

Complete Heart Block in Pregnancy: A Case Report

Dhanang Ali Yafi¹, Cloudia Noviani¹, Rahmi Eka Saputri¹, Adi Purnawarman^{1,2},
Mohammad Andalas^{1,3}, Yusmalinda^{1,4}

Abstract

Background: Complete heart block occurs due to various pathological conditions that cause infiltration, fibrosis, or connection loss from a part of the cardiac conduction system. Complete heart block in pregnancy is often caused by congenital anomalies. In around 30% of cases, complete heart block remained asymptomatic and not detected until adulthood and may present in pregnancy state and the puerperium. When the reversible cause of the AV Block cannot be found, a permanent pacemaker or temporary pacemaker may be indicated when the patient shows symptoms.

Case Illustration: A 21-year-old female, G2P0A1 preterm pregnancy (27-28 weeks) with bradycardia. Electrocardiography examination revealed Total AV Block with junctional escape rhythm. Transthoracic echocardiogram showed mild mitral regurgitation, massive tricuspid regurgitation, early phase of peripartum cardiomyopathy and ejection fraction was 36-40%. Caesarean section was performed due to PPRM. A male baby was born with birth weight of 1100 grams, body length of 32 centimeters and APGAR score of 7/9. The baby died in the NICU on 4th day of care, with suspected respiratory problem.

Conclusion: Complete heart block in pregnancy is a rare condition. This condition could remain asymptomatic and not detected until pregnancy. Multidisciplinary approach, close monitoring of the symptoms and cardiac functions are needed for patients with CHB.

¹ Faculty of Medicine Syiah Kuala University, Banda Aceh.

² Department of Cardiology, Dr. Zainoel Abidin Hospital, Banda Aceh.

³ Department of Obstetrics and Gynecology, Dr. Zainoel Abidin Hospital, Banda Aceh.

⁴ Department of Anesthesiology and Intensive Care, Dr. Zainoel Abidin Hospital, Banda Aceh.

Correspondence:

Dhanang Ali Yafi
Faculty of Medicine Syiah Kuala University, Banda Aceh, Indonesia
Email: dhanangaliyafi@gmail.com

(Indonesian J Cardiol. 2021;42:29-34)

Keywords: Complete Heart Block, Pacemaker, Bradycardia, Pregnancy

Introduction

Complete heart block (CHB) is a rare condition that can be a serious problem in pregnancy. Incidence of CHB is around 1:15,000 to 1:20,000.¹ Complete heart block in pregnancy is often caused by congenital anomalies. In around 30% of cases, complete heart block remained asymptomatic and not detected until adulthood and may present in pregnancy state and the puerperium.^{1,2}

Complete heart block occurs due to various pathological conditions that cause infiltration, fibrosis, or connection loss from a part of the cardiac conduction system. A third-degree Atrioventricular (AV) Block can occur as a result of congenital or acquired anomalies.³ When the reversible cause of the AV Block cannot be found, a permanent pacemaker or temporary pacemaker may be indicated when the patient shows symptoms.⁴

Case Illustrations

A 21-year-old female, gravida 2 abortion 1, presented to hospital at 27-28-weeks of gestation with increasing exertional dyspnea when the patient performed mild activity. One month before admission, she had a syncope at 23-24-weeks of gestation and was referred from local hospital. Under cardiologist's supervision, she was diagnosed with mild mitral regurgitation, massive tricuspid regurgitation and early phase of peripartum cardiomyopathy. Thereafter, patient was discharged in good condition on 5th day of treatment.

Upon examination, she was conscious, fully oriented with pulse rate of 54 bpm and normal blood pressure. Physical Examination found regular heart rate, holosystolic murmur, and a jugular vein distention. Obstetric examination revealed size of uterus was appropriate to the age of pregnancy and the fetus heart rate was within normal limit.

Electrocardiogram (ECG) was done which showed sinus bradycardia (heart rate 43 bpm) with narrow QRS complexes and junctional escape rhythm suggestive of complete heart block Figure 1. However, there was no previous ECG examination for comparison

Laboratory result revealed leukocytosis at 17,300 cells per mm³ and hypokalemia at 2.9 gr/dL. Previous maternal transthoracic echocardiogram showed mild mitral regurgitation, massive tricuspid regurgitation, early phase of peripartum cardiomyopathy with ejection fraction of 36-40%.

Patient was planned for caesarean section due to preterm premature rupture of the amniotic membranes (PPROM) during hospitalization. A multidisciplinary approach involving cardiology and anesthesiology team was taken. After two days of fetal lung maturation using steroids, caesarean section was done at the same time with the insertion of temporary pacemaker with VVIR Pacing Mode Figure 2.

