

Problem based review: The Pregnant Woman Presenting to the AMU with Palpitations

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Abstract

Pregnant patients commonly present to the acute medical team with symptoms requiring further investigation. Palpitations are a common reason for presentation on the acute medical take, and most acute physicians will be familiar with the process of investigation. The combination of pregnancy and palpitations raises a broad differential diagnosis and can complicate the management pathway. This problem based review is designed to summarise the key issues which may arise during the management of a typical patient presenting in this way.

Keywords

Pregnancy; palpitations; tachycardia; thyrotoxicosis

Key Points:

1. Pregnant patients with palpitations require careful evaluation to ensure that serious causes have been excluded
2. Presence of a sinus tachycardia may be a normal finding during pregnancy, but underlying systemic and endocrine disease should be considered
3. Imaging to exclude pulmonary embolism and structural heart disease should always be considered
4. Early involvement of the obstetric team is recommended if any significant cardiac or systemic disease is identified

Case Vignette

A 29 year old woman, in her second pregnancy at 10 weeks gestation, had been recently treated with oral antiemetics for hyperemesis gravidarum and had required two admissions for intravenous hydration over the past 2 weeks. On follow up review in the early pregnancy assessment unit she reported that the antiemetics had minimal effect and she was still vomiting 6-7 times a day; she was noted to have a persistent tachycardia with a heart rate of 140 beats per minute. She was referred to the acute medical unit for further investigation.

Why do Pregnant Women Develop Palpitations in Pregnancy?

Most pregnant women who complain of palpitations do not have an arrhythmia. Commonly, there is a pregnancy-related physiologic increase in heart rate of 10 to 20 beats/min above baseline.^{1,8} Furthermore, during pregnancy, the cardiac output increases, resulting in greater awareness of a relative sinus tachycardia or normal beats after a compensatory pause that follows ventricular ectopics.

A differential diagnosis for palpitations during pregnancy is summarised in table 1.

The majority of arrhythmias that occur during pregnancy are benign; advice about appropriate actions during symptomatic episodes, together with reassurance, is usually all that is required when caring

for these patients. In the remaining minority of cases, prudent use of anti-arrhythmic drugs can lead to a successful and equally important, safe, outcome for both mother and baby.^{2,6}

In women with known structural heart disease, however, arrhythmia is one of the five independent predictors of having a cardiac event during the pregnancy and should therefore be treated seriously.^{2,3}

What Aspects are Important in the History?

The patient's description of their 'palpitations' may give a clue as to the cause. Erratic forceful beats with

Table 1. Differential Diagnosis of 'Palpitations' during pregnancy

Differential diagnosis	
• Physiological • Anxiety	• Pulmonary embolism • Bradycardia
• Hypovolaemic states	• Heart block
• Anaemia • Thyrotoxicosis • Phaeochromocytoma • Infection/sepsis	• Cardiomyopathy • Supraventricular tachycardia • Ventricular tachycardia • Atrial fibrillation or flutter • Paroxysmal tachycardia as a result of junctional re-entry phenomenon, e.g. WPW

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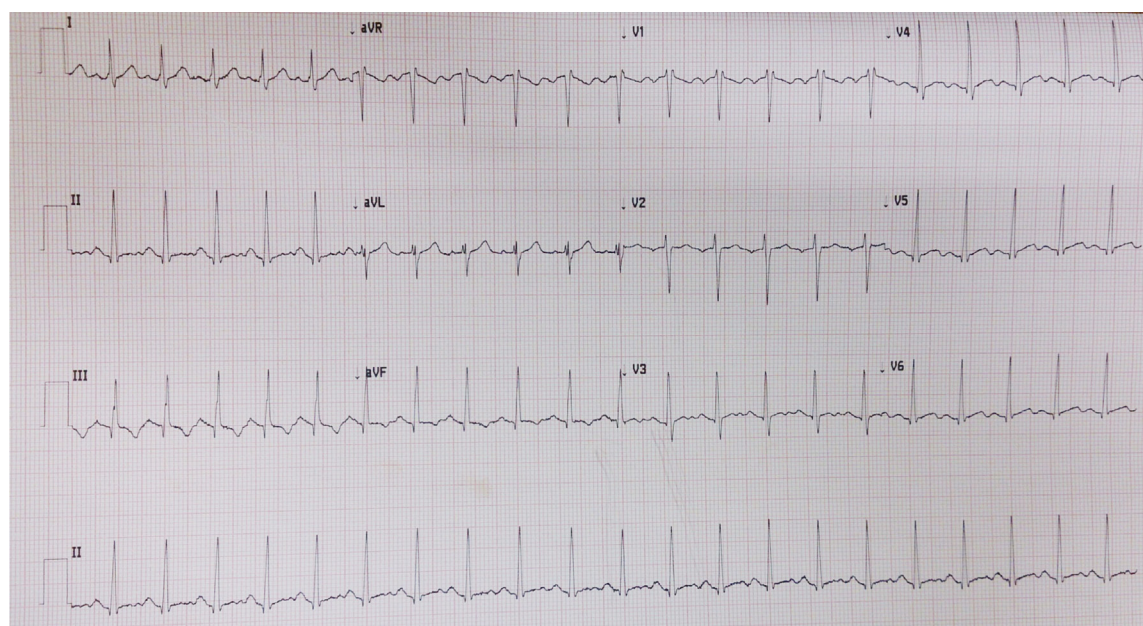


