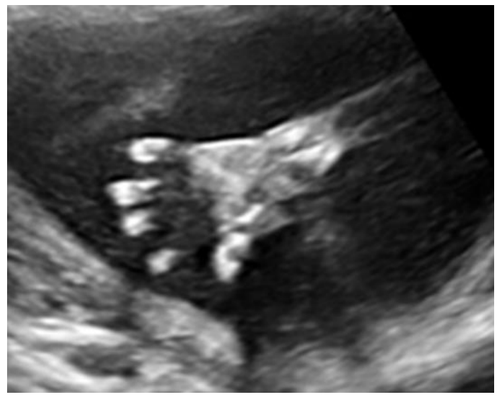
BMUS

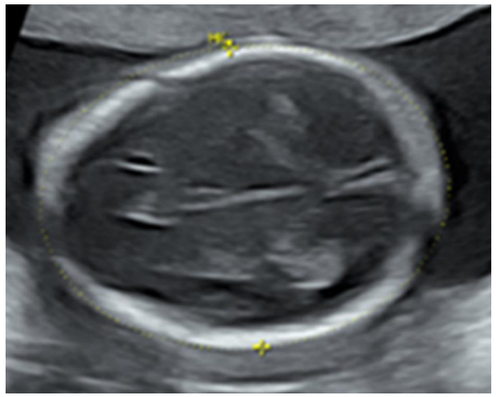
Experiences of an Expert Witness

- Good practice points
- Courtroom scenarios
- Take home messages

Presented by Trish Chudleigh

Chest • lungs • heart	Situs/laterality of heart
	4 chamber view (4CV)
	Aorta arising from left ventricle (LVOT)
	Pulmonary artery arising from right ventricle (RVOT) or the 3-vessel view (3VV)
	3 vessel and trachea view (3VT)





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BMUS

Disclaimer

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Experiences of an Expert Witness - Good Practice Points

- Legal test of good practice

- Best practice, good practice or poor practice?

Legal Test of Good Practice

- On the balance of probabilities, it is more likely than not that ….
- In my opinion, the ultrasound care provided on …….. was as expected from a reasonably competent sonographer performing a routine anomaly to the standard required by the Fetal Anomaly Screening Programme (FASP) in 2023
- In my opinion, the ultrasound care provided during the pregnancy fell below the standard expected of reasonably competent sonographers performing routine scans as required by local and national standards in 2023

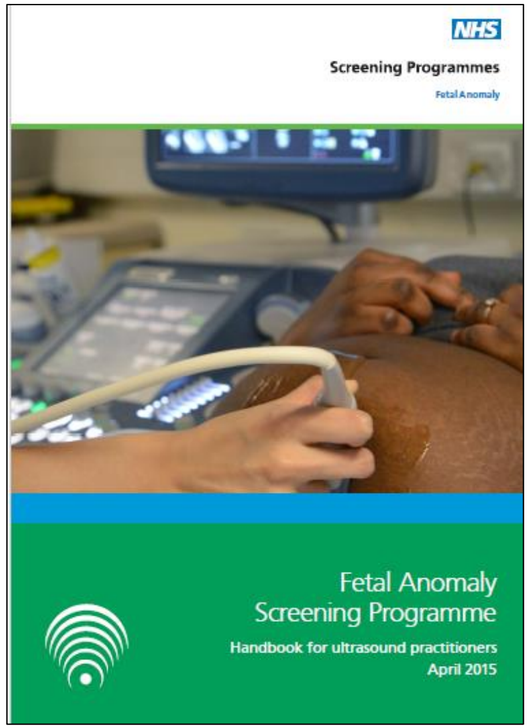
Best Practice

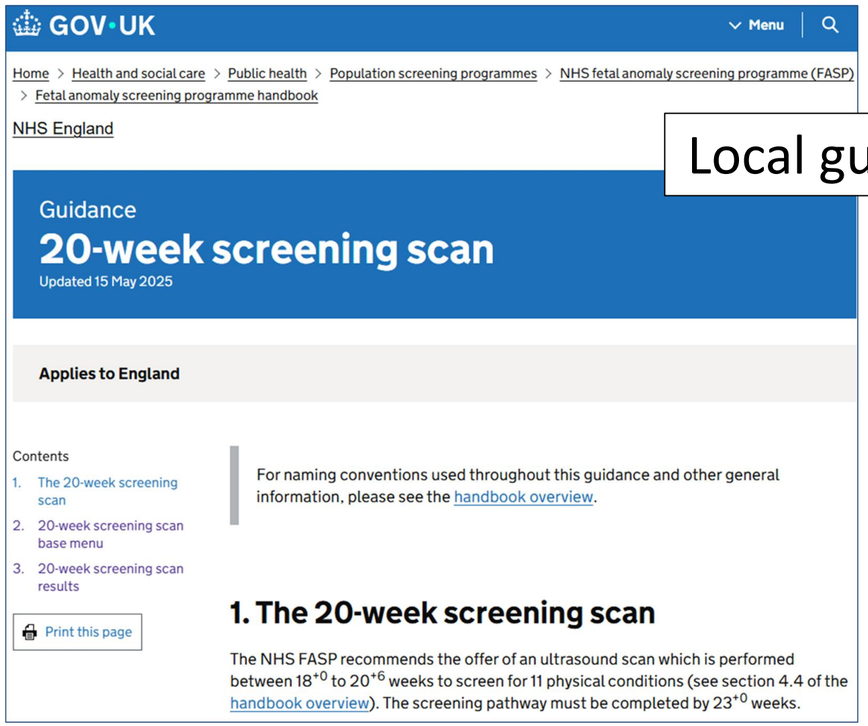
Perform, interpret & report the required ultrasound examination to the appropriate standard requires:

- thorough knowledge of local & national recommendations/guidance
- technical ability – to obtain required images & measure correctly
- experience - of range of normal appearances at that gestation
  - of overlap between normal, not normal & abnormal (appearances & measurements)
- assessment – ability to distinguish between normal, review, refer
- communication of findings – verbal, written to:
  - a) parents
  - b) clinically relevant colleagues

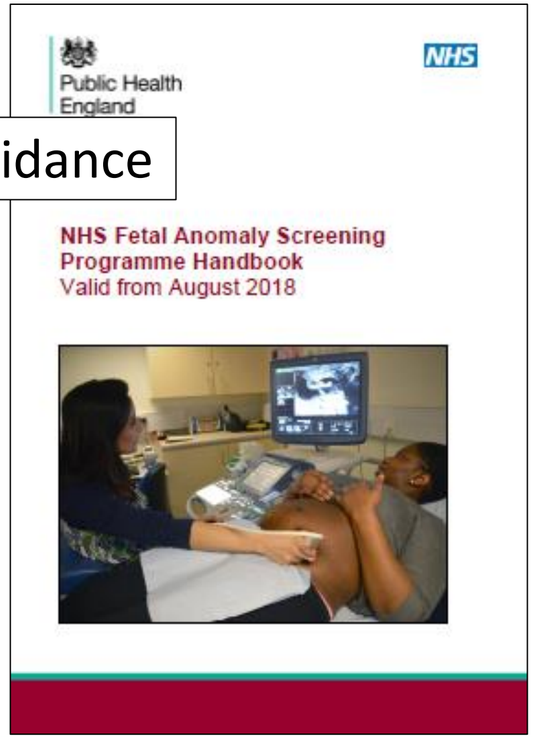
Best Practice

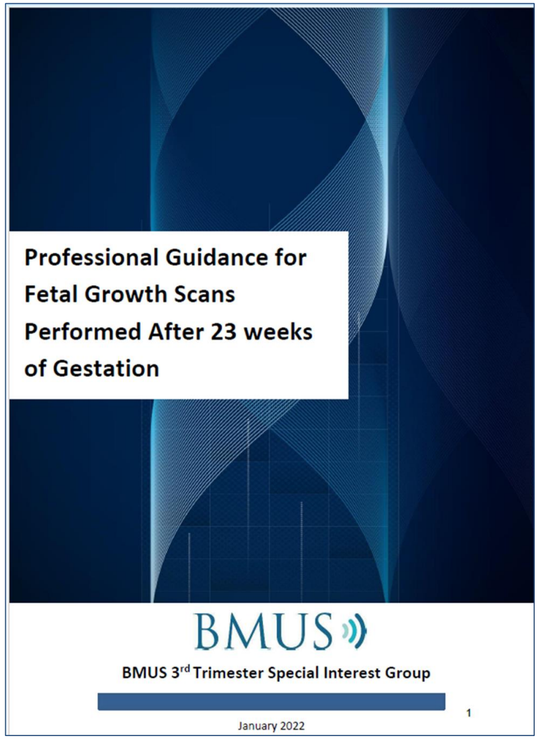
- *Perform, interpret & report the required ultrasound examination to the appropriate standard*
- thorough knowledge of local & national recommendations/guidance





Local guidance





FASP (July 2022)

NHS England

NHS fetal anomaly screening programme (FASP)

20-week screening scan base menu

Area	Structure detail	Measurement	Images to be archived
Head and neck • skull • brain • neck	Head shape	Head circumference (HC)	Yes (to include HC measurement, CSP and measurement of the atrium of the posterior lateral ventricle)
	Cavum septum pellucidum (CSP)	Not required	
	Ventricular atrium (VA)	Atrium of the posterior lateral ventricle at the level of the glomus of the choroid plexus	
	Cerebellum	Transcerebellar diameter (TCD) in the suboccipitobregmatic view	Yes
	Nuchal fold (NF) Measure if appears large	Distance between the outer border of the occipital bone and the outer skin edge	Yes (only
Face	Coronal view of lips and nasal tip	Not required	Yes
Chest • lungs • heart	Situs/laterality of heart	Not required	No
	4 chamber view (4CV)		
	Aorta arising from left ventricle (LVOT)		
	Pulmonary artery arising from right ventricle (RVOT) or the 3-vessel view (3VV)		
	3 vessel and trachea view (3VT)		
Abdomen	Stomach and position	Abdominal circumference (AC)	Yes (to include AC measurement, stomach and short section of umbilical vein)
	Kidneys Measure antero-posterior (AP) renal pelvis diameter if it appears large	Measurement not required unless AP renal pelvis diameter >7.0mm	Yes (only if AP renal pelvis diameter measures > 7.0mm)
	Abdominal wall and cord insertion	Not required	No
	Diaphragm		
	Bladder		
Spine • cervical • thoracic • lumbar • sacral	Vertebrae Skin covering To be assessed in sagittal, transverse and coronal planes	Not required	Yes (image sagittal plane. If it is not possible to archive the sagittal plane, then it is acceptable to archive the coronal plane)
Limbs • lower • upper	Femur, tibia and fibula (both legs)	Femur length (FL)	Yes (image and measure a single femur only)
	Metatarsals (both feet)	Digit count not required	No
	Radius, ulna and humerus (both arms)	Not required	
	Metacarpals (both hands)	Digit count not required	
Uterine cavity • uterine content	Placenta	According to local guidelines	According to local guidelines

July 2022

Local guidance

BMUS

Best Practice

- *Perform, interpret & report the required ultrasound examination to the appropriate standard*
- evaluate what is required & what is expected
- Mordel v Royal Berkshire NHSFT, judgement October 2019
  - child with Down's syndrome delivered
  - mother declined Down's screening at booking appt July 2014
  - *'so you don't want Down's screening'* only asked at 12 week scan
  - sonographer did not confirm that mother's decision was based on correct interpretation of information given at booking ('needle test' v blood test)
  - Judge found for the Claimant

Best Practice

- Mordel v Royal Berkshire NHSFT – report of judgement

Expert evidence diverged on whether the sonographer's approach met the standard for obtaining informed consent. The claimant's experts advocated for a more thorough, open-ended inquiry to ensure understanding, while the defendant's experts supported the sonographer's succinct approach as reasonable and in line with policy. The court found the claimant's experts more persuasive on the necessity of reasonable steps to confirm understanding and secure informed consent, emphasizing that the sonographer's brief question and statement were inadequate in this case.

