

Pregnancy and congenital complete atrioventricular block: management during pregnancy and the periparturient period (RCD code: VII-V)

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Abstract

Complete atrioventricular block (AVB) is rare during pregnancy. Congenital atrioventricular block is the most common type of heart block in this group of patients. About one-third of female patients with complete AVB remain asymptomatic until adulthood and may be first diagnosed during pregnancy. We present a case of a 31-year-old pregnant woman with complete AVB who was in her final stage of pregnancy. After reviewing the various advantages and disadvantages of feasible approaches with the patient, we decided to use fluoroscopy-guided temporary backup pacemaker implantation. Estimated radiation skin dose was small and safe. The patient agreed to this treatment plan. Four days prior to scheduled cesarean delivery (39 weeks of gestation), during a one-day stay in the hospital, the patient underwent single-chamber temporary pacemaker implantation (using transvenous active fixation lead and external re-sterilized pacemaker). The abdominal and pelvic regions were covered with a lead shield. The caesarean delivery was uneventful and the baby was healthy with an Apgar score of 10. JRCDD 2018; 3 (6): 204–208

Key words: pregnancy, complete atrioventricular block, pacemaker, active fixation lead, rare disease

Background

Complete atrioventricular block (AVB) is rare during pregnancy. Congenital atrioventricular block is the most common type of heart block in this group of patients [1]. About one-third of female patients with complete atrioventricular block remain asymptomatic until adulthood and may be first diagnosed during pregnancy [2]. Complete AVB in pregnancy may be an indication for pacemaker implantation [3].

Case presentation

We present a case of a 31-year-old woman with complete congenital AVB at 16 weeks of gestation (gravida 2, para 1). Previous pregnancy was delivered via elective caesarean section with temporary backup pacing. The patient underwent dual chamber (DDD) pacemaker implantation 3 years prior to the current hospitalization (after her first pregnancy) to avoid complications during planned future pregnancies. Shortly after implantation, she presented with pacemaker pocket infection with *Staphylococcus aureus* and the entire pacing system was removed [4, 5]. The patient never reported light-headedness, dizziness, or syncope. The patient did not consent to contralateral pacemaker reimplantation. The patient was referred to our centre to develop an indi-

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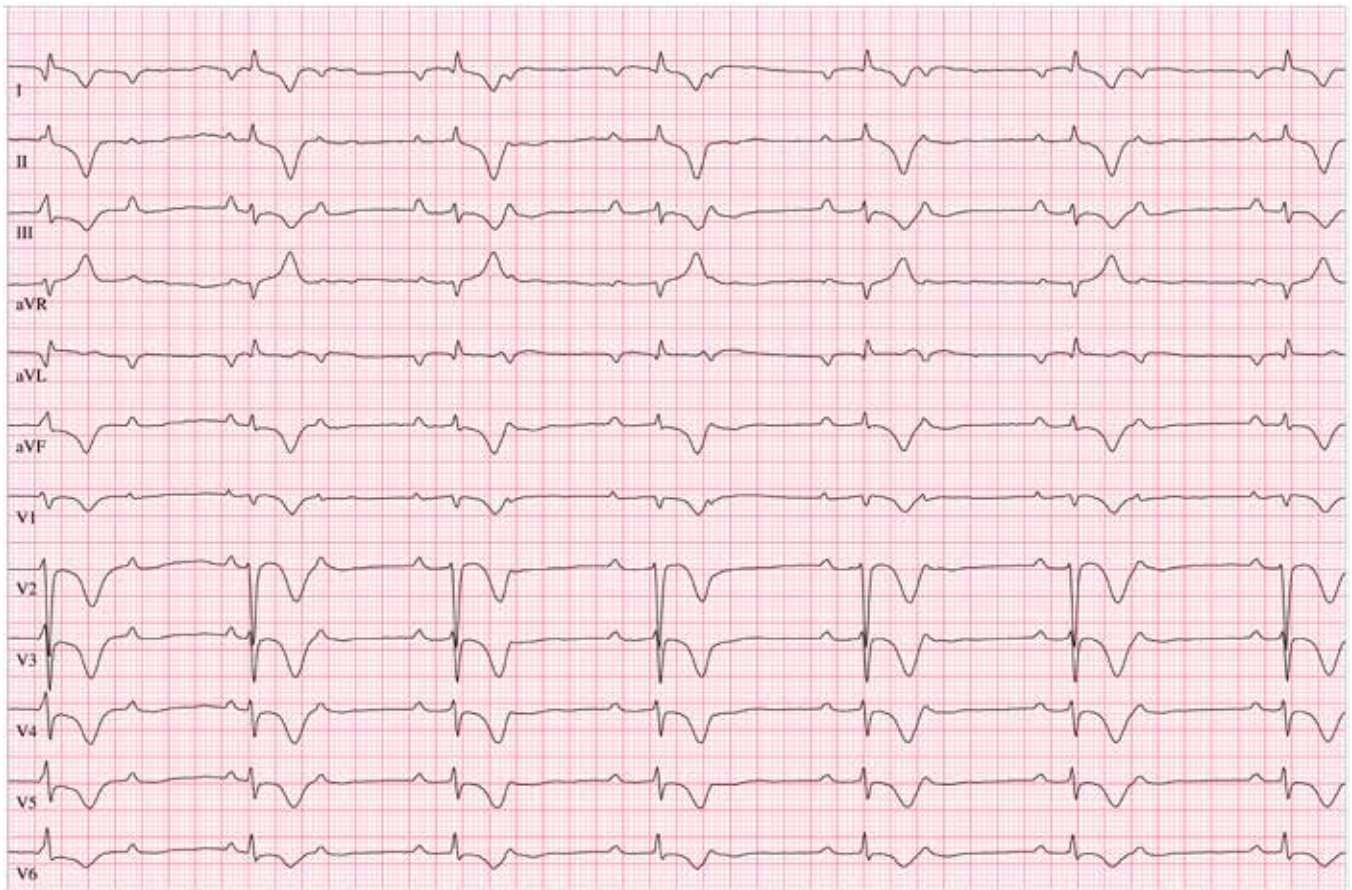


