

Conference Paper

Asymptomatic Lone Atrial Fibrillation in Pregnant Women

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Abstract

We examined 43 pregnant women with paroxysms of asymptomatic lone atrial fibrillation. It was revealed that the increasing of the gestational age leads to increase of number of single, paired and group supraventricular extrasystoles; single and paired ventricular extrasystoles; number and duration of paroxysms of atrial fibrillation. However, the number of extrasystoles and paroxysms of arrhythmia decreased to baseline values after delivery. Thus, it was proved that pregnancy contributes to the increase of paroxysms of lone atrial fibrillation due to the increased influence of modulating components on the triggering extrasystoles. The importance of the method of 24-hour ECG monitoring in the detection of arrhythmia in pregnant women is emphasized.

Keywords: lone atrial fibrillation, extrasystole, pregnancy.

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Received: 17 January 2018

Accepted: 25 March 2018

Published: 17 April 2018

Publishing services provided by
Knowledge E

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Selection and Peer-review under the responsibility of the PhysBioSymp17 Conference Committee.

1. Introduction

Atrial fibrillation (AF) is one of the most common cardiac rhythm disorders with serious complications. According to available data, the body of a pregnant woman has electrical instability and increased arrhythmogenicity [1-3].

Atrial fibrillation in a patient without an organic pathology of the heart is called lone AF [4]. According to some authors, lone AF is up to 34% of all occurring AF in pregnant women [5]. Most often, patients with AF present complaints about tachycardia, irregular heartbeat, shortness of breath, monotonous aching pain in the heart, increased fatigue, frequent dizziness and loss of consciousness. Nevertheless, a lone AF may not be accompanied by an obvious symptomatology, having an asymptomatic character. This asymptomatic arrhythmia is often not diagnosed on time, which creates a great danger in the development of complications in the patient [4, 6].

Early diagnosis of heart rhythm disturbances ensures the effectiveness of treatment and prevention of complications [4, 7]. For pregnant women, a particularly important

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criterion in the diagnosis of cardiac pathology is the non-invasiveness and safety of the method, thus avoiding negative effects on the fetus [8, 9].

The method of continuous 24-hour ECG monitoring (HM) allows to detect symptomatic and asymptomatic paroxysms of AF, as well as to evaluate the dynamics of arrhythmia flow [10]. This method is safe and routinely used in modern practice in non-pregnant women.

However, the frequency of occurrence of extrasystoles and paroxysms of AF in pregnant women has not been estimated at different terms of pregnancy until now. This is caused by the rare use of HM in this group of patients because of the lack of specific Russian guidelines for screening pregnant women with heart rhythm disturbances [9].

The purpose was to study the course of asymptomatic lone atrial fibrillation for trimester of pregnancy and after childbirth.

2. Materials and Methods

A study was conducted at the Department of Internal Medicine of the Medical Institute of Penza State University. We examined 43 pregnant women with paroxysms of asymptomatic lone atrial fibrillation.

Studies included: anamnesis collection, physical examination, 12-channel ECG, 24-hour ECG monitoring in each trimester of pregnancy and after childbirth.

The statistical processing of data was carried out using the software package Statistica 10 Enterprise (TIBCO Software Inc.) and Microsoft Office Excel 2016 (Microsoft Corp.). The following statistical elements were used: the arithmetic mean, the mean error, the standard deviation, the variance, the coefficient of variation and the oscillations with the calculation of the probability value.

3. Results and Discussion

Using the HM method, the triggering factors of asymptomatic lone atrial fibrillation in the examined patients were identified, which were represented by varieties of supraventricular and ventricular extrasystoles.

A quantitative analysis of triggering factors for trimester of pregnancy and after childbirth was conducted, which is presented in Table 1.

TABLE 1: Quantitative analysis of triggering factors of asymptomatic lone atrial fibrillation in pregnant women in trimester ($M \pm m$, $n = 43$).