Best Practice

- Mordel v Royal Berkshire NHSFT – report of judgement

The court held that informed consent requires more than a simple question and acceptance or declination; it demands reasonable steps to ensure the patient understands the nature and purpose of the test. The sonographer failed in this duty by not adequately confirming the claimant's understanding, especially given the claimant's characteristics and the importance of the decision.

Best Practice

- *Perform, interpret & report the required ultrasound examination to the appropriate standard*
- technical ability – to obtain required images & measure correctly
- experience - of range of normal appearances at that gestation
  - of overlap between normal, not normal & abnormal (appearances & measurements)
- assessment – normal, review, refer
- communication of findings – verbal, written

Images

- All images archived, plus any momento images provided by parents, contribute to the expert's opinion
- Where normal appearances are reported, all the imaging must support this
- Screening for the '11 conditions', & suspecting/excluding other conditions, results from obtaining the correct sections & interpreting their appearances correctly
- *The sonographer's role is to differentiate between appearances &/or measurements which are normal & those which are not*

Best, Acceptable or Poor Practice?

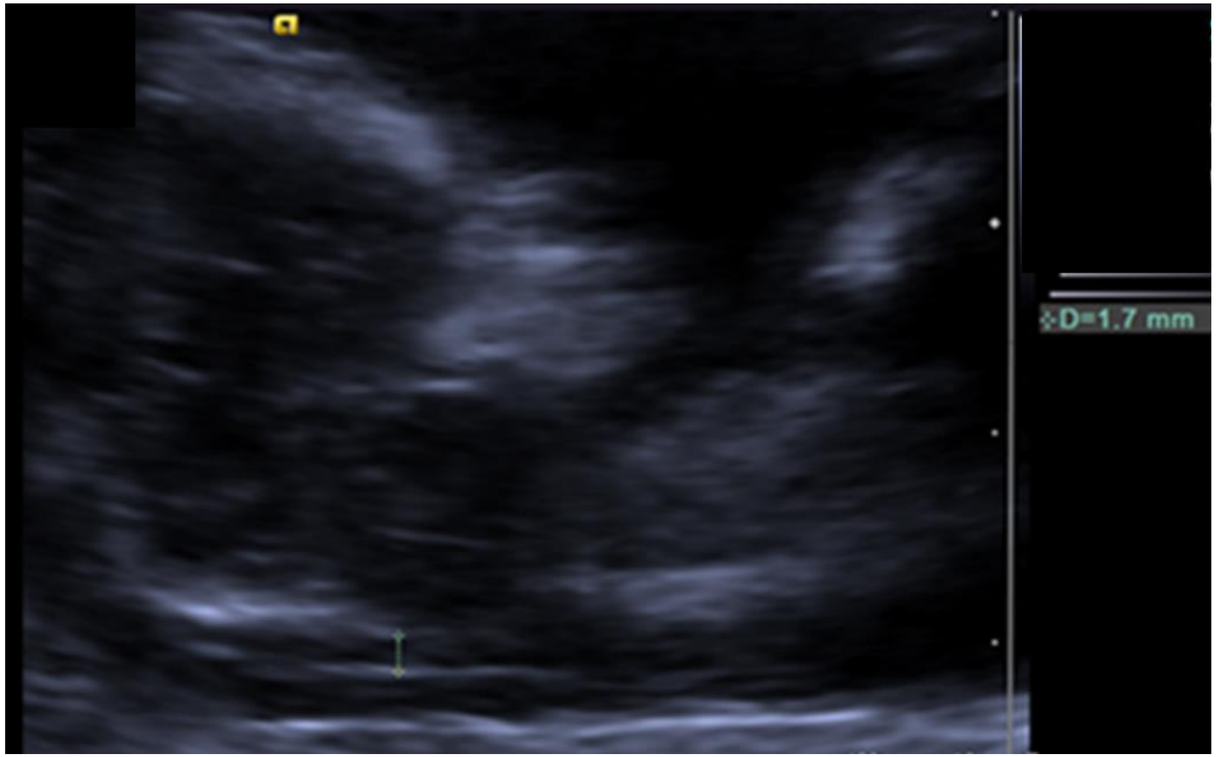
- Combined screening scan
- Routine anomaly scan
- Growth scan

