

EDITORIAL

Strict adherence to the standardized classification of severity of chronic valvular regurgitations by echocardiography into three grades: mild, moderate and severe. Uncertainty is easier but does not help!

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Abstract: Current Guidelines on Valvular heart Disease are suggesting different modalities of intervention only in presence of severe valvular regurgitation. The precise classification of the severity of regurgitation by Echocardiography is then very crucial for clinical decision making. The recommendations for the assessment of valvular regurgitation are suggesting three different degrees of severity: mild, moderate and severe. However, in clinical practice, it is very common to find in the echocardiographic report intermediate degrees of severity, like „mild to moderate” or “moderate to severe” regurgitation. Some classification with four degrees of severity, including mild, moderate, moderate to severe and severe or massive are sometimes also used in clinical practice. Indetermination of severity can appear even more evident when another type of classification, as „at least moderate”, is used in the report. Greater effort should then be devoted in each echocardiographic examination to reach a sufficient confidence, through adequate imaging effort, trying to more clearly separate the three defined and standardized degrees of severity (mild, moderate, severe) in order to allow a better management of different clinical situations, avoiding unnecessary use of other multimodality imaging and potentially wrong operational decisions.

INTRODUCTION

Current Guidelines on Valvular heart Disease (VHD) are suggesting different modalities of intervention only in presence of severe valvular regurgitation¹. The precise classification of the severity of regurgitation by Echocardiography is then very crucial for clinical decision making. Valvular regurgitation or insufficiency is defined as the presence of backward or retrograde flow across a given closed cardiac valve². It is evident that the spectrum of regurgitation severity should be considered as a continuum from the mildest trivial form of insufficiency to the maximal degrees of severe massive regurgitation. The great effort devoted to try to classify and separate the severity of regurgitation into three degrees (mild, moderate and severe) is a way to help the clinician to better manage the medical situation and the decision making process on how to proceed in the single patient.

With the advent of Doppler techniques, it is frequent to detect some degree of regurgitation even in the absence of valve lesion. Trivial regurgitation in presence of a normal valve, particularly of the right-sided valves, should be then considered as physiological. In other situations, a complete echocardiographic assessment is more appropriate and should integrate quantification of the regurgitation, assessment of the valve anatomy and function, and the consequences of valvular disease on cardiac chambers². Practically, the quantification of regurgitation is based on the integration of a set of direct and indirect parameters. Direct criteria derive from colour Doppler Echocardiography². Indirect criteria are mainly represented by the impact of regurgitation on the cardiac size and function. In practice, the evaluation starts with two-dimensional (2D) echocardiography, which can orient readily to a severe regurgitation in the presence of a major

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valvular defect or to a minor leak when the valve anatomy and leaflet motion are normal. Then, a careful assessment of the regurgitant jets by colour Doppler, using multiple views, can rapidly diagnose minimal regurgitation, which requires a priori no further quantification. In the other cases, the use of a more quantitative method is advised when feasible. In the second step, the impact of the regurgitation on the ventricles, the atrium, and the pulmonary artery pressures are estimated². Finally, the collected data are confronted with the individual clinical context and symptoms, in order to stratify the management and the follow-up. Of note, the comprehensive haemodynamic evaluation of patients with complex valve disease, including full quantitation of valvular regurgitation, should be performed by echocardiographers with advanced training level and appropriate exposure to valvular heart disease patients, according to the EAE recommendations and including qualitative, semi-quantitative and quantitative parameters².

HOW A STANDARDIZED METHODOLOGY CAN IMPACT ON CLINICAL PRACTICE

The recommendations for the assessment of valvular regurgitation by Echocardiography are suggesting three different degrees of severity: mild, moderate and severe²⁻⁴. Since the introduction of 2-dimensional and Doppler echocardiography, even mild or trivial valvular regurgitation has become easily recognized and diagnosed non-invasively even in healthy normal individuals⁵⁻⁸. The prevalence rate of mitral regurgitation in normal subjects are increasing with age, while the prevalence rate of tricuspid and pulmonary regurgitation tends towards the lower rate in groups over the age of 30 years^{7,8}. „Physiological” Mitral and Tricuspid regurgitation in normal valves are reported to occur more commonly in athletes than in control normal sedentary volunteers (mitral 69% vs 27%; tricuspid 76% vs 15%)⁹. Regurgitation of at least one of the cardiac valves was found in 91% of athletes, but in only 38% of control subjects ($P < 0.001$)⁹. Multivalvular regurgitation should be considered as another characteristic of the “normal” athlete’s heart⁹. In VHD descriptive morphological findings of the valves, which always need to be well delineated in the echo report, and traditional calculated measurements have to be integrated into a concise and conclusive echo report¹⁰. Because VHD mainly affects geometry and function of cardiac cavities, the neighbouring cavities

