

## Permanent Pacemaker Implantation in a Pregnant Woman with Rheumatic Mitral Valve Disease

Rodrigo Barbosa Esper, Remo Holanda de Mendonça Furtado, Flávio Tarasoutchi, Guilherme Sobreira Spina, Max Grinberg, Walkiria Samuel Ávila

Instituto do Coração (InCor), Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, São Paulo, SP - Brazil

We describe a rare case of permanent pacemaker implantation in a pregnant woman with rheumatic mitral valve disease previously undergoing percutaneous balloon valvuloplasty. She presented symptomatic advanced atrioventricular block of non-reversible cause and manifest in the third trimester of gestation.

### Introduction

Pregnancy is the most common cause of cardiac decompensation in patients with hemodynamically significant mitral stenosis due to the high incidence of rheumatic fever in our midst.

Presentation of bradyarrhythmias is uncommon during pregnancy. Some cases may require scopy-guided pacemaker implantation, thus exposing the fetus to the risks of radiation.

The clinical management of a pregnant woman with mitral stenosis presenting advanced atrioventricular block (AVB) with no potentially reversible cause was the objective of the present case report.

### Case report

A 39-year-old woman, residing in Sao Paulo, in the 36th week of gestation, started to present with dyspnea on usual exertion (NYHA functional class III), occasional orthopnea, palpitations and nocturnal dry cough with episodes of hemoptysis since the second trimester of gestation. She had episodes of presyncope three months earlier. For the past week, the patient presented partial improvement of dyspnea, but remained with episodes of presyncope characterized by sporadic visual darkening not related to exertion, unaccompanied by palpitation or chest pain, lasting from seconds to minutes, with a feeling of imminent fainting, without loss of consciousness and with spontaneous cessation.

### Key Words

Pacemaker, artificial; mitral valve stenosis; pregnancy; atrioventricular block

#### Mailing address: Guilherme Sobreira Spina •

Av. Dr. Enéas de Carvalho Aguiar, 44 – Cerqueira César – Unidade Clínica de Valvopatía - 05403-000 – São Paulo, SP - Brazil  
E-mail: guilherme.spina@incor.usp.br

Manuscript received December 26, 2007; revised manuscript received January 29, 2008; accepted March 04, 2008.

She had a history of rheumatic mitral stenosis diagnosed four years earlier during a previous pregnancy, and underwent percutaneous balloon mitral valvuloplasty at that time. She was a former alcoholic and former smoker. Obstetric history of 14 pregnancies with one spontaneous abortion and 12 normal deliveries, with no obstetrical complications during labor. She was taking propranolol 80mg/day, furosemide 40mg/day, and ferrous sulfate.

At admission, her blood pressure was 110 x 70mmHg, HR 100bpm, RR 16rpm, no fever. On physical examination: grade 2/6 holosystolic regurgitant murmur and grade 1/6 rumbling murmur, both in the mitral area. Lungs clear to auscultation. Abdominal examination revealed a gravid uterus, with fundal height of 34cm and fetal heart rate of 140bpm. Lower extremities without edema; peripheral pulses present and symmetric.

Obstetric ultrasound showed a fetus with no morphological abnormalities and normal movements. Cardiococography showed a reactive pattern.

Electrocardiography showed normal sinus rhythm and frequent atrial extrasystoles (Figure 1). Chest radiography, blood count, electrolytes, coagulation tests, and renal function tests were normal. Inflammatory activity tests were normal.

Doppler echocardiography: ejection fraction of 67%, left atrium 47mm, diastolic diameter 53mm, systolic diameter 33mm, mitral valve thickening, commissural fusion, mild mitral stenosis (valve area 1.7cm<sup>2</sup>), and moderate mitral regurgitation. Peak and mean diastolic transmitral gradient estimated at 13mmHg and 7mmHg, respectively.

A 24-h Holter monitoring showed normal sinus rhythm, with heart rate between 43 and 147bpm and mean of 100bpm. Frequent atrial extrasystoles (307/h) and 141 periods of tachycardia with 22 beats at most and maximal rate of 195bpm. There were episodes of advanced atrioventricular block (AVB) with maximum pause of 3.6 sec. Seven days after beta-blocker discontinuation, a 24-hour Holter monitoring was repeated and identified one episode of 2:1 AVB and one episode of 3:1 AVB (Figure 2).

Before the end of pregnancy, a permanent dual-chamber pacemaker was implanted under fluoroscopic guidance and abdominal protection with lead shielding. Beta-blocker was restarted after pacemaker implantation.

