Pacing for complete heart block in pregnancy: A case report

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ABSTRACT

Whereas sinus tachycardia and paroxysmal supraventricular tachycardia are common during pregnancy, bradyarrhythmias are infrequent. Moreover, bradyarrhythmias are generally well tolerated during pregnancy. Nevertheless, a 12-lead ECG is indicated for pregnant women who present with bradycardia, to rule out sinoatrial (SA) node dysfunction or AV conduction abnormalities. Third-degree AV block (complete heart block, CHB) requires multidisciplinary care during pregnancy, with combined input from Cardiologists and Obstetricians. As CHB is associated with increased mortality and morbidity if left untreated, permanent pacing is usually indicated during pregnancy, even if the patient remains asymptomatic. However, not all pregnant patients with CHB require urgent pacing. In a pregnant patient who has CHB with an escape rhythm with narrow QRS complexes and rate of >50bpm, permanent pacemaker implantation can be delayed until after delivery, as described in this case report.

SAHeart 2022;19:202-206

INTRODUCTION

Despite the increase in prevalence of tachyarrhythmias during pregnancy,[1,2] bradyarrhythmias are rare in pregnant women.[3,4] It is estimated that maternal bradycardias and complete heart block (CHB) occur in around 1:20 000 young women.[5] Bradyarrhythmias are generally well tolerated during pregnancy, and seldomly require urgent intervention.[6] However, multidisciplinary care, with combined input from Cardiology and Obstetrics, is recommended.[7] In this case report, we describe a patient that was incidentally diagnosed with CHB during labour, and the management strategies in this setting.

CASE REPORT

A 29-year-old primigravid woman presented in labour at 39 weeks of gestation. She had no comorbidities, denied the use of any chronic medication and her pregnancy was uneventful until presentation. Apart from mild fatigue during the third trimester, she reported no shortness of breath and maintained a New York Heart Association (NYHA) functional class I antenatally. She has also never experienced any palpitations, dizziness, or syncope. On admission to the labour ward, the midwives noted a bradycardia and performed an ECG, which demonstrated complete or third-degree atrioventricular (AV) block. She was urgently transferred to a tertiary health care facility for advanced obstetric care and review by Cardiology.

On arrival at the obstetric high care unit, the patient was in labour with 5cm cervical dilatation. Her blood pressure was 118/70mmHg and pulse 42 beats per minute (bpm). She had no signs of congestive cardiac failure. Jugular venous examination showed cannon A waves. Auscultation revealed heart sounds of variable intensity, and a soft ejection systolic murmur across the sternum. Her chest was clear and abdominal examination found a gravid uterus with intermittent contractions.

Her ECG (Figure 1) showed a regular, narrow QRS complex rhythm with a rate of 48bpm. The P wave rate was 72 per minute, and the PR interval was variable, confirming AV dissociation and complete heart block (CHB). The QRS duration

was 86ms (consistent with a junctional escape rhythm) and QRS axis 85°. The QRS transition point was at V4, and there was no evidence of left ventricular hypertrophy or pathological Q waves. The ST segments and T waves were normal, apart from occasional T wave that was distorted by P waves. The corrected QT interval (QTc) by Bazett's formula was prolonged (488ms).

Echocardiography showed a non-dilated left ventricle (LV) with preserved LV systolic function with no evidence of any structural heart disease.

Multidisciplinary team, comprising cardiologists and obstetricians, advised that the patient could continue with normal vaginal delivery, amid continuous cardiac monitoring in a high care unit. In view of her narrow complex escape rhythm with no underlying structural heart disease, a provisional diagnosis of congenital CHB was made. The patient would not need transcutaneous or transvenous pacing, unless, in the unlikely event that her escape rhythm would fail. However, a Caesarean section was performed for foetal distress. She was transferred to the cardiac care unit after delivery, for continued cardiac monitoring, further investigations, and permanent pacemaker implantation. Further work-up excluded an acute coronary syndrome, infection, rheumatoid arthritis (RA), ankylosing spondylitis, systemic lupus erythematosus (SLE) and sarcoidosis. The patient declined a cardiac MRI for further investigation of the aetiology of the CHB. A dual chamber pacemaker was implanted prior to discharge. She was discharged in good health and continues regular follow up at the pacemaker clinic (Figure 2).

