Tygerberg O&G Ultrasound Unit

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MID-TRIMESTER ANOMALY SCAN PROTOCOL TBH

Second trimester Routine Anomaly scan

Ultrasound screening for fetal anomalies should be routinely offered to all pregnant women, ideally between 18 weeks 0 days and 20 weeks 6 days. For women booking later than that, the anomaly scan is still offered routinely up to 23 weeks 6 days.

The purpose of a scan at this gestation includes, in addition to dating and growth assessment, ruling out of placenta praevia and twins, a complete anatomical survey of the fetus and the identification of soft markers as part of risk assessment for aneuploidy.

Women at increased risk for structural anomalies (previous history, preexisting diabetes, teratogen exposure) should have a detailed fetal anomaly scan by a qualified professional. If this is not available locally, this should be discussed with TBH.

Down's syndrome (T21) screening

Biochemical screening tests or the non-invasive cfDNA tests for T21 are not offered in the public sector. Women at increased risk for genetic disorders in the fetus (age ≥ 37 at conception, previous aneuploidy, translocation carriers, recurrent early miscarriages, family history etc.) are eligible for first trimester screening (nuchal translucency "NT scan") at TBH.

Women who are 40 years or older at conception

- Offered genetic counselling and invasive testing (irrespective of their T21 risk based on ultrasound findings) provided they can be seen at TBH US before 23 completed weeks of gestation.
- Dating should be confirmed as early as possible with ultrasound so they can make use of the NT scan if feasible.

Women who are 37-39 years at the time of conception

- If adjusted risk for T21 from NT screening less than 1:165 (i.e. low risk) can have their anomaly scan at 20 weeks gestation locally
- If the adjusted risk is higher than 1:165, invasive testing will be offered.

Women of any age who have the following at midgestation

- more than one soft marker (i.e. markers that hardly change the risk when isolated: mild pielectasis, short humerus or femur, echogenic focus)
- **or** a single strong marker (i.e. markers that increase the risk substantially even if isolated: nuchal edema, mild ventriculomegaly, echogenic bowel, hypoplastic nasal bone)

need to be seen at TBH US for review and genetic counselling, unless they decline referral after being informed of its purpose (ruling out T21).

Consent: patients should be informed that

- the scan performed at midgestation is a medical exam with the purpose of assessing fetal anatomy and development and that in some cases a problem is detected.
- not ALL structural anomalies can be excluded with this scan and that the outcome of some ultrasound findings may be uncertain.
- this scan is not compulsory.

Procedure

- ALL STANDARD PLANES ARE TO BE OBTAINED ACCORDING TO ISUOG GUIDELINES
- All measurements should be made to ISUOG standards and must be entered on Astraia database.
- Gestational age should be determined carefully at the first scan in the US unit. Take into account all previous scan reports and verify LMP history – enter previous scan findings in Astraia, especially the first one. Follow official dating policy.
- If pictures are saved on Voluson or Antares, complete patient details need to be entered to allow retrieval.
- Thermal images are only printed for purchase by parents on their spontaneous request, or otherwise for clinical indications by permanent staff only
- Trainees must print pictures for their logbooks on their OWN paper.
- Trainees are advised to store all their images electronically for review by the trainers after each case.

	Landmarks	**Measurements**
Head and Neck	Intact ovoid cranium	BPD, HC
	Ossification of skull bones	
	Cavum septi Pellucidi	
	Falx in midline, reaching the occiput	
	Thalami symmetrical	
	Cerebral ventricles	Atrium width (inner to inner)
	Cerebellum	Trans-cerebellar diameter
	Cisterna Magna	(outer to inner)
	Nuchal fold	(outer to outer)
	Neck masses or cystic hygroma	

Face	Two orbits, spacing Palate intact Upper lip intact Facial profile – assess chin size Nasal bone present Facial skin	IOD and EOD if suspected hyper- or hypotelorism (transverse view) (coronal view) Nasal bone length Pre-nasal thickness
Chest Heart	Four chamber Position in chest Heart rate, regular Chambers balanced Off-setting of valves, both moving No pericardial effusion Septum intact Flap foramen ovale left Outflow tracts: L and R including valve motion Three vessel view Exclude diaphragmatic hernia	(apical view) 45° deviation to left 120- 160 bpm (2mm) (lateral view, colour)
Abdomen	Stomach present, on left, size Diaphragm Bowel - Not dilated Bowel echogenicity Two kidneys Bladder	 (parasagittal view) compare to iliac wings AP diameter of pelvis
Umbilical cord	Cord insertion – abdominal wall integrity Three vessels Cysts	 (Colour flow Doppler at level of bladder; transverse view)
Spine	Exclude hemi-vertebra and spina bifida Cervical, Thoracic, Lumbar and Sacral: "up sweep" in sagittal view; tapering in coronal view	Check in sagittal and transverse planes
Extremities	Twelve long bones, straight and well ossified Presence of hands and feet Open hands – 5 fingers Exclude talipes Plantar view of feet – 5 toes, no gap	Humerus and Femur lengths (lateral view)
Placenta	Position Relation to internal cervical os* Vasa praevia Accessory lobes Grannum	Anterior, posterior, fundal or lateral RCOG Guideline for placenta praevia
Amniotic fluid	Liquor volume Polyhydramnios ** Oligohydramnios ***	Deepest vertical pool (< 24w or twins) or amniotic fluid index
Gender	Male or female	Optional Evaluation of multiple gestations

***Placental location** should be reported correctly and described in detail: If placenta within 20 mm of internal os at 18 to 22 week scans - Confirm with Transvaginal ultrasound

- If covering or reaching os: rescan 32 weeks
- If not reaching os but within 20 mm of os: rescan if vaginal bleeding
- If more than 20mm from os: report as HIGH

****Polyhydramnios (AFI > 25cm; MVP > 8cm in twins or early ulstrasound)**

Mild (AFI 25-30cm) Careful check for structural and/or markers for aneuploidy
Screen for gestational Diabetes
Do TVS for cervical length

If any fetal abnormality detected/ SGA fetus/ AFI > 30 cm: consider invasive testing and close follow-up.