Figure 1. Electrocardiogram before temporary pacemaker insertion shows atrial rhythm at a rate of about 75 bpm and third-degree atrioventricular block with junctional escape rhythm with narrow QRS complexes, at a rate of about 40 bpm (25 mm/s, 10 mm/mV)

visualized cardiac-obstetric care plan. Electrocardiogram (ECG) showed a third-degree atrioventricular block with junctional escape rhythm with narrow QRS complexes at a rate of about 40 beats per minute (bpm) (Figure 1). 24-hour Holter ECG monitoring showed that atrial rhythm and third-degree atrioventricular block were likely present; average ventricular rate was 45 bpm (from 33 to 79 bpm); 15 pauses > 2 s (maximum 3364 ms) were noted; 1200 polymorphic premature ventricular beats per day, 8 pairs and 1 idioventricular rhythm (7 ventricular contractions) of about 60 bpm (Figure 2, Panel A-C). Because the patient was in good general condition, a relatively good prognosis associated with hemodynamically stable isolated congenital complete AVB with junctional escape rhythm, as well as the patient's concern and fear related to risk of recurrent device infection, contralateral pacemaker implantation was not performed [2]. Frequent obstetric consultations were recommended. The consulting obstetrician reported a favourable course of pregnancy and elective caesarean delivery was recommended. Temporary supportive pacing during delivery was advised due to obstetric reasons. At 35 weeks gestation, an alternative to conventional temporary pacing was proposed. This led to implantation of an externalized permanent active fixation ventricular lead connected to an external permanent pacemaker.

Because the patient was in her final stage of pregnancy, after reviewing the various advantages and disadvantages of feasible ap-

proaches with the patient, we decided to use fluoroscopy-guided temporary backup pacemaker implantation. Estimated radiation skin dose was small and safe. The patient agreed to this treatment plan. Four days prior to scheduled caesarean delivery (39 weeks of gestation), during a one-day stay in the hospital, the patient underwent single-chamber temporary pacing system implantation. The abdominal and pelvic regions were covered with a lead shield. The ventricular lead was inserted via percutaneous puncture of the left subclavian vein into the right ventricular apex and then sutured to the skin and connected to an external pacemaker (Figure 3, Panel A and B). Fluoroscopy time was 1 minute and 42 seconds (estimated skin dose 14.11 mGy). We used low dose fluoroscopic imaging at a rate of 4 frames per second. The relatively long fluoroscopy time resulted from difficulties during the procedure, including subclavian vein puncture (the patient had previously undergone pacemaker implantation and extraction), tricuspid valve crossing, and lead stabilization. On post-procedure day 2, the patient was followed-up in an outpatient clinic and the pacemaker was verified as functioning properly. The caesarean delivery was uneventful and the baby was healthy with an Apgar score of 10. During the early post-partum period (10th day), the temporary pacing lead was safely removed.