From per-abdominal labor, a male baby was born with birth weight of 1100 grams and APGAR score of 7/9. Patient was also implanted contraceptive Intra-uterine device (IUD) right after delivery as a method of family planning.

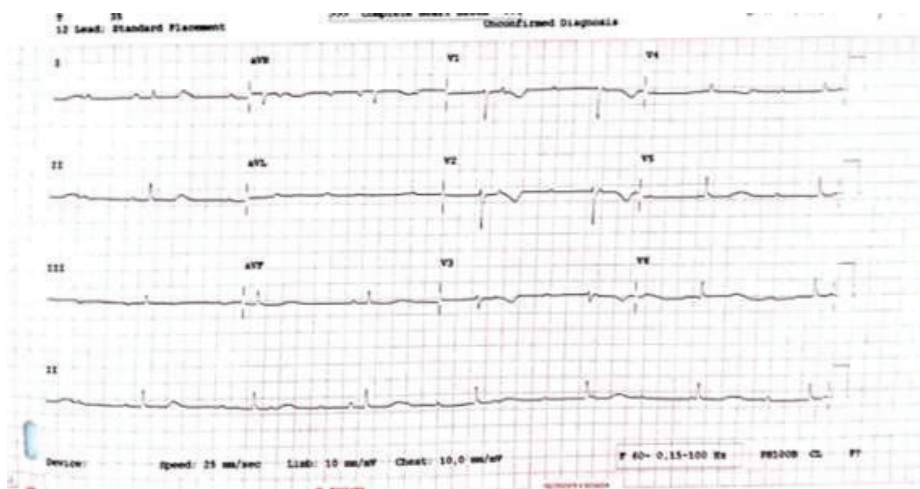


Figure 1. Complete AV Block

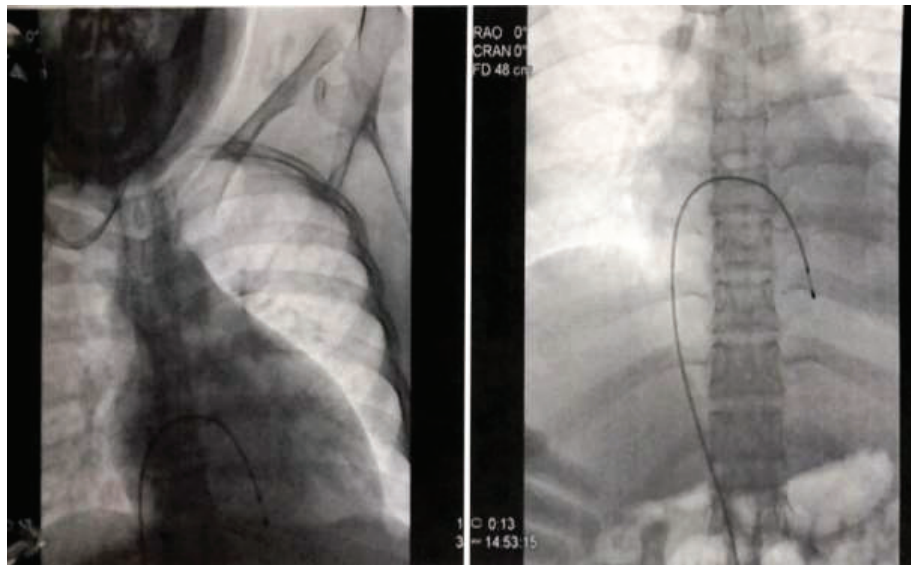


Figure 2. Temporary Pacemaker VVIR Mode attached

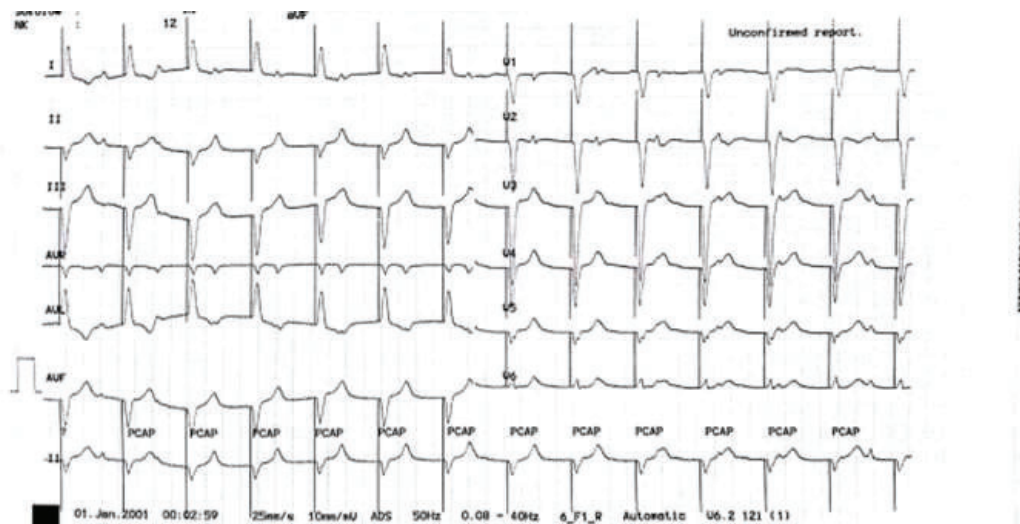


Figure 3. ECG of Post-insertion of Temporary Pacemaker

After insertion of temporary pacemaker to the left ventricle, the ECG showed Figure 3 an increase in heart rate to 81 bpm.

Permanent pacemaker implantation was done by an interventional cardiologist on post-caesarean day 3 using VVIR Pacing Mode paced at 60 bpm Figure 4 and continued with observation in the ICCU with close monitoring.

After the permanent pacemaker was implanted, ECG was done which showed QRS rate of 60 bpm. (Figure 5)

Discussion

Complete heart block in pregnancy is rare, and the characteristic of the disease must be recognized. If the QRS complexes are narrow and heart rate increases in response to atropine or exercise, then the block is most likely within the AV node. This condition is often reversible, and pacing may not be indicated. Otherwise, if the AV conduction worsens with atropine or exercise, the most likely level of block is at the His bundle, and pacing may be needed.^{4,5}

