

3D/4D fetal echocardiography using spatio-temporal image correlation technology

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Objective

To assess the performance of 3D/4D Fetal Echocardiography using spatio-temporal image correlation (STIC) technology for the diagnosis of congenital heart diseases (CHD).

Methods

A systematic search was performed to identify all relevant studies assessing the accuracy of 3D/4D ultrasound using STIC technology for the detection of CHDs. For the meta-analysis, a hierarchical summary receiver operating characteristic (hsROC) using random-effects modeling (inverse of the variance), was constructed. A meta-regression was performed to assess the influence of the gestational age at ultrasound evaluation to the pooled sensitivity.

Results

A total of 13 studies and 19,539 patients were included in this meta-analysis. From these, 5.6% (1,106/19,538) had a CHD and 92% (1,019/1,106) of them were diagnosed at ultrasound scan. The pooled area under the ROC curve, sensitivity, specificity, positive and negative likelihood ratios for 3D/4D STIC ultrasound were: 95.6%, 90.4% (95% CI: 85-94%), 94.6% (95% CI: 87-98), 18.8 (95% CI: 7.96-36.6), and 0.104 (95% CI: 0.067-0.151), respectively. The meta-regression analysis showed no influence of the mean gestational age at ultrasound to the pooled sensitivity (estimate: 0.024; 95% CI: -0.131 to 0.179; p=0.738).

Conclusion

3D/4D STIC fetal echocardiography is a reliable method that prenatally identifies the majority of the CHDs during the first and second trimesters of pregnancy, and should be included in the routinely structural evaluation of the fetus.