CASE REPORT

Pregnancy with Cardiac Pacemaker: A Multidisciplinary Approach to Rare Case Management

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Received on: 20 July 2023; *Accepted on:* 03 August 2023; *Published on:* XX XXXX XX

Abstract

Background: The prevalence of pregnant women arriving with pacemakers has increased due to advancements in pediatric cardiology and surgery. A multidisciplinary approach in the management of these patients leads to better maternal and perinatal outcomes.

Case description: A 26 years term primigravida with labor pain since 3 hours presented to us. She has a history of permanent pacemaker *in situ* after ASD repair done 10 years back. She delivered a healthy child of 2.5 kg by LSCS and got discharged on 7th postoperative day in stable and satisfactory condition.

Conclusion: Pregnant patient with pacemaker requires a multidisciplinary approach. A team of skilled obstetrician, cardiologist, and anesthesiologist are required. All patients with cardiovascular diseases need to be closely monitored during and after pregnancy and should return to their baseline cardiac status after postpartum.

Keywords: Multidisciplinary approach, Pacemaker, Pregnancy.

Journal of South Asian Federation of Obstetrics and Gynaecology (2024): 10.5005/jp-journals-10006-2375

Introduction

Now a days, the prevalence of pregnant women arriving with pacemakers has increased due to advancements in pediatric cardiology and surgery. The use of pacemakers is not limited and is needed for various indications.[1] With the advancement of resources, the prognosis of individuals with congenital heart diseases (CHD) has been markedly improved.[2,3] Pregnancy is a condition in which there is normal physiological alterations in woman's cardiovascular system including significant increase in the cardiac output with decreased systemic blood pressure. The treatment giving obstetrician has to be aware about all this while managing a pregnant female with pacemaker *in situ*.[4] Congenital heart disease may raise the chance of feto-maternal adverse outcomes in pregnant woman; this risk is independent of whether the woman was clinically stable at the time of conception. Therefore, the management of cardiac diseases in pregnancy is very crucial and may turn into nightmare for an obstetrician if not taken care properly.

A woman with permanent pacemaker *in situ* with atrial septal defect repair presented to us in latent phase of labor with 39 weeks 5 days of gestational age.

Case Description

A 26 years primigravida with 39 weeks 5 days of gestational age with known case of operated CHD (atrial septal defect repair done 10 years back) with cardiac pacemaker *in situ* (Fig. 1), referred to AVBRH with labor pain since 3 hours. Her antenatal checkups were irregular and uneventful. She had not followed up with cardiologist since past 6 years and was not on any medication. On examination, her general condition looked fair, her blood pressure was 110/70 mm Hg, pulse rate was 110 bpm. On cardiovascular system examination, it was revealed that she had tachycardia; S1 and S2 were heard with no murmur. Respiratory system examination revealed the presence of bilateral air entry with no added sounds. On per abdomen examination, term size uterus with a single live fetus in cephalic presentation was observed. Fetal heart rate was 140 beats/minute. Uterine contractions were present. On per vaginal examination, cervical os was 2 cm dilated, 50% effaced, with vertex as presenting part which was at (-2) station, membranes were present. Her Hb was 13.3 gram%, total leucocytes count was

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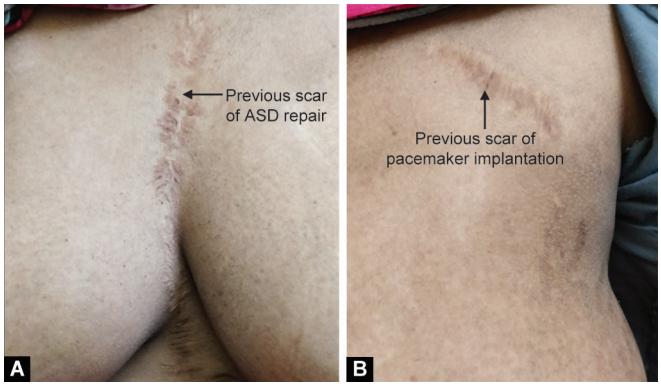
How to cite this article: Joshi J, Tembhare A. Pregnancy with Cardiac Pacemaker: A Multidisciplinary Approach to Rare Case Management. J South Asian Feder Obst Gynae 2024;xx(x):xx–xx.