Figure 1. ECG obtained from the patient

apparent ‘missed beats’ usually implies ventricular or atrial ectopics, while a more prolonged, fast, irregular disturbance may indicate atrial fibrillation. Sinus tachycardia, ventricular and supraventricular tend to be fast and regular. The presence of syncope, breathlessness or chest pain are key features which should be specifically sought.

During the history it is important to consider whether there may be underlying cardiac disease and to exclude any systemic disorders that may be responsible for the arrhythmia. Prior history of valvular or congenital heart disease should be sought, along with symptoms suggestive of left ventricular dysfunction or myocardial ischaemia. Associated breathlessness or lower limb pain / swelling should raise the suspicion of pulmonary embolism or peripartum cardiomyopathy, which is more common in the third trimester and in multiparous patients. Endocrine disorders such as thyrotoxicosis or phaeochromocytoma may manifest for the first time during pregnancy, and a history of recent vomiting may indicate hypovolaemia or sepsis.

A detailed drug history should include any non-prescribed or recreational drugs, nicotine and alcohol consumption. Family history should include enquire specifically about endocrine and auto-immune diseases.

Case Continued

On questioning she described fast, regular palpitations for the last 2 weeks, associated with shortness of breath on exertion, feeling hot and sweaty, and weight loss of 1 stone over the last 3 weeks. She denied any chest pain, neck swelling, sore throat or leg pain.

Past medical history consisted of an appendectomy aged 21 and a course of in-vitro fertilisation in order to fall pregnant with her first child who is now 8 months old. Apart from anti-emetics, she was taking no regular medications. There was no family history of note and she currently worked as a hotel manager, was a non-smoker and had no alcohol intake since the start of her pregnancy. She denied any recreational drug use.

On examination she appeared pale with a regular tachycardia of 140/min and had a fine tremor, but was not obviously dehydrated with blood pressure 120/70.. Oxygen saturation was 98% on room air. Respiratory, cardiovascular, gastrointestinal and nervous system examinations were otherwise unremarkable. Her left calf was slightly tender but no obvious swelling was seen.

An ECG was performed (see figure 1); no old ECGs were available for comparison.

What does the ECG show and how should this be interpreted in the context of her history?

The ECG in this case (figure 1) shows a sinus tachycardia with a rate of 140 beats per minute. There are small Q-waves and T-wave inversion in leads III and aVF. The axis is normal. Many of these changes may be explained by the normal physiological

Table 2. ECG changes in pregnancy

- Sinus tachycardia
- Hypertrophy of the left ventricle due to increased cardiac output
- Left axis deviation 15°
- Inverted T wave in lead III, and sometimes V1 and V2
- Q wave in leads III and aVF
- Non-specific T wave inversion in lateral leads

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changes of pregnancy (see table 2). However the presence of breathlessness and leg pain in association with a persistent sinus tachycardia and possible right ventricular strain also raises the possibility of pulmonary embolism, particularly in view of her recent hospital admissions with dehydration. In this case the presence of recent weight loss, vomiting, sweating and tremor also raises the possibility of thyrotoxicosis as a cause for her tachycardia. Her recent vomiting should also lead to consideration of electrolyte imbalance as a cause for an arrhythmia; a regular narrow complex tachycardia at 140/min could represent atrial flutter induced by hypokalaemia or hypomagnesaemia.

What Further Investigations Should be Performed for patients with palpitations during pregnancy?