DISCUSSION

Bradycardia is conventionally defined as a heart rate of less than 60bpm. However, resting sinus rates between 50 and 60bpm can occur in healthy individuals or during sleep.[8] A 12-lead ECG is indicated for patients who present with bradycardia. As summarised in Figure 3, the 12-lead ECG helps to distinguish between impulse generation abnormalities (i.e. deficient, or absent impulse generation from the sinoatrial [SA] node or atria) or conduction abnormalities (i.e. intermittent, or absent impulse conduction from the atria through the AV node to the ventricles, recognised by the presence of more P waves than QRS complexes [Figure 4]). In this case report, we describe a pregnant woman who was incidentally found to have CHB, at the time of labour. In the absence of any acquired cause, the aetiology of her CHB was thought to be congenital.

CHB, also referred to as third-degree AV block, remains an uncommon arrhythmia in the young. The estimated preva-

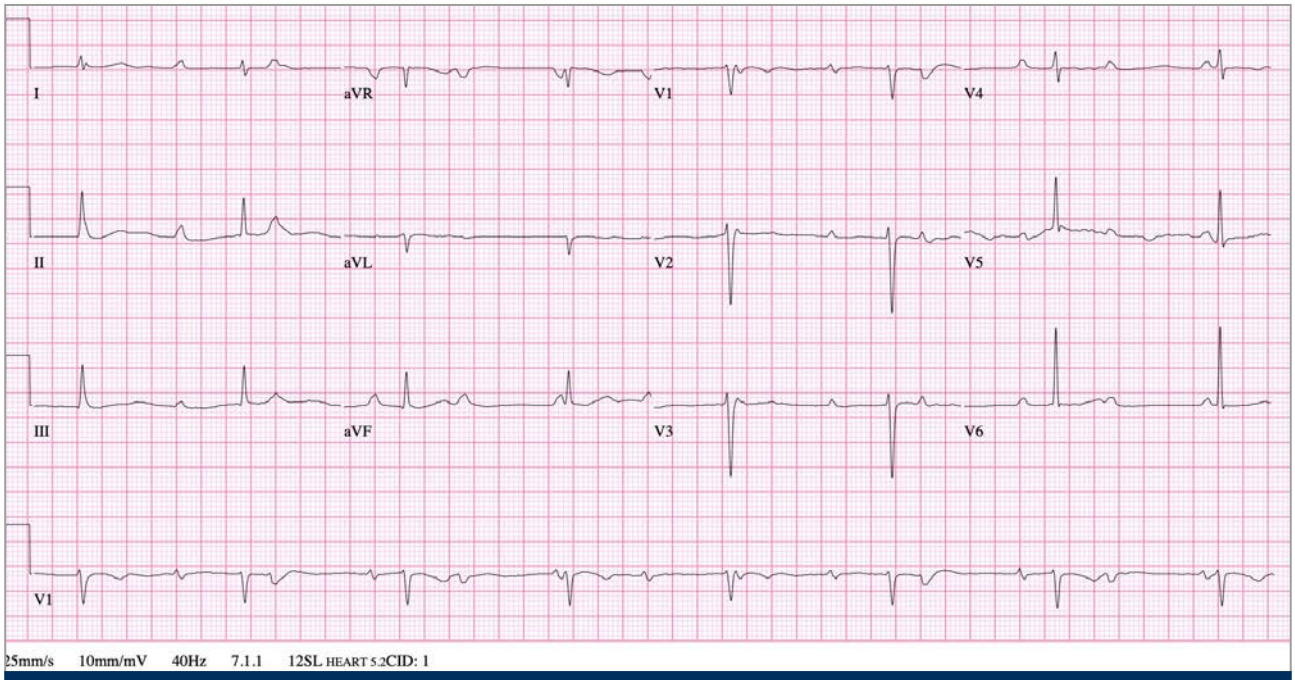

FIGURE 1: A 12-lead ECG confirming complete or third-degree AV block with a junctional escape rhythm (QRS duration 86ms). Note the regular QRS complexes with a rate of 48, the P wave rate of 72, but PR intervals of variable duration, confirming AV dissociation.