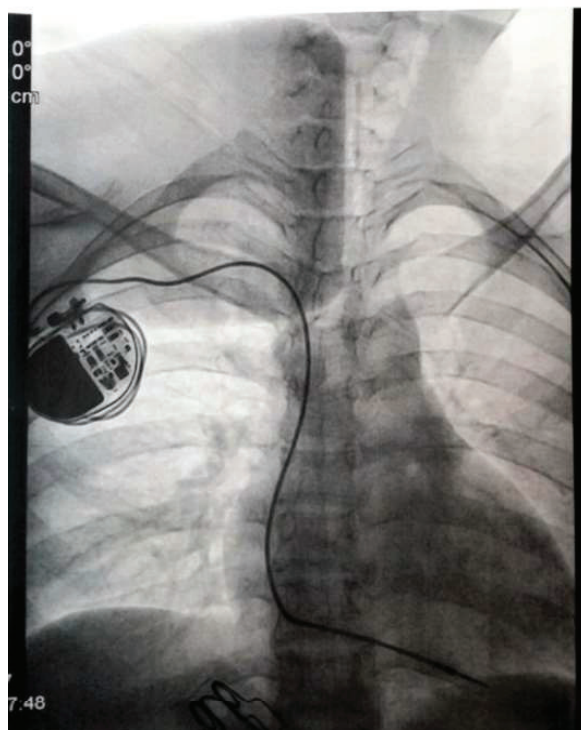


Figure 4. Permanent Pacemaker VVIR Mode attached

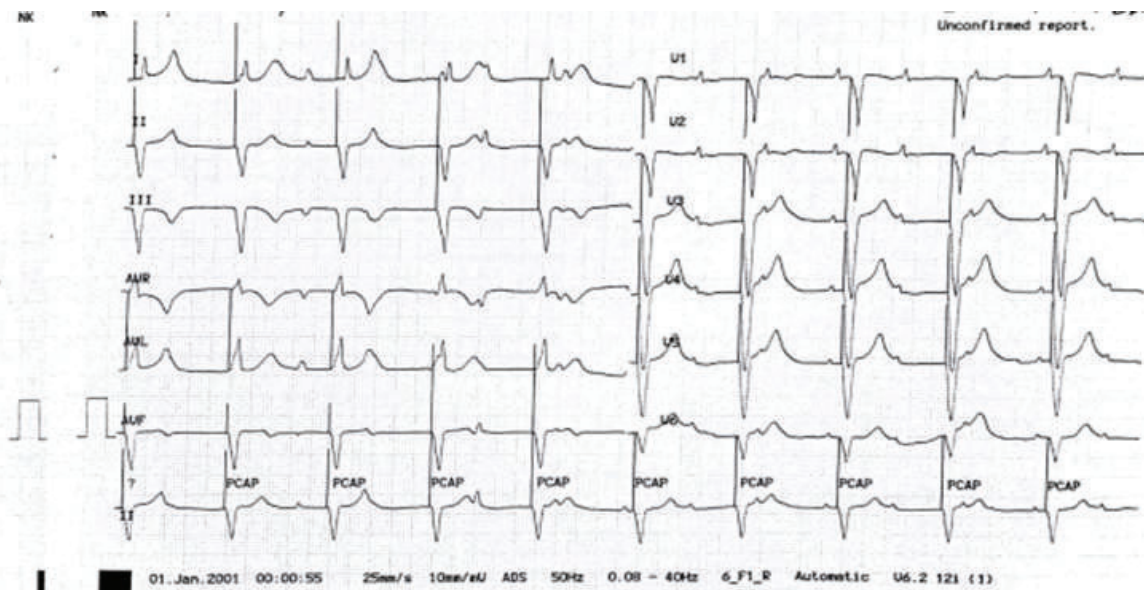


Figure 5. ECG at Post-implantation of Permanent Pacemaker

In this case, physical activity test is not possible because of general condition of the patient. The use of temporary or permanent pacemaker may be indicated because the complete heart block has caused symptoms, that is, patient experienced syncope a month ago. The pairing strategy pacemaker comprehensively by Hidaka et al, shows that in most of the cases of Total AV block that is asymptomatic, delivery can be done safely without temporary pacemaker.⁶

Patient with heart problem and combined with laboratory findings such as leukocytosis may be suspected to have myocarditis. Myocarditis may present with a wide spectrum of symptoms, the lack of precision in routine cardiac test has led to the need for diagnostic advancement. Improvement in the detection of subtle diastolic dysfunction, regional strain rates, and tissue characterization have increased the diagnostic role of echocardiography. In early phases, focal inflammation leads to local cell necrosis and tissue edema, often before left ventricle dilatation or dysfunction are noticeable. Increased sphericity and LV volume occur in acute, active myocarditis.^{7,8} In this case, echocardiography found no focal inflammation that indicated myocarditis.

After correcting the hypokalemia from 2.9 gr/dL to 3.8g/dL, ECG still showed CHB, therefore, it is possible that CHB in this patient was from congenital origin which is irreversible.

A better delivery method is vaginal. Vaginal delivery is related with less blood loss and less risk of infection compared to caesarean section.^{9,10} There is no consensus that mention the absolute contraindications to vaginal delivery because it depends on the patient's condition and their cardiopulmonary tolerance. Caesarean section is chosen when there is an obstetric indication.⁹⁻¹¹ Termination of pregnancy on this patient was done with caesarean section over an obstetric indication which is PPRM.

