Section: Cardiology

Original Research Article

A BEAT OF TWO HEARTS "- CLINICAL PROFILE AND OUTCOMES OF MATERNAL ARRHYTHMIAS ON MATERNAL AND FETAL OUTCOMES

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Abstract

Background: Maternal morbidity and mortality due to cardiovascular causes in non-structural heart disease have risen steadily due to multifactorial causes. In particular, limited data suggest an increased incidence of pregnancy-related arrhythmias, including supraventricular tachycardia (SVT), atrial fibrillation (AF), atrial flutter, and ventricular tachycardia (VT). Although many arrhythmias during pregnancy have been considered benign, there is also limited data suggesting a causal role for maternal comorbities during pregnancy. The association between arrhythmias before or during delivery and APOs and other cardiovascular outcomes, including cardiogenic shock and cardiac arrest, is underestimated during pregnancy. It is therefore necessary to recognize causative agent and risk factors associated with arrhythmias during pregnancy, particularly if associated with APOs and other outcomes, to better guide in prognosis and management. **Materials and Methods:** This Prospective Observational study was based on a single Tertiary care hospital antenatal registry of in Coimbatore Medical College & Hospital. 50 patients enrolled form July 2021- June 2023 and closed followed up for outcomes and characterstics. **Result:** The most common arrhythmia seen during pregnancy is supraventricular tachycardia in 42%, followed by ventricular premature complexes in 32%, Atrial fibrillation found in 14% of cases. Almost 70% of arrhythmias due to SVT / PVCs found in IIIrd Trimester of pregnancy. Ventricular tachycardia 4% is the most common hemodynamically unstable arrhythmia. Bradyarrhymias were relatively infrequent with AV Blocks / CHBs noted in 8% of cases. Palpitation 70% was the most common presenting symptom followed by weakness and fatiguability in 60% of cases. 84% of arrhythmias were idiopathic Origin mostly. Atrial fibrillation occurred due to pulmonary embolism and hyperthyroidism in (4)60%. About 76% of cases undergone normal delivery with 24% cases were taken for Cesarean section. There was one case (2%)of stillbirth and one case of preterm labor (2%) with LBW. Majority (98%) of cases had no major adverse neonatal and maternal outcomes. Maternal death wasn't noted during study. No patients required pacemaker insertion or intervention in form of RFA in course of pregnancy for any form of arrhythmias. **Conclusion:** In pregnant women with no structural heart disease supraventricular tachycardia and ventricular premature complexes were common arrhythmia with majority of cases noted during IIIrd trimester of pregnancy. Majority of cases have good pregnancy course and outcomes.

INTRODUCTION

Maternal morbidity and mortality due to cardiovascular causes in nonstructural heart disease have risen steadily due to multifactorial causes. In particular, limited data suggest an increased incidence of pregnancy-related arrhythmias, including supraventricular tachycardia (SVT), atrial fibrillation (AF), atrial flutter, and ventricular tachycardia (VT). Although many arrhythmias during pregnancy have been considered benign, there is also limited data suggesting a causal role for maternal comorbities during pregnancy. Many cardiovascular risk factors, including preexisting

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diabetes, obesity, and hypertension increase the risk of adverse pregnancy outcomes (APOs), including preeclampsia and preterm labor, which then contribute to later cardiovascular diseases and play a role in arrhythmogenesis in pregnancy. However, the association between arrhythmias before or during delivery and APOs and other cardiovascular outcomes, including cardiogenic shock and cardiac arrest, is underestimated during pregnancy. It is therefore necessary to recognize causative agent and risk factors associated with arrhythmias during pregnancy early, particularly if associated with APOs and other cardiovascular outcomes, as it could help guide further risk mitigation. The purpose of this paper is threefold: (1) To provide a contemporary analysis of the prevalence of arrhythmias in delivery hospitalizations, (2) To identify outcomes associated with arrhythmias during delivery hospitalizations, and (3) To identify risk factors associated with arrhythmias during delivery hospitalization.

The physiological alterations during pregnancy result in hemodynamic changes, including increased heart rate, intravascular blood volume and cardiac output, and reduced systemic vascular resistance. In addition, the plasma levels of catecholamines and neurohormones, and adrenergic responsiveness, are increased in pregnancy. All of these may provoke or exacerbate maternal arrhythmias. During pregnancy an increased incidence of maternal cardiac arrhythmias is observed, ranging from clinically irrelevant isolated APBs or VPBs to debilitating SVT and VT or VF. In all pregnant patients with tachyarrhythmias, evaluation of the underlying etiology and the degree of left ventricular function/dysfunction is essential. Correct treatment of arrhythmias in the intensive care patient should be based on understanding the causal mechanism. In pregnant women with maternal and/or fetal arrhythmias, therapeutic strategies should be based on interdisciplinary co-operation (obstetrics, cardiology). In general, acute therapy of arrhythmias during pregnancy is similar to that in the non-pregnant patient. However, special consideration should be given to potential teratogenic and hemodynamic adverse effects on the fetus.