- Normal findings reported at each scan
- Measurements = dates

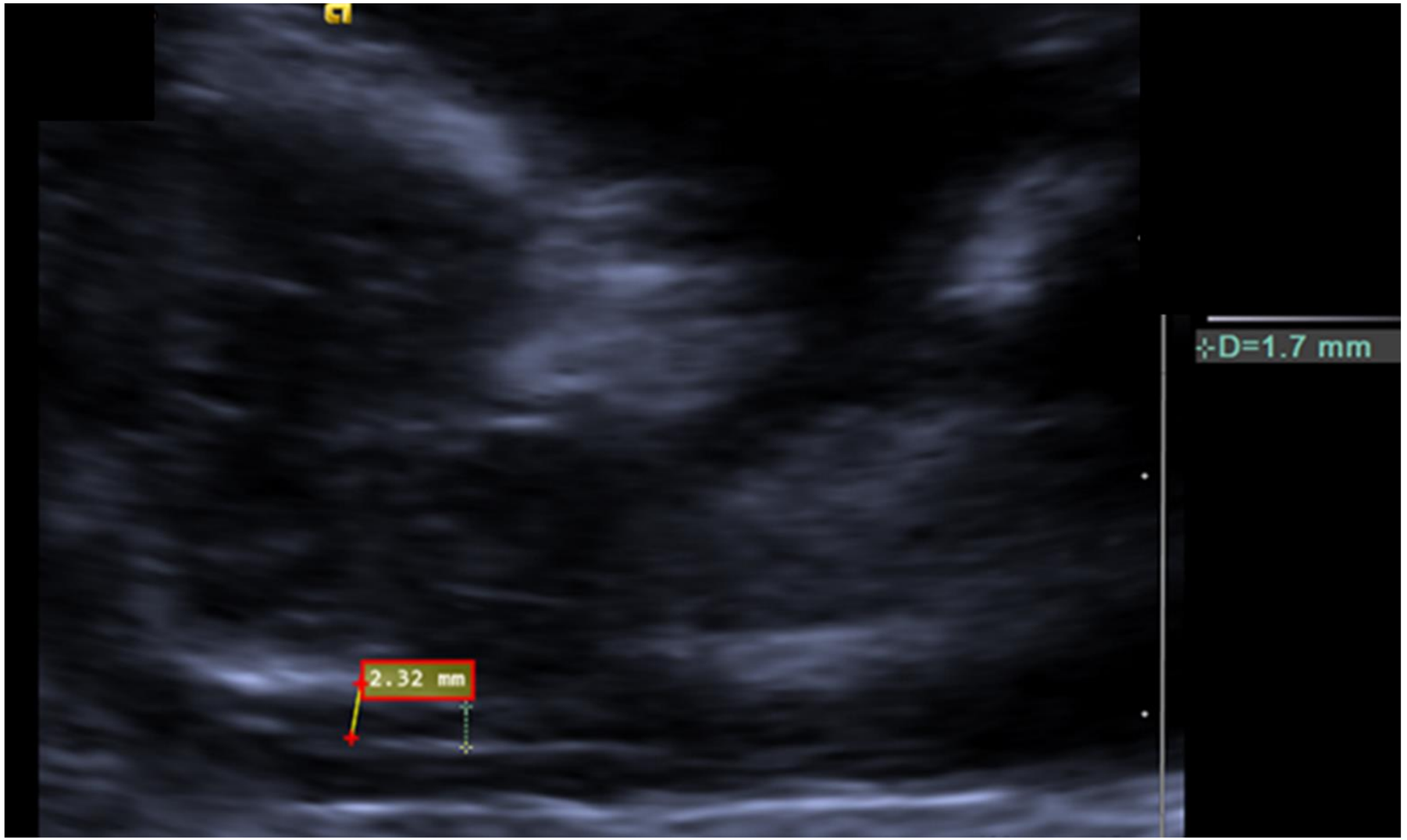
Combined Screening Scan

Combined Screening

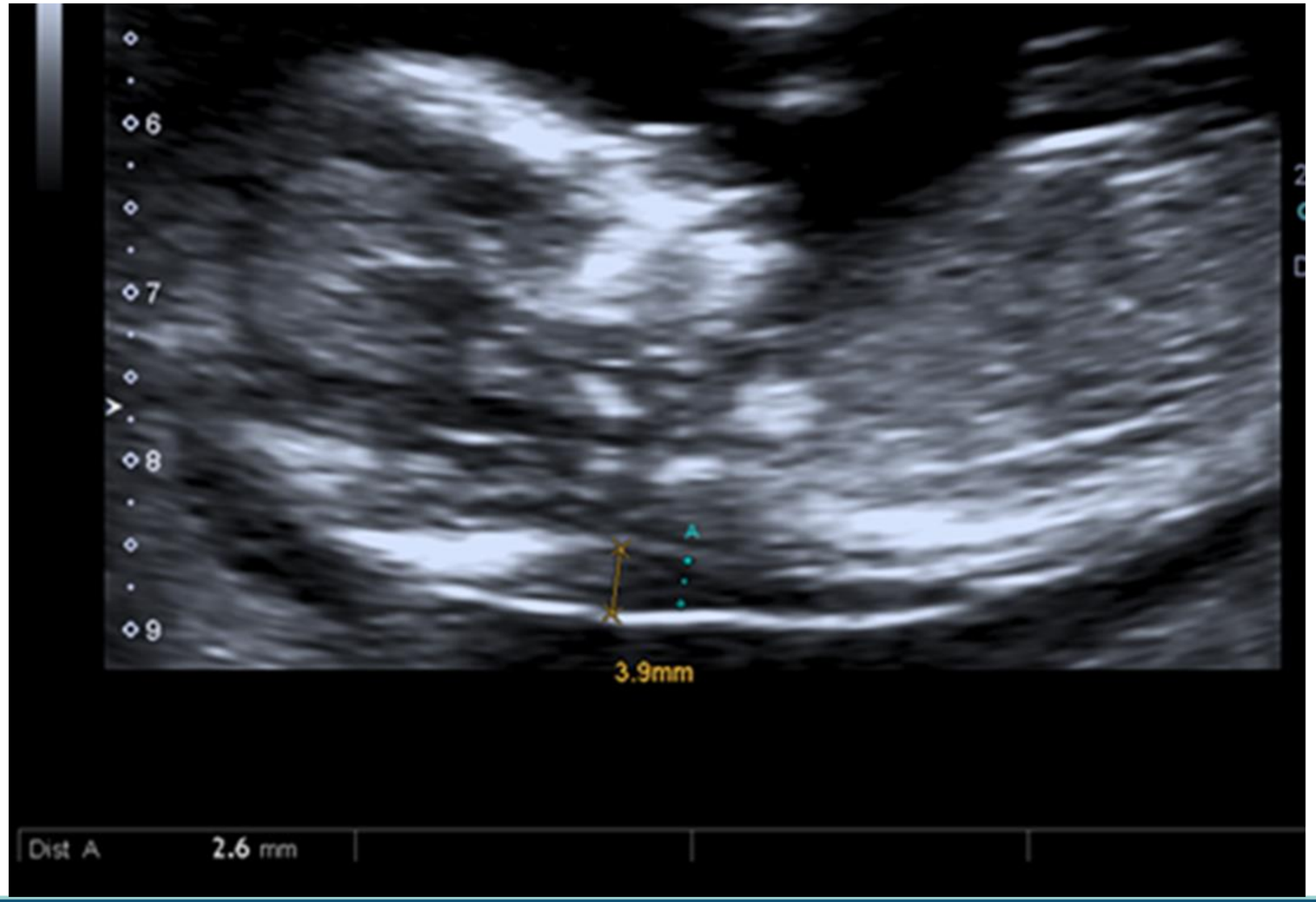
- CRL & NT sections + caliper placements FASP score ≥9?
- FASP score: 12/12 = good; 9-11/12 = acceptable



Dating/Combined Screening 1



Dating/Combined Screening 2



Best Practice

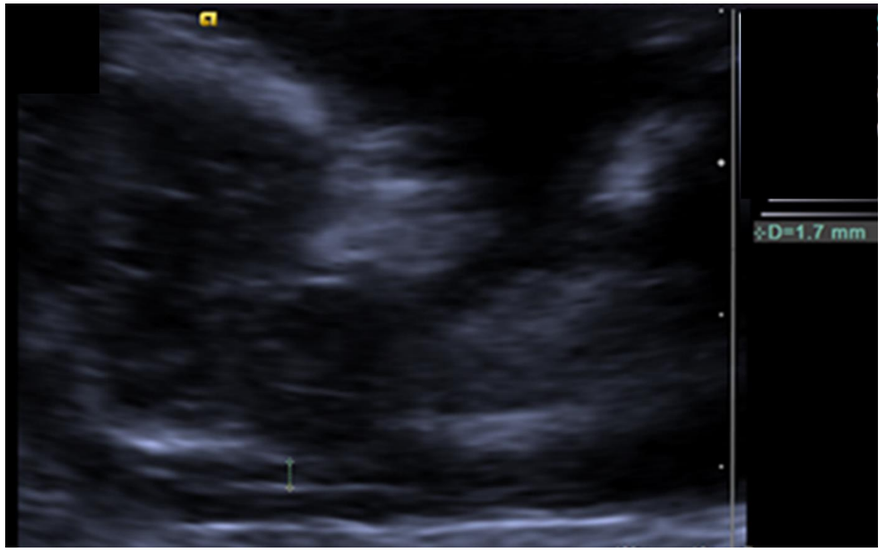
FASP requires:

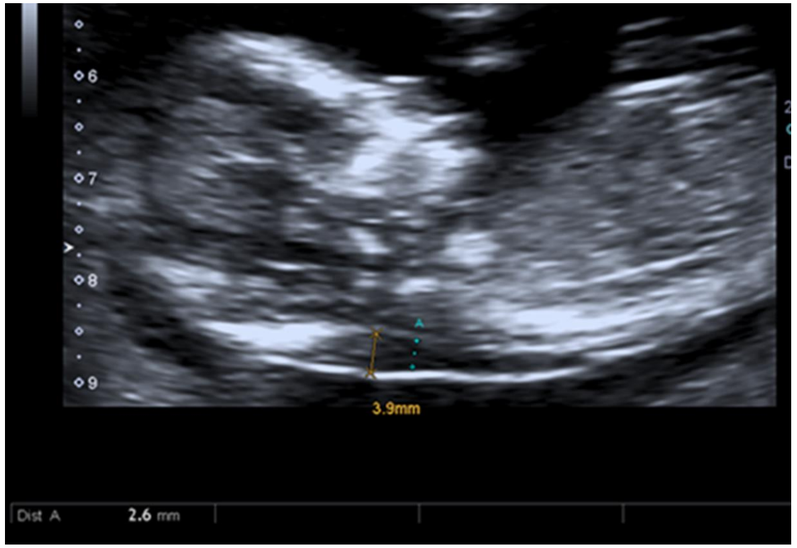
- ‘widest part of the NT should be measured’

- ‘NT should be measured at least twice & the maximum measurement that meets the criteria should be reported’

- ‘the image demonstrating the measured NT which has been reported should be archived’

Best, Acceptable or Poor Practice?





- *Failing to measure the widest part of the NT and/or failing to image the reported NT as demonstrated in the stored images falls below the acceptable standard for a routine combined screening scan*

Anomaly Scan

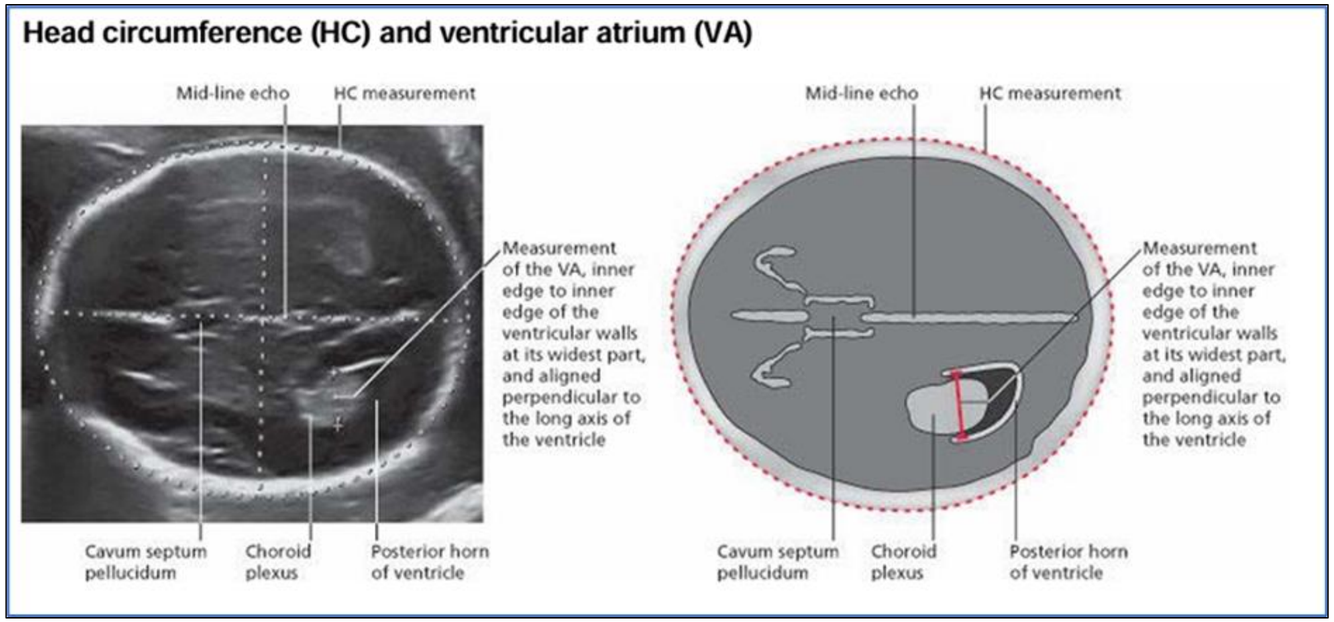
sections, landmarks, calipers

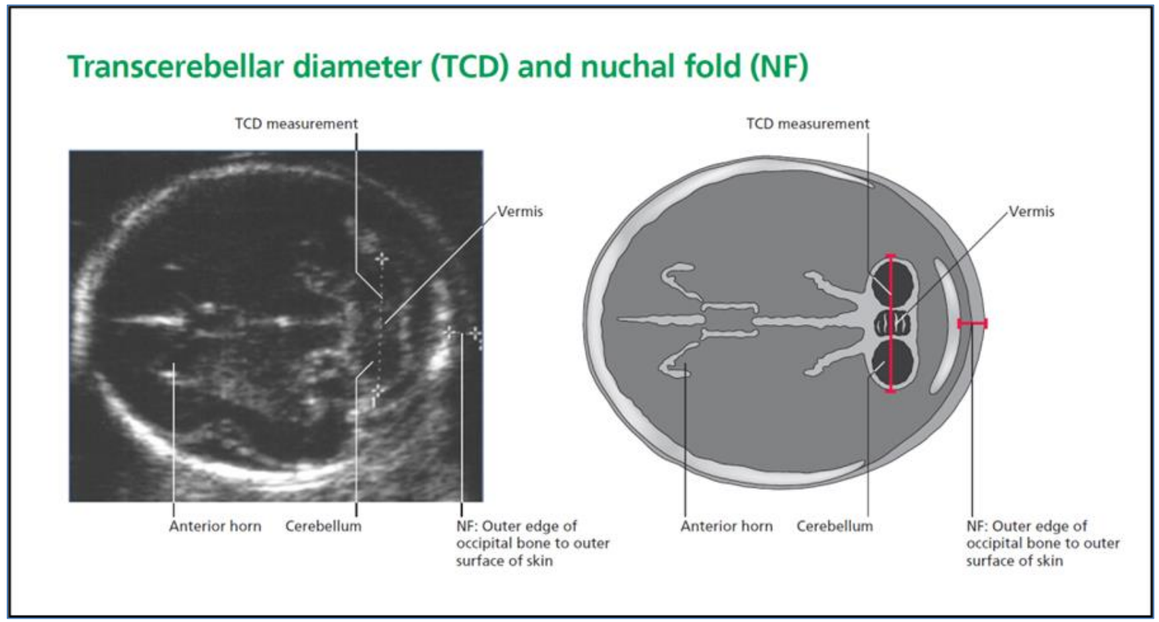
guidelines

momento images

the heart

Sections & Landmarks (FASP, BMUS)

