IS-AC-4-1  Assignment of the direction and axis in single cardiac volume dataset without information of fetal position—Toward the virtual diagnosis of fetal cardiac lateralization disorders by 4D spatiotemporal image correlation technique

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[Objective] Spatiotemporal image correlation (STIC) is a powerful tool that can integrate the gated fetal cardiac images into a virtual heart for scanning. Moreover, it allows the transmission of the virtual heart (digital dataset) via the internet for tele-consultation. We carry out this prospective study to determine whether the fetal cardiac location, situs, ventricular looping, and ventriculo-arterial connection could be determined by the single volume dataset without the reference of fetal lying to the maternal abdomen. [Methods] This study is carried on by the approval of our institutional review board. We recruited the pregnancy with fetal lateralization defects as our study group. The control group consist the pregnancy with other forms of cardiac anomalies. The scanning gestations ranged from 20 weeks to 36 weeks of gestation. We scan the fetal heart in the duration of 12.5s with the scanning angle of 25 degrees during fetal quiescence. The 3D volume dataset was re-oriented in 4D VIEW software (GE healthcare, United States). In brief, we reoriented the cardiac position in panel A, with cardiac apex in superior and the spine in the right. The interventricular septum was aligned in the Y-axis and the AV canal was aligned in X-axis. The navigation dot was set in the atrial septum primum. Then we accessed the heart in panel C. Since the inherent human axes have already set— the fetal spine is always at posterior and great vessels extend upward from heart, we are able to assign the directional information for the cardiac volume without reference of fetal lying in relation to maternal uterus. After determination of the left–right axis, we further identify the cardiac situs (position of right atrium) by the drainage of the inferior vena cava in relevant to body axis. The ventricular looping (location of right ventricle in compare to the body axis) is then determined by the location of moderator band. The vessels of aorta and pulmonary artery are further recognized by their characteristics. [Results] Totally 32 fetuses of lateralization disorders (including right atrial isomerism, left atrial isomerism, situs inversus, corrected transposition of great arteries, and certain double outlets of right ventricles) and 337 fetuses of other forms of congenital cardiac defects were recruited in this period. Of these patients, follow-up information was available in 38 fetuses in study group and 258 fetuses in the control group. The cardiac location, axis were correctly predict in 36/38 (95%) in the study group and 100% in control group before birth. The only 2 exceptions were 2 mesocardia of right atrial isomerism in which we were unable to determine the left–right axis before birth. Besides, we were able to assess atrio-ventricular connection in 31/38 cases in study groups and 213/258 cases of fetuses. Furthermore, we were able to describe ventriculo-arterial relationship in 26/38 cases of study group and 186/258 cases of control group. With these information, we are allowed to make the diagnosis by virtual scanning of fetal heart in subsequent 296 complex congenital heart diseases. [Conclusions] Assignment of directional information and axes of single fetal cardiac dataset is feasible solely by 4D STIC without additional information of fetal position in relevant to maternal position. This study highlights the potential of telediagnosis of fetal complex heart defects, especially for those diagnosis relying on the documentation of cardiac axis and atrio-ventricular, ventriculo-arterial relationship.

IS-AC-4-2  Fetal outcomes in pregnancies detected hypoplasia of nasal bone at second trimester of gestation

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[Objective] Nasal bone is an important factor for predicting fetal aneuploidies including trisomy 21. This study is aimed to evaluate fetal outcomes in pregnancies diagnosed hypoplasia of nasal bone at second trimester of gestation. [Methods] A prospective study was carried out from January 1st 2013 to December 31 2014. All pregnant women were measured routinely nasal bone length following ultrasonography scanning at 16 to 26 weeks' gestation. The 5th percentile of nasal bone length was chosen as cut-off point of hypoplasia. Pregnancies diagnosed hypoplasias of nasal bone were performed an amniocentesis and followed up to the delivery. Fetal outcomes were recorded and analyzed in order to evaluate a relation between hypoplasia of nasal bone and fetal prognosis. [Results] A total of 38 fetuses (1.6%) were detected hypoplasia of nasal bone following measurement of nasal bone length in 2440 pregnancies. Most of these women (89.5%) were delivered healthy babies. 3 cases of them (7.9%) were terminated pregnancies because of trisomy 21 (2 cases) and osteogenesis imperfecta type 1 (1 case). Severe intra-uterine growth restriction was found in one case of hypoplasia associated with cleft lip (2.6%). [Conclusion] Fetuses with adverse outcomes had additional abnormalities determined in prenatal ultrasonography. It is necessary to perform a detailed scanning in case of hypoplasia of nasal bone before counseling fetal outcomes. Keywords : Fetal outcomes, hypoplasia of nasal bone, ultrasonography.