***** **Oligohydramnios (AFI < 5cm; subjective if early MVP <2cm):** Always confirm presence of normal kidneys, bladder filling, history of SROM and UA Doppler

SOFT MARKERS FOR CHROMOSOMAL ABNORMALITIES for This Protocol

For an anomaly scan to qualify as a "genetic" or "soft marker" scan, the following should be included, in addition to the full fetal biometry and anatomy ("detail scan"): humerus length, nasal bone, assessment of the facial profile on a perfect mid-sagittal view for micrognathia, nuchal fold measurement, ensure both hands open fully, ensure offsetting of the AV-valves at the crux of the heart, ARSA.

Renal pelvis dilatation: pelvis diameter measured in an AP view of the kidneys. Cut-off value to define mild dilatation:

- T1: any visible pelvis
- 16-20 w 4mm or more
- 20-24 w 5mm or more (mild 5-10 mm)
- T3: > 10 mm needs postnatal follow up

Mild, isolated pielectasis: followed up at 32 weeks.
Moderate (> 10 mm) or severe (> 15mm) dilatation of the pelvis, calyceal involvement, ureteric or bladder dilatation, echogenicity of cortex are more serious findings and require increased surveillance with explanation to patient

Short Humerus and/or Femur (> 8 days different from other measurements or < -2SD on astraia with other biometry average)

This is defined as a measurement below the 2.5th percentile for gestational age (alternatively a measurement that is less than 0.9 of that predicted by the measured BPD). Care is required with the interpretation, in relation to the rest of the biometry.

Echogenic bowel: The echogenicity of bowel is compared to the adjacent iliac bone, after turning off advanced imaging technologies (incl. harmonics). Different grades include:

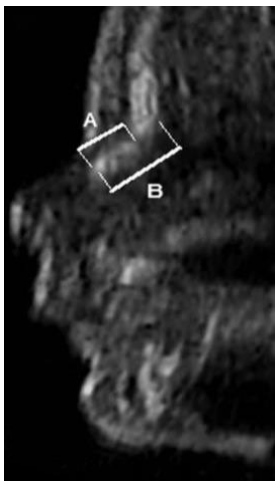
- Grade 1: less echogenic than iliac crest (mild); does not require further investigation
- Grade 2: echogenicity equal to crest (moderate)
- Grade 3: more echogenic than iliac crest (severe)

Echogenic intracardiac focus: These are discrete bright spots demonstrated within the papillary muscles, within the cavities of the ventricles of the fetal heart. They may be single or multiple and occur in either or both ventricles, but a single focus in the left ventricle is the most frequent finding. They result from strong ultrasound reflections from microscopic calcification within the tension apparatus of the atrioventricular valves. They must be distinguished from false locations including the moderator band, endocardial cushion and the tricuspid valve annulus.

Nuchal fold thickening: edema at the back of the fetal neck, measured on the transverse plane of fetal head at the TCD level; include cerebellum, occipital bone and cavum septum pellucidum. Measure by placing calipers on the outer edge of the occipital bone to the outer edge of the skin. Ensure on sagittal section that the neck is not extended and that there is no tight nuchal cord. Be cautious with interpretation in breech with dolichocephaly.
Cut off values to define increased NF:

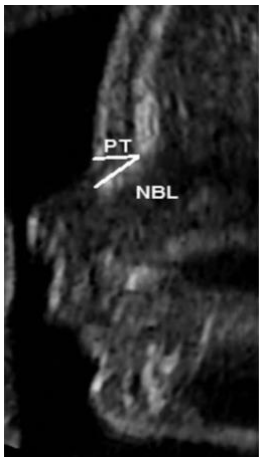
- 16-18 w: 5mm
  18-24 w: 6mm

Hypoplastic nasal bone: measured in the perfect midsagittal plane with the bone at a slight angle towards the horizontal plane to give clear demarcation, from the nasion (= most anterior portion of the junction between frontal and nasal bones; if they are not touching: only the nasal bone) to the distal end of the white ossification line.



A is correct, B is incorrect

Prenasal thickness (PNT): Measured in the perfect midsagittal plane as the shortest distance between the anterior edge of the lowest part of the frontal bone (at junction with nasal bone when present) and the facial skin anteriorly. If the frontal and nasal bones are not touching, the point that intersects the two lines that are tangential to the frontal and the nasal bone are used as proxy.



Cut-off values for definition		
Gestational age (w)	Nasal bone hypoplasia (mm)	Increased PNT (mm)
16	< 3	> 3.5
18	< 4	> 4
20	< 4.5	> 4.5
22	< 5	> 5
24	< 6	> 5.5

Mild ventriculomegaly: Atrium width in transventricular plane, measured inner-to-inner
Cut-off used to define ventriculomegaly: > 9.5 mm (borderline VM); ≥ 10m: overt VM

Choroid plexus cyst: Well-defined fluid filled area within the CP, only report if > 2mm

Hands: Look for clinodactyly, polydactyly, syndactyly

Feet: Look for sandal gap, rocker bottom feet

DETAIL SCANNING AFTER 23 WEEKS GESTATION

1. The first scan should include a growth assessment and full structural survey as far as technically possible
2. Enter scan under "biometry" in ASTRAIA and enter what was seen and not seen
3. See twin scan protocol for specific follow-up for twin pregnancies

MA du Toit, HA Swart, L Geerts, August 2023

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