

## Syncope during Pregnancy in a Patient with Permanent Cardiac Pacemaker Due to Increased Pacing Threshold

Mohammad Ali Akbarzadeh <sup>1,\*</sup>, Morteza Safi <sup>1</sup>, Isa Khaheshi <sup>1</sup>, Negar Bahrololoumi Bafruee <sup>2</sup>

<sup>1</sup> Cardiovascular Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>2</sup> Razi Hospital, Tehran University of Medical Sciences, Tehran, Iran

\* Corresponding author: Mohammad Ali Akbarzadeh, Cardiovascular Research Center, Shahid Modarres Hospital, Saadat Abad Street, Tehran, Iran. Tel: +98-9173171001, E-mail: akbarzadehali@yahoo.com

DOI: 10.20286/ijcp-010207

Submitted: 05-20-2016

Accepted: 06-24-2016

### Keywords:

Pacemaker, Artificial  
Pregnancy  
Syncope

### Abstract

A 22-year-old pregnant woman referred with syncope due to pacemaker malfunction. During the second trimester of pregnancy, the right ventricular (RV) lead pacing threshold increased and led to early generator depletion. We believe that this might happen due to lead micro-dislodgement or less probably effect of hormonal changes during pregnancy on electrode-myocardium interface.

© 2016. International Journal of Cardiovascular Practice.

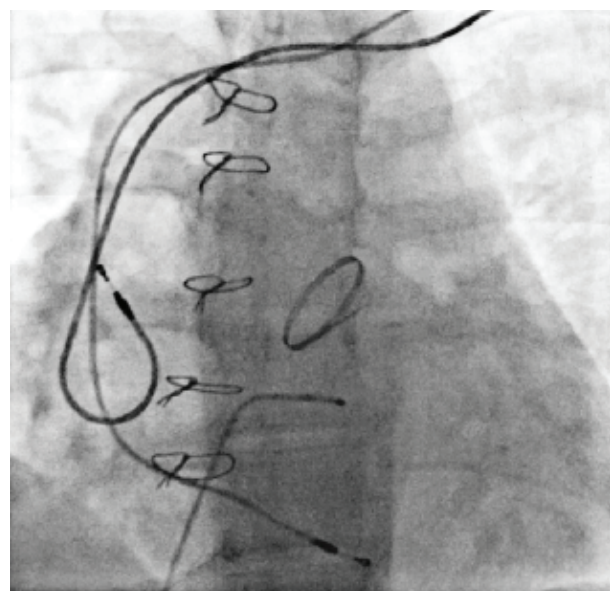
## INTRODUCTION

Due to improvement of cardiology and cardiovascular surgery, use of permanent pacemaker (PPM) in young adults is increased. Today, there are many pregnant women with PPM. These patients commonly have favorable perinatal outcomes [1]. As the PPMs were larger and heavier in previous reports, the most frequent complications of PPM implantation in pregnant women were skin irritation and ulceration at the site of implantation. However, some other complications such as pain, battery failure, extra systoles and endocarditis have also been reported during pregnancy [2].

## CASE PRESENTATION

A 22-year-old woman, gravida 1, at 18 weeks of pregnancy, referred to the pacemaker clinic with the diagnosis of device malfunction. She presented a history of several episodes of syncope and pre-syncope in the last week. She was a case of aortic valve replacement nine years ago due to severe Aortic stenosis, and dual chamber pacemaker (Verity ADx XL DR, St. Jude Medical) implantation one week after the surgery due to postoperative complete heart block. Three months before this presentation, at the second months of pregnancy, pacemaker analysis showed normal function (atrial lead impedance of 476 Ohms, ventricular lead impedance of 361 Ohms, atrial lead pacing threshold of 1 V at 0.4 ms, ventricular lead pacing threshold of 0.5 V at 0.4 ms, P-wave amplitude sensing of 1.4 mV; R-wave amplitude sensing could not be evaluated as the intrinsic rate of the patient was less than 30 beats/min). The battery longevity was estimated to be more than two years. New analysis was performed at this presentation and revealed significant rise of RV pacing threshold (atrial lead impedance of 552 Ohms, ventricular lead impedance of 538 Ohms, atrial lead pacing threshold of 1 V at 0.4 ms, ventricular lead pac-