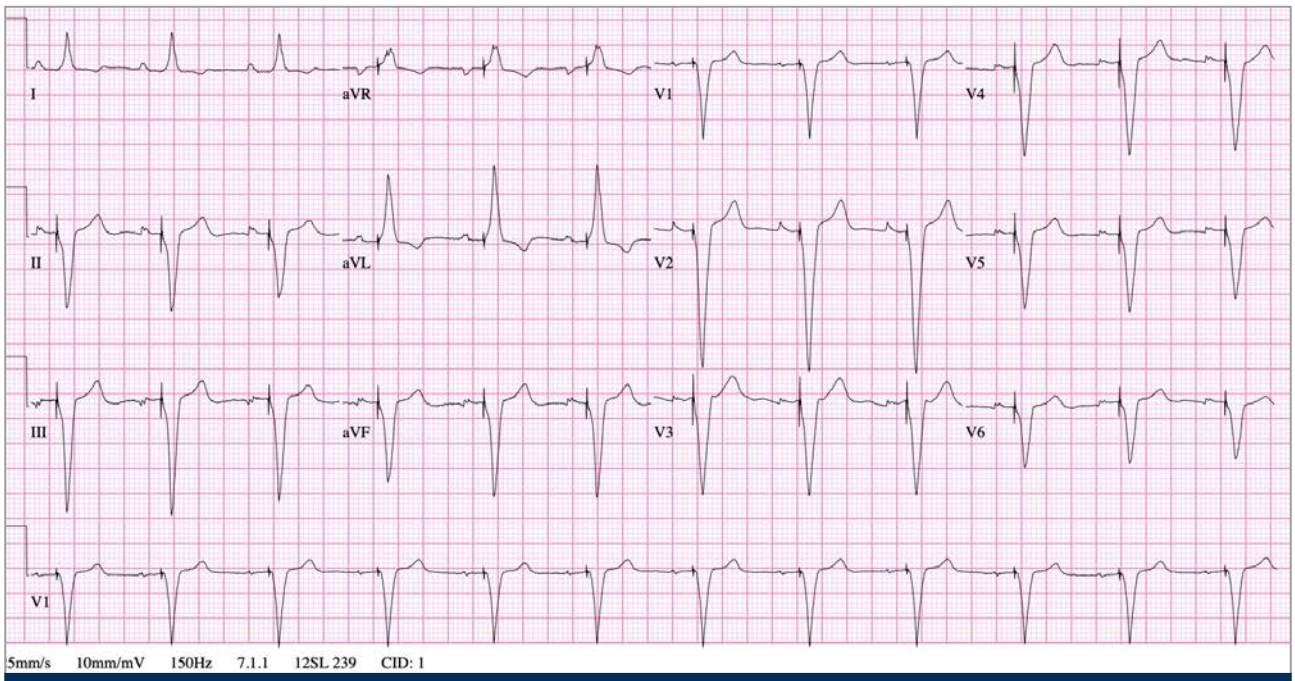

FIGURE 2: A 12-lead ECG recorded after dual chamber pacemaker implantation. The P waves are sensed and the QRS complexes are paced.