Aim

To study the effects of cardiac arrhythmias and antiarrhythmic treatment on the course and outcomes of pregnancy.

MATERIALS AND METHODS

This Prospective Observational study was based on a single Tertiary care hospital antenatal registry of in Coimbatore Medical College & Hospital. The study protocol was approved by the Institutional Ethical Committee. Informed consent from patients was not necessary given the registered nature of the study, nonetheless all patient records/information were anonymous prior to analysis.

Patients

The analytical cohort for this study consisted of patients enrolled from antenatal registry aged 17 – 42 years in our hospital from June 2021 to 2023.Inclusion criteria were as follows 1. Asymptomatic antenatal patients having ECG findings suggestive of bradyarrhythmias & Tachyarrhythmias on routine antenatal cardiac screening. 2. Asymptomatic patients with prior h/o Arrhythmia 3. Asymptomatic patients with Congenital complete heart block. 4. Symptomatic Antenatal patients on evaluation of syncope & palpitations with ECG finding suggestive of abnormal rhythm were all included in study. All enrolled patients were evaluated with appropriately with ECHOCARDIOGRAPHY, HOLTER MONITORING, THYROID PROFILE, ELECTROLYTES & CT PULMONARY ANGIOGRAPHY if needed for certain patients to rule out Pulmonary embolism. All Patients with structurally abnormal heart with any form of arrhythmia were excluded from the study. Patients were monitored periodically in all trimesters.

Outcomes and Management

Maternal arrhythmias were characterized according to the various subtypes such as SVT, PVCs, AF, AV Blocks (AVB), Complete Heart Block (CHB) and Ventricular fibrillation (VF). The primary endpoint was all cause in-hospital mortality. Secondary endpoints included APOs such as preterm labor, preeclampsia, placenta previa, adverse fetal outcomes such as fetal death, mode of delivery such as cesarean section and cardiovascular outcomes such as cardiogenic shock, cardiac arrest, complete heart block and pacemaker implantation, and acute heart failure. All cases were managed accordingly with ACC/ AHA guidelines for management of arrhythmias during pregnancy.

Statistical Analysis

All of the statistical analyses were performed using SPSS19.0 (SPSS Inc., Chicago, USA).

RESULTS

Trends and characteristics of arrhythmias in pregnancy. [Figure 1-5]

The most common arrhythmia seen during pregnancy is supraventricular tachycardia in 42%, followed by ventricular premature complexes in 32%, Atrial fibrillation found in 14% of cases. Ventricular tachycardia 4% is the most common hemodynamically unstable arrhythmia noted in pregnancy. Bradyarrhymias were relatively infrequent with AV Blocks noted in 4% cases and Congenital Complete Heart Block noted in 6% of cases. all hemodynamically stable arrhythmias were managed medically with Ventricular tachycardia was unstable arrhythmia requiring DC shock followed by Cesarean section.Only 20% patients have h/o of arrhythmia prior to pregnancy. Palpitation 70% was the most common presenting

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symptom followed by weakness and fatiguability in 60% of cases. Only 5% of cases were presented with syncope. 84% of arrhythmias were idiopathic mostly Atrial fibrillation occurred due to underlying causes with pulmonary embolism and hyperthyroidism in (4)60%, cases of atrial fibrillation. About 76% of cases undergone normal delivery with 24% cases were taken for Cesarean section. There was one case of stillbirth and one case of preterm labor with LBW baby requiring neonatal intensive care. Majority (98%) of cases had no major adverse neonatal and maternal outcomes. No patients required pacemaker insertion or intervention in form of RFA in course of pregnancy for any form of arrhythmias.

1. Supraventricular Tachycardia [Figure 1,4,5].

The most common arrhythmia seen during pregnancy is supraventricular tachycardia, found in 40% (20) cases. Among the supraventricular tachycardia (4)20 % were detected during first trimester, (7) 35% cases were noted during second trimester, (9)45%cases were noted during third trimester. All cases of Supraventricular tachycardias were hemodynamically stable managed with medical strategy alone. 20% of cases undergone Cesarean section for obstetric conditions, rest 80% were normal delivery. There were no adverse Maternal or fetal outcomes.