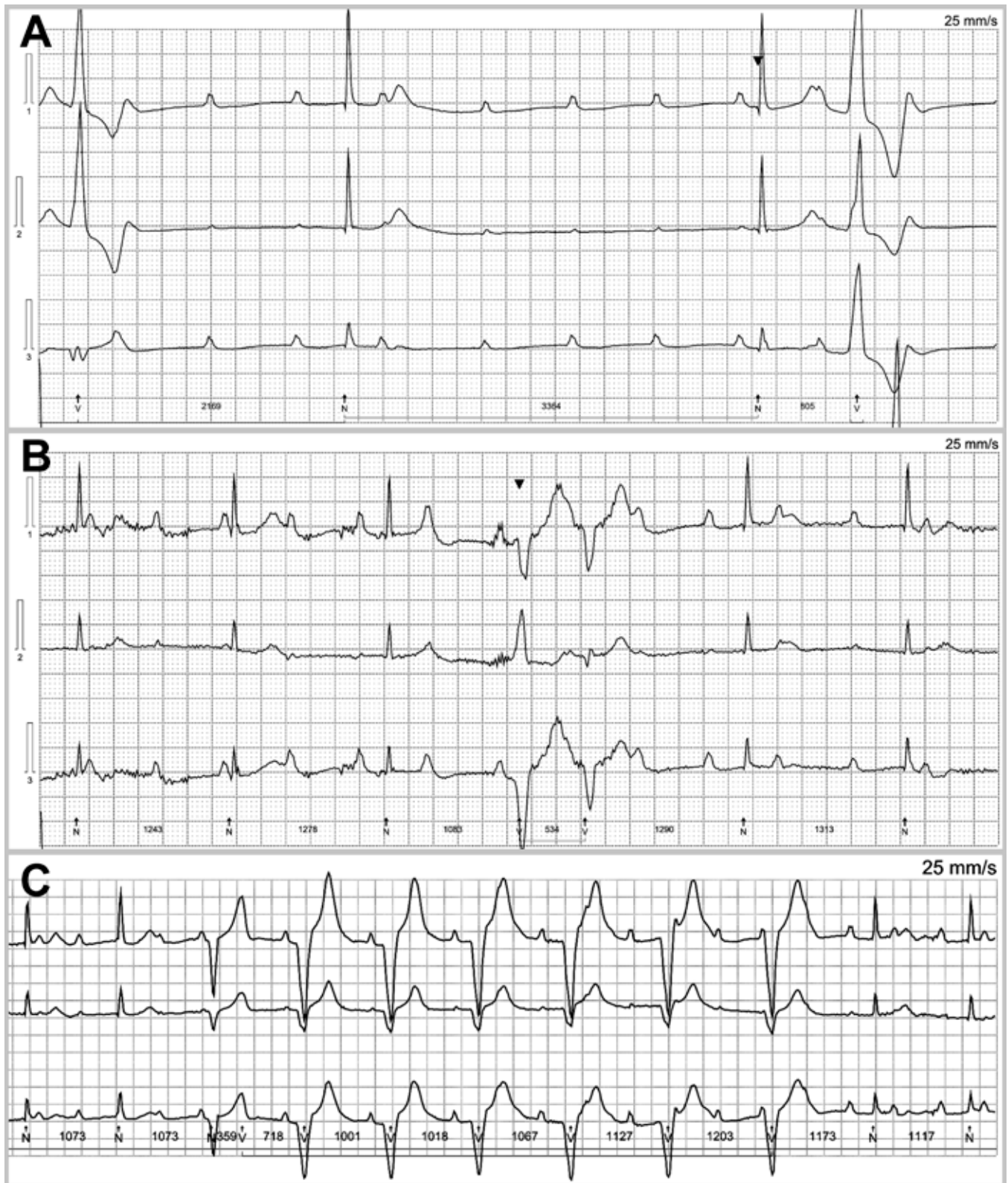


Figure 2. 24-hour Holter electrocardiogram monitoring (25 mm/s, 10 mm/mV). Panel A: Atrial rhythm, no atrioventricular conduction and a pause of 3364 ms. Panel B: Pair of ventricular contractions. Panel C: Episode of idioventricular rhythm of about 60 bpm (7 contractions)