ing threshold of 3.0 V at 0.8 ms, P-wave amplitude sensing of 1.5 mV, and the intrinsic rate of the patient was less than 30 beats/min), which was compatible with the patient's syncope. The output of the RV lead was programed to 5 V \* 0.8 ms. The patient was followed closely. During the next follow-up, there was no significant changes in the pacemaker parameters, but the increased output of RV pacing caused early battery depletion. Therefore, the pacemaker generator was replaced at 30 weeks of pregnancy with a dual chamber pacemaker (Relia, Medtronic) after temporary pacemaker insertion (Fig 1).



**Figure 1:** Anteroposterior Fluoroscopic View of Permanent Pacemaker and Temporary Pacemaker Leads during Generator Replacement

During the operation and after PPM replacement with the new generator, the high RV lead pacing threshold was reconfirmed. At 38 weeks of pregnancy, elective caesarian section was performed without any complication. After six months of post-natal follow-up, there was no significant change in the RV lead pacing threshold.

## DISCUSSION

In this report, we presented an uncommon pacemaker malfunction during pregnancy. Pregnancies in patients with a pacemaker have commonly shown favorable perinatal outcomes in most of the recent studies [1]. To our knowledge, this was the first report showing a non-reversible rise of RV lead pacing threshold during pregnancy.

There are many parameters that can affect pacing threshold and pacemaker performance. Electrode-myocardium interface, medications, lead damage and micro-dislodgement are some of these parameters [3]. Persistent high pacing threshold of pacemaker is against most of these parameters (electrolyte and metabolic abnormalities and drugs consumption). In our case, the effect of hormonal changes during pregnancy and permanent myocardial tissue changes might play some role in changing the pacing threshold, but these changes had not been reported till now and seem to be unlikely. Therefore, we believe that some other factors might interfere.

Physiological or hemodynamic changes associated with preg-

nancy have been well recorded. Increased circulating blood volume leads to an increment of atrial and ventricular distension; thus, all chambers increase in size, especially during the second trimester [4]. Although unproven, micro-dislodgement of the RV lead due to RV enlargement in the second trimester of pregnancy may be the reason for this complication. Lack of enough slack of the lead before pregnancy may predispose the patient to micro-dislodgement.

## CONFLICTS OF INTEREST

The authors report no financial relationships or conflicts of interest.

## REFERENCES

1. Thaman R, Curtis S, Faganello G, Szanthy GV, Turner MS, Trinder J, et al. Cardiac outcome of pregnancy in women with a pacemaker and women with untreated atrioventricular conduction block. *Eurpace*. 2011;13(6):859-63. DOI: [10.1093/europace/eur018](https://doi.org/10.1093/europace/eur018) PMID: [21388976](https://pubmed.ncbi.nlm.nih.gov/21388976/)
2. Jaffe R, Gruber A, Fejgin M, Altaras M, Ben-Aderet N. Pregnancy with an artificial pacemaker. *Obstet Gynecol Surv*. 1987;42(3):137-9. PMID: [3550552](https://pubmed.ncbi.nlm.nih.gov/3550552/)
3. Dohrmann ML, Goldschlager NF. Myocardial stimulation threshold in patients with cardiac pacemakers: effect of physiologic variables, pharmacologic agents, and lead electrodes. *Cardiol Clin*. 1985;3(4):527-37. PMID: [3910236](https://pubmed.ncbi.nlm.nih.gov/3910236/)
4. Rubler S, Damani PM, Pinto ER. Cardiac size and performance during pregnancy estimated with echocardiography. *Am J Cardiol*. 1977;40(4):534-40. PMID: [910718](https://pubmed.ncbi.nlm.nih.gov/910718/)