The investigation and management of broad complex tachycardia and ventricular standstill presenting in pregnancy: A case report

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Abstract

A 23 year old pregnant lady at 35 weeks gestation presented to accident and emergency with worsening dyspnoea, palpitations and dizziness. Twelve lead electrocardiogram, routine bloods and echocardiography were normal. Ambulatory monitoring previously had shown an episode of monomorphic broad complex tachycardia (BCT) and a short episode of ventricular standstill. She was admitted for cardiac monitoring until delivery. Several episodes of ventricular standstill and self-terminating BCT were recorded, which were not associated with symptoms. The patient's symptoms either corresponded with sinus rhythm or supraventricular tachycardia. She underwent elective caesarean section at 37 weeks with no complications. The patient's symptoms reduced considerably post delivery, and she was discharged three days later. Unfortunately she then had a presyncopal episode whilst holding her baby. Due to concern regarding the safety of her baby she had a permanent pacemaker implanted to allow safe beta-blockade. She remains asymptomatic six months later.

Keywords

Arrhythmia, pregnancy

Introduction

Although palpitations are common in pregnancy, significant dysrhythmia is relatively rare and the bulk of evidence surrounding management is from case reports and series.^{1–4} Life-threatening arrhythmia is rarely reported in women with structurally normal hearts and few reports of atrioventricular block exist in the literature.^{3,4} We present the case of a patient in her third trimester who developed non-sustained narrow and broad complex tachycardia (BCT) as well as transient ventricular standstill.

Case report

A 23 year old lady presented to the emergency department 35 weeks into her third pregnancy with episodes of palpitations, dizziness and dyspnoea. She had suffered from similar but less intense episodes since childhood. She had a history of anaemia treated with ferrous sulphate, and gestational diabetes in her first pregnancy. She was an ex-smoker who took no alcohol or recreational drugs. There was no family history of cardiovascular disease or sudden death.

Investigations revealed normal biochemistry, unremarkable echocardiography and normal sinus rhythm on resting 12-lead electrocardiogram.

Ambulatory monitoring was arranged, showing a run of three non-conducted p-waves and five beats of BCT (Figure 1(a)). In view of the risk of peripartum dysrhythmia, she remained as a cardiology inpatient for observation until delivery. Rate controlling medications were avoided because of the ventricular standstill. She was reviewed daily by cardiologists and every alternate day on a combined obstetric/anaesthetic ward round, with the provision for further obstetric review as dictated by symptoms. She underwent cardiotocography (CTG) on one occasion due to a temporary reduction in fetal movements, and this was unremarkable.

Maternal cardiac telemetry over the following two weeks showed asymptomatic nocturnal sinus bradycardia including several episodes of ventricular standstill (maximum 2.7s). Three episodes of monomorphic BCT were recorded which were asymptomatic (Figure 1(b)).

Symptoms were accompanied by either sinus rhythm or supraventricular tachycardia (SVT).

Given the nocturnal and asymptomatic nature of her pauses, there was deemed to be a small but significant risk of her requiring peripartum pacing. A prophylactic pacing wire was therefore not inserted, but her cardiologist and obstetrician felt that a planned delivery at 37 weeks would be the most practical way to ensure appropriate cardiac back-up in the event of peripartum dysrhythmia. Elective caesarean section was chosen in order to ensure delivery in controlled, time-limited conditions and within a theatre environment that would facilitate pacing if required.

Accordingly, she underwent elective caesarean section under spinal anaesthesia at 37 weeks. She had an anaesthetic escort with equipment that could provide cardioversion or cutaneous pacing in the event of dysrhythmia and on the same site as cardiology and radiology in order to facilitate pacing wire placement if needed. In the event, this was not required; delivery was unremarkable and her symptoms reduced considerably in the postpartum period.

Seven-day ambulatory ECG was carried out post-discharge, showing significant bradycardia and brief salvos of non-sustained BCT (Figure 2), all of which were asymptomatic. At follow-up the patient described a presyncopal episode whilst holding her baby, unfortunately not during ambulatory monitoring. Further investigation with cardiac MRI and an implantable loop recorder was considered but there was significant patient and clinician anxiety regarding presyncope whilst

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Figure 1. (a) Pre-admission Holter showing broad complex tachycardia and ventricular standstill. (b) Inpatient prepartum telemetry showing broad complex tachycardia.

