South Australian Perinatal Practice Guidelines

Ultrasound soft marks of aneuploidy (management of)

Guidelines for South Australian public hospitals regarding the management of a woman whose fetus is found to have ultrasound markers for down syndrome – including thickened nuchal fold, echogenic bowel, shortened femur, shortened humerus, pyelectasis and absent or hypoplastic nasal bone.

NB: All abnormalities of morphology have the potential for association with either lethal or severely handicapping conditions. In general, except for lethal anomalies, it may be very difficult, or even impossible to find an obstetric team that will facilitate late terminations in South Australia - for this reason, it is very important if a pregnant woman and her partner would choose termination of pregnancy in the case of a seriously handicapped fetus, that referral to a tertiary obstetric centre is made well before the end of the 22nd week of pregnancy in a woman who wished to exercise this option.
(For further information see PPG, Medical induction for second trimester terminations of pregnancy and miscarriages at URL http://www.health.sa.gov.au/PPG/Default.aspx?PageContentMode=1&tabid=140)

Introduction

Following the publication of "Bethune M. Australasian Radiology (2007) 51, 218-225. A Literature Review and suggested protocol for managing ultrasound markers for Down syndrome" and Bethune M. Australasian Radiology (2007) 51, 324-329. Management options for echogenic intracardiac focus and choroid plexus cysts: A review (which include the Australian Association of Obstetrical and Gynaecological Ultrasonologists consensus statements) Ultrasonologists and Obstetricians in South Australian Public Hospitals will follow the guidelines below in order to standardise management across the state.

Absent nasal bone

See technical note.

An absent nasal bone (NB) in the second trimester has been estimated to have a likelihood ratio of 83 times (Bromley et al. 2002) the background risk of aneuploidy and as such, all reasonable efforts should be made to identify this marker. If this is found:

- Counselling / amniocentesis should be offered

Nuchal fold

See technical note.

A thickened nuchal fold (NF) i.e. ≥ 6 mm from 15-20 completed weeks gestation has been associated with an increased risk of trisomy 21 with a likelihood ratio of 17 (95 % CI 8-38) (Smith-Bindman et al. 2001). If this is found:

- Calculate a new risk for Down syndrome: 17 x prior risk
- If the new risk level is increased (≥ 1 in 250) counselling / amniocentesis should be offered

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Echogenic bowel

See technical note.

First trimester bleeding appears to be a common cause (presumably due to swallowed blood) but a history of first trimester bleeding does not exclude other causes which include aneuploidy, fetal infections, an association with cystic fibrosis and fetal growth restriction

- Calculate new risk for Down syndrome: 6 x earlier risk (95 % CI 3-13) (Smith-Bindman et al. 2001)
- If new risk level is increased (≥ 1 in 250) offer amniocentesis. If doing amniocentesis save fluid for microbiological analysis (Polymerase chain reaction and culture) pending maternal serology
- Infection risk: Carry out maternal blood serology for common prenatal infections (CMV specifically). Toxoplasmosis, varicella, and parvovirus less so and more commonly present with discrete echogenic foci (commonly liver) rather than hyperechoic bowel. Serology can be considered for these if the type of echogenicity of the fetal abdomen is equivocal
- Cystic fibrosis risk: Offer counselling and parental testing for cystic fibrosis carrier status (detects approximately 80 % of carriers). If both parents are carriers, offer amniocentesis for fetal DNA analysis
- Intrauterine growth restriction risk: perform growth scan at approximately 28-32 weeks

Shortened humerus

Shortened humerus (< 2.5th percentile from standard charts) have both been associated with an increased risk of chromosomal abnormalities. The humerus has been shown to be a more reliable discriminator for trisomy 21 than the femur. For this reason, humerus length should be considered as part of the routine assessment at time of morphology exam

Shortened long bones can also indicate skeletal dysplasia or early onset intrauterine growth restriction (IUGR)

- Calculate new risk for Down syndrome based on the bone which is short:
- Short humerus – new risk for Down syndrome: 7.5 x earlier risk (95 % CI 5-12)
- If new risk level is increased (≥ 1 in 250) counselling / amniocentesis should be offered.
- Consider possibility of early IUGR or skeletal dysplasia. The latter is more likely if there is: severe long bone shortening, abnormal morphology of long bones, ribs or vertebrae and / or abnormality of skull shape

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Shortened femur

Shortened femur (< 2.5th percentile from standard charts) has been associated with an increased risk of chromosomal abnormalities. Shortened long bones can also indicate skeletal dysplasia or early onset intrauterine growth restriction (IUGR)

Calculate new risk for Down syndrome based on the bone which is short:

- Short femur – new risk for Down syndrome: 2.7 x earlier risk (95 % CI 5-12)
- If new risk level is increased (≥ 1 in 250) counselling / amniocentesis should be offered
- Consider possibility of early IUGR or skeletal dysplasia. The latter is more likely if there is: severe long bone shortening, abnormal morphology of long bones, ribs or vertebrae and/or abnormality of skull shape

Pyelactasis

See technical note.