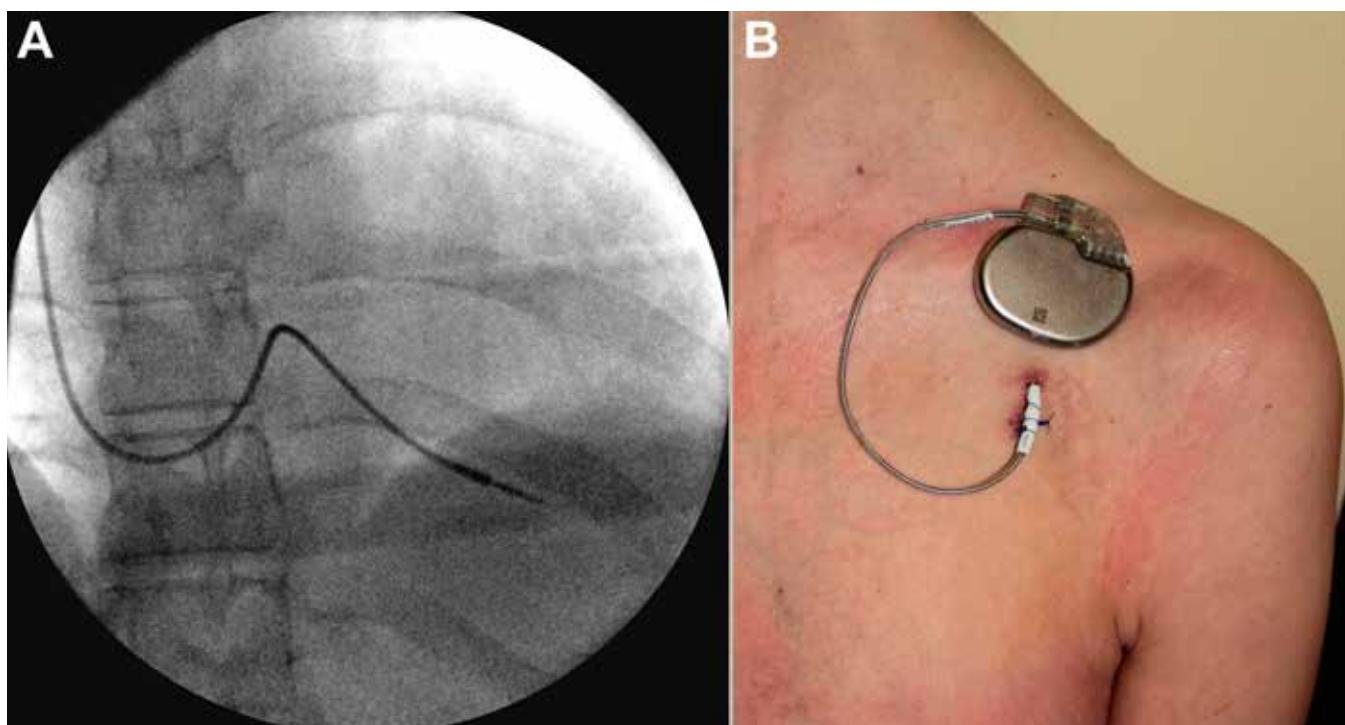


Figure 3. Temporary pacing system. Panel A: Active fixation ventricular lead inserted into the right ventricular apex. Panel B: Externalised lead connected to the external, re-sterilised pacemaker

Discussion and review of literature

Vaginal delivery is not associated with extra risk in a pregnant patient with congenital complete AVB [2] and the majority of women who do not require permanent pacemaker before delivery can undergo labour without temporary pacing [6]. However, when the escape rhythm is relatively slow, concerns about fetal health may be present. According to the European Society of Cardiology (ESC)/European Society of Anaesthesiology (ESA) guidelines on non-cardiac surgery, pre-operative establishment of cardiac pacing (temporary or permanent) may be appropriate in patients with complete heart block or symptomatic asystolic episodes [7].

