GLPSS reflects myocardial viability and severity of IHD. Thus, additional measurement of GLPSS by conventional 2DSTE leads to understand the pathophysiology in IHD.

ECHOCARDIOGRAPHY OTHER

P5628
Left atrial booster dysfunction and enlargement predict left atrial thrombus in patients with sinus rhythm after cardiogenic cerebral infarction

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Background: Re-infarction due to remaining or newly formed left atrial thrombus (LAT) has been reported in the acute phase after the onset of cardiogenic cerebral infarction (CI). Prediction for LAT remains difficult in some patients with paroxysmal atrial fibrillation (AF) who continue to show sinus rhythm (SR) after cardiogenic CI. On the other hand, left atrium (LA) has been known to have reservoir, booster and conduit function during SR. We investigated the predictor of LAT and spontaneous echocardiography contrast (SEC) in patients present SR after cardiogenic CI.
Methods: We retrospectively studied 65 patients (39 men, age 69±15) who had suffered acute cardiogenic CI and continued to present SR. Clinical factors were evaluated on admission, and a transthoracic echocardiography (TTE), transesophageal echocardiography (TEE) and a blood sample were obtained within 72 hours after the onset of cardiogenic CI. LA functions were calculated using the following formula; (1) Reservoir function = {[maximum LA volume (LAV max) – minimum LA volume (LAV min)] / LAV min} × 100, (2) Booster function = {[Pre-A volume (LAV pre-A) – LAV min] / LAV pre-A} × 100, LAV pre-A was defined as LA volume at the onset of the P-wave on electrocardiogram. (3) Conduit function = [(LAV max – LAV pre-A) / LAV max] × 100.
Results: Sixteen patients (25%) with LAT/SEC (4 LAT and 12 SEC) had a higher prevalence of lower LA reservoir function (P=0.0012), reduced LA booster function (P<0.0001) and larger LA volume index (P=0.0013) compared with patients without LAT/SEC, while CHADS2 factors were not significantly associated with LAT/SEC. On multivariate analysis, reduced LA booster function (p=0.0107, OR 1.113 for each 1% decrease in LA booster function, 95% CI 1.024–1.229) and larger LA volume index (p=0.0144, OR 1.050 for each 1 ml/m^2 increase in LA volume index, 95% CI 1.009–1.107) were independently associated with LAT/SEC. Prevalence of LAT/SEC in patients with LA booster dysfunction (<22%) and large LA volume index (>37ml/m^2) was 88% (14/16).
Conclusion: Patients who show sinus rhythm with LA booster dysfunction and LA enlargement might require anticoagulants at the early stage of the onset of cardiogenic cerebral infarction.

P5629
Feasibility of teaching patients self-assessment of inferior vena cava operating a portable ultrasound device

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Background: The size and respiratory variation of inferior vena cava (IVC) is an efficient surrogate of the intravascular volume and is assessed by ultrasound (US). Data exists that IVC status at patient discharge from hospitalization due to heart failure decompensation is a predictor of re-hospitalization. We hypothesize that patients can perform a focused US study on themselves to assess IVC after a brief training on the use of pocket-size US devices (PUD). The data can be used to tailor the medical treatment to the patient.
Purpose: We aim to assess the feasibility of teaching the US technique of self-examination of the IVC to subjects without any experience and knowledge of US in a short time.
Methods: A prospective study was conducted among healthy volunteers with no previous knowledge of US, who received a 30-minute lecture followed by 30 minutes of hands-on practice of self-examination of the IVC operating a PUD. After a week, the volunteers performed a self-study of the IVC focused on the acquisition of images that can be used to measure IVC size and assess its respiratory variation; the images were recorded and stored in the PUD. A second US study using PUD was done by a cardiologist blinded to the previous study and also recorded the images for future evaluation. Another cardiologist performed measurements of the IVC size on the recorded clips and assessed its respiratory variation. The images were scored as follows: 0 no image provided and one point for each of the following conditions: faint image but unable to perform measurements; able to assess IVC respiratory variation; able to measure IVC size. The score ranged from 0 to a maximum of 3.
Results: The study included 30 volunteers, aged 54±21 years, 65% females. After the practical training 2 volunteers refused to continue with the study because they were unable to hold the transducer in the subcostal area with gentle pressure. Then 28 volunteers performed their IVC self-assessment. Volunteer and cardiologist score of the IVC images was 2.2±0.8 and 2.8±0.1, respectively (p=0.16). There were 18 volunteers ≥65 years. The score of this group was 1.4±0.6, lower than the score of the volunteers younger of 65 years: 2.3±0.3 (p=0.027). Although not statistically significant, by univariant analysis the only parameter that had an impact on volunteers results was age. In those cases (17 out of 28) that IVC size could be measured from the images obtained by the volunteers' and cardiologists' study, the correlation was good (0.67). IVC respiratory variation was able to be evaluated in 25/28 cases done by the cardiologist but in only 13/28 of self-studies.
Conclusions: The feasibility of teaching an adult population the US technique of self-assessment of the IVC after a brief training is high. Advanced age influenced adversely on the IVC image quality. Evaluation of IVC size by an independent reader of self-US studies is possible with acceptable precision.

