



First Trimester Examination of Fetal Tricuspid Flow

The findings of recent studies suggest that examination of the fetal tricuspid flow at 11-13+6 weeks could have major beneficial implications in screening for Trisomy 21 by maternal age and fetal nuchal translucency (NT). However it is imperative that, as for the NT scan, sonographers undertaking risk assessment by examination of fetal tricuspid flow must be able to demonstrate consistent mastery of their competence in performing the tricuspid flow scan.

This document describes the Fetal Medicine Foundation:

1. Protocol for the assessment of fetal tricuspid flow
2. Clinical application of tricuspid flow findings
3. Accreditation in the first trimester assessment of fetal tricuspid flow

Protocol for the assessment of fetal tricuspid flow

1. The gestational period must be 11 to 13+6 weeks
2. An apical four-chamber view of the fetal heart should be obtained
3. A pulsed-wave Doppler sample volume of 2.0 to 3.0 mm should be positioned across the tricuspid valve so that the angle to the direction of flow is less than 30 degrees from the direction of the inter-ventricular septum.

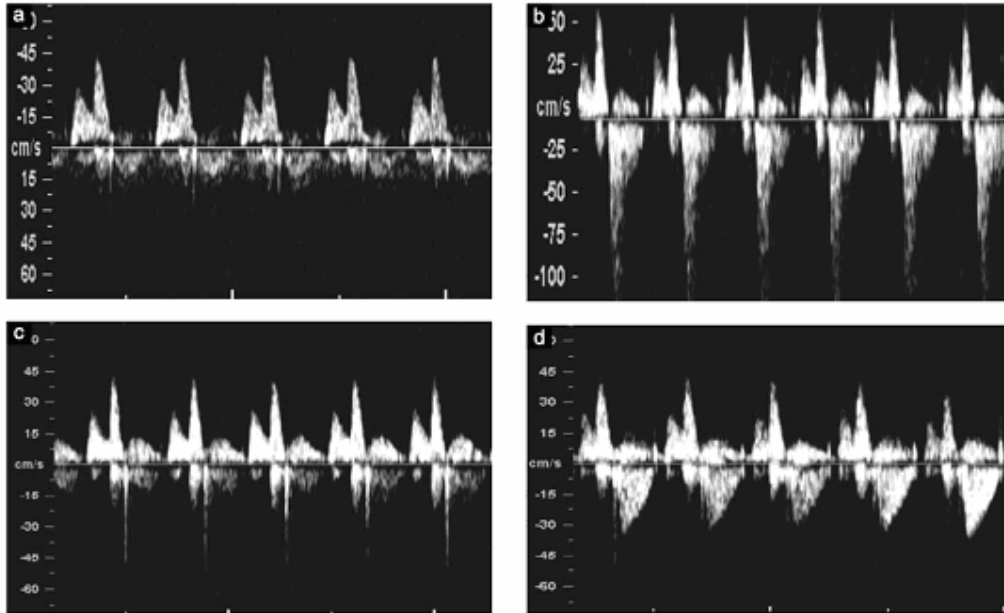


Apical four-chamber view of the heart at 12 weeks. The Doppler sample volume is positioned in the tricuspid valve orifice, including the right atrium and ventricle. The alignment of the atrioventricular valve flow is parallel to the ultrasound beam.

4. Tricuspid regurgitation is diagnosed if it is found during at least half of the systole and with a velocity of over 60 cm/s, since aortic or pulmonary arterial blood flow at this gestation can produce a maximum velocity of 50 cm/s.



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Doppler flow profile in the tricuspid valve with no regurgitation during systole (a),
Regurgitation during approximately half of systole and with a velocity more than 60 cm/s (b)
The short reverse 'spike' generated by closure of the valve cusp (c)
And the jet produced by aortic or pulmonary arterial blood flow, which at this gestation
can produce a maximum velocity of 50 cm/s (d)

(C) and (D) above should **not** be mistaken for tricuspid regurgitation (B).

5. The tricuspid valve could be insufficient in one or more of its three cusps, and therefore the sample volume should be placed across the valve at least three times, in an attempt to interrogate the complete valve.

Clinical application of tricuspid flow findings

The incidence of tricuspid regurgitation is related to NT and CRL as well as aneuploidy, being more common with increased NT and smaller CRL measurements. Therefore it is not possible to give simple numbers by which the presence of normal flow will reduce the risk for Trisomy 21 and the presence of tricuspid regurgitation will increase the risk. It is essential that those adjusting the risk for Trisomy 21 using the finding of tricuspid flow do so with recognized risk calculation software that takes into account all the appropriate parameters. The Fetal Medicine Foundation will release such risk calculation software in October, but will only make it available to sonographers who have been appropriately trained and accredited in the assessment of the fetal tricuspid flow.

The finding of tricuspid regurgitation increases the risk for trisomy 21. There is also an increased risk for cardiac defects and therefore such patients should have a follow up specialist fetal cardiac scan.



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Normal tricuspid flow is reassuring and will be particularly useful for patients with risks between 1 in 150 and 1 in 300 who are traditionally classified as screen positive, but with the presence of normal flow confirmed, may be sufficiently reassured.

Accreditation in the first trimester assessment of the fetal tricuspid flow

The requirements for certification in first trimester assessment of the fetal tricuspid flow are:

- FMF accreditation in the 11-13+6 weeks scan (nuchal translucency accreditation)
- Participation in the FMF audit of the distribution of NT measurements and images and demonstration of satisfactory performance
- Submission of 5 still images demonstrating tricuspid flow (no more than 2 images are permitted per fetus), including at least one with tricuspid regurgitation. In addition, for each image submitted with tricuspid Doppler demonstrated (like the examples in step 4), please include one image of the 4-chamber view and Doppler gate placed (like the example in step 3), **before** Doppler is instigated, to allow the reviewer to assess placement of the Doppler gate, insuring that it is the tricuspid valve Doppler that is being obtained.

Please send your completed images to:

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References

1. Huggon IC, DeFigueiredo DB, Allan LD. Tricuspid regurgitation in the diagnosis of chromosomal anomalies in the fetus at 11-14 weeks gestation. *Heart* 2003;89:1071-1073
2. Faiola S, Tsoi E, Huggon IC, Allan LD, Nicolaidis KH. Likelihood ratio for trisomy 21 in fetuses with tricuspid regurgitation at the 11 to 13+6 week scan. *Ultrasound Obstet Gynecol* 2005;26:22-27
3. Falcon O, Auer M, Gerovassili A, Spencer K, Nicolaidis KH. Screening for trisomy 21 by tricuspid regurgitation, nuchal translucency, and maternal serum free-hCG and PAPP-A at 11+0 to 13+6 weeks. *Ultrasound Obstet Gynecol* 2006; 27: 151-155