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Original Article

Evaluation of mitral and tricuspid valve velocities in 45 fetuses

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Abstract

Objectives: The study was done to assess the tricuspid and mitral valve velocities in 45 fetuses between 18 and 28 weeks and to compare these findings with reported values from literature. *Methods*: The study was conducted on 45 women referred to the clinic for sonography examination. They were between 18 and 28 weeks gestation. They had no past history of any medical disorder, no history of drug exposure, and no family history of congenital heart disease. They had undergone 1st trimester screening and the NT was reported as normal. The fetuses were otherwise normal with respect to sonographic findings. Fetal echocardiography was done using 2D and color Doppler. Standard views of the heart were obtained and were confirmed to be satisfactory and normal. When these conditions were satisfied, the patients were included in the study. The mitral and tricuspid velocities were assessed with Pulsed Wave Doppler. Peak "A" wave velocities across both valves were measured. From the data, mean velocity, minimum and maximum values and 95% confidence limits were calculated. *Results:* The mitral valve peak "A" wave velocity observations were, mean mitral valve velocity = 45.67 cm/sec, maximum mitral valve velocity = 75.81 cm/sec, minimum mitral valve velocity = 31.00 cm/sec, standard deviation = 10.20, maximum 95% confidence limit = 66.08 cm/sec and minimum 95% confidence limit = 25.27 cm/sec. The tricuspid valve peak "A" wave velocity observation were Mean Tricuspid velocity = 46.61 cm/sec, Max velocity = 76.39 cm/sec, Min velocity = 33.97 cm/sec, sd = 8.44, higher 95% confidence limit = 63.50 and lower 95% confidence limit 29.72 cm/sec. *Conclusions:* The results showed that the velocities obtained in the Indian population were similar to those obtained in the western literature.

Key words: mitral velocity, tricuspid velocity

Aim

This study was done to assess the tricuspid and mitral valve velocities in 45 fetuses between 18 and 28 weeks and to compare these findings with reported values from literature.

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Material and Methods

Forty five otherwise normal pregnancies studied. All were singleton pregnancies. Any history of drug ingestion or family history of congenital heart disease was ruled out. All the patients had a nuchal translucency examination at 11-13+6 weeks. For this study, all patients with NT measurement less than 3.2mm were taken. Maternal FBS and PLBS values obtained. All the patients enrolled in the study had normal values. Detailed sonography examination was done on Voluson 730 using 2 D sonography. The subjects enrolled in the study underwent sonography once at various gestational ages between 18 to 28 weeks. The fetus was examined sonologically to rule out any abnormalities. Biometric measurements were taken. All the patients included in

the study had normal biometry (Mediscan chart). The machine setting was changed to "Fetal Echocardiography". STIC technology was not used for this study. The measurements were taken with harmonics setting turned on. The situs was confirmed by locating the position of stomach, aorta, IVC and heart. The axis was determined by visual inspection. The size of the heart was assessed and compared with the size of the thorax at the four chamber view.

Standard views of the fetal heart were first assessed to rule out any cardiac abnormality. These included (1) Four chamber view - apical and lateral, (2) Right and left ventricular outflow view, (3) Short axis view ventricles and great vessels (4) Both the arches. Only those cases where all these views were satisfactory and normal were included in the study. The velocities were obtained with Pulsed Doppler. The measurements obtained were "A" wave mitral and tricuspid valve velocities. The mitral and tricuspid valve velocities were obtained by placing the sample gate just distal to the valves in the respective ventricles. The four chamber view was used for these measurements.

Results

The 45 enrolled patients had pregnancies between 18-28 weeks amenorrhea. Mean gestational age was 24.59 weeks. The fetal heart rate varied between 134 bpm and 166 bpm. Average FHR was 146.50 bpm.

The mitral valve "A" wave velocity observations were, mean mitral valve velocity = 45.67 cm/sec, maximum mitral valve velocity = 75.81 cm/sec, minimum mitral valve velocity = 31.00 cm/sec, standard deviation = 10.20, maximum 95% confidence limit = 66.08 cm/sec and minimum 95% confidence limit = 25.27 cm/sec

The tricuspid valve "A" wave velocity observations were as follows:
Mean tricuspid velocity = 46.61 cm/sec, Maximum velocity = 76.39 cm/sec, Minimum velocity = 33.97 cm/sec, sd = 8.44, Higher 95% confidence limit = 63.50 and lower 95% confidence limit 29.72 cm/sec.

Discussion

Nuchal translucency has been reported as being a marker for cardiac diseases[1]. Patients with increased NT with normal chromosomes have been known to have higher incidence of congenital heart disease[1].

Several conditions like family history of congenital heart disease, exposure to known cardiac teratogens and maternal conditions like diabetes, presence of extracardiac markers for cardiac diseases are known to increase the possibility of congenital heart disease[2].

Table 1
Mitral valve peak velocity

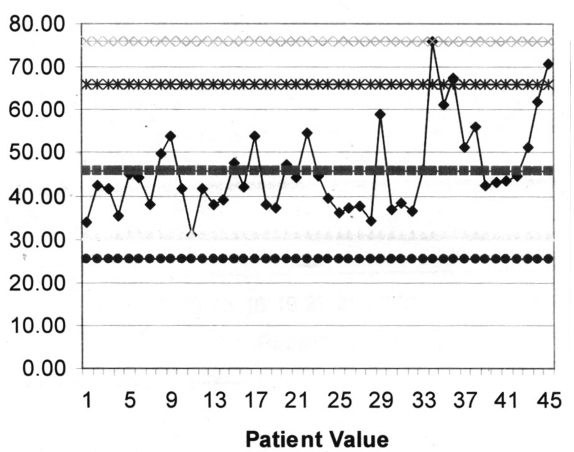
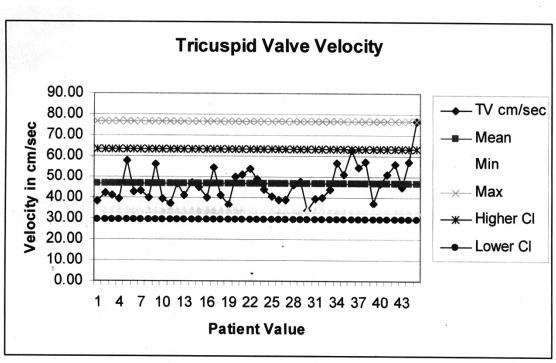


Table 2
Tricuspid Valve Peak Velocity



The normal "A" wave tricuspid and mitral valve velocities have been reported as mitral = 47+/- 1.1 (range 20.8-67.6) and tricuspid = 51 +/- 1.2 (range 34.1-78.2)2. The velocities observed in the study were, mitral = 45.67 (range 31-75.81) and tricuspid = 46.61 (range 33.97-76.39). The observed values were more or less similar to the reported values in the literature. The values of the mitral and tricuspid velocities remain same throughout the pregnancy[2].

Flow velocities slower than the normal range is suggestive of valve atresia while increased velocity is suggestive of valvular stenosis. Study of the velocities gives a good idea of the dynamics across the valves and helps us understand the dynamics of the fetal heart better.

Apart from the measurement of absolute values, the exercise of measuring the velocities dictates close examination of the structures concerned. One needs to use 2D color Doppler and pulsed wave extensively. As a result, subtle abnormalities of the valve, concerned chambers are easily appreciated. Any alteration in velocity can raise suspicion about abnormality in the valve/chambers before and after the valve. This can stimulate the examiner to carry out more detailed examination.

Conclusion

Thus it can be concluded that the velocities of the tricuspid and the mitral valves in Indian population corresponds to the reported values in the western literature.

References

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