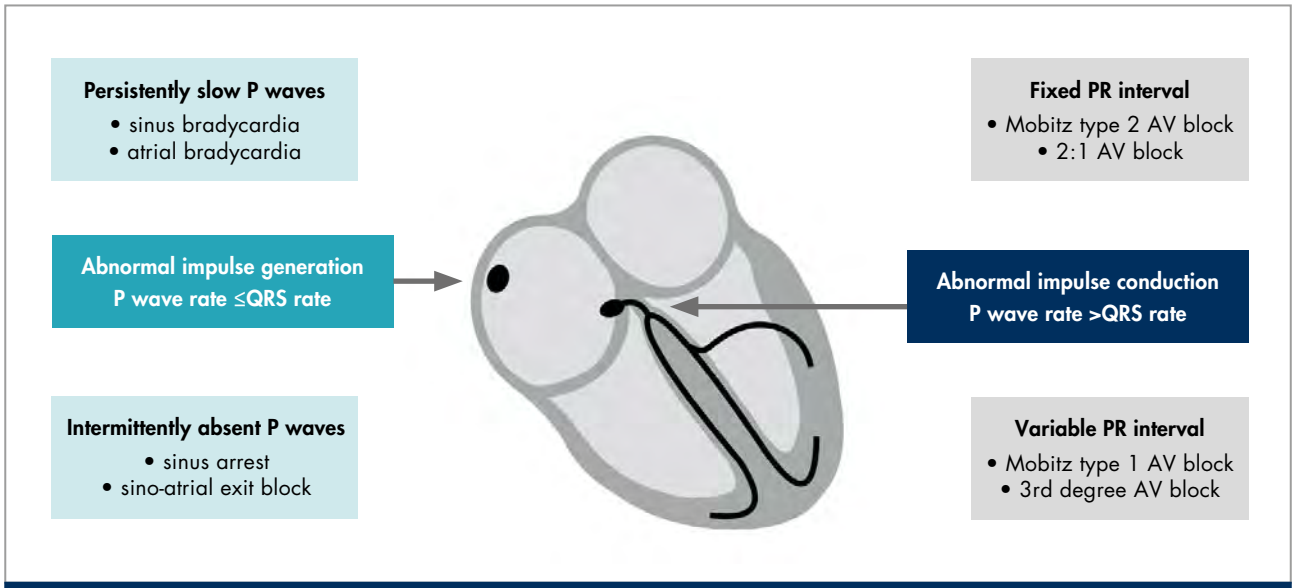

FIGURE 3: Diagnostic approach to bradycardia *(image modified from ECG APPtitude, and used with permission).*

lence of CHB is 0.04% amongst healthy young individuals.[9] AV block is estimated to occur in 1.5 in 100 000 pregnancies.[10]

The aetiology of CHB in the young can be classified as either congenital or acquired. Congenital CHB is caused by anti-SSA, anti-Ro-SSB or anti-La antibodies (associated with maternal lupus), which cross the placenta and result in an immune-mediated injury of the conduction system of the foetus or neonate.[11] Congenital CHB occurs in up to 1 in 22 000 live births.[12] The diagnosis is usually made within the first years of life, but could be detected for the first time in early adulthood.[13] Pacing is generally recommended in the teenage years (if asymptomatic with a stable escape) or at any age if symptomatic.[6]