Patient with symptomatic heart block when approaching term may require insertion of a temporary pacemaker and epidural anesthesia in vaginal delivery as well as assisted delivery with vacuum or forcep to minimize cardiac demand and prevent unwanted effects of induced-valsava maneuvers when the mother is pushing the baby.^{10,14} Permanent pacemaker is used for women with complete heart block who still have symptoms in the postpartum period or have experienced syncope in early pregnancy due to bradycardia. Pacemaker is not

required when complete heart block is asymptomatic.¹⁵ Evaluation of the responsiveness of the heart using atropine is an important key point to know whether the pacemaker is required or not.¹⁶ Atropine is not used in our case because the patient already had Stokes-Adams attack as a symptom of her heart block. Other optional management for these patients are administration of sympathomimetic beta-2 agonists including salbutamol, methylxanthine such as aminophylline, or inotropes such as dopamine. However, pacemaker is mandatory in the patient in our case.

In this patient, because the health insurance coverage has reached the maximum limit, the DDD Pacing Mode was not installed and instead the VVI Pacing Mode was. However, in certain cases with atrioventricular block that require permanent pacing and have significant comorbidities that are likely to determine clinical outcomes and may limit the benefit of dual chamber pacing, single chamber ventricular pacing is effective.¹⁷

Pregnancy cause significant hemodynamic changes, they include increase of blood volume and cardiac output, and reduction of systemic vascular resistance and blood pressure.¹⁰ Therefore, high risk patients should be advised against pregnancy.¹⁸ On this patient, trans-caesarean intrauterine device has been inserted as a family planning method. Sterilization is not done to respect the woman's autonomy and also considering the patient is still young and currently has no living children. A permanent pacemaker has been implanted on the patient which is expected to help the cardiac activity and stabilize it so that it can be possible to face pregnancy.¹⁹

In this case, the neonate was monitored in the Neonatal Intensive Care Unit and died of respiratory problem on post-caesarean day 4.

