CHAPTER V

DISCUSSION AND CONCLUSION

The use of Echocardiography to predict pulmonary artery pressure seems to be the most popular technique and various parameters are shown to have good correlation. Initial study by M - mode pulmonic valve echocardiogram suggested various predictors of pulmonary hypertension but they are less sensitive and only qualitative evaluation can be demonstrated. Difficulty in determination of opening and closing of pulmonic valve is one of the problem in clinical practice and recent progress in 2-dimensional and pulsed doppler echocardiography has provided an easier means of detecting intracardiac blood flow , so M - mode echocardiography today can help only to qualitative determination of pulmonary artery hypertension.

MPA diameter measured from 2-D echocardiogram in this study shows no correlation with pulmonary artery pressure. Various factors may cause the dilatation of MPA, in some patients the MPA was enlarged but the PAP was normal or slightly increased, and in some cases of CHD with left to right shunt the PAP was high but the MPA was normal. Previous study by Goodman et al., 1974, Kasper et al., 1980 and Zenger et al., 1985 showed a very good correlation between MPA diameter and PAP, but their studies were done only in selected patients. In this study there are various heart diseases that may interfere with this correlation,

especially in CHD with left to right shunt or in some cases of valvular heart diseases so the MPA diameter may correlate with PAP insome groups of these patients.

In the present study, RV ejection flow was recorded by pulsed wave doppler echocardiography with sample volume placed just distal to the pulmonic valve to obtain the best flow pattern, but in 4 patients with PDA the sample volume was put just proximal to the pulmonic valve to avoid the turbulence in MPA as recommended by Isobe et al. ,1986. The best correlation was found between AT/ET ratio or AT/DT ratio and the PAP. AT alone also has good correlation with PAP as well as PEP/AT ratio but PEP/ET failed to have good correlation.

From previous studies by Hirschfeld et al, 1975, and Riggs et al, 1978 demonstrated a good correlation between PEP/ET ratio and the PAP but they were obtained in children with predomination of CHD, therefore this ratio may be useful in CHD but not in valvular heart disease.

Usually, RV preejection period is influence by 4 basic factors including afterload and preload of the heart, contractility of the myocardium and the ventricular electrical activation (Isobe et al., 1986), there may be some factors in present population that alter the RV preejection time. The reason that this ratio has poor correlation need to be discussed.

The predominant subjects in this study were RHD, almost all had severe MS with AF, and some patients had ASD with RBBB, these might interfere with PEP. There might be compromised cardiac contractility or changing in ventricular electrical activities in these patients. To prove this hypothesis, subgroup analysis and electrophysiologic study may require.

Kitabatake et al, 1983 also found good correlation between the AT/ET ratio and PAP but the best correlation was between AT/ET and $\log_{10}$ (mean PAP) while Isobe et al, 1986 could not demonstrate this high correlation. The present study confirmed that AT/ET ratio is one of the best parameters which can be used for the estimation of the PAP and no correction with logarithm scale was needed.

The reason why some studies could not demonstrate this may be from the difficulty in determination of the end or the ejection flow from the turbulence especially found in patients with pulmonary artery hypertension. In this study the doppler sample volume was placed just above the pulmonic valve and this technique could decrease the interference in deceleration period, so the ET or DT can be measured easily.

AT/DT also has good correlation with PAP in this study, thus comfirmed that the pattern of the RV ejection flow is the most reliable one to determine PAP and can be used in congenital left to right shunt or valvular RHD and CAD as well. This ratio is a new parameter but the principle is the same as the AT/ET ratio.

In this study, the doppler examination did not perform simultaneously with PAP recorded, but in almost all patients it was done just before the cardiac catheterization. The patients who had unstable clinical conditions or some particular therapy added were excluded from the study, thus it is unlikely that the intracardiac pressures would be effected to alter the results of this study.

Ratio of AT/ET is the best predictor in this study. High resistance to ejection flow early in systole probably shorten acceleration time in patient with elevated pulmonary artery pressure. The major factors responsible to explain this phenomenon are not known, perhaps some mechanisms may be the same as we found in changing of peripheral arterial pressure compared to central arterial pressure by reflected wave or decrease of pulmonary artery compliance from early atherosclerosis.

Results from the present study indicated that pulsed wave doppler echocardiogram can be used to determine the pulmonary artery pressure by using right ventricular AT/ET or AT/DT ratio. This noninvasive technique is available in many laboratories and allows a high degree of accuracy without any difficulty. It can be used repeatedly without any side effects and can determine all systolic,diastolic and mean pulmonary artery pressure. In the future this technique may be useful to determine the pulmonary capillary wedge pressure and reflected LA pressureor LVEDP especially in patients with CAD or mitral stenosis which these informations are very useful.

Finally, the application of this study provides an estimation of pulmonary artery pressure and aids in diagnosis and management of different degree of patients with pulmonary artery hypertension.