2. Premature Ventricular Contractions [Figure 1,4,5].

The second common arrhythmia seen during pregnancy is Premature ventricular contractions, found in 32% (216) cases. Among the Premature ventricular contractions (3)19 % were detected during first trimester, (5) 31% cases were noted during second trimester, (8)50%cases were noted during third trimester. All cases of PVCs were hemodynamically stable required management with medical strategy alone. 18 % of cases undergone Cesarean section for obstetric conditions, rest 82% were normal delivery. There were no adverse Maternal or fetal outcomes

3. Atrial Fibrillation [Figure 1,4,5]

Atrial fibrillation was noted in 14% of cases in pregnancy. Among 7 cases of atrial fibrillation, (2)28.5% cases were due to hyperthyroidism, (2) 28.5% cases due to pulmonary embolism (3) 43% cases is of idiopathic origin due to paroxysmal Atrial fibrillation. Among Atrial fibrillation (4) 57% were detected during first trimester, (1) 14% cases were noted during second trimester, (2) 29%cases were noted during third trimester. Almost all cases of Atrial fibrillation were hemodynamically stable managed with rate control strategy and treatment of underlying etiology. 40% of cases undergone Cesarean section for obstetric conditions. There was no adverse Maternal or fetal outcomes.

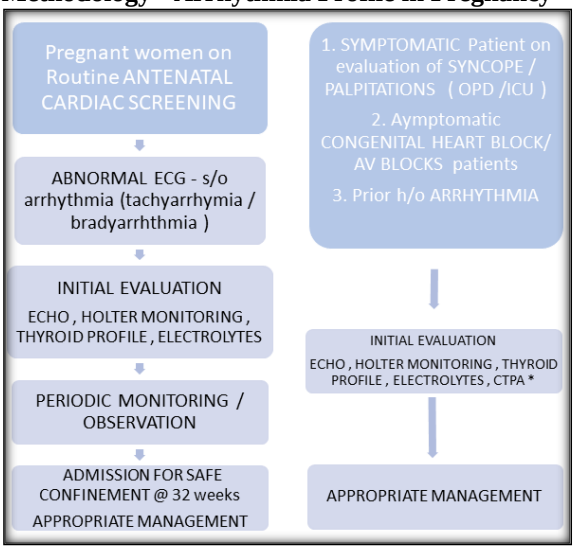
4. Ventricular Fibrillation [Figure 1,4,5].

Ventricular fibrillation is most common hemodynamically unstable arrhythmia detected antenatally. 2 cases required Synchronised DC shock followed by medical management with amiodarone and betablockers. Since both cases were detected during third trimester, emergency cesarean section was done followed by intensive care management. One case was associated with Stillbirth and other case had preterm labor and LBW baby managed without any adverse outcomes.

5. Bradyarrhythmias [Figure 1,4,5].

Only 10% (5) cases were diagnosed antenatally with bradyarrhythmia. out of 5 2 cases had 2:1 or higher degree AV Blocks, 3 cases were congenital Complete Heart block without any symptoms. All cases bradyarrhythmias were detected early in course of pregnancy and were well tolerated without any adverse fetal or maternal outcomes.

Methodology - Arrhythmia Profile in Pregnancy



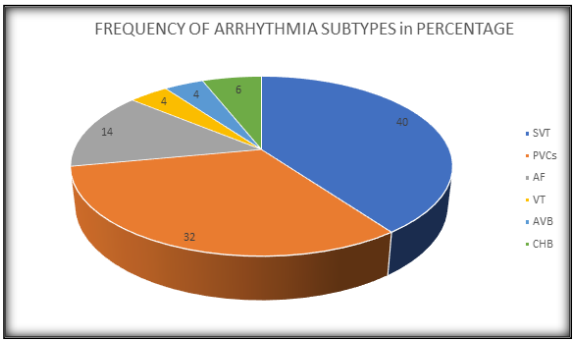


Figure 1: Frequency of arrhythmia subtypes in pregnancy

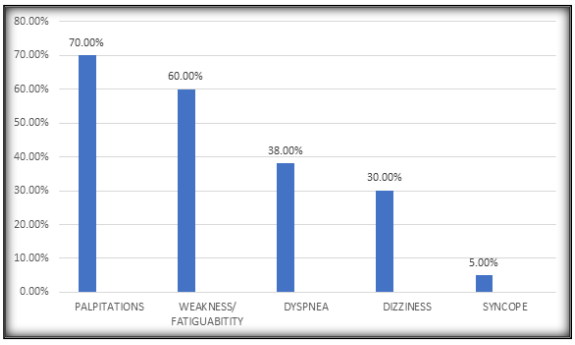


Figure 2: Symptamatology of Arrhythmia in Pregnancy

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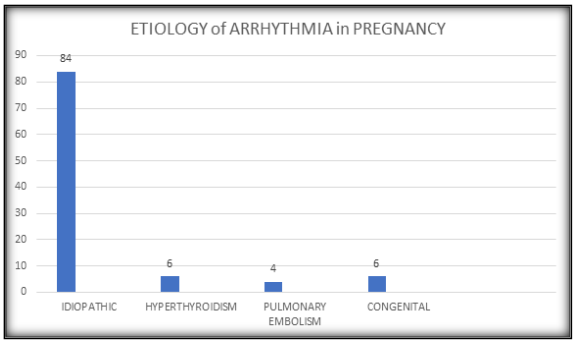


