Learning Curve and Factors Influencing the Feasibility of Performing Fetal Echocardiograhy at the Time of the First Trimester Scan

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Objective

To assess the learning curve and factors influencing the feasibility of carrying out a complete fetal cardiac evaluation at the time of the first trimester scan (FTS).

Methods

Prospective study on 104 gravidas presenting for FTS at 11w6d-13w6d. Maternal body mass index (BMI), fetal crown-rump length (CRL), and 8 cardiac parameters were evaluated transabdominally by a single sonologist certified by the Fetal Medicine Foundation: 4 chamber view (4CV), tricuspid regurgitation (TR), outflow tracts cross over (CO), bifurcating pulmonary artery (BPA), 3 vessel view (3VV), aortic arch (AoA), superior and inferior venae cavae in sagittal views (VC) and Dopplers of the ductus venosus (DV). The average time from the first to the last cardiac image obtained was calculated. Chi square, ANOVA test of means, scatter plot and polynomial curve fitting were utilized to analyze the data. P<.05 was considered statistically significant.

Results

103 fetuses were evaluated. Median CRL was 72.1 mm (range 53.9-85.8 mm). Median BMI was 23 (range 17.7-32.3). The 4CV and TR were obtained on 100%, CO on 90%, BPA on 81%, 3VV on 55%, AoA on 76%, VC on 65% and DV on 99%. A complete exam was feasible in 55% of cases: in 15% of the first 52 and 94% of the last 51 cases.
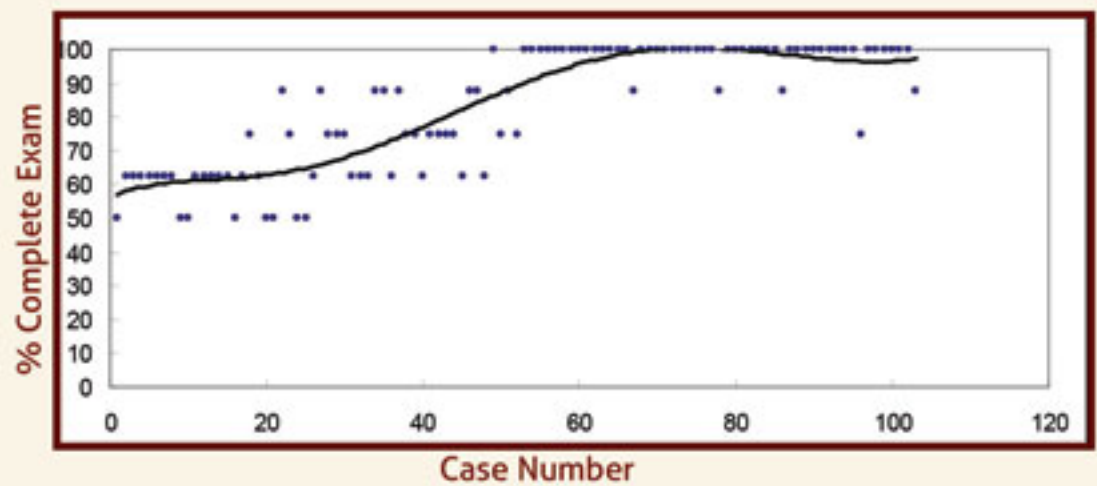
Of the 8 parameters, 59.5% were seen in case 1-21 , 75% in case 22-52 and 98.6% in the last 51 cases (P=0.0001). Average time spent on the cardiac exam increased among the 3 groups: 4.37, 7.13 and 9.3 minutes respectively (p=0.032). There was no statistically significant influence of CRL (p=0.899) or BMI (p=0.752). The gained sonographer experience and duration of the exam were the most significant factors.

Conclusion

Fetal cardiac evaluation is feasible in the first trimester. At least 52 exams are needed for a significant improvement in the ability to carry out a complete exam. Gained sonographer experience and allocation of time seem to be the most influential factors. If other sonologists were to immediately dedicate 10 minutes to the fetal echocardiographic part of the exam. they may attain a superior learning curve to ours.
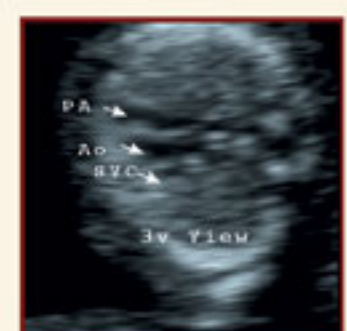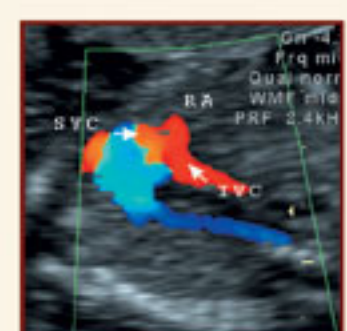

4CV

Doppler of 4CV

Cross Over

3VV

RV Inflow

	1st period [Case 1-21]	2nd period [Case 22-52]	3rd period [Case 53-103]	p-value
#Views out of 8	4.76 (59.5%)	6.0 (75%)	7.89 (98.6%)	0.0001
Average Time (sec)	262.4 (4.37 m)	429.3 (7.13m)	560.1 (9.3m)	0.032
BMI	24.08	24.0	23.5	0.752
CRL	72.2	72.7	72.1	0.899

Feasibility of Intracerebral Translucency Measurement at the Time of the First Trimester Scan

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Objective

To assess the feasibility of measuring the intracerebral translucency (IT) at the time of the first trimester scan (FTS) and to compare our reference range of IT to crown-rump length (CRL) to the established range of Chaoui et al.

Methods

Prospective study on 157 gravidas presenting for FTS between 11w6d and 13w6d. One fetus was excluded because of ectopia cordis. CRL and IT were measured in the same midsagittal plane in which nuchal translucency (NT) and facial angle were measured. All exams were carried out by a single sonologist certified by the Fetal Medicine Foundation. Regression analysis was used to study the reference range of the AP diameter of the IT according to CRL.

Results

IT was measured on 156/156 (100%). The median CRL was 71.7 mm (range 52.4-85.8 mm), the median IT was 2.3 mm (range 1.1-3.6 mm). Regression analysis yielded: IT=0.023CRL+0.565 with an R^2 of 0.119.

Scatter plot: Fourth Cerebral Ventricle: IT vs CRL (cm)
$$IT = 0.023\,CRL + 0.565$$
$$R^2 = 0.119$$

Conclusion

IT assessment is highly feasible at the time of the FTS. Statistically, we were unable to reproduce the established IT to CRL relationship of Chaoui et al. In case the actual size of the IT, and not simply its presence or absence, proves to be the determining factor in the early detection of spina bifida, then this would imply the need for sonographer certification and ongoing quality control as has been implemented with the NT.