ABSTRACTS

03 — Echocardiography and imaging

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Accuracy of new transthoracic 3D-echocardiographic automated software for left heart chamber quantification in children

R. Amadieu , K. Hadeed*, C. Karsenty , M. Ratsimandresy , A. Guitarte Vidaurre , Yves. Dulac , Philippe. Acar
Cardiologie pediatrie, CHU de Toulouse, Toulouse, France
* Corresponding author.
E-mail address: drhadeed@hotmail.fr (K. Hadeed)

Background   A new three-dimensional echocardiographic (3DE) automated software (HeartModel) is now available to quantify left heart chamber. Our aims were to assess the feasibility of this software in children and its correlation with manual 3DE and cardiac magnetic resonance (CMR).

Methods   Ninety-two children were prospectively included in 2 separate protocols. In protocol 1, 73 healthy children (8.8 ± 3.0 years) underwent 2D and 3D transthoracic echocardiography (EPIQ 7 C). LV end-diastolic volume (LVEDV), LV end-systolic volume (LVESV), LVEF and LA volume at ventricular end-systole (LAV) obtained with automated 3DE were compared with the manual 3DE measurements. In protocol 2, automated 3DE measurements from 19 children with cardiopathy (12.8 ± 2.9 years) were compared with CMR values. Intra and inter-observer variability were assessed.

Results   Automated 3DE was feasible in 77% of datasets and reduced significantly time required for indices analysis compared with manual 3DE (20 vs. 125 seconds). There was excellent correlation for LVEDV, LVESV and LAV between automated and manual 3DE ($R = 0.95$) but less for LVEF ($R = 0.57$). Compared with manual 3DE, automated 3DE slightly overestimated LVEDV, LVEF and LAV and slightly underestimated LVESV. There were excellent correlation for LV volumes between automated 3DE and CMR ($R = 0.94$) but the correlation for LVEF was moderate ($R = 0.46$). Compared with CMR, automated 3DE slightly underestimated LVEDV and LVESV (biase-7.5%), underestimated LAV (-31.6%), and had a negligible bias for LVEF (1.0%). Intraobserver and interobserver variability for automated 3DE measurements were low (< 12% (Fig. 1)).

Conclusions   HeartModel is promising software for fast assessment of left heart chamber volume and function. Its feasibility in children aged more than 5 years is good, with high reproducibility. The automated 3DE measurements were comparable to manual 3DE. Compared with CMR, LVEDV and LVEF measured by automated 3DE seem interesting in clinical practice.

Fig. 1   Automatic 3DE analysis of LV volumes and EF using Heart-Model software.

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Multimodality imaging guidance for percutaneous paravalvular leak closure: Insights from the multicenter FFPP register

S. Hascoët[1],*, G. Smolka[2], F. Bagate[3,4], K. Hadeed[5], Y. Lavie-Badie[6], H. Bouvaist[7], C. Dauphin[8], F. Bauer[9], M. Nejjari[10], L. Mangin[11], G. Bonnet[12], V. Ciobotaru[13], G. Leurent[14], N. Hammoudi[15], A. Aminian[16], C. Karsenty[17,5], S. Armero[18,19], D. Champagnac[20], J. Ternacle[4], M.A. Isorni[1]
[1] *Pôle des cardiopathies congénitales de l'enfant et de l'adulte, Hopital Marie Lannelongue, Plessis-Robinson, France*
[2] *Department of cardiology, Medical University of Silesia, Katowice, Pologne*
[3] *Cardiologie, Clinique Ambroise Paré, Neuilly-Sur-Seine*
[4] *Cardiologie, Hôpital Henri Mondor, Assistance Publique des Hôpitaux de Paris, Inserm U955, Creteil*

[5] Cardiologie pédiatrique, Hopital des enfants, Centre Hospitalier Universitaire de Toulouse
[6] Cardiologie, Hopital Rangueil, Centre Hospitalier Universitaire, Toulouse
[7] Cardiologie, Hôpital La Tronche, Centre Hospitalier Universitaire, Grenoble
[8] Cardiologie, Hôpital Gabriel Montpied, Centre Hospitalier Universitaire, Clermont-Ferrand
[9] Cardiologie, Centre Hospitalier Universitaire, Rouen
[10] Centre Cardiologique du Nord, Saint-Denis
[11] Cardiologie, Centre Hospitalier Régional, Annecy
[12] Cardiologie, Hôpital Timone, Assistance Publique des Hôpitaux de Marseille, Marseille
[13] Cardiologie, Hôpital Prive Les Franciscaines, Nimes
[14] Cardiologie, Centre Hospitalier Universitaire, Rennes
[15] Cardiologie, Hôpital Pitié-Salpetrière, Assistance Publique des Hôpitaux de Paris, Paris, France
[16] Cardiologie, Hôpital Universitaire de Charleroi, Charleroi, Belgique
[17] Cardiologie, Hôpital Européen Georges Pompidou, Assistance Publique des Hôpitaux de Paris, Université Paris Descartes, Inserm U 970, Paris
[18] Cardiologie, Hôpital Européen de Marseille
[19] Cardiologie, Hôpital privé Clairval, Marseille
[20] Cardiologie, clinique du Tonkin, Villeurbanne, France
* Corresponding author.
E-mail address: hascoets@gmail.com (S. Hascoët)