Figure 3: Etiology of Arrhythmia

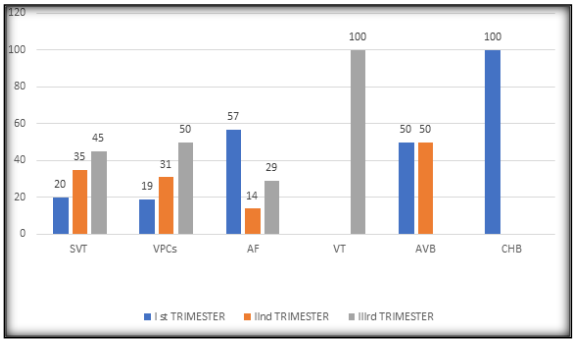


Figure 4: Occurrence of Arrhythmia During Course of Pregnancy

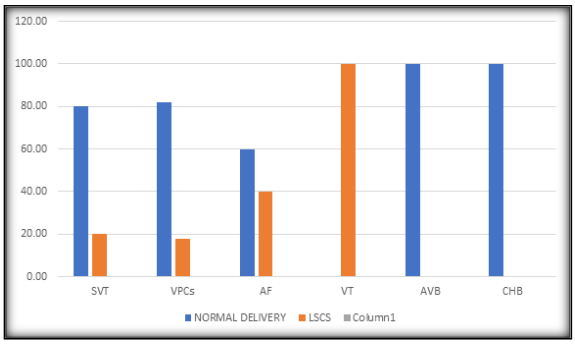
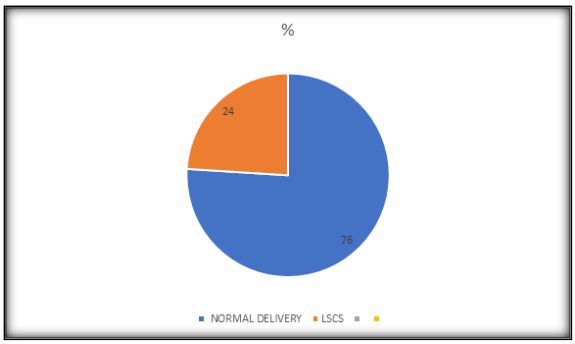


Figure 5: Mode of Delivery in Arrhythmia – Subtypes.



DISCUSSION

These findings build upon previously published studies, which have all shown an increased frequency of arrhythmias in pregnant women since the 2010s.[1-5] Our findings demonstrate a similar increase in arrhythmias from 2009 to 2019 In another report of pregnancy hospitalizations from 2000 to 2012 AF was the most frequent arrhythmia in pregnancy; but according to our study SVT is most common arrhythmia in pregnancy, which has benign course At the very least, the presence of an arrhythmia might help identify a higher risk group that will benefit from addressing cardiovascular health during pregnancy and in the post-partum time frame Arrhythmias were also associated with increased obstetric complications, including increased likelihood of Cesarean section, cardiovascular complications, including cardiac arrest, and APOs, specifically preeclampsia and preterm labor.[6-10]

All women with increased CVD risk benefit from multidisciplinary care and preventive cardiology intervention prior to pregnancy and antenatally. As more individuals with either simple or complex cardiovascular history are becoming pregnant, interdisciplinary cardio-obstetric collaboration has been instrumental to reduce cardiac maternal morbidity. Management of arrhythmia must occur at every stage of pregnancy, from prevention to early recognition of complications during delivery. Current risk scores for cardiovascular maternal morbidity, such as ZAHARA and CARPREG II (Cardiac Disease in Pregnancy II) already include history of prior cardiac events or arrhythmias in their score. It is therefore to make necessary interventions on cardiovascular comorbidities of pregnant women to reduce the growing morbidity and mortality of arrhythmia.[11-13]

CONCLUSION

In pregnant women with no structural heart disease supraventricular tachycardia and ventricular premature complexes were common arrhythmia with majority of cases noted during IIIrd trimester of pregnancy. Majority of cases have good pregnancy course and outcomes.

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