A Novel Sonographic Plane for Evaluation the Fetal Thymus: The Innominate Vein View of the Upper Mediastinum

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Background
• Accurate measurements of fetal thymus are critical for evaluation of fetal chromosome abnormality (Deletion 22q11) and intrauterine infection.
• The thymus is extremely irregular in three-vessel tracheal (3VT) view for its close proximity to the blood vessels.
• We found the transverse section of fetal thymus on the innominate vein (INV) slightly above the 3VT section has linear back boundary and more regular shape which is easier to measurement than on the 3VT view.

Objectives
To assess the feasibility of fetal thymus measurement in the innominate vein view (INVV) of the upper mediastinum between 16 and 38 weeks' gestation.

Methods
• 101 healthy singleton fetuses with thymuses shown in the INVV and 3VT in optimal fetal position between August 2018 to February 2019.
• Double-blind method was used to evaluate image quality (Level 1 and 2) and measure fetal thymus on 3VT and INVV ultrasound sections.
• Fetal thymic lateral and anteroposterior diameters, area, perimeter and the ratio of anteroposterior diameters of thorax and thymus (T-T ratio) in the INVV and 3VT were measured and compared.
• Correlations analysis between thymus parameters and gestational age (GA) were assessed.

Results
• The image quality of fetal thymus in the INVV was better than that in the 3VT with significant difference (P=0.004).
• The means of thymus anteroposterior diameter 8.62±3.49mm, perimeter 55.13±16.92mm and area 181.98±128.22mm² in INVV were significantly shorter and smaller in comparison to the measurements in 3VT (10.81±3.99mm, 66.54±19.21mm and 210.5±132.12mm², all P<0.05).
• Whereas the mean of lateral diameter 20.1±6.47mm and the T-T ratio 0.41±0.07 in INVV showed no significant difference to the diameter and ratio in 3VT (25.21±27.6mm, and 0.42±0.11 with P>0.05).
• The correlation coefficients between anteroposterior diameter, lateral diameter, perimeter and area to GA in INVV (0.783, 0.863, 0.879 and 0.868, all P<0.000) were higher or similar comparing with those in 3VT (0.76, 0.309, 0.857 and 0.879, all P<0.01), except the correlation coefficient between T-T ratio to GA in the INVV and 3VT (0.132 and 0.058 with P>0.05).

Conclusion
The fetal thymus can be more clearly and accurately shown in the INVV with higher correlation coefficients between most of the measurements of fetal thymus to GA in comparison to those in the conventional 3VT and hence are preferable, as INVV imaging can show more easily and delineate the thymus borders more accurately.