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GUEST EDITORIAL

The Right Ventricular Infundibulum: Has it a Role?

Please see page 29 for the article by Lindqvist *et al.* (doi.10.1053/euje.2002.0177) to which this editorial pertains.

The Oxford English Dictionary defines 'function' in its physiological sense as 'the mode of action by which an organ fulfils its purpose'. Although there appears to be widespread agreement that systolic function of the left ventricle is covered by ejection fraction, no satisfactory definition of that of the right ventricle has emerged. The reasons for this are obvious. The structure of the two ventricles is strikingly different, the right ventricle being thin walled with prominent trabeculae. Its inlet dimension is much wider than that of the left, and the amplitude of its long axis motion much greater. Thickening of the trabeculae during ejection expresses the blood from between them during ejection in a manner quite different from the smooth walled left ventricle, and in doing so emphasizes the limitations of the simple Laplace model for describing a structure in which tension originates in the wall and not in the cavity. Finally, the outflow tract of the right ventricle is formed by the infundibulum, whose contribution to normal function is ill understood, and whose involvement in disease uncertain. It follows, therefore, that any study of right ventricular function must be designed in the absence of a gold standard. This has the advantage that previous stereotypes cannot be reproduced with each new technique, as has occurred with ejection fraction on the left, but in contrast, stimulates original observation.

In this issue, Lindqvist *et al.*[1] investigate the shortening fraction of the right ventricular outflow tract in normal adults and patients with heart disease, correlating the results with long axis amplitude. Both these measurements can be made very simply and reproducibly by M-mode echocardiography. Normal outflow tract shortening fraction is in excess of 60%. Such a high value cannot be brought about simply from circumferential fibre shortening, but implies, as in the left ventricle the combination of short and longitudinal muscle. Values of shortening fraction were substantially reduced in the patient group. Without a gold standard, the definition of disease was not rigorous in the study of Lindqvist *et al*. However, of greater interest is their finding of striking sensitivity of infundibular shortening fraction to peak right ventricle systolic pressure assessed from tricuspid regurgitation velocities. A difference was apparent not only between normals and patients, but also within the patient group and could be detected even when the peak TR pressure drop was less than 35 mmHg. Long axis amplitude showed no such sensitivity. Furthermore, in individual patients, correlation was even closer between right ventricular outflow tract shortening fraction and pulmonary artery acceleration time, a variable thought to reflect pulmonary resistance or impedance rather than simply peak pressure.

These results, if confirmed, seem to provide a starting point for more detailed physiological studies of the infundibulum. Clearly more details are required beyond simple values of shortening fraction to include transverse dimension and wall thickening. Patients with more severe disturbances of pulmonary artery pressure and flow should be included. The greatly depressed value of shortening fraction seen in a patient with acute pulmonary embolism is in line with clinical experience. Closer correlation with PA acceleration time rather than pressure is suggestive, and indicates that more detailed pressure flow studies might be considered. Alternatively, it might be possible to use right ventricular outflow tract measurements to detect and even quantify disturbances of the proximal pulmonary circulation. Perhaps these and similar studies might lead to increased understanding of a structure whose significance, in terms of muscle mass is small, but which is peculiar to the right ventricle and which appears to show remarkable load sensitivity.

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Reference

[1] Lindqvist P, Henein M, Kazzam E. Right ventricular outflow-tract fractional shortening an applicable measure of right ventricular systolic function. *Eur J Echocardiogr*. (this issue).

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