The patient progressed with spontaneous resolution of pregnancy at 38 weeks and two days, via outlet-forceps delivery, with no complications. The newborn weighed 2940g and had an Apgar score of 9/9. The patient was discharged on postpartum day 3 for outpatient follow-up.

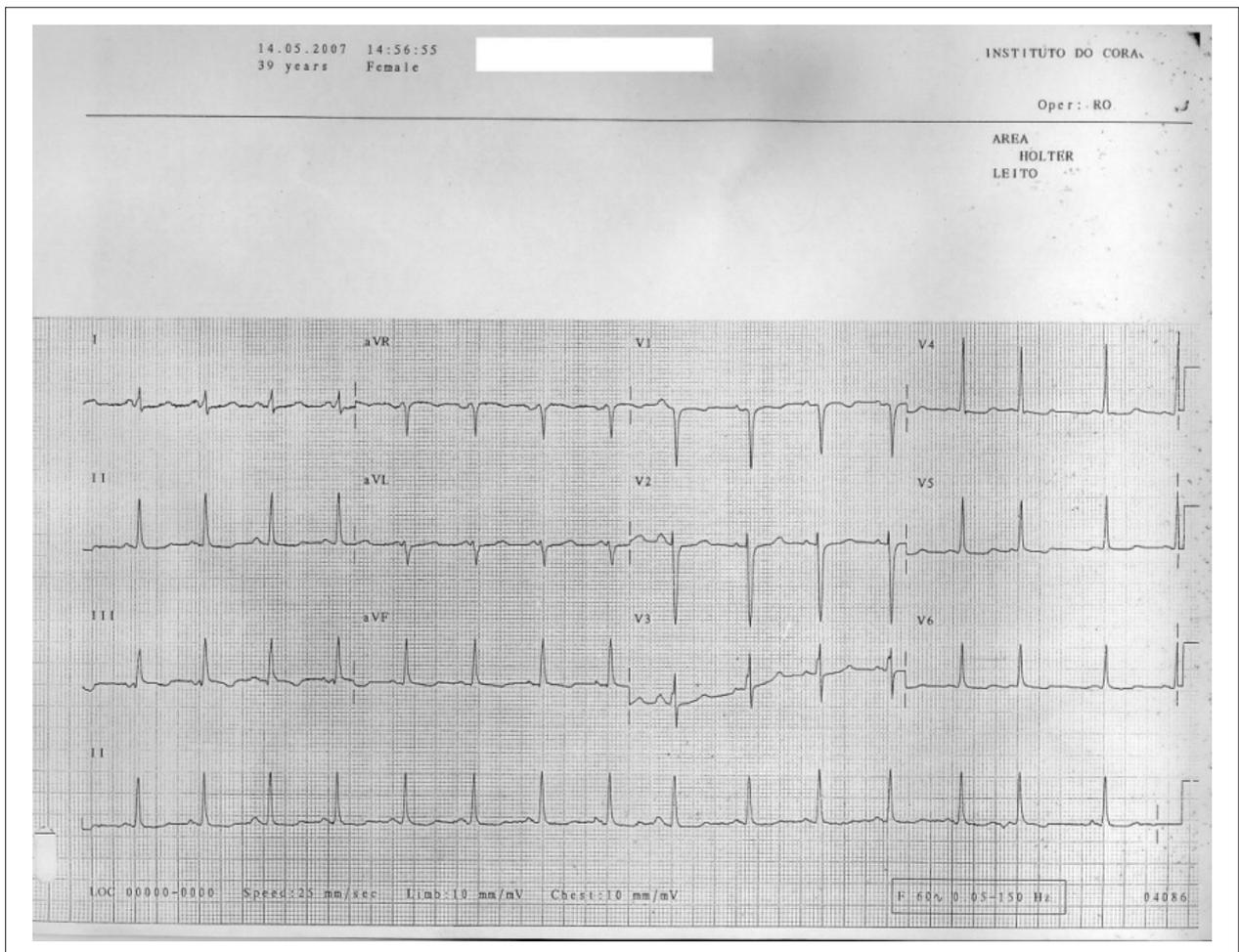


Figure 1 - Resting electrocardiogram showing normal sinus rhythm with frequent supraventricular extrasystoles

## Discussion

Pregnancy and puerperium are associated with important cardiocirculatory changes that may lead to marked clinical deterioration in women with heart disease: increased blood volume; anemia due to the increase in plasma volume faster than that of erythrocyte mass; progressive increase in cardiac output from the fifth to the twenty-fourth week of gestation; reduction in blood pressure with the lowest levels in the second trimester of gestation associated with decreased systemic vascular resistance.