Background   Percutaneous paravalvular leakages (PVL) closure has emerged as a palliative alternative to surgical management in selected high-risk patients. Percutaneous procedures are challenging especially for mitral PVL. An accurate imaging of the morphologies of the defects is mandatory together with a precise guiding in the catheterization laboratory to enhance success rate.
Purpose   We aimed to describe imaging modalities used in clinical practice to guide percutaneous PVL closure and assess the potential interest of new imaging tools.
Methods   Data from the FFPP (''Fermeture de Fuite paraprothétique'') register were used. The FFPP register is an international multi-institutional collaborative register started in 2017.
A descriptive analysis of multimodality imaging used to guide PVL closure in clinical practice was performed.
Results   Data from 173 procedures performed in 19 centers from 3 countries (France, Belgium, Poland) were collected and included 8 cases of PVL following transcatheter valve replacement. Transesophageal echocardiography was used in 167 cases (96.5%) including 87.4% of cases with use of 3D-echocardiography. In one case 3D- echocardiography was combined and fused in real time with fluoroscopy images using echonavigator software. From a sample of 31 patients, details about multimodality imaging were available. Cardiac tomodensitometry (CT) was done before 10 procedures. In one case, fusion between pre-procedural cardiac CT angiography data and fluoroscopy data was used. In 2 cases, printing of a 3D model of the valve with PVL was done (Fig. 1).
Conclusion   Echocardiography and in particular the 3D mode, is the cornerstone of paravalvular leakages imaging. Other imaging modalities such as cardiac computed tomography and cardiac magnetic resonance imaging may be of complementary interest. New techniques such as imaging fusion and printing may further facilitate the percutaneous approach of paravalvular leakages.
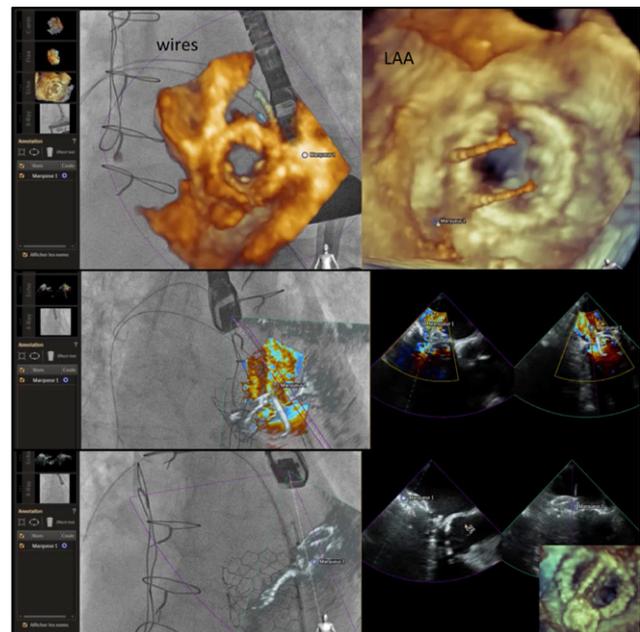

Fig. 1 Mitral paravalvular leak closure under 3D-Echocardiography-Fluoroscopy fusion guidance.

Disclosure of interest   The authors declare that they have no competing interest.

Three-Dimensional inferior vena cava for assessing central venous pressure in patients with cardiogenic shock

R. Huguet [1,*], Damien. Fard [1,2], Thomas. D'humières [1,2], O. Brault-Meslin [1,2], Louis. Nahory [1,2], L. Faivre [1,2], J.L. Dubois-Randé [1,2], Julien. Ternacle [1,2], Léopold. Oliver [1,2], P. Lim [1,2]
[1] Cardiologie, CHU Henri Mondor - UPEC
[2] Inserm U955, Creteil, France
* Corresponding author.
E-mail address: raphaellehuguet@gmail.com (R. Huguet)

Background   Evaluation of central venous pressure (CVP) by inferior vena cava (IVC) measurements is crucial in the management of patients with cardiogenic shock to optimize drugs therapy. IVC has a complex 3-dimensional (3D) shape but measurements used to estimate CVP remain based on 2-dimensional (2D) echocardiographic imaging.
Purpose   The aim of this study was to investigate the accuracy of CVP estimation by IVC size and collapsibility index obtained using 3D-echocardiography compared with 2D in patients with cardiogenic shock.
Methods   Eighty consecutive echocardiographic examinations performed in 33 patients (72 ± 15 years, left ventricular ejection fraction = $19 \pm 10\%$) admitted for cardiogenic shock were prospec-