Source of support: Nil

Conflict of interest: None



Figs 1A and B: Previous scars of pacemaker implantation and ASD repair

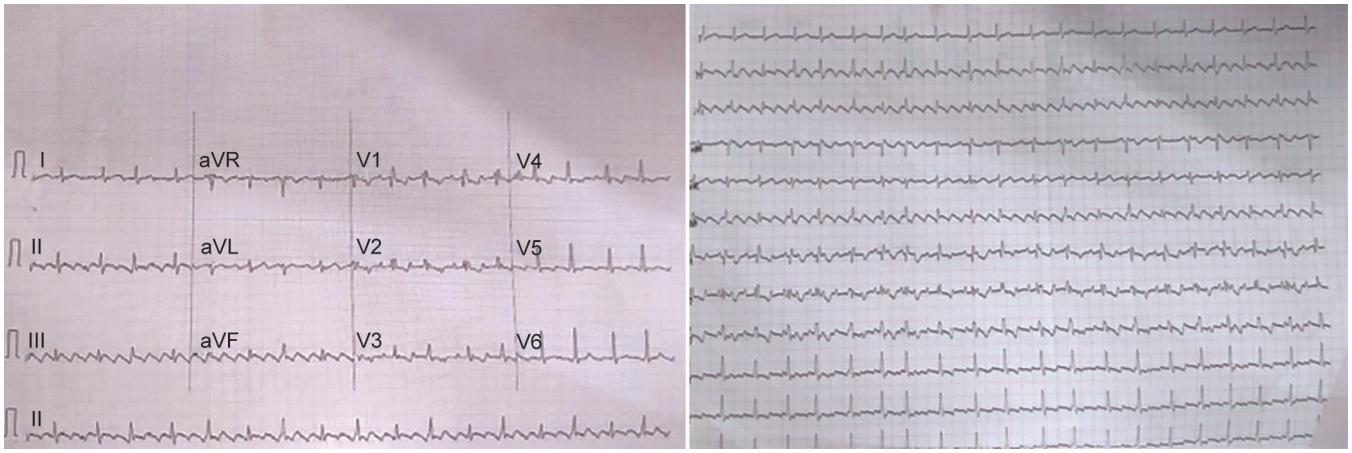


Fig. 2: ECG suggestive of atrial fibrillation with incomplete RBBB

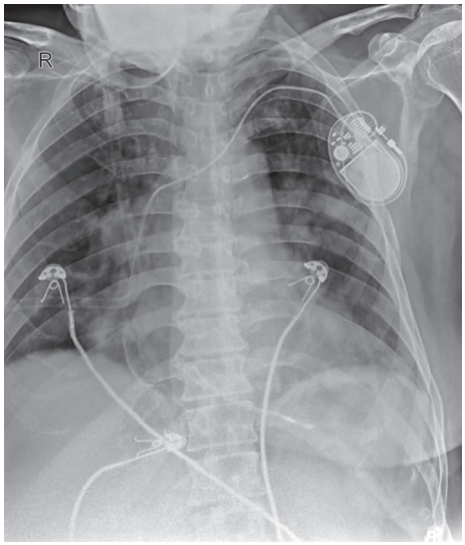


Fig. 3: Postoperative X-ray of patient

11,800/cumm and pletelets count was 2.18 L/cumm. Her INR was 1.01. Her renal function test and liver function test was within normal range and her TSH was 3.06 mIU/mL.

Physician opinion was sought and tab. metoprolol 12.5 mg OD was advised. The ECG recording was suggestive of atrial fibrillation with incomplete RBBB, nonsinus tachycardia (Fig. 2).

After settling the patient, an emergency LSCS was done with high-risk consent under general anesthesia in view of fetal distress with persistent fetal tachycardia. Thick meconium in liquor was present. A female child of 2.5 kg was born. Cardiovascular examination of the neonate was unremarkable. Postoperatively, the patient was shifted to MICU and a chest X-ray was obtained in the PA position (Fig. 3) and an emergency cardiology opinion was taken; The patient was advised metoprolol 25 mg tablet OD.