Conclusion

Complete heart block in pregnancy is a rare condition. ECG is a very reliable and easily available tool to diagnose a serious condition such as CHB. This condition could remain asymptomatic and not detected until pregnancy. Once diagnosed, a multidisciplinary approach involving an obstetrician, a cardiologist and anesthesiologist, facilities for pacing, and close monitoring of the symptoms and cardiac functions are necessary for patients with CHB.

References

- Mandal D. Complete Heart Block and Pregnancy Outcome: An Analysis from Eastern India. *SOJ Gynecol Obstet Women's Heal*. 2015;1(1).
- Tietge W, Daniëls M. A case of an acquired high-degree AV block in a pregnant woman. *Netherlands Hear J*. 2008 Dec;16(12):419–21.
- Budzikowski AS. Third-Degree Atrioventricular Block. 2015.
- Fiser W, Hayes K, Paydak H. Complete Heart block in Pregnancy. case reports *Intern Med [Internet]*. 2017;4:22–4. Available from: <http://www.sciencedirect.com/journal/index.php/crim/article/view/10719>
- Kumar AU, Sripriya R, Parthasarathy S, Ganesh BA, Ravishankar M. Congenital complete heart block and spinal anaesthesia for caesarean section. *Indian J Anaesth [Internet]*. 2012 Jan;56(1):72–4. Available from: <https://pubmed.ncbi.nlm.nih.gov/22529426>
- Hidaka N, Chiba Y, Fukushima K, Wake N. Pregnant women with complete atrioventricular block: perinatal risks and review of management. *Pacing Clin Electrophysiol*. 2011 Sep;34(9):1161–76.
- Mendes LA, Picard MH, Dec GW, Hartz VL, Palacios IF, Davidoff R. Ventricular remodeling in active myocarditis. *Am Heart J [Internet]*. 1999;138(2):303–8. Available from: <http://www.sciencedirect.com/science/article/pii/S000287039970116X>
- Skouri HN, Dec GW, Friedrich MG, Cooper LT. Noninvasive Imaging in Myocarditis. *J Am Coll Cardiol [Internet]*. 2006;48(10):2085–93. Available from: <http://www.sciencedirect.com/science/article/pii/S073510970602105X>
- Bonanno C, Gaddipati S. Mechanisms of hemostasis at cesarean delivery. *Clin Perinatol*. 2008 Sep;35(3):531–47, xi.
- Regitz-Zagrosek V, Blomstrom Lundqvist C, Borghi C, Cifkova R, Ferreira R, Foidart JM, et al. ESC Guidelines on the management of cardiovascular diseases during pregnancy. *Eur Heart J*. 2011;32(24):3147–97.
- Vahanian A, Baumgartner H, Bax J, Butchart E, Dion R, Filippatos G, et al. Guidelines on the management of valvular heart disease: The Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology. *Eur Heart J*. 2007 Jan;28(2):230–68.
- Elkayam U, Ostrzega E, Shotan A, Mehra A. Cardiovascular problems in pregnant women with the Marfan syndrome. *Ann Intern Med*. 1995 Jul;123(2):117–22.
- Hiratzka LF, Bakris GL, Beckman JA, Bersin RM, Carr VE, Casey DEJ, et al. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with Thoracic Aortic Disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, . *Circulation*. 2010 Apr;121(13):e266–369.
- Blake MJ, Martin A, Manktelow BN, Armstrong C, Halligan AW, Panerai RB, et al. Changes in baroreceptor sensitivity for heart rate during normotensive pregnancy and the puerperium. *Clin Sci (Lond)*. 2000 Mar;98(3):259–68.
- Sundararaman L, Hochman Cohn J, Ranasinghe JS. Complete heart block in pregnancy: case report, analysis, and review of anesthetic management. *J Clin Anesth*. 2016 Sep;33:58–61.
- Mohapatra V, Panda A, Behera S, Behera JC. Complete Heart Block in Pregnancy: A Report of Emergency Caesarean Section in a Parturient without Pacemaker. *J Clin Diagn Res*. 2016 Oct;10(10):QD01–2.
- Kusumoto FM, Schoenfeld MH, Barrett C, Edgerton JR, Ellenbogen KA, Gold MR, et al. 2018 ACC/AHA/HRS Guideline on the Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm. Vol. 140, *Circulation*. 2019. 382–482 p.
- Thorne S, MacGregor A, Nelson-Piercy C. Risks of contraception and pregnancy in heart disease. *Heart* 2006;92:1520–1525.
- Coolen J, Turnelp R, Vonder Muhll I, Chandra S. Permanent pacemakers in pregnancy. *Clin Exp Obstet Gynecol*. 2011;38(3):297–8.