In the literature, there is evidence indicating that temporary cardiac pacing using transvenous active fixation leads and external re-sterilized pacemakers may be more beneficial than standard transcutaneous temporary pacing [8].

We considered the implantation of a temporary pacing lead under echocardiographic guidance or using electroanatomic mapping without the use of fluoroscopy [9]. However, with the use of the above-mentioned techniques, it is not possible to confirm that there is enough slack and that the helix has extended completely [9]. Any dosage of X-ray is potentially harmful, as there is no threshold dose. A lower dosage of X-ray means a lower risk of potential harm for the embryo and various precautions are undertaken to minimize radiation exposure during invasive procedures in pregnancy [10]. In our patient, the late period of pregnancy (near its end) was an extenuating factor. Therefore, the harmful effects of X-rays were minimized. Fluoroscopy could only be used during the most important period in the procedure (helix extension), however, subclavian vein puncture without fluoroscopy would increase the risk of pneumothorax and

other perioperative complications. Such complications were observed in 12.9% of patients during implantation of subcutaneous infusion ports [11]. Fetal exposure to X-rays during invasive cardiological procedures is a few times lower than the maternal exposure [2]. Taking into account a maternal exposure of about 14 mGy, the fetal exposure was few times lower. In our opinion, implantation of a temporary pacing system using low dose fluoroscopy was an acceptable compromise between radiation exposure and increased risk of procedure-related complications. Potential complications could lead to prolonged hospitalization and additional medical procedures, including those with radiation use, immediately before caesarean section. An important aspect of the procedure was to minimize periprocedural complications with low radiation exposure. Externalized permanent active fixation lead connected to a permanent pacemaker generator for temporary pacing appears to be a safe and effective method of treatment in conduction abnormalities also during pregnancy [12]. ESC guidelines on the management of patients with complete AVB in different clinical settings are summarized in Table 1. The data on chronic pharmacotherapy in complete AVB is based on 40 years of clinical experience in our Department of Electrophysiology.

Conclusion

A smaller, externalized permanent pacing generator and active fixation lead is a safe and more convenient pacing system for the patient when compared with traditional temporary pacing. It may be beneficial due to improved lead stability, greater patient mobility and comfort, and represents a useful alternative to traditional temporary pacing, particularly when prolonged need for pacing is anticipated.

Table 1. Comparison of management options in patients with complete atrioventricular block in different clinical settings

	Congenital complete AVB	Complete AVB during pregnancy	Acquired, irreversible complete AVB
Prevalence	1:15 000–1:22 000 [6, 13]	Rare	~0.02–0.04% [14, 15]
Acute Pharmacotherapy	Atropine (or glycopyrrolate), isoprenaline, adrenaline, aminophylline, dopamine, glucagon (if beta-blocker or calcium channel blocker overdose) [16]	Pregnancy categories: atropine – C, glycopyrrolate – C, isoprenaline – C, adrenaline – C, aminophylline – C, dopamine – C, glucagon (if beta-blocker or calcium channel blocker overdose) – B**	Atropine (or glycopyrrolate), isoprenaline, adrenaline, aminophylline, dopamine, glucagon (if beta-blocker or calcium channel blocker overdose) [16]
Chronic Pharmacotherapy	Salbutamol, theophylline	Salbutamol – C, theophylline – C**	Salbutamol, theophylline
Preferred pacemaker type*	Preferably DDD (especially in patients with symptoms, ventricular dysfunction, ↑ QTc, complex ventricular ectopy, wide QRS escape rhythm, ventricular rate <50 bpm or pauses >3-fold the cycle length [17])	Preferably VVI, beyond 8 weeks of gestation in symptomatic patients [2]. Pre-operative establishment of cardiac pacing may be appropriate [7]	Preferably DDD (irrespective of symptoms [17])
Radiation exposure	No strict limitations	If possible >12 weeks after menses and <50 mGy for embryo [2]	No strict limitations

AVB – atrioventricular block; *in patients without indications for implantable cardioverter-defibrillator placement or cardiac resynchronisation therapy; **no direct recommendations in current European Society of Cardiology clinical practice guidelines on the management of cardiovascular diseases during pregnancy

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