

Detection of congenital heart defects in the first trimester using measurements of NT and DV in euploid fetuses

Alvaro Navidad M, Mayas Flores MA, Ruiz Ramos M, Gonzalez Alonso MC, Rodriguez Marquez C, Plaza Arranz FJ
Fundación Jiménez Díaz, Madrid, Spain

Objective

To establish the effectiveness and efficacy of NT and DV in the screening of congenital heart defects in the first trimester.

Methods

This is a prospective observational study between the years 2012 and 2016 in Hospital Universitario Fundación Jiménez Díaz. We included 2946 single euploid gestations without congenital heart disease that came for a routine first trimester ultrasound between November 2012 and January 2016. Multiple gestations were excluded and those with incomplete postnatal follow ups. Ultrasound was performed according to ISUOG protocol and CRL, NT and ductus venous flow according to FMF protocols. Cardiac axis was evaluated following criteria published by Comstock in 1989 and Shinkovskaya in 2010 (The angle formed by a line dividing the thorax into 2 halves from vertebral body to sternum and another line at the level of the Interventricular septum at plane level of 4 chambers view). In those cases of difficult evaluation, the color Doppler was used to improve the quality of the image.

Results

The prevalence of major congenital heart disease in our population was 0.56%, of them 64% were presented in euploides fetuses (pulmonary Atresia: 2, C. Complex: 1, AV Canal: 1, Doble outlet of right ventricle: 1, TOF: 2, Heteroataxy sd. : 3 and Truncus: 1. Prenatal detection rate is 94% including I, II and III trimester ultrasound. Detection rate, specificity, PPV, NPV, LHR +, LHR-, of major congenital heart disease in euploides fetuses by NT > 3.5 mm is 33.3% (0-69.69), 99.31% (98.98-99.64), 13.64% (0-30.5) 99.78% (99.59-99.97) 48.07 (17.2-134.08) and 0.67 (0.42-1.07). Detection rate, specificity, VPP, VPN, LHR +, LHR-of major congenital heart disease in euploides fetuses by absent or reverse a wave of DV is 55.56% (17.54-93.57), 97.98% (97.44-98.53), 8.33% (0.51-19.99), 99.98% (99.69-100), 27.55 (14.52-52.25) and 0.45 (0.22-0.94) The ROC area of NT > 3.5 mm and/or DV absent or reverse a wave as a predictor of major heart disease is 0.82. If we define as a high risk population those whom present NT > 3.5 mm and/OR DV absent or reverse a wave the DR: 67.67% 30.31-100), E: 97.69% (97.11-98.27), VPP 8.7% (1.32-16.07), VPN 99.98% (99.74-100), LHR + 28.8% (17.11-48.66) and LHR- 0.34% (0.14-0.86).

Conclusion

NT > 3.5 mm and the absent or reverse a wave of DV are early markers of congenital heart defect in euploid fetuses. The combination of both markers has the better predictive capacity to detect congenital heart defects in first trimester.

TN >3.5 mm

	Sens.	Espec.	VPP	VPN
Todas	10% (0-0.55)	99.7% (99.48-99.36)	33.33% (2.49-64.17)	1.46% (0.99-1.93)
Mayores	33.3% (0-69.69)	99.31% (98.98-99.64)	13.64% (0.0-30.25)	99.78% (99.59-99.97)

DV reverse/absent

	Sens.	Espec.	VPP	VPN
Global	20% (6.35-33.65)	98.07% (97.53-98.61)	13.33% (3.9-22.77)	98.8% (98.37-99.23)
Mayores	55.56% (17.54-93.57)	97.98% (97.44-98.53)	8.33% (0.51-16.16)	99.8% 99.69-100)

TN>3.5 and/or DV reverse/absent

	Sens.	Espec.	VPP	VPN
Global	14.49% (5.46-23.52)	98.88% (98.46-99.29)	25.0% (10.3-39.6)	97.8% (97.2-98.34)
Mayores	67.67% (30.31-100)	97.69% (97.11-98.27)	8.7% (1.32-16.07)	99.89% (99.7-100)