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ASSESSMENT OF DIASTOLIC FUNCTION DURING NORMAL PREGNANCY

Cardiology

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ABSTRACT

INTRODUCTION : Pregnancy changes haemodynamics dramatically. Our aim is to assess diastolic function in normal healthy pregnant mothers, and changes in diastolic function in each trimsters and in post-partum period.

MATERIALS AND METHODS: our study was planned as prospective in nature, assessing diastolic functions on 40 asymptomatic, healthy antenatal pregnant women who came to our cardiology outpatient department for routine checkup from the period of March 2018 to April 2019..

RESULTS: E wave -peak transmitral velocity in early diastole, decreased significantly during third trimester and postpartum. No much variation in I trimester. A wave - the atrial contraction wave increased in second trimester and decreased in third trimester and postpartum.So E/A ratio reduced progressively by the duration of pregnancy as pregnancy advanced. Em peak myocardial velocity of early diastole by (TDI) increased during second trimester followed by decrease in in third trimester and postpartum . Am – peak myocardial velocity of atrial contraction increased progressively as pregnancy advances.So the net result was reduction in both E/Em ,Em/Am ratios through the pregnancy.

KEYWORDS

E-Wave peak transmitral velocity in early diastole, A -wave the atrial contraction wave, Em peak myocardial velocity wave, Am – peak myocardial velocity of atrial contraction, TDI- Tissue Doppler Imaging

INTRODUCTION

Pregnancy changes haemodynamic dramatically. Preload and afterload increases and cardiac output increases by 30-50%.in the heart. Both systolic and diastolic function alters, and coming to normalcy in the postpartum period. Changes are seen in the transmitral flow velocities and also in the Tissue Doppler Imaging. However the values of transmitral inflow velocities are load dependant and hence volume overloaded heart of pregnancy may not correctly assesses the diastolic function. But Tissue Doppler Imaging ,being a load independent technique, will give a more accurate assessment of diastolic function in pregnant women. In our study the aim was to evaluate maternal diastolic function

METHODS AND MATERIALS

our study was planned as prospective in nature, on 40 asymptomatic, healthy antenatal pregnant women. M –mode, transmitral flow velocities (E-wave early diastolic wave, A-wave atrial contraction wave) and TDI studies (peak myocardial velocities during early diastole Em wave), during atrial contraction (Am wave) and peak systole in ejection phase (Sm wave) performed in I,II,III trimester and in postpartum (in the third week-postpartum)the variations in the values between each phase analysed.

RESULTS

Forty healthy pregnant women were selected .Of which thirty eight came for second semester review/assessment. Thirty two and thirty reported for third and post-partum assessment respectively. The mean age was 22.0 +/- 6.8 yrs. Their BMI was 22+/- 3.0 /kg/meter square

E wave -peak transmitral velocity in early diastole, decreased significantly during third trimester and postpartum. No much variation in I trimester.

A wave - the atrial contraction wave increased in second trimester and decreased in third trimester and postpartum

So E/A ratio reduced progressively by the duration of pregnancy as pregnancy advanced,

Em peak myocardial velocity of early diastole by (TDI) increased during second trimester followed by decrease in in third trimester and postpartum.

Am – peak myocardial velocity of atrial contraction increased progressively as pregnancy advances.

So the net result was reduction in both E/Em ,Em/Am ratios through the pregnancy.

DISCUSSION

In our study we have found changes in maternal diastolic function throughout pregnancy. In the first trimester due to increased venous return (pre load) both Em and Am increases. Due to physiological myocardial hypertrophy of pregnancy, reduction in myocardial relaxation took place, results in reduction of Em wave in second and third trimesters. This is compensated by increased LA pressure and volume contribution for LV filling as gestation advances. Hence Am wave increases as gestation advances ,and Em/Am ratio decreases from first to third trimester. In spite of reduction in E/A ratio from second trimester, we found to have normal Em or with insignificant changes. The E/Em ratio which conveys Left Atrial pressure showed very little change or decreased from second trimester onwards. Thus it was apparent that diastolic function was not impaired during normal pregnancy the increase in preload was managed by the heart by the increase in LA contractile augmentation.

This study results are similar to Mesa et al (ref 1) in which they demonstrated that E wave and E/EA ratio decreased from second to third trimester and coming back to normalcy in post-partum. So it is evident from this study maternal diastolic function alters during pregnancy to compensate increased venous return understanding this will help us to anticipate early signs of LV failure features and take prompt measures to prevent it.

CONCLUSION

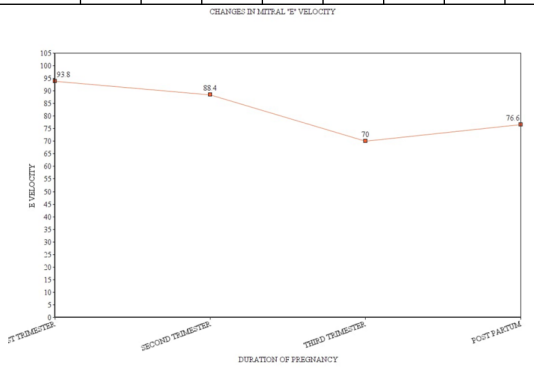
By understanding the normal physiological variation of diastolic function during pregnancy it is possible to detect early heart failure features and take prompt action. Transmital velocities are load dependant. Hence TDI being load independent it may be used as a non-invasive method for monitoring maternal cardiac functions in high risk cases to detect early signs of cardiac failure and for appropriate interventions. Changes in myocardial relaxation observed throughout pregnancy. During pregnancy, LV diastolic functions preserved with alterations in its flow velocities and myocardial velocities to manage the increase in preload. In the post-partum period the parameters are found to return to normalcy.

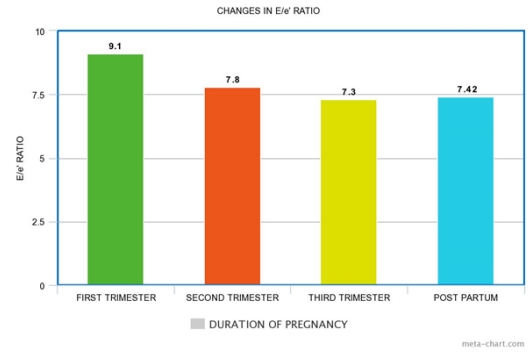
Chart I

Transmitral inflow, Tissue Doppler Imaging ,Deceleration Time in all the three Trimsters and Post-partum periods.

	E	A	e	a	E/e	E/A	DT	s
First Trimster	93.8 +/- 14.2	50.2 +/- 9.6	10.2 +/- 2.4	6.2 +/- 1.42	9.1 +/- 2.4	1.86 +/- 0.5	154.6 +/- 28	11.2 +/- 1.4
Second Trimster	88.4 +/- 12.6	53.8 +/- 8.8	11.4 +/- 1.8	6.8 +/- 1.2	7.8 +/- 1.4	1.64 +/- 0.4	182 +/- 30	11.6 +/- 1.6

Third Trimster	70 +/- 13.4	49.6 +/- 8.4	9.6 +/- 1.6	8.4 +/- 1.8	7.3 +/- 1.6	1.41 +/- 0.53	186 +/- 26	11.8 +/- 1.4
postpartum	76.6 +/- 12.6	44.6 +/- 8.2	6.4 +/- 2.2	7.6 +/- 1.4	7.42 +/- 1.8	1.71 +/- 0.3	148 +/- 36	11.4 +/- 1.2





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