shall be accurately assessed with respect to size and function^{10,11}. The precise classification of the severity of regurgitation is then very crucial for clinical decision making, even before considering clinical symptoms and the possible relation or compatibility of the same symptoms with the degree of regurgitation. The recommendations for the assessment of valvular regurgitation are suggesting three different degrees of severity: mild, moderate and severe²⁻⁴. However, in the heterogeneity of clinical practice, it is very common to find in the echocardiographic report intermediate degrees of severity, like “mild to moderate” or “moderate to severe” regurgitation. Indetermination of severity can appear even more evident when another type of classification, as „at least moderate”, is used in the report. Difficulties in grading severity of mitral regurgitation, considered as a continuum, are expected and can derive from primary versus secondary MR, acute versus chronic regurgitation, holosystolic versus partial systolic MR, different loading conditions, particularly blood pressure, and patient-related factors such body habitus or motion artifacts^{12,13}. In cases where Transthoracic Echocardiography (TTE) is technically difficult or it cannot deliver conclusive data, Transesophageal Echocardiography (TEE) and/or Cardiac Computed Tomography (CCT), Cardiac Magnetic Resonance (CMR) or 3D Echocardiography could be useful¹²⁻¹⁵. Image quality can also be a limiting factor in assessing severity of chronic aortic regurgitation¹⁶. All these difficulties can be exalted by several technical and physiological factors such as inadequate acoustic windows, incomplete examinations, impinging jets, multivalvular diseases and heart failure¹⁷⁻¹⁹. However, uncertainty does not help in clinical practice and decision making, and intermediate degree of severity should not be easily and immediately accepted as a rule or a way to spare time and effort and to conclude anyway a difficult echocardiographic examination. Research interventional clinical trials are supporting the need of precisely defined severity of regurgitation^{20,21} even though uncertainties and intermediate classification of severity have sometimes to be accepted²⁰, but this should not be the general rule at a first glance. Furthermore, progression of severity is generally slow, at least for aortic regurgitation^{22,23}. This means that each new control follow-up examination gives a further opportunity to assess and grade more precisely the severity of regurgitation, in comparison with previous examination and report. This opportunity should be taken with awareness, great care and atten-

tion, following all the indications of guidelines¹⁻⁴ and even a standardized methodology control, internal to each echocardiographic examination, for improving confidence in reliably measuring left ventricular linear internal dimensions¹¹. In fact, the assessment of severity of valvular regurgitation should be in some way logically separated and independent from the subsequent decision if the patient have to be operated on for that particular regurgitation. The interventional decision is in fact secondary not only to the fact that we assess the presence of severe regurgitation, but also in presence of a defined cut-off of ventricular dilatation and symptoms which can be ascribed to that specific observed VHD in that individual patient¹. If indication to cardiac surgery and benefit of surgery with reverse remodeling after the intervention, as assessed by Cardiac Magnetic Resonance (CMR), are considered as the reference gold standard for comparison in separating severe from moderate regurgitation, as assessed at the echocardiographic examination^{24,25}, this modality of approach can introduce further bias. The difficulty of having and applying an easy and direct access to CMR, is further underlined by the comparison of reproducibility and consistency of conventional Magnetic Resonance Imaging (MRI) with 4D flow MRI in the quantification of Mitral and Tricuspid Regurgitation²⁶. The paper is in fact dealing with only 21 cases recruited in a period of time of 21 months²⁶. This approach does not seem then a general solution for quantifying valvular regurgitation. In daily clinical practice we can in fact decide that a patient has severe regurgitation by Echocardiography, but does not need surgery at present and we can follow-up strictly his LV size by subsequent examinations, until linear LV internal dimensional cut-off defined by the guidelines are reached and the decision to intervene can appropriately be made.

Multimodality imaging should be then considered only as a complementary second step, when Echocardiography, first step technique more easily accessible and repeatable in clinical practice, is giving equivocal or uncertain result and a clinical decision is immediately needed in that single patient^{12-16,25}. It is also important to say that current European guidelines for the management of valvular heart disease (I) are preferring echocardiographic linear LV size internal dimensional cut off for the decision to undergo surgery, probably due also to the greater variability and uncertainty of volume measurements in clinical practice. In fact the accuracy of assessing linear internal dimensions of

LV size can undergo further control during the same echocardiographic examination, since they can be assessed from different echocardiographic windows (parasternal, apical and subcostal) allowing a simplified three-dimensional spatial approach for improving confidence in reliably measuring such left ventricular linear internal dimensions¹¹.

The development of a consensus algorithm by experts has also allowed improvement of interobserver agreement and accuracy, at least in the determination of Tricuspid Regurgitation severity²⁷. Accreditation of echocardiographic laboratories could further help to reach more complete reporting and better image quality²⁸. In this setting echocardiographic quantification and color Doppler image quality were associated with improved concordance in grading valvular heart disease²⁸. Future quality improvement initiatives should highlight the importance of high-quality color Doppler imaging and echocardiographic quantification to improve accuracy, reproducibility, and quality of echocardiographic studies for valvular heart disease²⁸.

CONCLUSIONS

Greater effort should be devoted, in each echocardiographic examination, to try to more clearly separate the three defined degrees of severity (mild, moderate, severe), following all the indications of published guidelines, in order to allow a better management of different clinical situations and to avoid unnecessary or inappropriate use of other multimodality imaging and potentially wrong operational decisions. Intermediate and uncertain classification should be avoided as much as possible, or only very exceptionally accepted in the clinical arena, after long, comprehensive and adequate evaluation of the complete echocardiographic examination. The use of other multimodality imaging techniques could be occasionally helpful in such situations, while an easy and immediate access to multimodality imaging should not be considered as an abjuration to a complete and comprehensive echocardiographic study. Furthermore, we have to take into account the easy repeatability of echocardiographic examinations. Serial short term follow-up echocardiographic studies could be in fact programmed in these uncertain situations, in order to make any effort to reassess valve morphology and function, to grade again regurgitation severity by Doppler, to reassess chamber dimensions and function, all in comparison with previous examination and reports, in the frame of clinical symptoms.

This aware try again could possibly overcome, in the next examination, those uncertainties and difficulties, allowing to achieve a more strict adherence to the recommended classification into three degrees of severity of regurgitation, i.e. mild, moderate and severe.

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