

Right ventricular echocardiographic parameters in patients with early cardiac graft dysfunction

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It was with great interest that we read the recent article by Siniawski et al. [1] entitled "Clinical, haemodynamic and echocardiographic features of early cardiac graft dysfunction" published in the October issue of "Kardiologia Polska". They aimed to establish haemodynamic and echocardiographic criteria of early graft failure to define patients who should be considered for assist device support or re-transplantation. This study is successful in planning and presenting the results. We believe that these findings will enlighten further studies about echocardiographic haemodynamic findings of early graft failure. Thanks to the authors for their contribution.

They defined the latent right ventricular (RV) dysfunction (RV-D) group if the patients had RV dilation and/or dysfunction (RV > 35 mm in parasternal view, EF < 50%) and had normal or hyperkinetic systolic function of the left ventricle (EF > 65%), small left ventricle chamber (< 39 mm) and systolic velocity of the posterior wall exceeding 12 cm/s recorded from the parasternal view. RV function was evaluated by using RV linear dimension and volumetric assessment.

Echocardiographic assessment of the RV has been largely qualitative, because of the difficulty of estimating RV volume and function with two-dimensional echocardiography because of its unusual shape [2]. RV function can be

assessed echocardiographically by using several parameters including RV index of myocardial performance (RV MPI), tricuspid annular plane systolic excursion (TAPSE), myocardial acceleration during isovolumic contraction (RV IVA), RV fractional area change (RV FAC), three-dimensional ejection fraction (3D RVEF), tissue Doppler-derived tricuspid lateral annular systolic velocity (Tri S), and longitudinal strain and strain rate [3]. We think that it might be helpful if the RV functions were assessed using these quantitative parameters in further studies.

Conflict of interest: none declared

References

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Author's response

We are grateful to Demirkol et al. for their appreciative letter regarding our paper "Clinical, haemodynamic and echocardiographic features of early cardiac graft dysfunction" [1].

We agree with the authors' suggestion that assessment of the right ventricle (RV) should be based on more sophisticated methodology, but we do not consider the available guide-

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lines [2] to be conceptually suited to RV function assessment in patients who have undergone heart transplantation. The guidelines are in no way based on investigations in transplant patients.

We should keep in mind some general and basic differences between RV cardiac graft function and dysfunction in other forms of heart diseases. Although heart transplantation techniques are well established, unfortunately the anatomical localisation and function of the heart chambers after transplantation are dependent not only on the surgical technique used (bi-atrial or bi-caval) but also on the tailoring of the technique to a patient's individual pre-conditions. It is well known that individual modification of surgery is required in many cases, leading to significant individual variability of heart position in the chest. Generally speaking, the surgeon 'drops' the heart into the widely opened pericardium; however, more and more patients are receiving transplantation after bridging with assist devices, and here scar formation limits the space available for the heart. This influences both the location and function of the cardiac graft. The heart axis, but also the functional twist and untwist mechanics of the heart, demonstrate wide individual variation (our own studies, unpublished). This causes wide interindividual variation in RV and left ventricular (LV) filling and in the heart chambers' mode of systolic ejection (different rotation patterns).

These problems influence the tricuspid annular plane excursion (TAPSE) and, in many cases, the longitudinal contraction of the RV. Echocardiographic studies have revealed that the reduction of RV tissue velocities at the tricuspid annulus in transplanted hearts is independent of normal mitral annulus velocities [3]. The same publication gives values of systolic velocities of the tricuspid annulus in no/mild vs. severe RV cardiac graft failure of 5.9 ± 1.4 vs. 5.4 ± 1.6 cm/s. This probably does not represent a statistically significant difference, since the difference is small and the standard deviation factors are relatively high (unfortunately the p value was not calculated by the authors).

Another group of investigators recently published 100% prevalence of RV systolic dysfunction as assessed by TAPSE, but only confirmed in 80% by fractional area change (FAC) in patients after transplantation [4]. The mean intraobserver difference in TAPSE was 6.7%. This means that tricuspid annulus motion does not perfectly define RV per-

formance regardless of the kind of method of investigation used. In our opinion, two- and three-dimensional echocardiographic RV chamber assessment is the best means of evaluating RV function after transplantation. Generally, we use quantitative parameters for RV assessment, including tissue Doppler and strain modalities, more for rejection diagnosis and follow-up.

The problem of discrepancies between the results of different methods of investigation was recognised by us at an early stage. It is also true that the control ('normal') group in our study is a historical group, with data collected between 2000 and 2003, and that the study was methodologically limited. The graft failure and graft dysfunction group was studied prospectively in 2000–2009, and for comparative purposes the methodology had to remain the same.

The main message of our paper was to set predictors or criteria of severe heart dysfunction as a whole in a clear and unquestionable manner. We decided that investigation has to be based on a trustworthy, broadly understandable investigational technique. We are confident that the criteria developed can be helpful for assist device and transplant teams in decision making regarding the early institution of mechanical support. Isolated RV function evaluation is important, but we aimed to find clear criteria based on heart chamber interaction (see Figs. 1, 2 [1]) rather than on single RV or LV assessment without descriptions of corresponding relations.

Conflict of interest: none declared

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