Species	Initial	Trimester 1	Trimester 2	Trimester 3	Postpartum period
Single SVE (per 24 hours)	655.6 ± 39.6	706.4 ± 42.3 p 1-2 = 0.662	823.1 ± 49.2 p 1-3 = 0.037 p 2-3 = 0.079	825.4 ± 39.6 p 1-4 = 0.020 p 3-4 = 0.815	643.5 ± 39.7 p 1-5 = 0.489 p 4-5 = 0.006
Daytime	372.2 ± 22.4	396.1 ± 23.8 p 1-2 = 0.479	468.4 ± 28.1 p 1-3 = 0.009 p 2-3 = 0.054	458.1 ± 22.5 p 1-4 = 0.008 p 3-4 = 0.696	368.4 ± 22.6 p 1-5 = 0.775 p 4-5 = 0.011
Night	283.4 ± 17.1	310.3 ± 18.4 p 1-2 = 0.312	354.6 ± 21.1 p 1-3 = 0.011 p 2-3 = 0.126	367.3 ± 17.1 p 1-4 = 0.005 p 3-4 = 0.608	275.0 ± 17.0 p 1-5 = 0.672 p 4-5 < 0.001
SV couplets (per 24 hours)	28.2 ± 1.6	35.4 ± 2.1 p 1-2 = 0.006	40.3 ± 2.3 p 1-3 < 0.001 p 2-3 = 0.142	42.7 ± 2.5 p 1-4 < 0.001 p 3-4 = 0.499	25.8 ± 1.5 p 1-5 = 0.389 p 4-5 < 0.001
Daytime	15.7 ± 0.92	20.4 ± 1.19 p 1-2 = 0.009	23.5 ± 1.36 p 1-3 < 0.001 p 2-3 = 0.095	25.5 ± 1.5 p 1-4 < 0.001 p 3-4 = 0.361	14.1 ± 0.87 p 1-5 = 0.317 p 4-5 < 0.001
Night	12.5 ± 0.74	15.0 ± 0.92 p 1-2 = 0.043	16.7 ± 1.01 p 1-3 = 0.005 p 2-3 = 0.233	17.1 ± 1.05 p 1-4 = 0.004 p 3-4 = 0.701	11.6 ± 0.7 p 1-5 = 0.465 p 4-5 < 0.001
SV triplets (per 24 hours)	13.3 ± 0.75	18.2 ± 0.9 p 1-2 = 0.010	20.2 ± 1.04 p 1-3 < 0.001 p 2-3 = 0.203	21.5 ± 1.3 p 1-4 < 0.001 p 3-4 = 0.499	12.0 ± 0.7 p 1-5 = 0.161 p 4-5 < 0.001
Daytime	8.4 ± 0.47	11.5 ± 0.65 p 1-2 < 0.001	13.2 ± 0.6 p 1-3 < 0.001 p 2-3 = 0.106	14.0 ± 0.83 p 1-4 < 0.001 p 3-4 = 0.498	7.3 ± 0.43 p 1-5 = 0.192 p 4-5 < 0.001
Night	4.9 ± 0.29	6.6 ± 0.2 p 1-2 = 0.006	7.0 ± 0.43 p 1-3 < 0.001 p 2-3 = 0.504	7.4 ± 0.47 p 1-4 < 0.001 p 3-4 = 0.538	4.6 ± 0.25 p 1-5 = 0.543 p 4-5 < 0.001
Total SVE (per 24 hours)	728.4 ± 42.0	760.1 ± 45.3 p 1-2 = 0.583	883.6 ± 52.6 p 1-3 = 0.027 p 2-3 = 0.087	890.0 ± 43.5 p 1-4 = 0.022 p 3-4 = 0.795	681.5 ± 42.0 p 1-5 = 0.474 p 4-5 = 0.009
AFib amount (per year)	14.3 ± 0.83	16.6 ± 1.01 p 1-2 = 0.088	18.1 ± 1.1 p 1-3 = 0.005 p 2-3 = 0.346	18.9 ± 1.12 p 1-4 = 0.005 p 3-4 = 0.587	13.6 ± 0.6 p 1-5 = 0.573 p 4-5 < 0.001
AFib duration (min)	9.4 ± 0.56	11.3 ± 0.65 p 1-2 = 0.037	12.1 ± 0.74 p 1-3 = 0.010 p 2-3 = 0.446	13.2 ± 0.6 p 1-4 < 0.001 p 3-4 = 0.341	9.0 ± 0.52 p 1-5 = 0.612 p 4-5 < 0.001
AFib HR (bpm)	117.0 ± 6.7	126.2 ± 7.4 p 1-2 = 0.391	130.3 ± 7.6 p 1-3 = 0.204 p 2-3 = 0.647	138.7 ± 8.2 p 1-4 = 0.048 p 3-4 = 0.469	115.3 ± 6.7 p 1-5 = 0.740 p 4-5 = 0.033
Single VE (per 24 hours)	590.0 ± 35.5	733.4 ± 44.3 p 1-2 = 0.046	736.2 ± 44.2 p 1-3 = 0.044 p 2-3 = 0.815	724.5 ± 44.8 p 1-4 = 0.036 p 3-4 = 0.785	578.8 ± 34.9 p 1-5 = 0.514 p 4-5 = 0.010
Daytime	334.6 ± 20.3	425.3 ± 25.6 p 1-2 = 0.010	423.6 ± 25.4 p 1-3 = 0.005 p 2-3 = 0.808	428.0 ± 25.9 p 1-4 = 0.009 p 3-4 = 0.773	328.6 ± 19.8 p 1-5 = 0.744 p 4-5 = 0.007
Night	255.4 ± 15.4	308.2 ± 18.6 p 1-2 = 0.037	312.5 ± 18.7 p 1-3 = 0.022 p 2-3 = 0.755	314.4 ± 18.8 p 1-4 = 0.019 p 3-4 = 0.796	250.1 ± 15.1 p 1-5 = 0.725 p 4-5 = 0.009
V-pair (per 24 hours)	25.5 ± 1.5	31.5 ± 1.9 p 1-2 = 0.036	33.6 ± 2.0 p 1-3 = 0.009 p 2-3 = 0.450	34.7 ± 2.0 p 1-4 = 0.005 p 3-4 = 0.667	24.2 ± 1.4 p 1-5 = 0.479 p 4-5 < 0.001
Daytime	14.2 ± 0.83	17.3 ± 1.05 p 1-2 = 0.027	18.0 ± 1.1 p 1-3 = 0.005 p 2-3 = 0.612	18.4 ± 1.14 p 1-4 = 0.011 p 3-4 = 0.712	13.6 ± 0.78 p 1-5 = 0.617 p 4-5 = 0.004
Night	11.3 ± 0.69	14.1 ± 0.83 p 1-2 = 0.014	15.6 ± 0.87 p 1-3 < 0.001 p 2-3 = 0.233	16.2 ± 0.96 p 1-4 < 0.001 p 3-4 = 0.612	10.6 ± 0.61 p 1-5 = 0.524 p 4-5 < 0.001