Isolated mild pelviectasis is a very uncommon finding in aneuploidy
Pyelectasis has been associated with an increased risk of hydronephrosis and postnatal urinary reflux

- There is no need to discuss aneuploidy as the likelihood ratio crosses 1
- Notify the patient of the need for third trimester/early neonatal review to assess for progression to hydronephrosis

Single umbilical artery

Isolated single umbilical artery is a very uncommon finding in aneuploidy. There is, however, an increased risk of fetal growth restriction

- There is no need to discuss aneuploidy
- Arrange a third trimester scan to assess fetal growth

Echogenic intracardiac focus (EIF)

The isolated finding of an EIF in a low-risk patient (i.e. < 1 in 250 risk of a chromosome abnormality at the time of first or second trimester screening or based on maternal age if screening was not performed) is unlikely to be a marker for Trisomy 21. The isolated finding can be ignored as a normal variant providing adequate views have been obtained of all structures

A possible format for reporting an EIF found at a routine midtrimester ultrasound could be:
"An ultrasound soft marker (EIF) has been noted. The presence of this isolated soft marker has no clinical or functional significance to this fetus and does not need review"

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Choroid Plexus Cyst (CPC)

The isolated finding of a CPC in a low risk patient (i.e. < 1 in 250 risk of a chromosome abnormality at the time of first or second trimester screening or based on maternal age if screening was not performed) is unlikely to be a marker for Trisomy 18. The isolated finding can be ignored as a normal variant, providing adequate views have been obtained of all structures and the fingers are seen to be open and not clenched.

A possible format for reporting an CPC found at a routine midtrimester ultrasound could be: *"An ultrasound soft marker (CPC) has been noted. The presence of this isolated soft marker has no clinical or functional significance to this fetus and does not need review."*

NOTE
If more than one marker is present, these are not additive. Choose the marker with the highest likelihood ratio to recalculate the risk.

References

1. Bethune M. A Literature Review and suggested protocol for managing ultrasound markers for Down syndrome. Australasian Radiology 2007; 51: 218-25.
2. Bethune M. Management options for echogenic intracardiac focus and choroid plexus cysts: A review. Australasian Radiology 2007; 51, 324-29.
3. Smith-Bindman R, Hosmer W, Feldstein VA, Deeks JJ, Goldberg JD. Second-trimester ultrasound to detect fetuses with Down syndrome. JAMA 2001; 285: 1044-55.
4. Bromley B, Lieberman E, Shipp TD, Benacerraf BR. The genetic sonogram: a method of risk assessment for Down syndrome in the second trimester. J Ultrasound Med 2002; 21: 1087-96.

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Abbreviations

AFI	Amniotic fluid index
CTG	Cardiotocograph
et al.	And others
IOL	Induction of labour
IUGR	Intrauterine growth restriction
LMP	Last menstrual period
mmol/L	Millimoles per litre
MSL	Meconium stained liquor
PE	Preeclampsia
RCOG	Royal College of Obstetricians and Gynaecologists
SOGC	Society of Obstetricians and Gynaecologists of Canada
USS	Ultrasound

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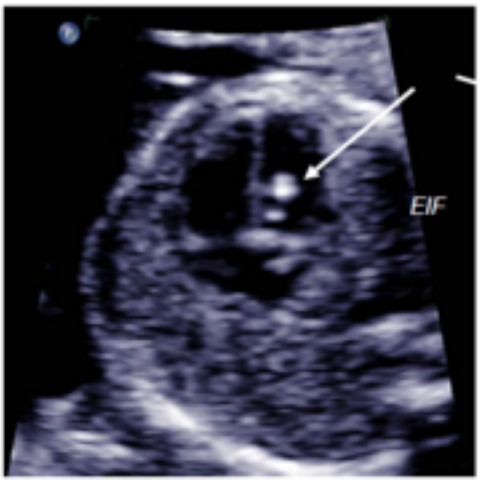
Appendix 1:

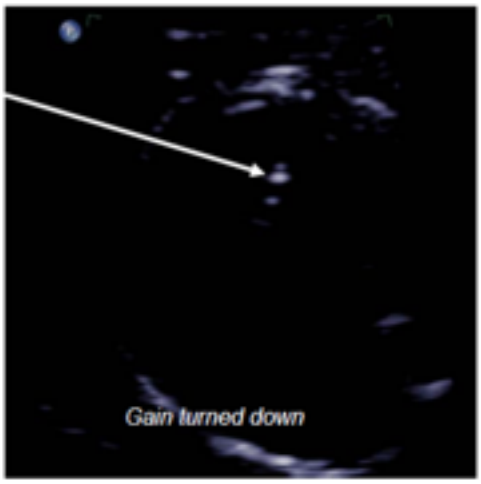
Technical Guidelines with example images