Mitral stenosis is an important cause of hemodynamic decompensation in pregnant women. Most of the patients with moderate to severe mitral stenosis show deterioration of one or two NYHA functional classes during pregnancy<sup>1</sup>.

Pregnancy is associated with a higher incidence of arrhythmias in women whether with or without structural heart disease<sup>2,3</sup>. Atrial and ventricular extrasystoles may occur with no hemodynamic consequences.

Asymptomatic bradycardias are rarely seen during pregnancy. In some cases, they are attributed to the reduction in the sinus rhythm frequency after inferior vena

cava compression by the uterus. Advanced AVB manifested during pregnancy is usually asymptomatic during pregnancy and labor. Symptomatic patients with bifascicular block and advanced AVB have been treated with temporary or permanent pacemakers during pregnancy. Advanced AVB was found in 0.02% of a series of 92000 pregnancies<sup>3,4</sup>. It may be diagnosed in asymptomatic patients by means of the findings of an electrocardiogram required for other reasons, or it may manifest with clinical complaints such as dyspnea, presyncope and syncope. In asymptomatic patients, temporary pacemaker implantation may be necessary before labor, or even permanent pacemaker implantation for symptomatic and asymptomatic patients<sup>5</sup>.

In the review of the literature, no case describing a pregnant woman with mitral valve disease and advanced atrioventricular block during pregnancy was found.

Due to the blood volume overload that is seen during pregnancy, patients with rheumatic mitral stenosis may present hemodynamic decompensation. These patients frequently need negative chronotropic medication to control the symptoms. The well-established use of beta-blockers in the management of mitral stenosis is contraindicated in this