P5630
Personal mobile device-based pocket echocardiograph -the diagnostic value and clinical utility

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Background: A microUSB ultrasound probe, which can be connected to personal mobile device constitutes a new class of diagnostic pocket size imaging devices (PSID). The aim of this study was to assess the feasibility and diagnostic value of brief transthoracic echocardiographic examination (bTTE) performed with the use of such equipment.
Methods: The study population comprised 87 consecutive patients (58 men, mean age 61±16 years), 53 of whom were admitted to intensive cardiac care unit and 34 patients, who were referred for transthoracic echocardiography from out-patient clinic. All patients underwent bTTE performed by cardiologist with the use of personal mobile device-based PSID. Within 18 hours of bTTE all subjects underwent a standard TTE (sTTE) using a full sized echocardiograph by expert echocardiographer.
Results: In all patients PSID imaging provided sufficient diagnostic image quality. Echocardiographic measurements were completed for both bTTE and sTTE in 98% of patients. The linear measurements obtained during bTTE showed good to excellent correlation with sTTE results (r=0.65–0.98, p<0.001). The agreement in detection of various pathologies between the bTTE and sTTE examination was very good (k=0.62–0.97, p<0.01)
Conclusion: Personal mobile device-based PSID allows for performing brief bedside echocardiographic examinations. The diagnostic value of such PSID in basic assessment of cardiac morphology and function as compared to standard echocardiography is very good.

P5631
Artificial intelligence (AI) and echocardiography: a training model using real world data for imputation of missing measurements

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Background: AI is the subject of intense interest in medicine and has great potential in cardiology. However, a number of major limitations have delayed widespread use of AI in echocardiography (echo). Disease pathophysiology is complex with simultaneous interactions between all of the variables under observation. In clinical echo data sets, not all measurements are performed in every patient, resulting in large quantities of missing data. This currently impacts on the capacity of AI to interpret clinical echo data.
Methods: Using big data from NEDA (National Echo database of Australia) we created an imputation model employing deep learning. We developed a proprietary AI model which is multi-dimensional and non-parametric, able to adaptively accept arbitrary sets of measurements during training and allow us to interact with the entire phenotypical clinical presentation, even when there is missing data. Our model was trained on a 70% random subset of data ("training set"), reserving the remaining 30% as a "test set". Using a "hold-one-out" methodology, we examined its raw imputation capabilities on the incomplete test set.
Results: By leveraging numerical optimisation techniques, we were able to fit a non-parametric, approximate joint distribution without imposing any of the coarse approximations traditionally present in parametric models, with inherent extensive variable independence assumptions. We generated our experiment using 530,871 echo examinations (Mean age 60.81±18.59 years) with 18,188,613 individual data points. In establishing our AI model, the system imputed relevant missing variables to develop a full phenotypic expression of the disease being examined. For example, the measured peak AV velocity was 159.85±68.54cm/s, and the mean AV gradient was 8.91±10.40 mmHg, with LVOT dimension 2.09±0.25cm. After employing the hold-one-out methodology the error on our imputation model was 10.30±75.77 cm/s for peak AV velocity, 2.01±12.38mmHg for AV gradient, and 0.008±0.24 for the LVOT dimension (p=ns for each imputed vs actual measurement).
Conclusion: In a real-world data set with missing variables, we have shown viability of a new AI system. The AI accurately imputes missing variables, analyses data into a disease phenotype, and uses the full range of measurements. Our imputed values are not significantly different from the original values, suggesting our AI system may be useful in a clinical setting.

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