Echogenic intra-cardiac focus (EIF)

Ultrasound examination:

- Broadband width transducers utilising higher frequencies and noise reduction techniques such as harmonics, compound imaging and spectral reduction can increase the apparent echogencity of intra-cardiac structures
- Objective assessment using comparison to bone echogenicity must be employed
- Subjective assessment of echogenicity should be avoided
- An EIF must be as echogenic as the adjacent ribs.
- Confirmation of EIF should be achieved by turning down the ultrasound gain till only bone should be seen; if the focus is still visible it can be classified as an EIF





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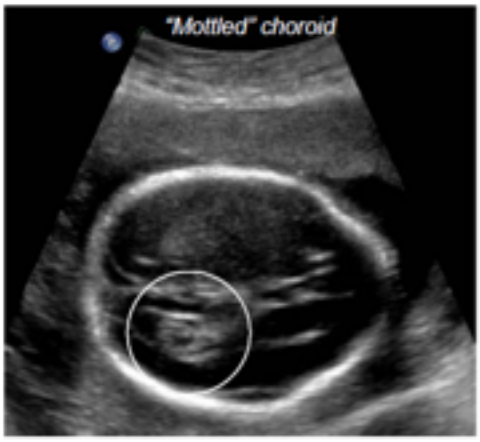
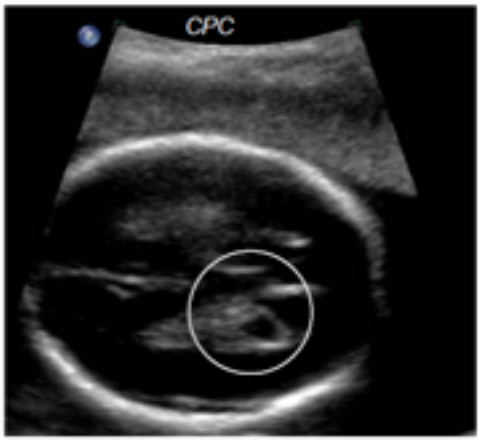
Choroid plexus cysts (CPC)

Ultrasound examination:

- Small "cystic" spaces within the choroid plexus are a common finding.
- These should not be identified as CPC's unless they are well defined and ≥ 5 mm in maximum diameter
- "Cystic" spaces not fitting this definition should be considered 'mottled' choroid and not described as CPC's





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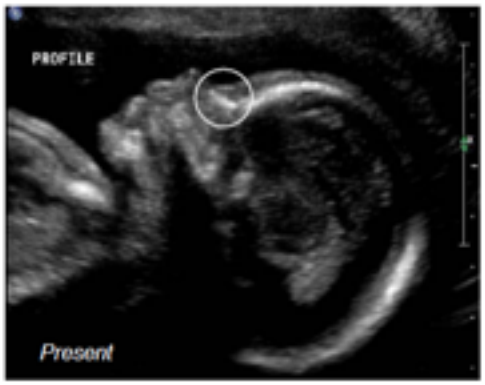
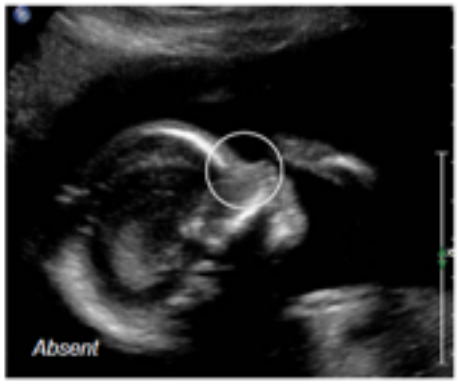
Nasal bone

Ultrasound examination:

- The magnification should be such that the head and thorax occupy the whole image
- A mid-sagittal view of the fetal profile should be obtained with the fetus facing toward the transducer with the frontal bone, nose, lips and mandible visible
- The nasal bone should be at 45° to the ultrasound beam
- The nasal bone should be described as present or absent