Figure 2. Postpartum Holter showing significant bradycardia and broad complex tachycardia.

looking after a newborn, and therefore a decision was made to insert a permanent pacemaker. This allowed safe beta-blockade for her salvos of BCT in the face of ongoing pauses. Her device was implanted successfully with resolution of her presyncopal symptoms.

Discussion

Arrhythmia in pregnancy is seen in most high volume centres, but is not common enough to provide a robust evidence base. Management is therefore challenging from both cardiovascular and obstetric medicine viewpoints.

Sustained tachycardia in pregnancy has an incidence of 2–3:1000, although transient arrhythmia and ectopic beats are commonly encountered.¹ Pregnancy can be pro-arrhythmic through various mechanisms. These include a tendency towards sympathetic overdrive, peripheral vasodilatation and mechanical stretch from increased cardiac filling pressures. A larger heart can also provide a greater propensity for re-entry circuits.¹ The neuroendocrine changes that occur in pregnancy have been postulated to drive arrhythmia: Makhija et al. report the case of a pregnancy-related left ventricular outflow tract (LVOT) ventricular tachycardia (VT) that could not be induced during a post-delivery electrophysiology study until a progesterone challenge was introduced.⁵ Similarly, Kotchetkov et al. describe a pregnant woman with asthma and ventricular trigeminy, treated with

nebulised salbutamol. After each nebuliser, this patient developed VT requiring treatment. This group offered the explanation of catecholamine-driven VT precipitated by tachycardia occurring during salbutamol therapy.⁶

Pathological bradycardia has an estimated incidence of 1:20,000 women in the UK.¹ A retrospective analysis in a US centre showed only two cases of atrioventricular block in 135,000 pregnancy-related admissions over nine years.² Complete heart block has been reported in an Indian case series,³ in which roughly half of the mothers underwent peripartum temporary pacing and some had permanent pacemakers, with no clear indicators as to who should be paced. To our knowledge, no cases of ventricular standstill in pregnancy have been published.

Existing literature shows that patients with structurally normal hearts, as in our patient's case, are unlikely to experience deterioration to sustained or unstable tachyarrhythmias,¹ which provided reassurance during management. Furthermore, symptomatic episodes were associated with SVT or sinus rhythm. Palpitations in the absence of dysrhythmia are benign and there is anecdotal guidance on managing SVT in pregnancy with rate-controlling agents or adenosine without significant risk to the fetus.^{1,5} Equally, VT originating from the ventricular outflow tracts can be treated with beta-blockade or verapamil. The main dilemmas in this case resulted from a tendency to bradycardia and asystole, interfering with safe rate control and necessitating a considered strategy for cardiovascular support during delivery.

Our decision to insert a permanent pacemaker is a matter of contention given the lack of a clearly demonstrable indication. The intended pathway for this patient post-delivery was to investigate further with cardiac MRI, potentially genetic testing and an implantable loop recorder. However, a pragmatic and safety-orientated approach was employed following discussion with the patient and consideration that her presyncopal symptoms could be bradycardia related. It was accepted that pacing would rule out performing a subsequent cardiac MRI.

We believe our case provides some reassurance on peripartum management, given that conflicting guidance exists regarding temporary pacing during delivery.¹ Temporary pacing would provide added haemodynamic support but any procedure brings attendant risks. Furthermore, a case series of six pregnant women with complete heart block who had prophylactic temporary wires found none required pacing.⁴ Due to the nocturnal and asymptomatic nature of our patient's asystolic periods temporary pacing was not performed. However the presence of ongoing postnatal symptoms and a tendency towards bradycardia provided a persuasive argument for planned delivery and subsequent permanent pacing on grounds of patient safety.

Conclusion

We believe this is the first reported case of a pregnant woman with co-existing VT and ventricular standstill with a structurally normal heart. Knowledge of her management may provide reassurance to cardiologists and obstetricians looking after patients with similar peripartum dysrhythmias.

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Declaration of conflicting interest

None declared.

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Ethical approval

Written consent was obtained from patient for publication.

Guarantor

Dr Anshuman Sengupta.

Contributorship

AS wrote the manuscript and TS helped with manuscript editing as well as collecting data and ECG figures. PS was the consultant managing the patient, supervised the reporting of the case and approved the manuscript.

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