is a half truth. Thus primary prevention of coronary heart disease should be an important issue for both sexes. Recent studies in women have shown that physical activity, cessation of smoking, changes in diet and lifestyle are effective in reducing the incidence of coronary heart disease\textsuperscript{[10,11]}. It is uncertain whether hormone replacement therapy in postmenopausal women plays a role in primary and secondary prevention of coronary heart disease\textsuperscript{[12,13]}.

Secondly, the poorer prognosis in younger women, especially with diabetes, is a major concern for clinical practice as well as scientific research. Among patients with acute cardiac ischaemia, women under the age of 55 years are at highest risk for not being hospitalized\textsuperscript{[14]}. Diabetic patients after myocardial infarction are at particularly high risk of dying, but clearly benefit from treatment with thrombolytics, beta-blockers and antiplatelets\textsuperscript{[15]}. Effort should be made to improve diagnosis and therapy in this subgroup of patients.

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Tricuspid annular velocity measurement. Simple and accurate solution for a delicate problem?

See page 340 for the article to which this Editorial refers

Analysis of right ventricular function is considered to be difficult and burdened with inaccuracies. The major difficulty relates to the complex shape of the right ventricular chamber, which is crescent in cross-section and triangular from a lateral view. In addition, right ventricular contraction has been thought to be different from that of the left ventricle. Due to the shape of the right ventricle, which has large sides in comparison to the space between them, contraction of the right ventricle has been believed to be mainly based on inward movement of the right
ventricular free wall, with slight movement of the long right ventricular walls towards each other, causing displacement of a large volume from within. Shortening of the ventricle, considered to be an important factor of left ventricular contraction, has only recently been demonstrated to be an essential part of right ventricular function. Analysis of right ventricular function using two-dimensional echocardiography is time-consuming and likely to result in unreliable data. Three-dimensional echocardiography promises accurate determination of left and right ventricular function. However, the technique is time consuming and still far from being clinically applicable.

Measurement of atrioventricular plane displacement has been described since the 1980s as a simple index for assessment of left and right ventricular function. Several echocardiographic studies have shown that the systolic excursion of the mitral annulus can be used as an uncomplicated, reliable, and highly reproducible parameter for the evaluation of left ventricular function[1,2]. Left-sided atrioventricular plane displacement was shown to correlate reasonably well with ejection fraction calculated by two-dimensional echocardiography, radionuclide ventriculography, as well as contrast cineangiography. The basis for its application is that contraction and relaxation of the ventricle along the long axis plays an important role in its function. While ventricular pump function has traditionally been attributed to circumferentially orientated myocardial fibres it has later become clear that there is great complexity of myocardial fibre orientation, with recognition of longitudinal myocardial fibres and longitudinal shortening. The significance of longitudinal fibres for left ventricular ejection has since been further emphasized. Offline analysis of left ventricular longitudinal shortening or determination of the absolute range of mitral annular descent during ventricular ejection has been the applied modality in the initial studies on atrioventricular plane displacement. When Doppler tissue imaging became available, which allows on-line assessment of systolic and diastolic myocardial velocities, it was quickly extended to the corners of the mitral annulus[3]. Subsequently, peak mitral annular descent velocity determined by tissue Doppler imaging has been shown to have the potential to rapidly estimate global left ventricular function. The major advantage of pulsed Doppler tissue imaging compared to analysis of ventricular longitudinal shortening is the ability to allow very easy and rapid evaluation of atrioventricular plane displacement.

While interest in assessment of myocardial function has long been focused on the left ventricle, recent reports on the importance of right ventricular function for patient outcome in patients with severely depressed left ventricular function has fuelled attention on right ventricular function. The impact of right ventricular function on survival in patients with advanced heart failure has been underlined by studies showing that left ventricular function loses its prognostic value in patients with an ejection fraction of less than 25%, while a preserved right ventricular ejection fraction proved to be predictive for exercise capacity and survival even in advanced heart failure[4]. These studies have supported the need for a method which allows a simple and rapid evaluation of right ventricular function.

The merit of the paper by Meluzin et al[5] published in this issue is that it extends previous studies on the use of Doppler tissue imaging to tricuspid annular motion. Meluzin et al. demonstrate that peak systolic tricuspid annular velocity determined by Doppler tissue imaging is a simple parameter with reasonable correlation to right ventricular ejection fraction. A low peak systolic tricuspid annular velocity proved to have high predictive accuracy for right ventricular dysfunction (ejection fraction <45%) determined by radionuclide ventriculography.

The use of tricuspid annular motion for analysis of right ventricular function is the logical consequence of recent findings on tricuspid annular motion. A systolic velocity even greater than that of the mitral annulus has been demonstrated for the tricuspid annulus in healthy subjects, indicating that longitudinal shortening plays an important role in right ventricular function[6]. It has been suggested that right ventricular systolic descent of the atrioventricular plane, the tricuspid annular motion, is probably related to systolic function in a similar manner to that of the left ventricle. Consequently, right ventricular shortening has been used for assessment of right ventricular ejection fraction. Kaul et al[7] demonstrated in 1984 that systolic shortening of the right ventricle from apex to base, referred to as tricuspid annulus systolic excursion, is an echocardiographic index that correlates with radionuclide right ventricular ejection fraction. However, the technique has never gained great clinical importance. One of the limitations has been the time consuming off-line analysis. The proposed approach by Meluzin et al. to use pulsed Doppler tissue imaging for analysis of the systolic velocity of tricuspid annular motion may yield a parameter which is more easily and quickly determined. This may make analysis of tricuspid annular motion more attractive and spread its application in clinical practice.

However, although assessment of annular systolic excursion is intuitively attractive, it has limitations. It fails to account for any base-to-apex motion of the
entire heart as it contracts, and will yield differing results in proportion to the angle between the transducer and the annular point of motion. For the tricuspid valve a particular limitation may also be encountered in cases of elevated right ventricular pressures. In this study a negative correlation between right ventricular pressure and tricuspid annular motion was noted. Thus, a significantly elevated right ventricular pressure may mimic depressed right ventricular function. Tricuspid regurgitation may be a cause of an impaired relationship between tricuspid annular motion and right ventricular ejection fraction. It is conceivable that tricuspid annular motion increases with tricuspid regurgitation independent of right ventricular function.

Furthermore, it has to be demonstrated whether tricuspid annular motion is independent of mitral annular motion. It may be that mitral and tricuspid annular motion are interrelated and that a depressed left ventricular function is indirectly reflected by a depressed tricuspid annular motion. In other words, it has to be demonstrated that tricuspid annular motion yields additional information on right ventricular ejection fraction independent from the status of left ventricular function. Recent studies indicated that left atrioventricular plane displacement may relate to both systolic and diastolic left ventricular performance[8]. Thus, atrioventricular plane displacement reflects ventricular diastolic performance in addition to being a measure of systolic function. A finding, while used to explain some of the discrepancies observed between left atrioventricular plane displacement and left ventricular ejection fraction, also points to the fact that atrioventricular plane displacement is not merely determined by the ejection fraction.

In conclusion, while measurement of the tricuspid annular velocity seems to provide an appealing, uncomplicated approach to determine right ventricular systolic function, its accuracy in different clinical settings still needs to be determined.

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