362 The feasibility and efficacy of short courses of echocardiography for medical students.

P. Szymanski1, A. Klisiewicz1, P. Micheal1, M. Lipczyńska1, S. Langner2, P. Hoffman1, 2
1National Institute of Cardiology, Noninvasive Cardiology Dept., Warsaw, Poland; 2Medical Academy, Student’s research group, Warsaw, Poland

Echocardiography became an essential study in cardiology and, with introduction of portable echocostoscopes, might became a tool used by general practitioners. Therefore it seems appropriate to introduce echocardiography to the curricula of medical schools. The aim of the study was to analyze the feasibility of short, intensive echocardiographic training of the medical students.

12 students underwent 6 hours course of reading of echocardiographic images, with emphasis placed on the ability to assess ejection fraction (EF), qualitatively estimate left ventricular systolic function (defined as: normal, minimally, moderately and severely impaired), the presence of segmental abnormalities (yes or no for each visible segment) and valvular regurgitation. Their performance was evaluated on a series of 12 digitized images of left ventricular performance and mitral regurgitation (color Doppler images, 0 to +4 scale), and assessed against the standard defined by 5 experienced cardiologists.

Segmental abnormalities were assessed with moderate agreement (kappa=0.56).

Agreement between students and cardiologists was fair (kappa=0.38) when EF was assessed, it was good with qualitative assessment (kappa=0.75, Spearman correlation 0.862; P<0.001, see Figure). The good degree of agreement was observed in the case of mitral regurgitation (kappa=0.780) and very good (kappa=0.83) when examined were asked to define the regurgitant jet as significant (+3 or +4) or nonsignificant (less than +3).

Conclusion: In conclusion, relatively short time is needed to achieve skills sufficient to perform a rough estimate of left ventricular function. Short courses of echocardiography are feasible and effective and can be successfully introduced into the curricula of medical schools.

363 The delay between ECG and spectral Doppler signal is PRF-dependent.

A. Ouss, P.A. Van der Wouw, Onze Lieve Vrouwe Gasthuis, Cardiology, Amsterdam, Netherlands

Background: Absence of a delay between the occurrence of events on ECG and spectral Doppler (ECG-Doppler delay) is important in studies of timing and temporal relationship of cardiac events. However, in our experiments a pulse repetition frequency (PRF) dependent delay became apparent.

Aim: The aim of this study was to describe the relationship between ECG-Doppler delay and PRF.

Methods and results: Standard pulsed wave (PW) Doppler settings were used to follow the left ventricular outflow tract (LVOT) flow signal using velocity scales in the range from 46 cm/s (PRF 1.25 kHz) to 440 cm/s (PRF 11.91 kHz) with an ATL HDI 5000 and 40 cm/s (PRF 1.03 kHz) to 500 cm/s (PRF 12.82 kHz) with a Vingmed System V. The time interval from the R wave until the end of the LVOT flow signal (interval-PW) was measured in 5 volunteers.

PW tissue Doppler imaging (TDI) settings were used to follow the myocardial velocity signal in the basal anteroseptal wall using velocity scales in the range from 18 cm/s (PRF 500 Hz) to 240 cm/s (PRF 6.25 kHz) with an ATL HDI 5000 and from 20 cm/s (PRF 615 Hz) to 200 cm/s (PRF 6.15 kHz) with a Vingmed System V. The time interval from the R wave until the peak of the first positive wave after the onset of the Q-wave (interval-TDI) was measured in 5 volunteers.

The relative change of the intervals-PW, TDI at every measured PRF relatively to the intervals-PW, TDI at the highest PRF within the corresponding settings (relative ECG-Doppler delay) was calculated for both echomachines (figure).

Conclusions: The delay between ECG and spectral Doppler signal is inversely related with PRF. The relationship is curvilinear, is different for standard PW Doppler and PW TDI settings, and is different for each echomachine.

364 Automated quantification of mitral ring displacements and velocities.

S.I. Rabben1, A.H. Torp2, A. Steylen3, H. Ihlen1, K. Andersen1, L.A. Brodin4, C. Storaas1, O.A. Smiseth1, 1Rikshospitalet University Hospital, Institute for Surgical Research, Oslo, Norway; 2GE Vingmed Ultrasound, Horten, Norway; 3NTNU, Institute of Circulation and Imaging, Trondheim, Norway; 4Huddinge University Hospital, Clinical Physiology, Stockholm, Sweden

Background: Mitral ring motion by M-mode echocardiography and velocities by tissue Doppler provide potentially useful measures of LV long axis function. Usually, the maximal mitral ring motion (MRM) is used to assess systolic function, while the velocities during early filling (Ea) and atrial contraction (Aa) are used to assess diastolic function.

Aim: To determine if measurements of mitral ring displacements and velocities can be automated.

Method: In 22 patients (age 52-81) we recorded apical four-chamber (4-Ch) and two-chamber (2-Ch) colour tissue Doppler with a Vivid7 scanner. An algorithm was developed that automatically identified the mitral ring, and thereby MRM, Ea and Aa, by combined use of tissue and colour tissue Doppler data. As reference values we used respective measurements derived from manually selected points by four cardiologists.

Results: The automatic detector of the mitral ring only failed in one (4.5%) of the 4-Ch cineloops and two (9%) of the 2-Ch cineloops (failure defined as average ± 2SD of the differences) for MRM, Ea and Aa were narrow: -0.6-1.3mm, -0.6-0.8cm/s, and -0.4-1.0cm/s, respectively (figure). However, the automatic method systematically overestimated MRM and Aa (p<0.01).

Conclusion: These results indicate that the automatic method does not detect the same points as those manually outlined. However, the differences between the computer-derived and the observer-derived parameters are within clinically acceptable limits. This, probably due to the spatial resolution of the Doppler data and the fact that neighbour points of the fibrous mitral ring move with almost the same motion.

365 Factorial parametric imaging of the LV contraction: validation of a new tool for assessing segmental wall motion abnormalities.

B. Diebold1, A. Deloueche2, H. Rafoul1, E. Abergel1, H. Diebold1, F. Founin3.
1HECRG, Cardiology, Paris, France; 2INSERM, U 494, Paris, France

Factor Parametric Imaging of left ventricular (LV) B&W images analyzes the time curve of each pixel of an image sequence, it extracts the most significant curves and the corresponding factorial images.

The present study has tested its ability to automatically detect segmental wall motion abnormalities on 48 patients (including 12 pts with LBBB or pace maker). After alignment by correlation of each sequence, two factors were extracted (one flat curve and one curve describing the contraction-relaxation sequence). A synthetic factorial parametric image (FPI) was built for each sequence with the combination of the constant in green, the positive values of the second factor in red and the negative in blue. The FPI were read as follows: wide red = normal, narrow red = hypokinetic, mosaic or green = akinetic, blue = dyskinetic. The evaluation was carried out on 398 segments (38 apical four-chamber views and 35 apical two-chamber views). The segments were graded independently (normal, hypokinetic, akinetic, or dyskinetic) visually and by FPI by three experienced echocardiographers. An absolute concordance was obtained for 68.6% of the segments and a relative concordance (within one grade) for 98.7. The 5 discordant segments were found on the mitral ring or the atrioventricular groove. Wall motion indices derived from this scoring correlated strongly both with the EF and the visual WMS (r=0.87). The same approach was tested without automatic alignment leading to false dyskinetic segments in pts with LBBB and weaker correlations with EF and WMS (r=0.76). In conclusion, the Factorial Parametric Imaging combined with an alignment is a promising tool to study the regional wall motion of the left ventricle.