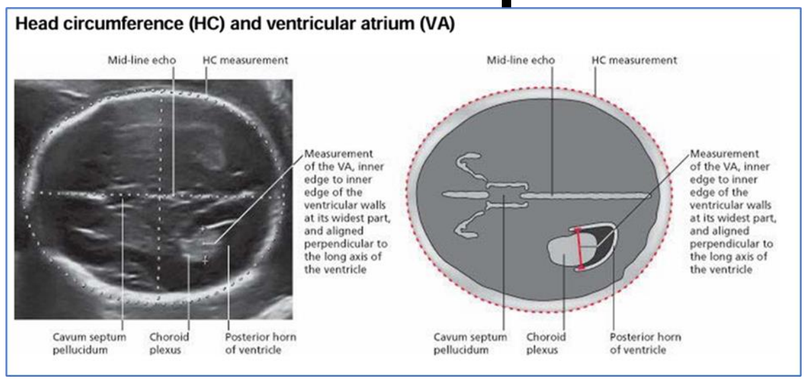


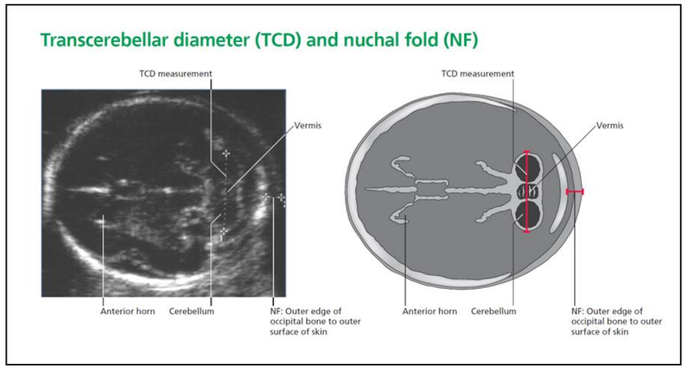


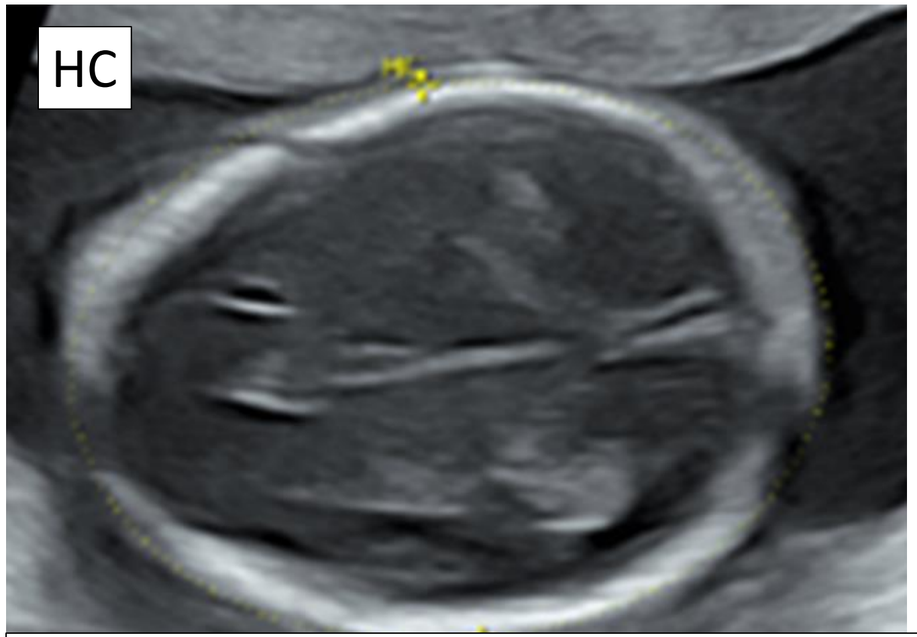
- Chitty section for HC & Vp – trans-ventricular (<u>across gestation)</u> not trans-thalamic

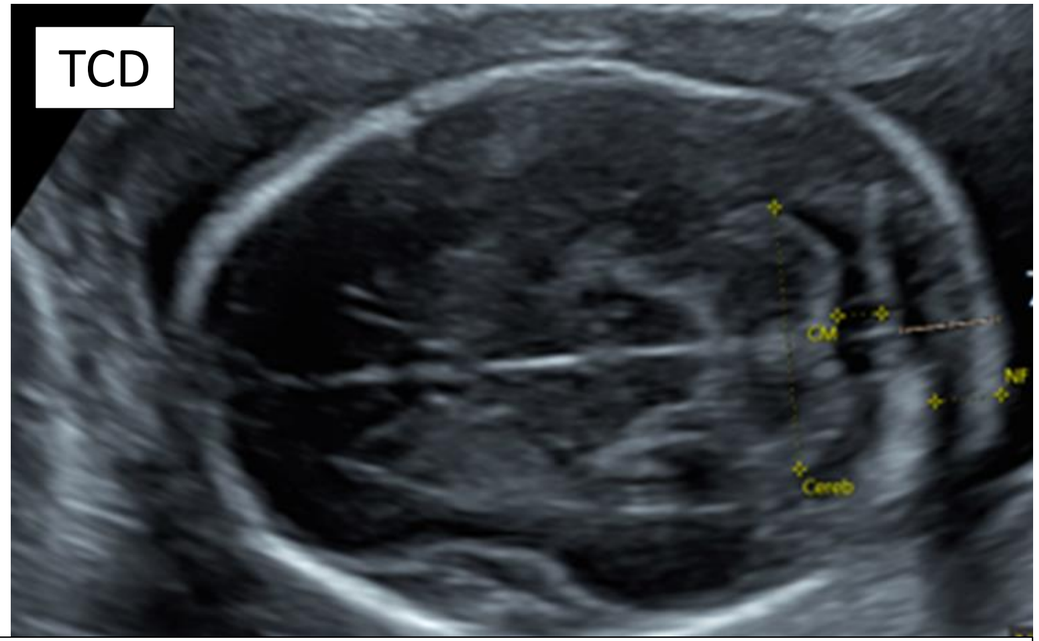
- HC & TCD sections both require CSP, <u>not</u> columns of the fornix

Required Landmarks - CSP









no CSP (+ transthalamic)

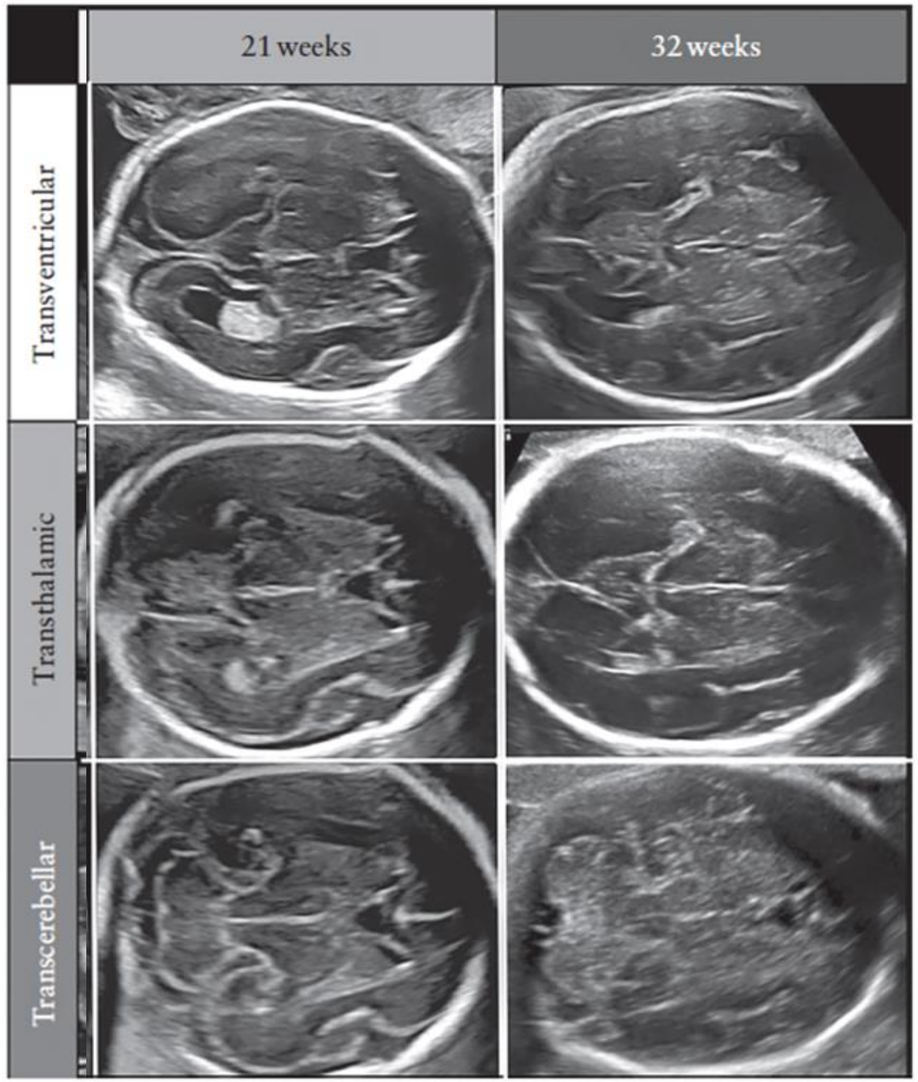
columns of the fornix

Best, Acceptable or Poor Practice?

