Objective

To scrutinize the validity of cardiac axis assessment using a semiautomated volumetric approach in a routine clinical setting.

Methods

In this retrospective cohort study we enrolled 1,730 volume data sets of 1st, 2nd & 3rd trimester pregnancies undergoing a targeted ultrasound scan including a volumetric assessment using FINE. The volume data sets were obtained with the fetus’ spine located between 3 and 9 o’clock. All volumes were analyzed using the FINE software (Fetal Intelligent Navigation Echocardiography) for semiautomatic diagnostic plane reconstruction and cardiac axis assessment. For further validation the program-derived angles were compared to those calculated manually.

Results

A total of 1,685 volumes were eligible for final analysis encompassing 259 volumes acquired during 1st trimester (16%), 1,043 volumes of 2nd trimester fetuses (66.7%) and 264 volumes during 3rd trimester (16.9%), respectively. The mean gestational age (GA) was 22.7 weeks (ranging from 12.1 to 38.0 wks). In > 90 % of all included volumes we were able to reconstruct ≥ 7 cardiac planes. Concomitantly, the cardiac axis was automatically calculated for objective assessment of the position of the heart in all cases. The cardiac axis in normal controls was 38.6° (15.3° to 53.7°). Subgroup analysis revealed no significant differences to manually assessed cardiac axis (38.6° vs. 39.9°). Comparing changes in cardiac axis in first trimester fetuses in relation to those in later gestation, we were able to show that cardiac axis was significantly more obtuse than in second trimester fetuses (45.3° vs. 37.8°). No differences in intrathoracic cardiac position could be noticed between normal second and third trimester fetuses.

Outcome

Assessment of fetal cardiac axis via FINE method is a reliable diagnostic tool and has the potential to give valid information regarding normal cardiac/thoracic arrangement and might therefore aid detection of CHD in a routine clinical setting.

email: jan.weichert@uksh.de