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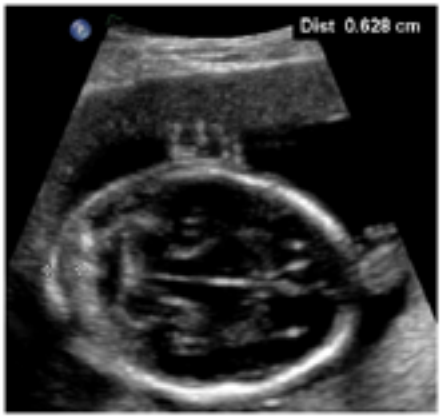
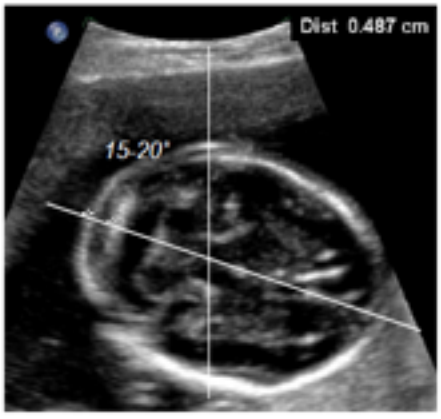
Thickened nuchal fold

Ultrasound examination:

- Measurement should be taken between 15 – 20 weeks gestation
- Beam width artefacts can produce an apparently thickened nuchal fold when the beam is perpendicular to the mid sagittal plane of the cranium; the following technique must be strictly followed to avoid incorrect measurements related to this phenomenon
- The transducer should be positioned such that the beam is angled from the posterior by 15-20° in relation to the mid sagittal line of the cranium, with the nuchal region centred to the middle of the field of view
- An axial plane should be obtained that includes the cavum septum pellucidum, the cerebral peduncles and the cerebellar hemispheres
- The measurement is taken from the outer skin line to the outer occipital bone
- A measurement of ≥ 6 mm is "thickened"



INCORRECT TECHNIQUE



CORRECT TECHNIQUE

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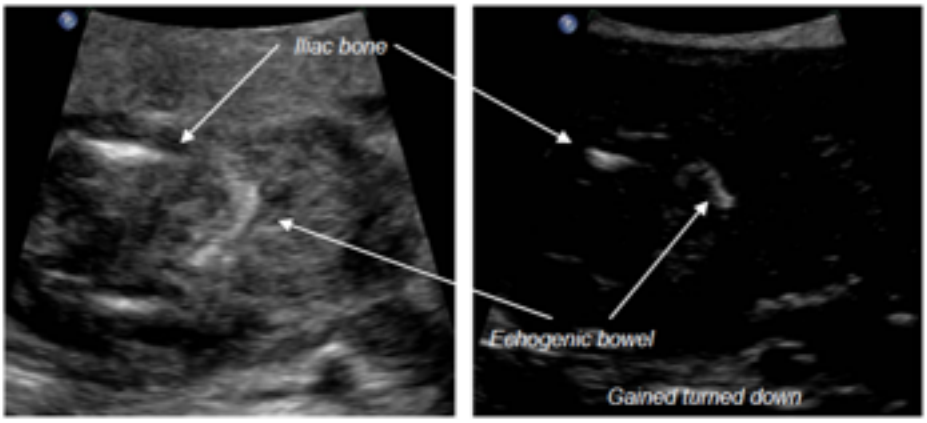
Echogenic bowel

Ultrasound examination:

- Broadband width transducers utilising higher frequencies and noise reduction techniques such as harmonics, compound imaging and spectral reduction can cause the fetal bowel to look more echogenic than was previously the case.
- Objective assessment using comparison to bone echogenicity must be employed
- Subjective assessment of echogenicity should be avoided
- Bowel must be as echogenic as the nearly iliac bone.
- Confirmation of echogenic bowel should be achieved by turning down the ultrasound gain till only bone should be seen; if bowel is still visible it can be classified as echogenic



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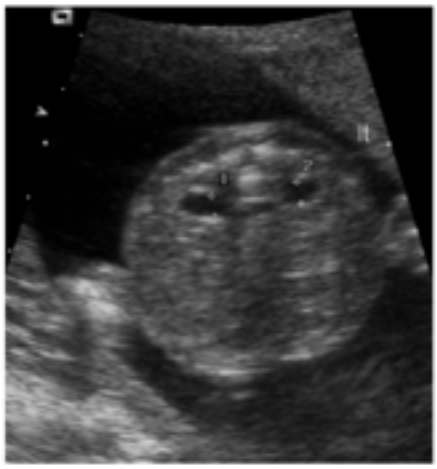
Pyelectasis

Ultrasound examination:

- The renal pelvis must be imaged in the transverse plane with an AP measurement being taken at the renal hilum
- Care should be to avoid measuring an extra-renal pelvis or the intra-renal collecting system
- If the renal pelvis is ≥ 4mm than imaging in the longitudinal axis should be performed to assess for dilatation of the intra-renal collecting system



Version control and change history

PDS reference: OCE use only

Version	Date from	Date to	Amendment
1.0	29 Nov 10	15 Jan 13	Original version
2.0	15 Jan 13	current	

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