A bedside 2D ECHO was performed (Fig. 4), which was suggestive of LV, RV, mildly dilated LVEF of 40–50%. Pacemaker lead was *in situ*.

Postoperatively, she was given IV antibiotics and other supportive treatment. Follow-up opinion of the cardiologist was done and tab. metoprolol 25 mg BD, inj. frusemide 20 mg BD, and thromboprophylaxis with low molecular weight heparin were advised. Her heart rate was maintained at 110–120 bpm and blood pressure was at 110/70 mm Hg and rest of the postoperative period went uneventful.

A cardiologist opinion for discharge was taken advising the continuation of tab. metoprolol 25 mg BD, and a 2D ECHO was done suggestive of PPI lead in RV apex. Valves are structurally normal, mild TR, surgical patch *in situ*, no residual shunt; RA and RV are mildly dilated with LVEF of 60%.

She got discharged from the hospital on the 7th postoperative day in stable condition.

The patient followed up in OBGYN OPD after 6 weeks, she was stable with pulse rate of 108 bpm and blood pressure of 110/70 mm Hg, after that she was referred to cardiologist for permanent pacemaker programming and a fluoroscopy image of pacemaker was taken (Fig. 5).

Discussion

During the course of pregnancy, the cardiovascular system of a woman undergoes significant structural and hemodynamic changes. This may cause pregnant woman to require pacemaker support or can change how a patient with an implanted pacemaker is managed.[4] During pregnancy, there is significant increase in cardiac output (30–40%) and a reduction in the systemic vascular resistance of the mother. Initially, this is caused by a raise in the stroke volume, but later on, tachycardia may be the cause. As pregnancy progresses, the gravid uterus lifts the diaphragm, causing the maternal heart to deviate toward left, which causes the QRS axis on an ECG to deviate to the left.

These adaptations during pregnancy are required for adequate fetal growth and adequate fetal development, and any maladaptation can lead to fetal morbidity.[5] The most common form of CHD is atrial septal defect in which left-to-right shunting leads to volume overload in right ventricle and excessive pulmonary blood flow resulting in complications like exercise intolerance, atrial arrhythmias, pulmonary vascular diseases, right ventricular dysfunction, and paradoxical thromboembolism.

Many women with cardiac pacemaker *in situ* have had successful pregnancy outcomes after its first case of implanted cardiac pacemaker in pregnancy in 1962. The commonest reasons for pregnant patient presenting with pacemaker *in situ* is the SA nodal dysfunction and atrioventricular block.

Different types of pacemakers exist today. Pacemakers mainly has one pulse generator and electrode wires or leads. In the case

