that patients with asystole during three seconds or more with syncope or asystole during six seconds or more without syncope showed a 57% reduction in the relative risk of events with dual-chamber permanent pacing ON [12]. The patient in this case report also showed spontaneous asystole documented by cardiac monitoring. Although there is no adequate correlation between a TT response and spontaneous episodes of syncope [10], asystole induced by TT has a specificity of 100% for patients with reflex syncope origin, as shown by analysis of the ISSUE-3 study [13]. The patient's cardioinhibitory response with asystole occurred during the passive phase of the test which indicates higher specificity of TT. Besides the discriminatory power of TT, the initial investigation beginning with TT as a strategy to indicate the PM implantation is more cost-effective compared to an investigation associated with implantable loop recorder monitoring (if negative TT) and implantable loop recorder monitoring [14].

Another interesting finding in this case report is the occurrence of atrioventricular block before asystole. This electrocardiographic presentation is rare and occurs only in 5% of patients and sinus bradycardia in 23% [3,4]. This is attributed to the lower sensitivity of the atrioventricular node to vagal influence in relation to the sinus node [4].

There is complete atrioventricular block description in myocarditis, including rheumatic fever with a frequency of up to 4.6% [15,16]. However, this patient was not in the acute phase of rheumatic fever. Syncope, especially during physical exertion, is a clinical manifestation of aortic stenosis, and is one of the indications for valvular prosthesis implantation [17]. Even after she was submitted to mechanical prosthesis in the mitral and aortic positions, the patient continued with syncope. Echocardiographic assessment showed prosthesis' function was normal. Rheumatic heart disease is a major cause of cardiovascular death in developing countries and still is a neglected disease. Although the most common valve diseases in the acute phase are mitral and aortic insufficiency, other involvements may occur in chronic rheumatic heart disease [18]. The delay in the diagnosis of vasovagal syncope may be due to overlapping symptoms of rheumatic heart disease.

### 4. CONCLUSION

PM implantation in patient with recurrent syncope due to asystole detected by TT and spontaneously by cardiac monitoring prevented further episodes of syncope. Clinical method and asystole in patients aged  $\geq 40$  years old with vasovagal syncope are important to guide this therapy after failure of initial recommendations. The delay in the diagnosis of vasovagal syncope may be due to overlapping symptoms of rheumatic heart disease.

### CONSENT

The authors declare that written informed consent was obtained from the patient.

### ETHICAL APPROVAL

It is not applicable.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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