- As FASP requires the trans-ventricular level for the HC, stored measured HC sections should be at that level
- As the CSP is a FASP required landmark for both the HC and TCD, stored HC & TCD sections should demonstrate the ‘empty box’ of the CSP
- Absence of the CSP is associated with agenesis of the corpus callosum (ACC) & requires referral

- *Failing to demonstrate the CSP in any stored anomaly scan images falls below the acceptable standard*

Calipers (ISUOG/FASP)



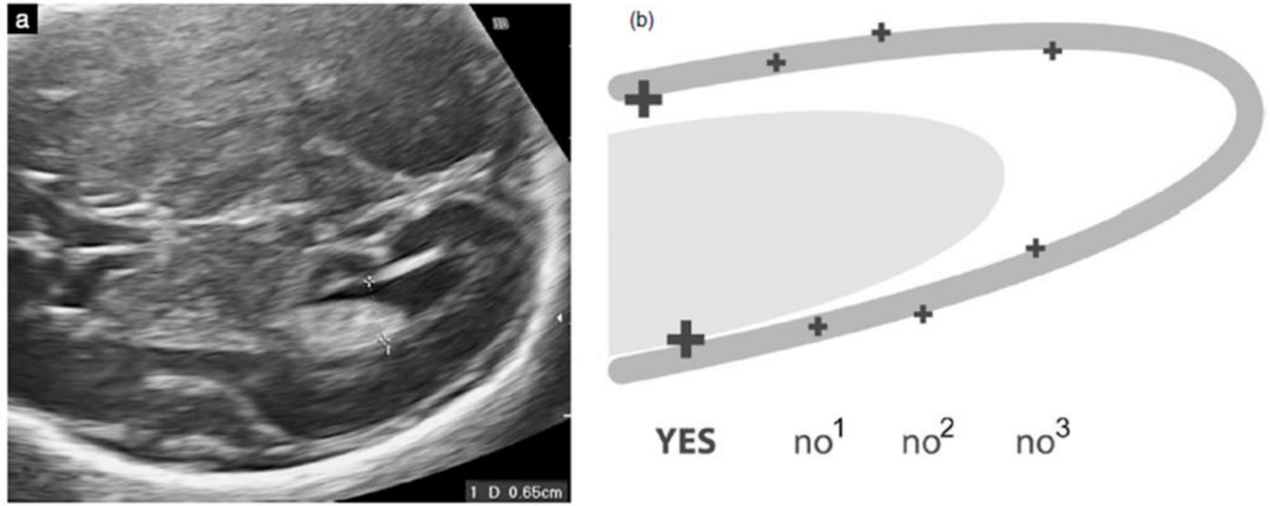
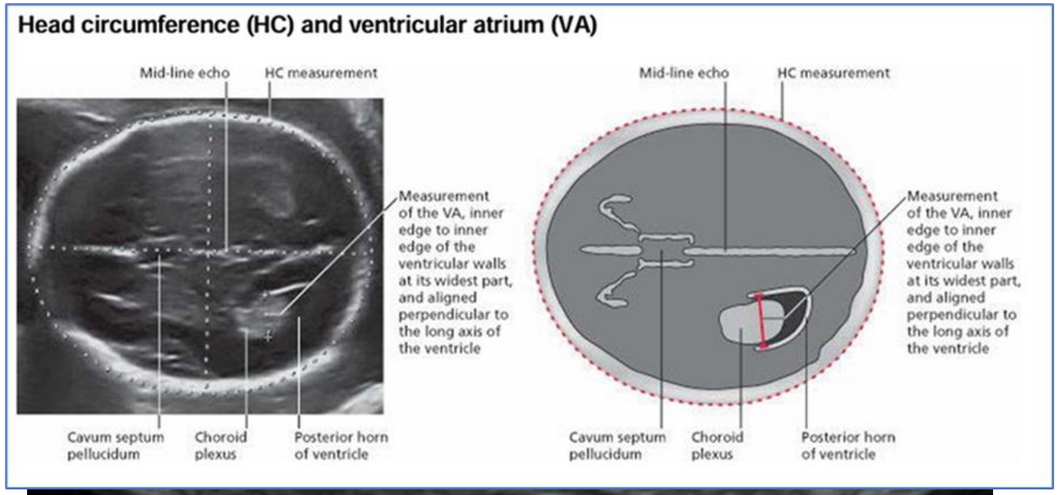
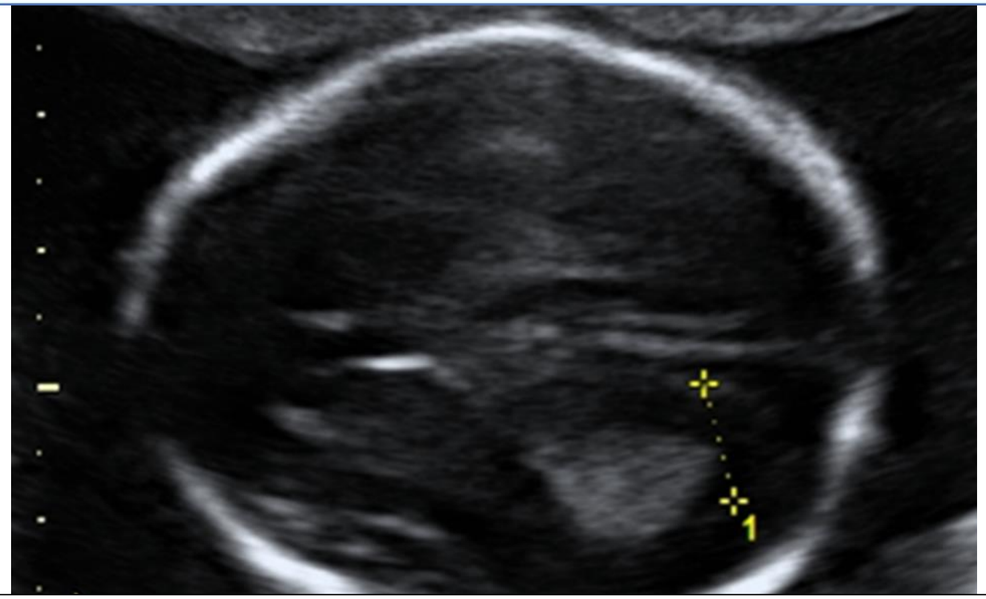


Figure 2 (a) Measurement of the atrium of the lateral ventricles. The calipers are positioned at the level of the glomus of the choroid plexus, inside the echoes generated by the ventricular walls; (b) diagram to illustrate correct caliper placement for ventricular measurement. Calipers are correctly placed touching the inner edge of the ventricle wall at its widest part and aligned perpendicular to the long axis of the ventricle (YES). Incorrect placements include middle–middle (no^1), outer–outer (no^2), and placement that is too posterior in the narrower part of the ventricle or not perpendicular to the ventricle axis (no^3).

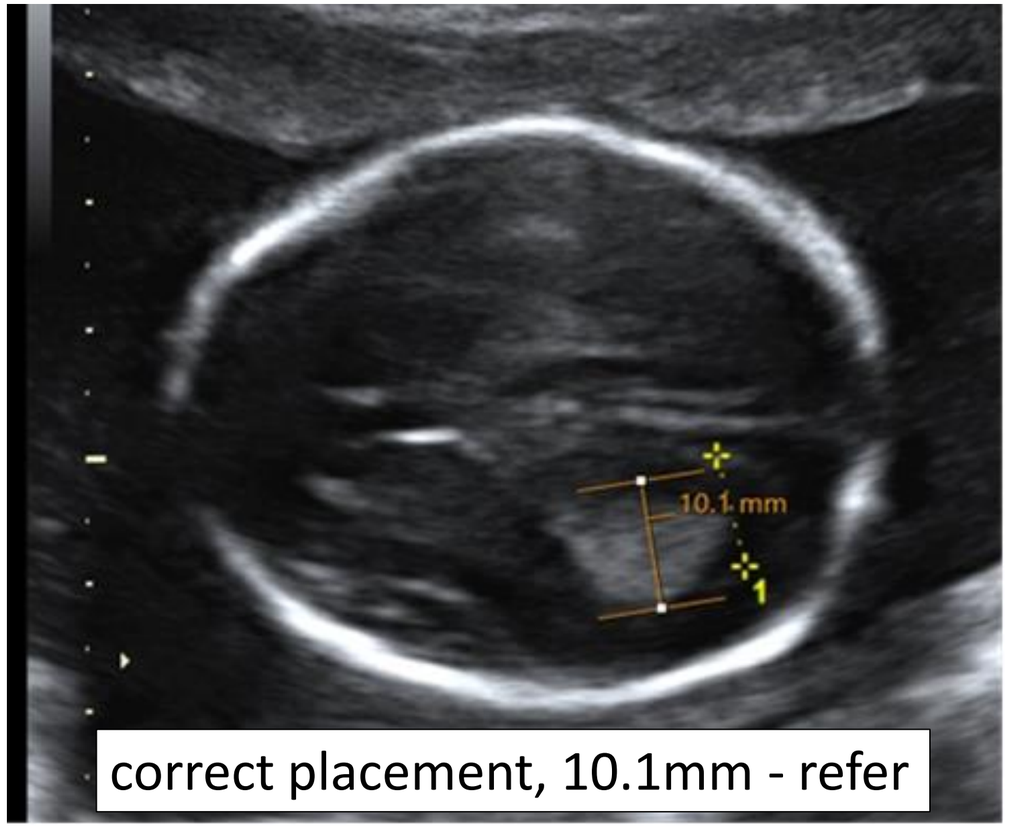
The intersection of the cross of both calipers should be placed on the inner border of the medial & lateral walls

Caliper placement (Vp)