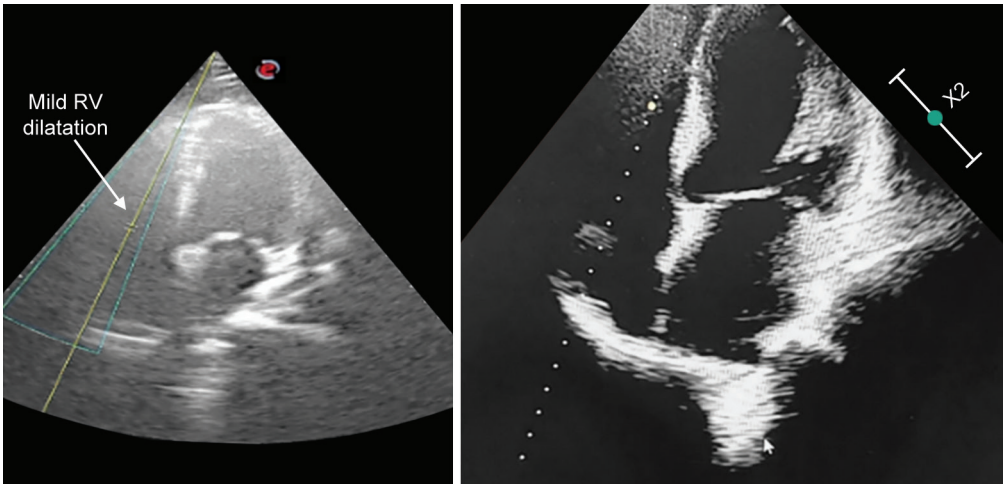


Fig. 4: 2D ECHO suggestive of mild right ventricular dilatation

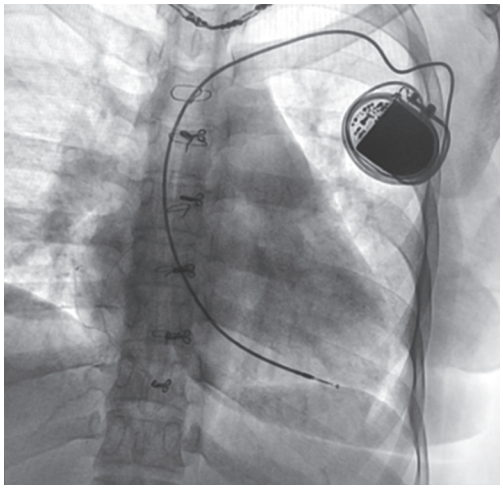


Fig. 5: Fluoroscopy image of single chamber pacemaker connecting the lead to right ventricle

of permanent pacemakers, transvenous lead placement is done through axillary, cephalic, or through subclavian veins.[4] Our patient had a single chamber permanent pacemaker controlling the heartbeat pacing by connecting the lead to right ventricle. Single chamber pacemakers have the benefits of lower rate of thromboembolism, less chances of atrial fibrillation, and lower mortality as compared with dual chamber pacemakers.

Preconception counselling should be done in patients with pacemakers; as it allows the evaluation of one's cardiac status, we can optimize her condition beforehand and can detect other comorbidities which may affect the pregnancy in later stages. Modifications in pharmacological treatment could be done for pregnancy. In patients with congenital heart diseases, there is 2–5 times higher risk of fetus having cardiac anomalies. And some of the genetic conditions have specific markers which can be detected by chorionic venous sampling or amniocentesis.[4]

During pregnancy, a multidisciplinary approach for the management of these patients should be done. Prior consultation with a cardiologist is advised because it can be challenging to mention the difference between typical pregnancy symptoms and moderate cardiac dysfunction, which may call for a change in pacemaker programming of the patient. However, attention should be paid to any new onset symptoms, such as palpitations, breathlessness, dizziness, syncope, exercise intolerance, and confusion. In patients with pacemakers, routine anticoagulation is typically not advised, but when it is necessary, heparin derivatives are preferred over warfarin. An anesthesiologist's opinion should also be taken as epidural anesthesia used for painless labor can attenuate the increase in the cardiac output at full dilatation of cervix. In patients undergoing cesarean section, anesthesiologist should be aware of pacemaker programming. Epidural anesthesia is preferable over spinal as it is less likely to cause maternal hypotension and subsequent fetal bradycardia. Any electrolyte abnormalities should be corrected beforehand. Use of electrocautery should be done cautiously.

Preexisting pacemakers are not a contraindication to vaginal birth; hence, in majority of cases, vaginal delivery is preferred. The reasons for a cesarean birth are the same for women with cardiac disease as they are for others, including those with permanent pacemakers. Choosing a route of delivery is based on obstetric indications and other comorbidities related to pregnancy.

Conclusion

Care for patients who have pacemakers *in situ*, management during and after pregnancy must be multidisciplinary as this can be challenging to mention the difference between typical pregnancy symptoms and moderate cardiac dysfunction. During pregnancy, labor, and delivery, the pregnant woman with a permanent pacemaker *in situ* runs the risk of experiencing destabilized cardiovascular adaption. Despite cesarean section in this case, the mode of delivery is based on obstetric indications of the patient. The best care to the mother and fetus can be provided only by a multidisciplinary team. Following delivery, the patient's heart condition should revert to its prepregnant state. Otherwise, the pacemaker settings should be modified accordingly.

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