Species	Initial	Trimester 1	Trimester 2	Trimester 3	Postpartum period
Abbreviation: n – number of patients; M – arithmetic mean; m – standard error of the mean; p – probability value; SVE – supraventricular extrasystoles; SV couplets – pair supraventricular extrasystoles; AFib – atrial fibrillation; HR – heart rate; VE – ventricular extrasystoles; V-pair – pair ventricular extrasystoles.					

Table 1 shows that the number of single SVE increased in the first trimester by 7.7% ($p = 0.662$), in the second - by 25.5% ($p = 0.037$), in the third - by 25.9% ($p = 0.020$), and after delivery decreased by 28.3% ($p = 0.006$). There was a similar increase in the number of paired and group SVE in the first trimester by 25.5% ($p = 0.006$) and 36.8% ($p = 0.010$), in the second - by 42.9% ($p < 0.001$) and 51.8% ($p < 0.001$), in the third - by 51.4% ($p < 0.001$) and 61.6% ($p < 0.001$), and the decrease after birth was 65.5% ($p < 0.001$) and 79.1% ($p < 0.001$), respectively.

The number of single and paired VE also increased in the first trimester by 24.3% ($p = 0.046$) and 23.5% ($p = 0.036$), in the second - by 24.8% ($p = 0.044$) and 31.7% ($p = 0.009$), in the third - by 22.8% ($p = 0.036$) and 36.0% ($p = 0.005$), and decreased after delivery by 25.2% ($p = 0.010$) and 43.4% ($p < 0.001$), respectively.

The number and duration of AF paroxysms in the first trimester increased by 16.0% ($p = 0.088$) and 20.2% ($p = 0.037$), in the second - by 26.6% ($p = 0.005$) and 28.7% ($p = 0.010$), in the third - by 32.2% ($p = 0.005$) and 40.4% ($p < 0.001$), and with delivery decreased by 39.0% ($p < 0.001$) and 46.7% ($p < 0.001$), respectively.

From the above, it follows that in pregnant women with asymptomatic lone AF, an increase in gestational age is accompanied by an increase in the number of all types of extrasystoles, the number and duration of AF paroxysms. A reliable increase in these indicators begins already with the first trimester of pregnancy. Nevertheless, after delivery, the number of extrasystoles, the number of paroxysms of AF and the duration of these paroxysms decreased down to baseline.

It is known that the appearance of AF requires the presence of an arrhythmogenic substrate, triggers and individual modulating components [11, 12]. In patients with lone atrial fibrillation, organic pathology in the myocardium is absent, and the arrhythmogenic substrate is often represented by functional disorders [4].

According to our data, the body of pregnant women is more prone to arrhythmia due to increased activity of the two pathogenetic mechanisms. The first of them is an increase in the influence of trigger factors, in the role of which supraventricular and ventricular extrasystoles acts. In the course of the study, we found that with an increase in the duration of pregnancy, there is an increase in the number of three types of SVE - single, pair and group, and two types of VE - single and pair. The second mechanism acting as a modulating component is well-known physiological

changes occurring in the body of a pregnant woman during gestation: hemodynamic (increase in the volume of circulating blood, stroke volume, minute volume of heart, heart rate, total peripheral vascular resistance), hormonal (increase in estrogen and progesterone levels) and vegetative (imbalance in the activity of the sympathetic and parasympathetic nervous system) [11].

Obviously, a large number of modulating components in the body of a pregnant woman promotes an increase in the activity of trigger effects on the atrial myocardium, which activates functional impairments in impulse conducting, leading to the development of dispersion of refractory periods. Therefore, even in the absence of organic injury to the atrial myocardium, pronounced functional impairments developed under the action of modulating components lead to the formation and progression of atrial fibrillation in pregnant women.

4. Conclusion

Thus, the continuation of pregnancy in women with asymptomatic lone atrial fibrillation accompanies an increase in the number of extrasystoles, the number and duration of paroxysms. The delivery is accompanied by a decrease in the extrasystoles, the number and duration of paroxysms of atrial fibrillation. The method of 24-hour Holter monitoring allows to effectively detect and evaluate the number and dynamics of heart rhythm disturbances in pregnant women, and to detect arrhythmia in asymptomatic patients timely, so it can be recommended as a screening method for pregnancy testing.

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