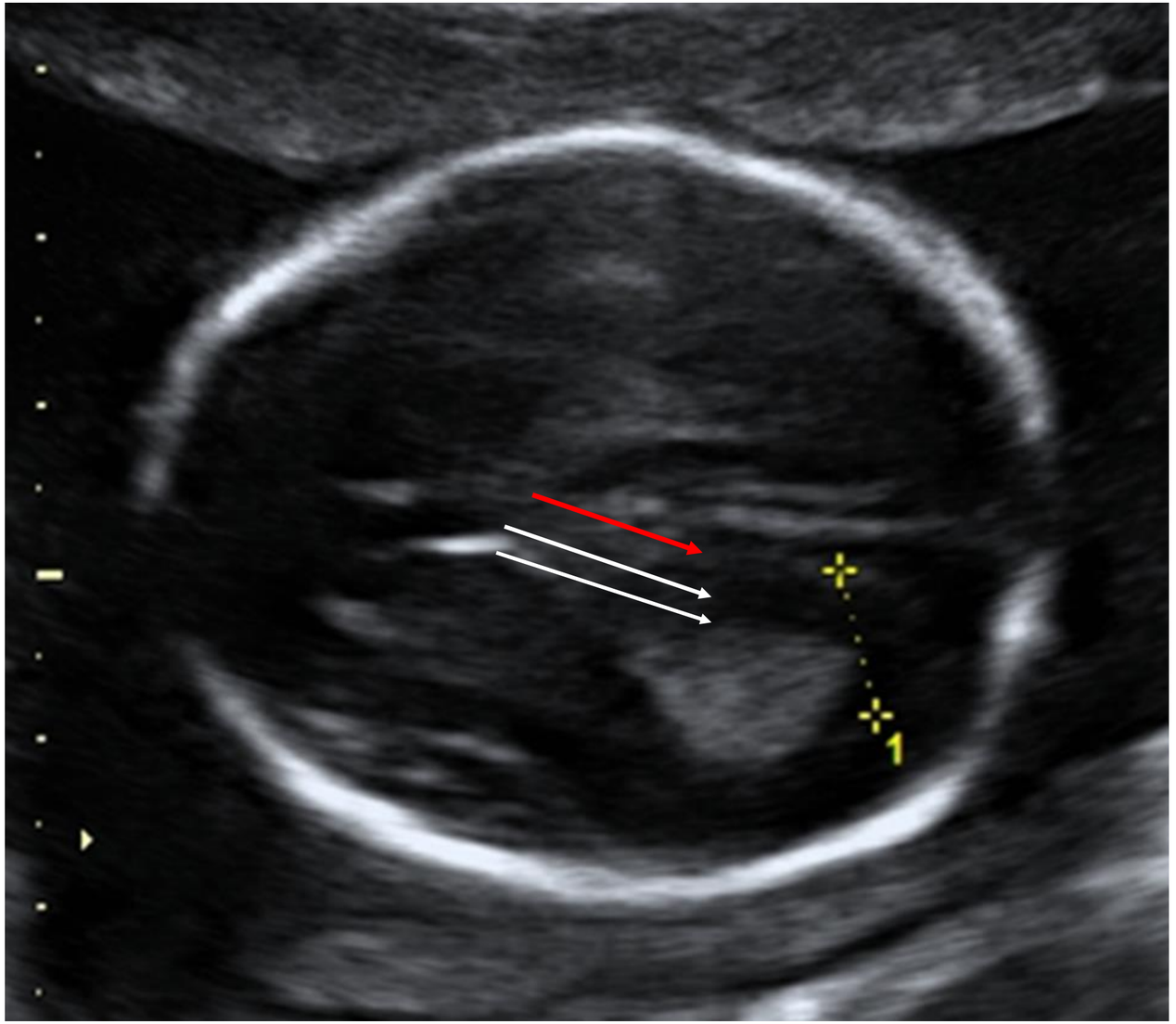


8.9mm reported (+.....+ 1)
not medial border of Vp, placement incorrect

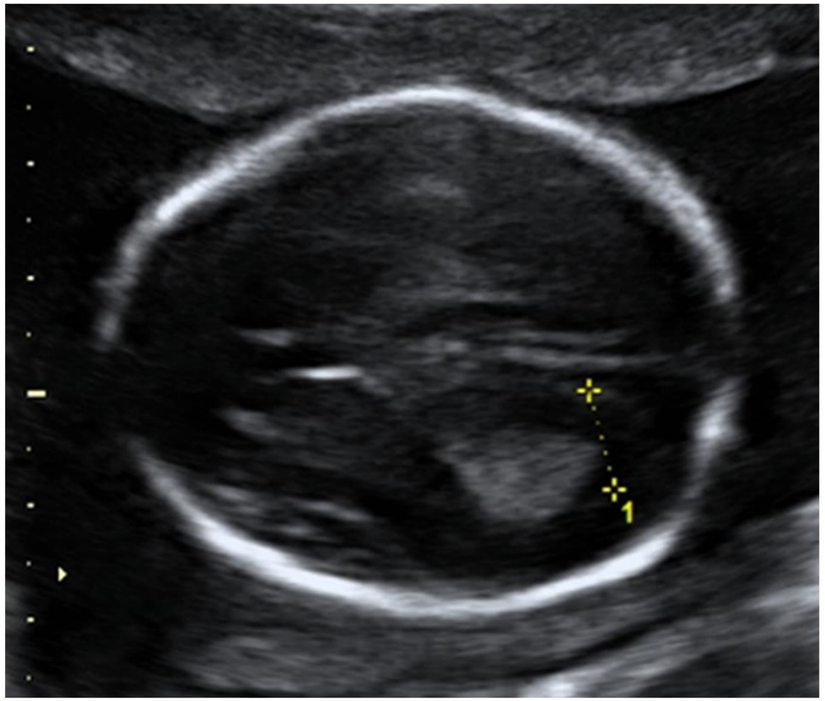


correct placement, 10.1mm - refer

Caliper Placement – Deciding on the Borders

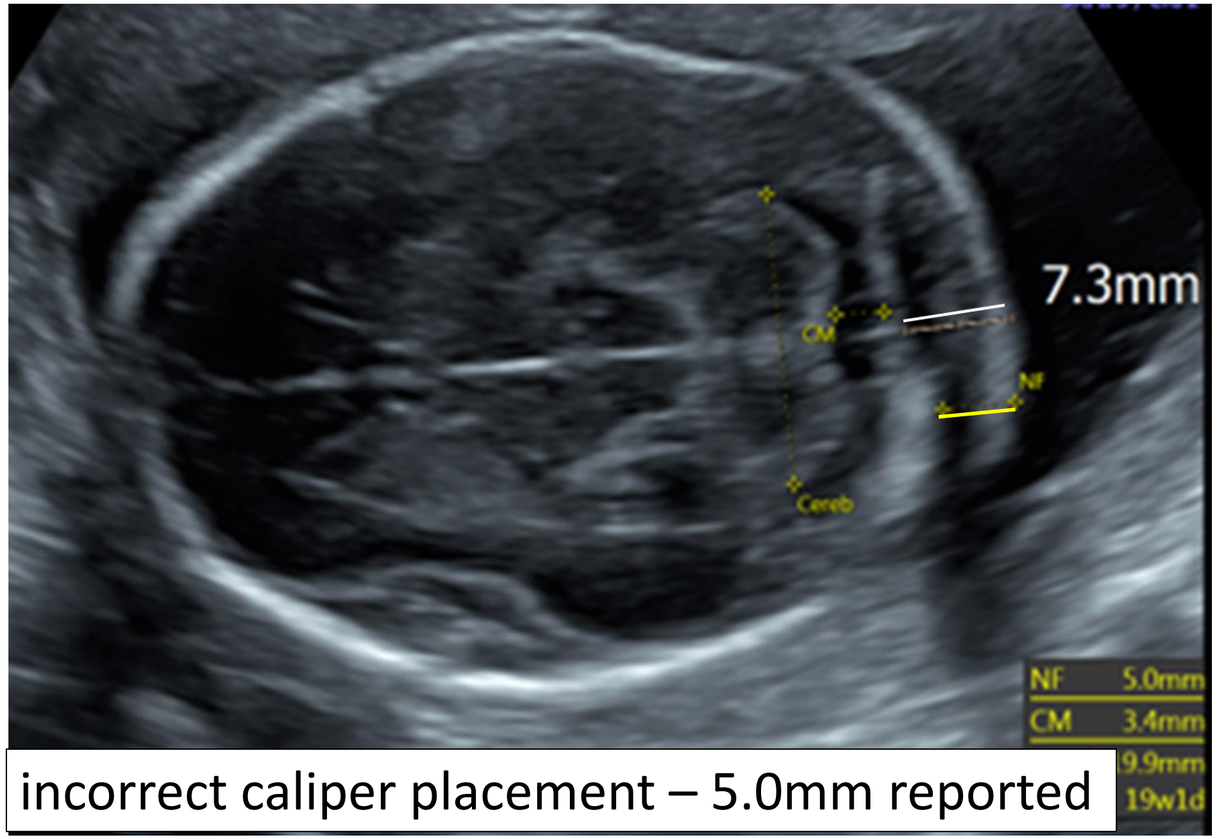


Best, Acceptable or Poor Practice?

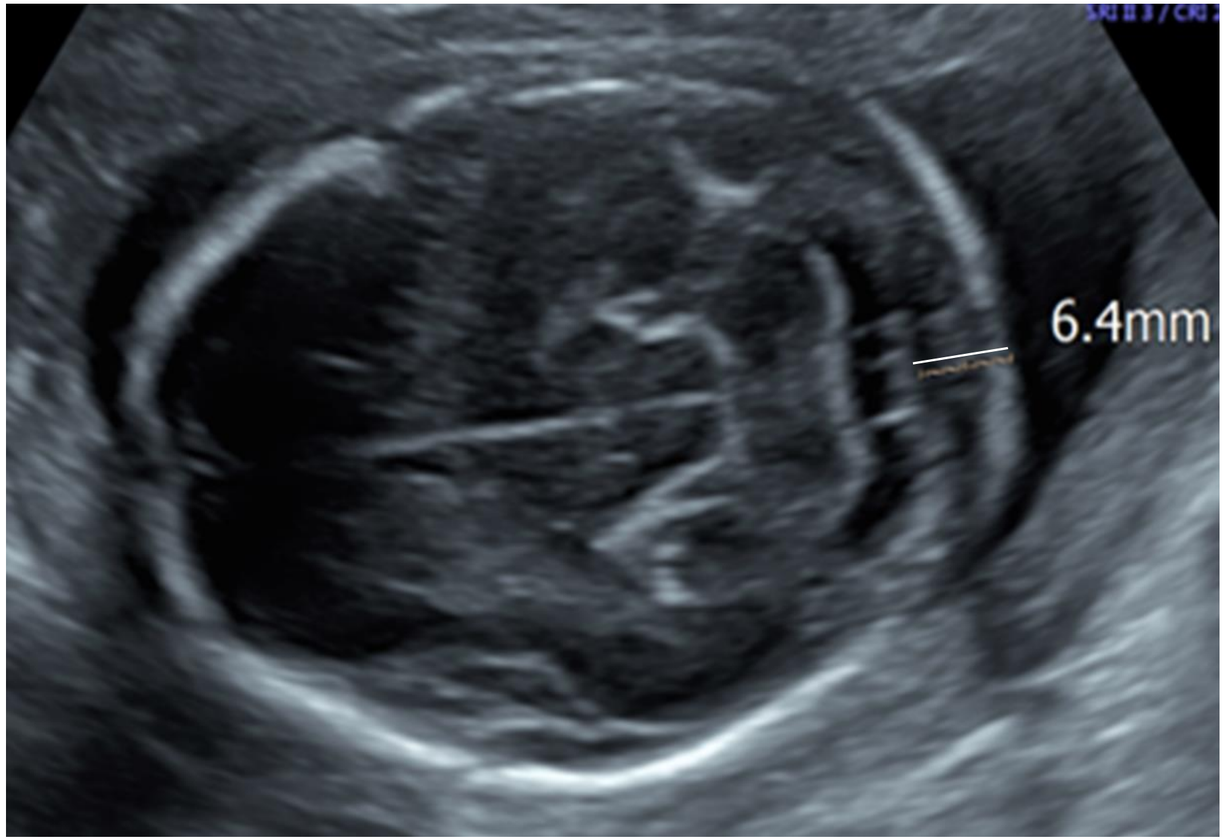


- *Failing to identify the ventricular walls correctly and/or to place the calipers correctly across the widest part of the VA in the stored image used to report the Vp falls below the acceptable standard*

Caliper Placement - NF



incorrect caliper placement – 5.0mm reported



correct caliper placement – left (reported) 7.3mm, right (stored) 6.4mm, both indicate referral

Best, Acceptable or Poor Practice?

