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Editorial

Next-Generation Approaches to Echocardiography: Clinical Perspectives

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1. Introduction

The application of imaging to cardiovascular diseases fosters the diagnosis, clinical management, and risk stratification of patients, thus leading to the early detection of cardiac and vascular diseases [1,2].

Since the introduction of echocardiography into clinical practice, advances in technologies have promoted dramatic ameliorations in the identification of cardiac and vascular alterations, thus allowing clinicians to improve their performances, accelerate diagnoses, and increase the compliance of patients in relation to the bedside application of these novel techniques as well as the widespread use of them in daily clinical practice [3].

The above being the case, the adoption of software able to identify physiologic and/or pathologic alterations in the contractions of a few groups of cardiac muscle cells allows physicians to quickly detect alterations in cardiac muscle before their gross manifestation [4–6]. The implementation of 3D software analyses for strain and transthoracic ultrasound evaluations of the heart further improves the diagnostic performances of echocardiographic machines [6–8].

The aim of this Special Issue was to promote articles able to display to physicians novel non-invasive diagnostic approaches to cardiac and vascular diseases.

2. Contributions

Cardiac and vascular ultrasound evaluations are fundamental tools for providing useful information about the clinical statuses of patients and their prognoses. The need for the early identification of alterations in morphology and function is the main aim of the physician who tries to identify and stratify a patient at risk of adverse events. Scicchitano P. et al. [9], for example, focused their attention on patients with cancers in order to point out echocardiographic and vascular parameters able to predict all-cause mortality. They considered forty-seven patients with gynecological cancer who underwent cardiac and vascular assessments. Endothelial function—as assessed by the flow-mediated dilation of the brachial artery—was demonstrated to be an independent predictor of all-cause death in these patients, as was left ventricle ejection fraction (LVEF). Therefore, an impairment in vascular function might be considered an effective biomarker of death in these patients.

The application of advanced echocardiography to healthy athletes might improve our knowledge about the impact of sport on cardiac performance. Hodzic et al. [10] three-dimensionally analyzed modifications in the strain of myocardial cells in American-style football athletes. They observed a uniform enlargement of cardiac chambers—both right and left—above all in the apical and outlet regions of the RV ventricle. The 3D strain analysis was highly reproducible, except when analyzing the outlet zones.

Nevertheless, when applying advanced echocardiographic techniques for the evaluation of the performances of the cardiac chambers, physicians should be aware about the possible influences of clinical features of the patients that might have an impact on the

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results of the study. Di Terlizzi et al. [11] tried to evaluate the impact of heart rate (HR) on two-dimensional speckle tracking echocardiography in patients with chronic heart failure and implantable cardioverter defibrillators. By increasing patients' heart rate up to 90 bpm, the authors observed a significant reduction in left ventricle global longitudinal strain (LVGLS), while a reduction in LVGLS during an incremental increase in HR was associated with poor left ventricle function. About half of the patients revealed an improvement in right ventricle global longitudinal strain during the protocol study.

The aim of echocardiography and technological innovations related to cardiac imaging is mainly related to the possibility of better displaying the heart structures, thus providing amelioration in diagnosing diseases and early alterations. This purpose should specifically be pursued in clinical practice by adopting new techniques. Rao [12] accordingly provided an interesting overview on the use of echocardiography in diagnosing tricuspid atresia (TA) and, consequentially, its management. This author described the main echocardiographic features of TA as well as alterations in morphologies subsequent to surgical approaches to this congenital heart disease. The narrative review from Rao is thus a comprehensive vade mecum for clinicians for the instrumental evaluation of patients with TA.

Finally, Roy et al. [13] described advanced cardiovascular imaging techniques for the evaluation of patients suffering with Fabry disease (FD), i.e., a rare X-linked lysosomal storage disorder caused by the accumulation of sphingolipids due to a deficiency in the enzyme α-galactosidase A. Strain assessments could provide useful insights in the evaluation of these patients, thus ameliorating the pathway for the identification of FD, improving the early identification of subtle alterations in cardiac structure due to FD, and promoting immediate clinical approaches for counteracting the progression of the disease.

3. Conclusions

This Special Issue collected intriguing proposals for the application of novel echocardiographic techniques for the evaluation of patients. Beyond classic cardiovascular diseases, authors provided works dealing with the identification of rare conditions—such as tricuspid atresia or Fabry disease—and the recognition of patients at risk for mortality due to cancers or heart failure itself.

Further studies are needed in order to better include additional novel echocardiographic techniques in clinical practice in order to facilitate diagnoses and, consequentially, clinical management.

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