



CHAPTER V

DISCUSSION

The present study used FT3 and FT4I as tests of thyroid function to show the true metabolic status of the patients. The STI were obtained from simultaneous fast speed recording, at 100 mm/sec., of electrocardiogram and M-mode echocardiogram under direct 2D echocardiogram guidance. The patients studied had good quality M-mode recordings with a good 'aortic box'. The STI thus obtained reflect the exact and true intervals. LVET measured by this method is significantly longer than the LVET taken from the indirect carotid pulse tracing and as a consequence, the PEP is significantly shorter than the conventionally measured PEP. This has been amply demonstrated by Griebenow et al (1982). McDonald also showed that the systemic pressure pulse undergoes a change in configuration as it passes down the arterial tree. It attains a higher peak pressure, becomes more rounded and the incisural notch which coincides with the aortic valve closure becomes less sharply defined. This would make the measurement of the STI by the conventional tripple record method inaccurate and as a consequence any analysis therefrom would lead to factitious values.

In earlier studies, none of them has used the M-mode echocardiogram to record the STI. This study agrees with other studies that have demonstrated that the ejection fraction and the velocity of contraction of the left ventricular wall increase significantly with increasing level of thyroid hormone. Good linear correlations have also been demonstrated in this study. We are also able to demonstrate good inverse linear correlations between levels of hormone and the QS2, LVETI, and PEPI. In hyperthyroid patients who usually have increased heart rates, the use of uncorrected PEP and LVET may not correlate well with the hormone level. As Spodick has pointed out, PEP requires no correction for heart rates up to 110 beats per minute only. But the hyperthyroid patients can have heart rates much higher than that, as is the case with a number of our patients. After corrections for heart rates, we found that the PEPI and the LVETI correlated well with the thyroid hormone levels. We believe that the shortening of the PEPI, the LVETI and QS2 are predominantly due to the chronotropic effect of the thyroid hormone, while the increase in ejection fraction and the velocity of contraction is primarily due to the inotropic effect. The force frequency relationship (Bowditch phenomenon) does not play any significant role in increasing the inotropism in intact and conscious subjects, which means that the increase in heart rate has negligible effect on the left ventricular contractile function.

The correlations demonstrated in this study could be used to improve the diagnostic sensitivity and specificity of patients

clinically suspected to be hyperthyroid. It is a noninvasive and easily reproducible method. This is more true in provincial hospitals where study is limited to T3 and T4 which do not reflect the true thyroid status of the patient, and often require several days to weeks for the reports to be available. These indices by themselves may not be specific enough to make the initial diagnosis of hyperthyroidism as they vary with a number of conditions such as the preload, the afterload, and the myocardial function which in turn varies with a variety of conditions including the inotropic state. But in the setting mentioned, they could help in making the decision in the treatment of the patient while the laboratory reports are awaited. Their particular usefulness lies in the follow up of the patients especially those with predominantly cardiovascular manifestations, the so called 'thyrocardiacs', as the test is noninvasive with little discomfort to the patients, can be performed quickly in a few minutes, and can be repeated as often as is required.

The disadvantage of this method is that trained personnels are required and the M-mode echocardiogram quality is not consistently good in patients with very thick chest wall or with air trapping diseases of the lung.

The use of doppler to detect the flow and velocity of blood flow in the aorta is now being investigated and have been found to vary insignificantly with the M-mode echocardiographically measured STI. The two techniques would improve and complement each other as the doppler

would help offset the disadvantage of inadequate M-mode imaging in patients with thick chest wall or inadequate echo-window.