FASP requires:

- evaluation of the nuchal fold (NF), to ‘measure if appears large’, image & archive ‘if measurement ≥ 6mm’

- caliper placement for NF ‘outer edge of occipital bone to outer skin surface’ at level of midline & centre of cerebellar vermis

- *Failing to identify an increased NF and/or to measure it correctly (in order to determine whether or not referral is required) falls below the acceptable standard*

Anomaly Scan

sections, landmarks, calipers

guidelines

momento images

the heart

Guidelines

FASP (July 2022)

NHS England

NHS fetal anomaly screening programme (FASP)

20-week screening scan base menu

Area	Structure detail	Measurement	Images to be archived
Head and neck • skull • brain • neck	Head shape	Head circumference (HC)	Yes (to include HC measurement, CSP and measurement of the atrium of the posterior lateral ventricle)
	Cavum septum pellucidum (CSP)	Not required	
	Ventricular atrium (VA)	Atrium of the posterior lateral ventricle at the level of the glomus of the choroid plexus	
	Cerebellum	Transcerebellar diameter (TCD) in the suboccipitobregmatic view	Yes
	Nuchal fold (NF) Measure if appears large	Distance between the outer border of the occipital bone and the outer skin edge	Yes (only
Face	Coronal view of lips and nasal tip	Not required	Yes
Chest • lungs • heart	Situs/laterality of heart	Not required	No
	4 chamber view (4CV)		
	Aorta arising from left ventricle (LVOT)		
	Pulmonary artery arising from right ventricle (RVOT) or the 3-vessel view (3VV)		
	3 vessel and trachea view (3VT)		
Abdomen	Stomach and position	Abdominal circumference (AC)	Yes (to include AC measurement, stomach and short section of umbilical vein)
	Kidneys Measure antero-posterior (AP) renal pelvis diameter if it appears large	Measurement not required unless AP renal pelvis diameter >7.0mm	Yes (only if AP renal pelvis diameter measures > 7.0mm)
	Abdominal wall and cord insertion	Not required	No
	Diaphragm		
	Bladder		
Spine • cervical • thoracic • lumbar • sacral	Vertebrae Skin covering To be assessed in sagittal, transverse and coronal planes	Not required	Yes (image sagittal plane. If it is not possible to archive the sagittal plane, then it is acceptable to archive the coronal plane)
Limbs • lower • upper	Femur, tibia and fibula (both legs)	Femur length (FL)	Yes (image and measure a single femur only)
	Metatarsals (both feet)	Digit count not required	No
	Radius, ulna and humerus (both arms)	Not required	
	Metacarpals (both hands)	Digit count not required	
Uterine cavity • uterine content	Placenta	According to local guidelines	According to local guidelines

July 2022

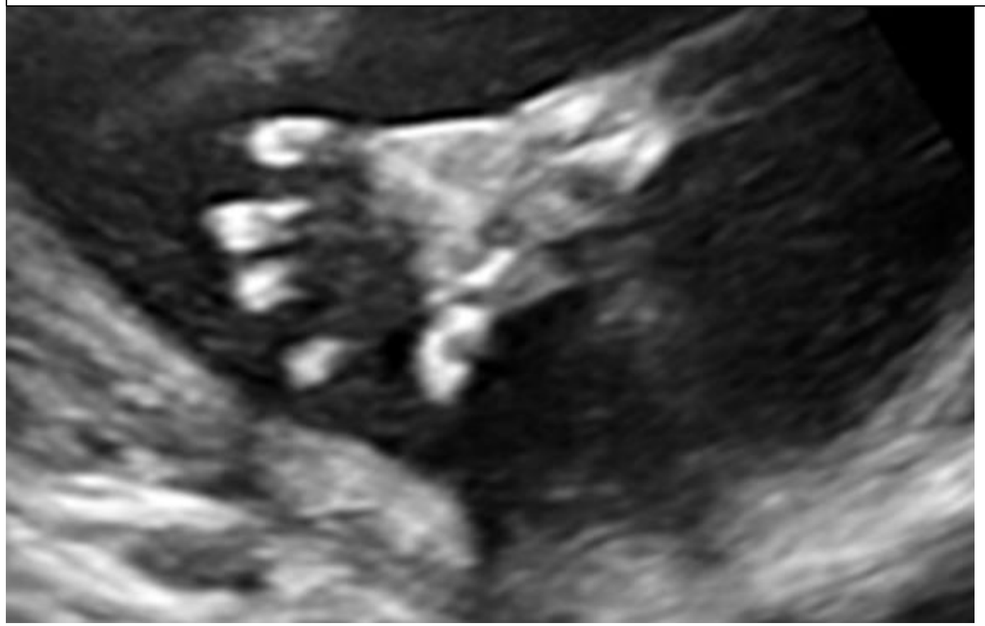
Local guidelines

BMUS

Guidelines – Hands

Limbs • lower • upper	Femur, tibia and fibula (both legs)	Femur length (FL)	Yes (image and measure a single femur only)
	Metatarsals (both feet)	Digit count not required	No
	Radius, ulna and humerus (both arms)	Not required	
	Metacarpals (both hands)	Digit count not required	

Local Guidance - fingers of both hands must be seen to open fully at least once during the scan.
Imaging – long bones including hands & feet required



What degree of hand anomaly is it acceptable to overlook when scanning to the FASP standard?

Is it acceptable to fail to identify overlapping fingers or clinodactyly or postaxial polydactyly when scanning to the local standard?

Does the local guidance require an image of the outstretched fingers of each hand?

Anomaly Scan

sections, landmarks, calipers

guidelines

momento images

the heart

Momento images

- All imaging, including momento photos, contributes to the expert's opinion
- Is it good practice to provide fetal profile momento images that are not truly mid-sagittal?
- Appearances consistent with micrognathia will be interpreted as such unless other imaging confirms these were due to technical issues rather than an underlying pathological process




Anomaly Scan

sections, landmarks, calipers
guidelines
momento images
the heart

Screening – for ‘11 conditions’

‘The r 4.
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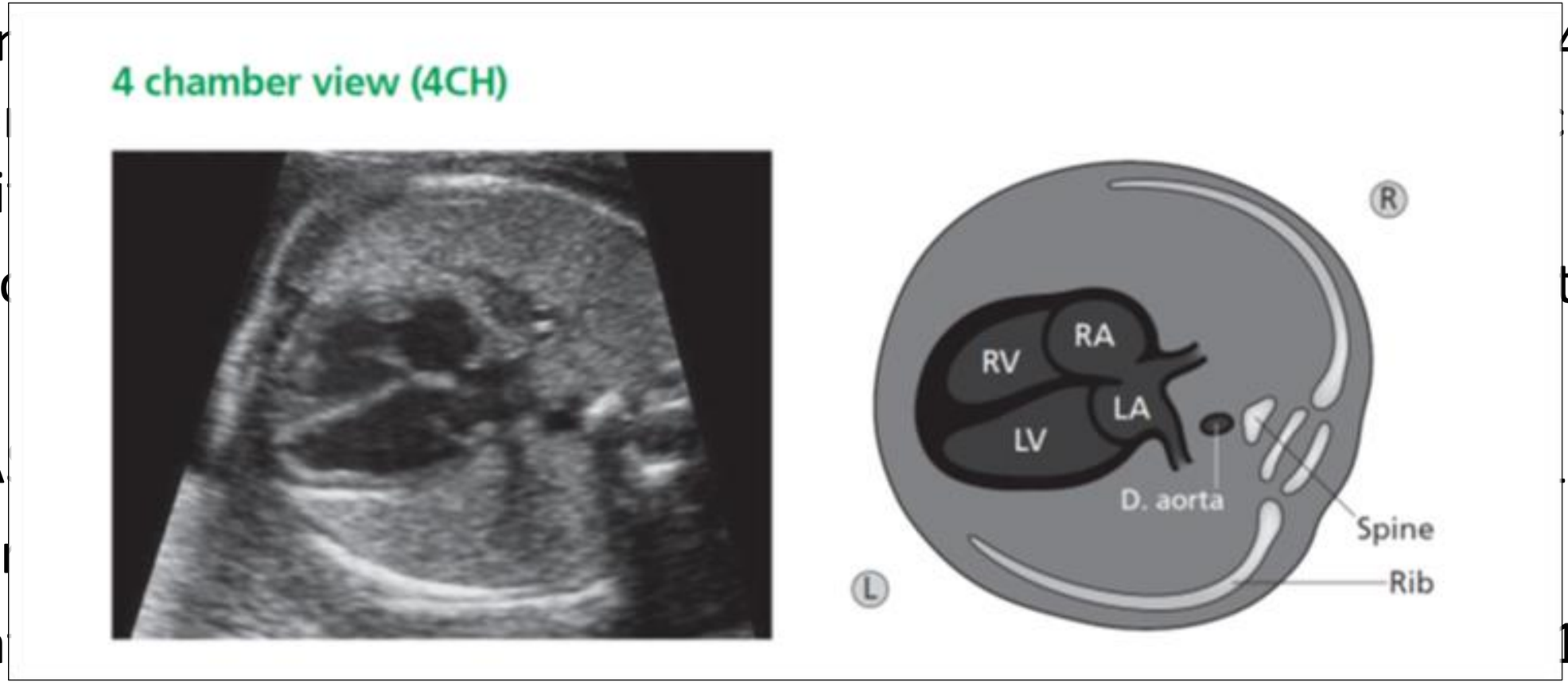
- FA 0
- ser
- na 16)
- what size is the foramen ovale? - approx 3mm in length at 20 weeks



Towards Acceptable Practice?

- FASP requires evaluation of 4 cardiac views
- storage of cardiac images is not required

- Cardiac abnormalities vary in their severity thus, early postnatal findings are key to determining likely ultrasound appearances at 20wks
- Therefore defer to opinion of expert perinatal cardiologist

Assessing the Heart

Information required to form opinion, using ToF as an example

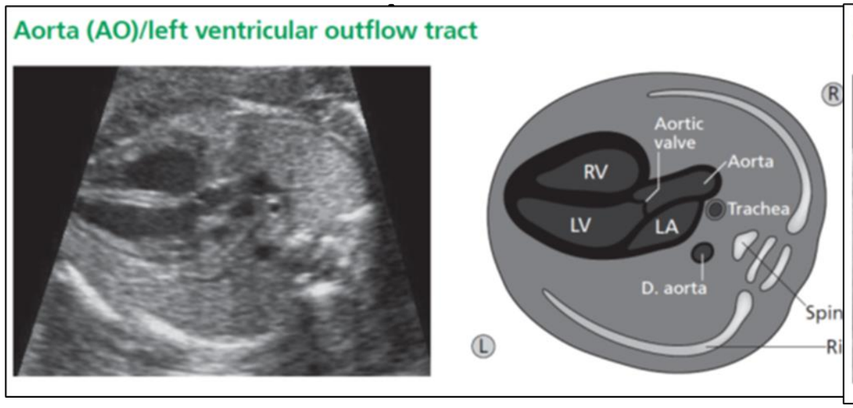
ToF = VSD, overriding aorta, narrowing of main pulmonary artery, (RV hypertrophy)

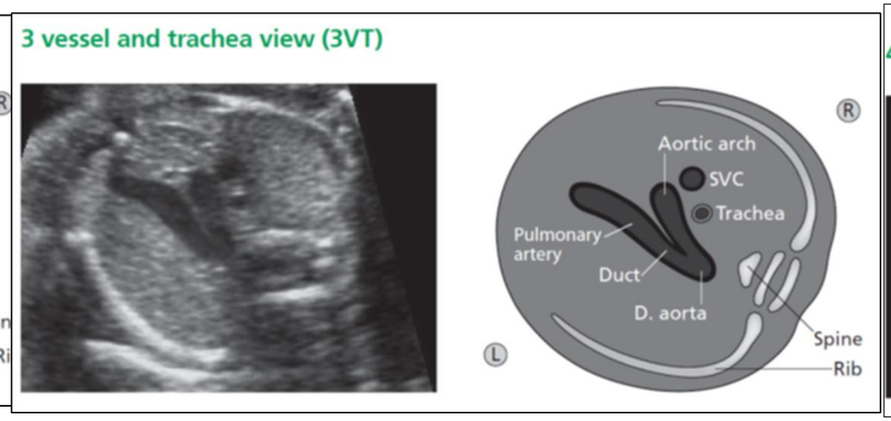
- does this VSD in this case lie in at least one of the FASP planes?
- what size would the VSD have been at 20 weeks?
- was there a marked difference in size between the AA & MPA/duct?
- was the aortic override ‘significant’?