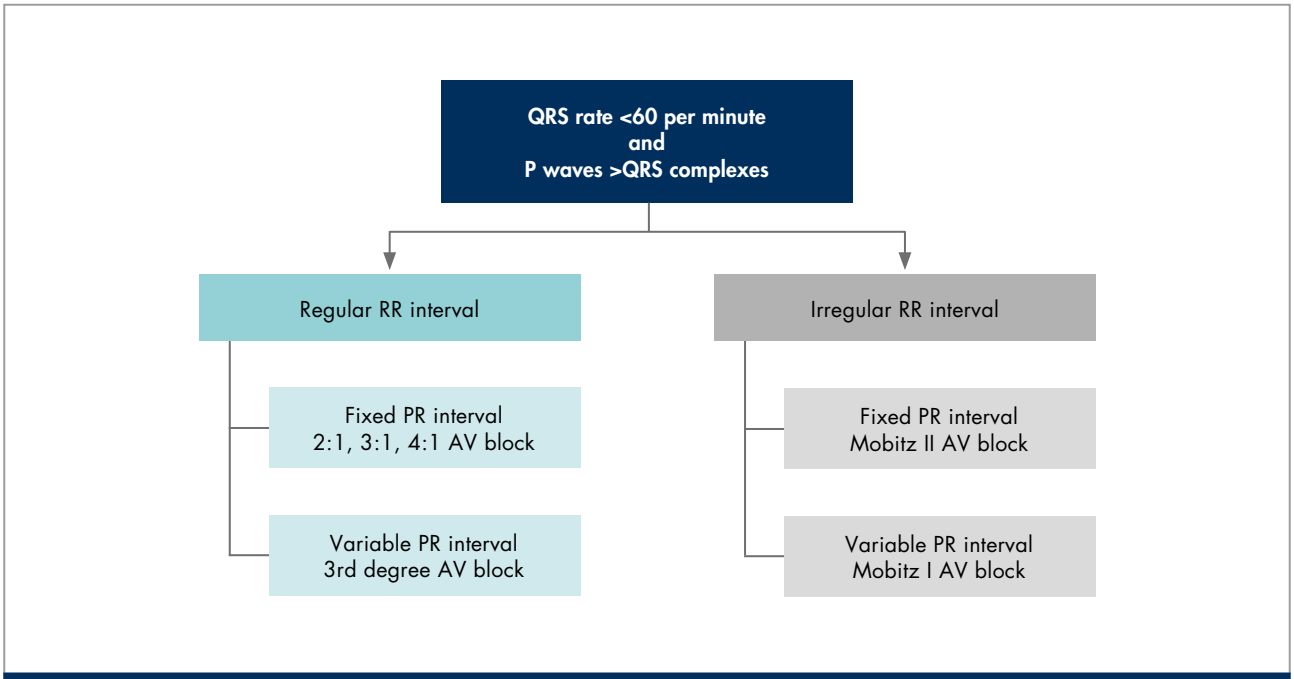

FIGURE 4: Diagnostic approach to defective AV conduction ***(image modified from ECG APPtitude, and used with permission).***

Apart from congenital CHB,[14] the most common causes of CHB in young adults include coronary artery disease post myocardial infarction, non-ischaemic cardiomyopathy, iatrogenic causes (i.e. drugs [digoxin toxicity] and cardiac surgery [especially replacement of multiple valves]), myocarditis (e.g. viral, Giant cell), infectious causes (such as infective endocarditis with paravalvular abscess formation, Lyme's and Trypanosomal disease, Aspergillus, varicella zoster), autoimmune diseases (i.e. RA, ankylosing spondylitis, SLE, systemic sclerosis) and infiltrative processes (e.g. sarcoidosis, amyloid).[12]

The hallmark of CHB on the 12-lead ECG (Figure 1) is a bradycardia with no electrical impulse conduction from the atria to the ventricles.[12] The P wave rate is typically faster than the QRS rate. The RR intervals are usually regular because of the escape rhythm, but the PR intervals vary in length because of AV dissociation. The QRS complexes could be narrow (junctional escape, arising above the bundle of His) or wide (ventricular escape, or junctional escape with a bundle branch block).

The clinical presentation of CHB is variable. In our case report, the patient remained asymptomatic throughout her childhood and early adulthood. She was only diagnosed when a bradycardia was noted during labour. Although some patients remain asymptomatic, the majority will experience a degree of effort intolerance, with dyspnoea and dizziness. In more severe instances, patients might develop syncope (cerebral hypoperfusion) or congestive cardiac failure.[4] Sudden cardiac death can ensue failure of the escape rhythm or ventricular arrhythmias precipitated by prolonged QT interval.[13]

Cardiac output (CO) normally increases during the first and second trimesters, to compensate for the increased metabolic demands of pregnancy. Increased CO is achieved by an increase in stroke volume (SV) and heart rate (HR).[15] Indeed, the heart rate can increase up to 25% during normal pregnancy. However, as the heart rate is dependent on the escape rhythm in CHB, an increase might therefore not be possible.[4] CO is therefore maintained by an increased SV in patients with CHB.

CHB is rarely transient. When left untreated, CHB is associated with increased mortality and morbidity.[13] Permanent pacing is therefore indicated, even if the patient with CHB is asymptomatic.[6,16] However, not all pregnant patients with CHB require urgent pacing. In the setting of an escape rhythm with a narrow QRS and rate of >50bpm, permanent pacemaker implantation can be delayed until after delivery prior to hospital discharge as described in this case report. Temporary pacing is also not necessary during labour and should be reserved for those that are haemodynamically unstable.[16] Urgent permanent pacemaker implantation is recommended during pregnancy in the setting of a slow, wide escape rhythm, and in

patients with syncope, complex ventricular ectopy and prolonged QTc.[6] Pacemaker implantation is considered a low risk procedure, and can be performed safely after 8 weeks of gestation with abdominal shielding with minimal fluoroscopic screening.[16] Non-fluoroscopic approaches have been described to reduce radiation.[17] Pacing is usually well tolerated during pregnancy, and should not interfere with any routine obstetric care.[14]

Vaginal delivery is generally recommended for patients with CHB, whether paced or not, unless there is an obstetric indication for caesarean section.[6]

CONCLUSION

CHB is a rare arrhythmia in pregnancy. However, the recognition and correct diagnosis of CHB is essential, to ensure that the appropriate management can be offered. In this regard, health care providers should perform a 12-lead ECG in patients who present with bradycardia during pregnancy. Multidisciplinary care, with combined input from Cardiology and Obstetrics, is recommended in pregnant patients with CHB.[7]

Conflict of interest: none declared.

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