The required investigations will vary according to the clinical context. Commonly requested blood tests are listed in table 3. D-Dimer is generally considered to be unhelpful for the investigation of suspected pulmonary embolism in pregnancy, except where the clinical suspicion is particularly low. In pregnancy, D-dimer can be elevated because of physiological changes in the coagulation system and levels become 'abnormal' at term and in the post-natal period in most healthy pregnant women.^{4,11} Furthermore, D-dimer levels are increased if there is a concomitant problem such as pre-eclampsia.^{5,12} Thus a positive D-dimer test in pregnancy is not necessarily consistent with venous thromboembolism and objective testing with VQ or CTPA is usually required to exclude the diagnosis.^{6,13} Presence of lower limb pain or swelling should lead to consideration of venous duplex scanning to exclude deep vein thrombosis, as this does not require ionising radiation. Investigation of suspected pulmonary embolism during pregnancy has been covered in more depth in a previous article in this journal.⁷ (ref)

Echocardiography should always be considered, particularly during the late stages of pregnancy when pregnancy-induced cardiomyopathy is more common. Echocardiography may also enable identification of underlying valvular or other structural heart diseases.

Should a chest X-ray be undertaken for investigations of palpitations during pregnancy?

Sometimes a clinical judgement can be made that chest x-ray is unnecessary, for example where the history of strongly suggestive of ectopic beats or a clear cause for the symptoms can be identified. However, when indicated, patients should be reassured that the radiation dose to a fetus from a chest x-ray performed

Table 3. Initial investigations and their rationale for patients with palpitations in pregnancy

Test	Rationale
Full blood count	Exclude significant anaemia; raised white cells in infection
Renal function, Electrolytes, Calcium, Magnesium	Electrolyte abnormalities or dehydration as trigger for arrhythmia or sinus tachycardia
Lactate	sepsis or dehydration
Blood gases	Pulmonary embolism or other cause for hypoxaemia
Liver function tests	Hepatic congestion due to cardiac failure; pregnancy associated liver disease
Glucose	Gestational diabetes
Thyroid function tests	Thyrotoxicosis

at any stage of pregnancy is negligible.^{8,9} Commonly during pregnancy, the uterus is shielded for non-pelvic procedures. Guidelines^{9,10} from the American Congress of Obstetricians and Gynaecologists state:

1. Women should be counselled that x-ray exposure from a single diagnostic procedure does not result in harmful foetal effects.
2. Concern about possible effects of high-dose ionizing radiation exposure should not prevent medically indicated diagnostic x-ray procedures from being performed on a pregnant woman. During pregnancy, other imaging procedures not associated with ionizing radiation should be considered instead of x-rays where appropriate.

Case Continued

Further investigation results are shown in table 4: Chest x-ray was normal. Lower limb venous duplex scan showed no evidence of deep venous thrombosis.

How should arrhythmias during pregnancy be treated?

In general, treatment of arrhythmias during pregnancy is similar to treatment of arrhythmias in the non-pregnant state. However, because of

Table 4. Blood results obtained for the patient

WBC	8.03	Na	138	Total protein	66
Neutrophil	6.22	K	4.1	Albumin	39
Hb	147	Ur	5.5	Globulin	27
MCV	87.7	Cr	34	Bilirubin	7
Platelets	273	eGFR	>90	ALP	48
				ALT	69
CRP	<4	TSH	0.01		
ESR	6	Free T4	78.3	Glucose	6.2

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potential adverse effects of anti-arrhythmic drugs on the fetus, they are typically only used when arrhythmias are associated with significant symptoms or hemodynamic compromise.

The decision to treat arrhythmias needs to be assessed on an individual basis. The decision to start antiarrhythmic drugs depends on the frequency, duration and symptoms associated with the arrhythmia; regardless of this the fetal risk (usually very low) of any potential antiarrhythmic medication needs to be discussed with the mother.

Amiodarone should be avoided during pregnancy, but other drugs including beta-blockers, verapamil, adenosine digoxin and flecainide are generally considered to be safe in situations where the clinical context justifies their use.

Case Outcome

The results confirmed the clinical suspicion of thyrotoxicosis; she was reviewed by a Consultant Endocrinologist and admitted overnight in order to give some fluid resuscitation and regular IV antiemetic. She was started on low dose propranolol and propylthiouracil which was to be continued until week 12 of gestation and then switched to carbimazole. Follow up was arranged in the joint obstetric and endocrine clinic. Subsequent thyroid ultrasound doppler revealed a solitary right thyroid nodule with a reduced flow compared to the remainder of the thyroid, not thought to have any suspicious features, and a FNA is planned.

Conflicts of interest

The authors declare no competing interests.

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