## Case Report

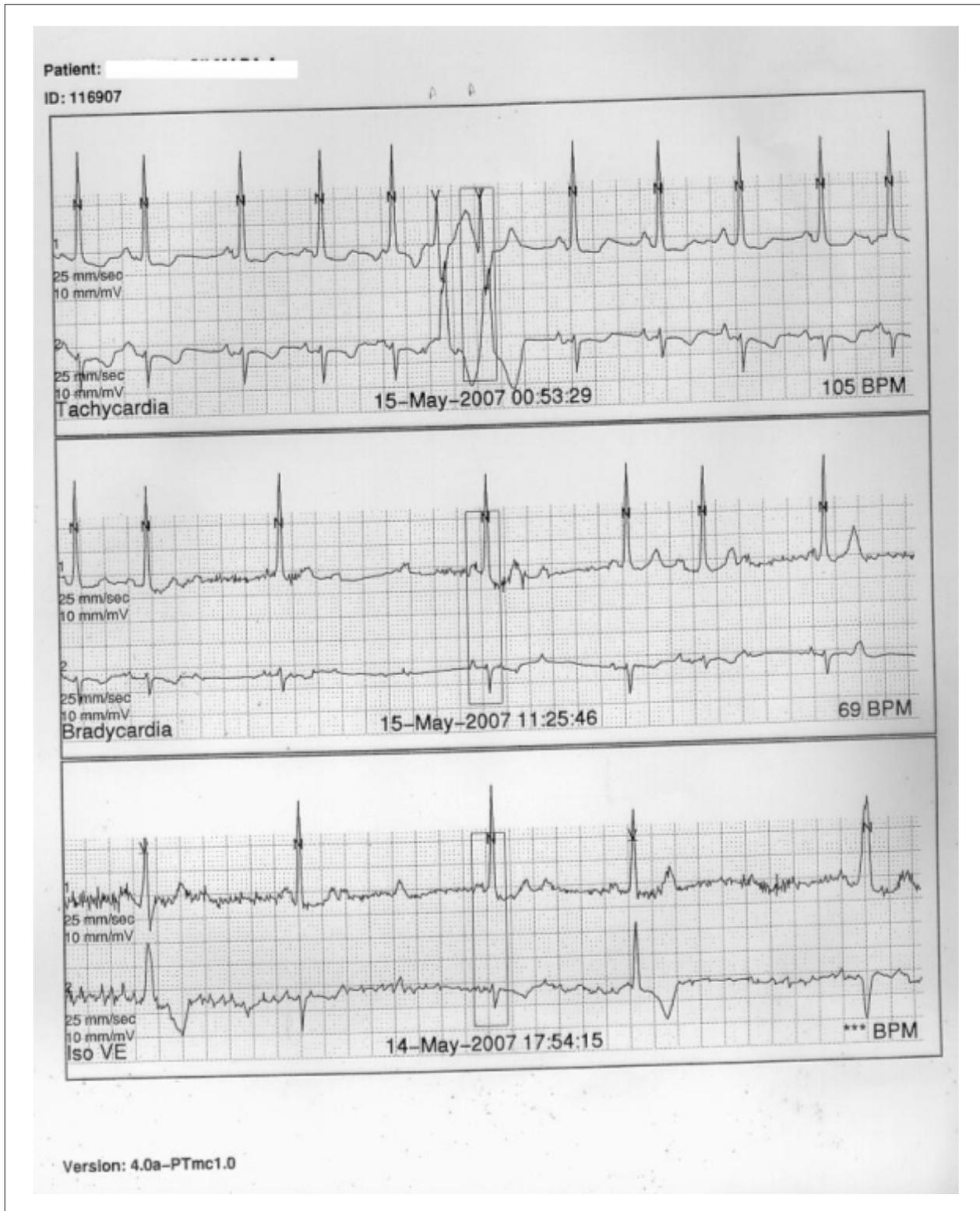


Figure 2 - Holter monitoring showing period of intermittent 2:1 atrioventricular block and episodes of advanced atrioventricular block.

clinical situation due to the presence of AVB. After ruling out potentially reversible causes of AVB, such as drug effect or inflammatory rheumatic activity, we chose to indicate permanent pacemaker implantation.

Fetal exposure to radiation should be avoided during pregnancy. The risk depends on the stage of pregnancy and on the dose received by the fetus. However, some precautions such as the use of lead shielding of the abdomen, collimation of the X-ray beam to the area of interest, and utilization of permanently calibrated and gauged equipment should be taken in pregnant patients who will be exposed to radiation.

An alternative described to avoid fetal exposure to radiation is echocardiography-guided permanent pacemaker implantation<sup>6,7</sup>. In this case, we chose to use the conventional fluoroscopy-guided technique because of the low risk of fetal damage, since the pregnancy was close to term. Also, the use of transesophageal echocardiographic study would have the additional inconvenient of need for sedation and risk of aspiration due to the slowed gastric emptying seen in advanced stages of pregnancy.

This report shows the importance of the correct assessment of symptoms presented by pregnant women with heart diseases<sup>8</sup>, by differentiating expected disorders in a normal pregnancy from signs of heart disease in imminent decompensation. Presyncope and dizziness may

occur during normal pregnancy; however, the differential diagnosis with bradyarrhythmias or tachyarrhythmias should be remembered in patients with structural heart disease. The presence of symptomatic advanced AVB, although intermittent, led to the indication of permanent pacemaker implantation. We chose not to indicate mitral valve reintervention, since the patient had an estimated valve area greater than 1.5 cm<sup>2</sup>. Mitral regurgitation may have been overestimated as moderate due to the increased plasma volume that occurs during pregnancy. After pacemaker implantation, we chose to maintain the medical treatment with beta-blocker and diuretics.

#### Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

#### Sources of Funding

There were no external funding sources for this study.

#### Study Association

This study is not associated with any graduation program.

## References

1. Hameed AB, Karaalp IS, Tummala PP, Wani OR, Canetti M, Akhter MW, et al: The effect of valvular heart disease on maternal and fetal outcome in pregnancy. *J Am Coll Cardiol.* 2001; 37: 893-9.
2. Shotan A, Ostrzega E, Mehra A, Johnson JV, Elkayam U. Incidence of arrhythmias in normal pregnancy and relation to palpitations, dizziness and syncope. *Am J Cardiol.* 1997; 79: 1061-4.
3. Wolbrette D. Treatment of arrhythmias during pregnancy. *Curr Womens Health Rep.* 2003; 3: 135-9.
4. D'Ilppolito G, Medeiros RB. Exames radiológicos na gestação. *Radiol Bras.* 2005; 38 (6): 447-50.
5. Sharma JB, Malhorta M, Pundir P. Successful pregnancy outcome with cardiac pacemaker after complete heart block. *Int J Gynaecol Obstet.* 2000; 68: 145-6.
6. Antonelli D, Bloch L, Rosenfeld T. Implantation of permanent dual chamber pacemaker in a pregnant woman by transesophageal echocardiographic guidance. *Pacing Clin Electrophysiol.* 1999; 22: 534-5.
7. Trappe HJ. Acute therapy of maternal and fetal arrhythmias during pregnancy. *J Intensive Care Med.* 2006; 21; 305-15.
8. Avila WS, Grinberg M. Gestação em portadoras de afecções cardiovasculares: experiência com 1000 casos. *Arq Bras Cardiol.* 1993; 60: 5-11.