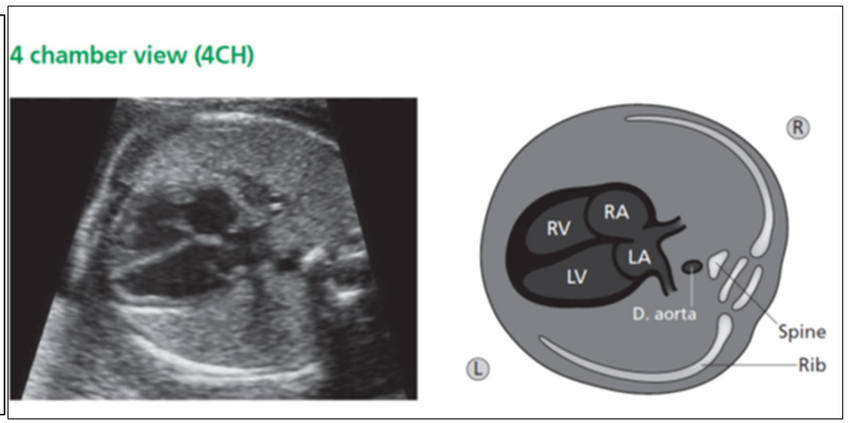
Towards Acceptable Practice

ToF = VSD, overriding aorta, narrowing of main pulmonary artery, (RV hypertrophy)

- VSD ≥3mm, when positioned in one of the FASP required planes, should be visible, & therefore detectable at 20 wks by a reasonably competent sonographer
- marked difference in diameter of AA & MPA/DA in 3VT view should be detectable at 20 wks by a reasonably competent sonographer
- LVOT view will not be normal when significant overriding of aorta present & therefore should be detectable at 20 wks by a reasonably competent





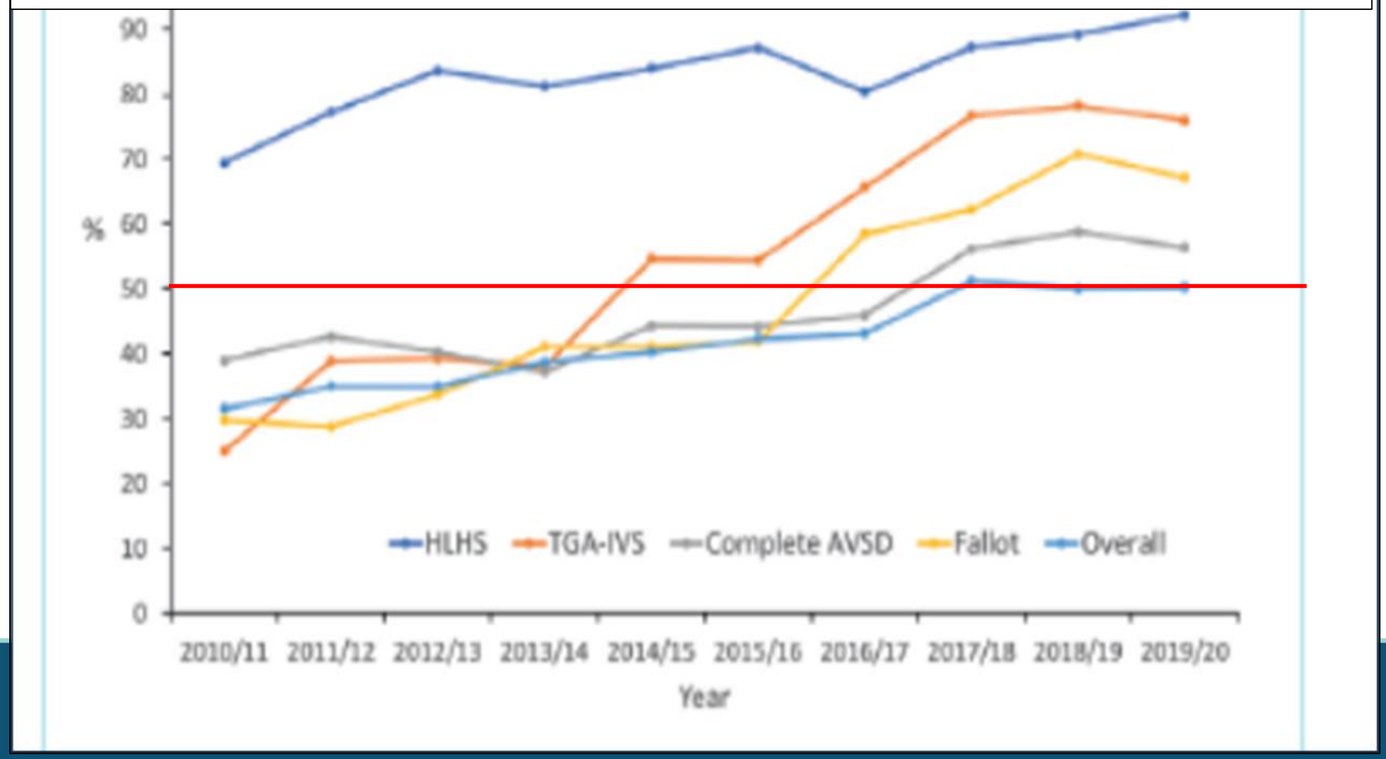


The Heart - Tetralogy of Fallot (ToF)

ToF = VSD, overriding aorta, narrowing of main pulmonary artery, (RV hypertrophy)

- FASP stated DRs are unchanged since 1st FASP publication in 2010
- serious cardiac anomalies (TGA, AVSD, TOF, HLHS) - DR 50%

Proportion of infants diagnosed antenatally & who underwent a cardiac procedure



Best, Acceptable or Poor Practice?

FASP:

- evaluation of 4 cardiac views to FASP standard is required
- storage of cardiac images not required

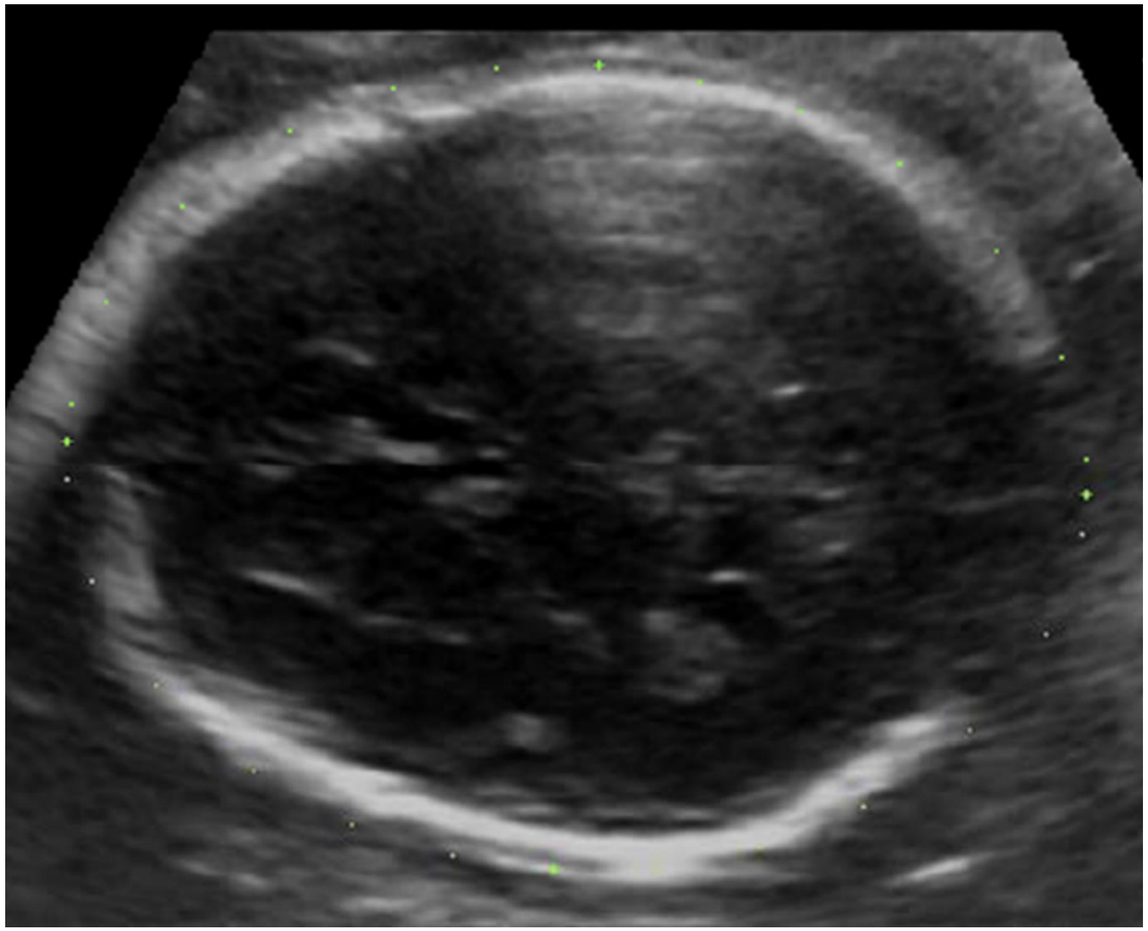
- as evidence indicates DR of 3 of 4 cardiac abnormalities >50% since 2018, using FASP 2010 DRs is arguably no longer acceptable practice

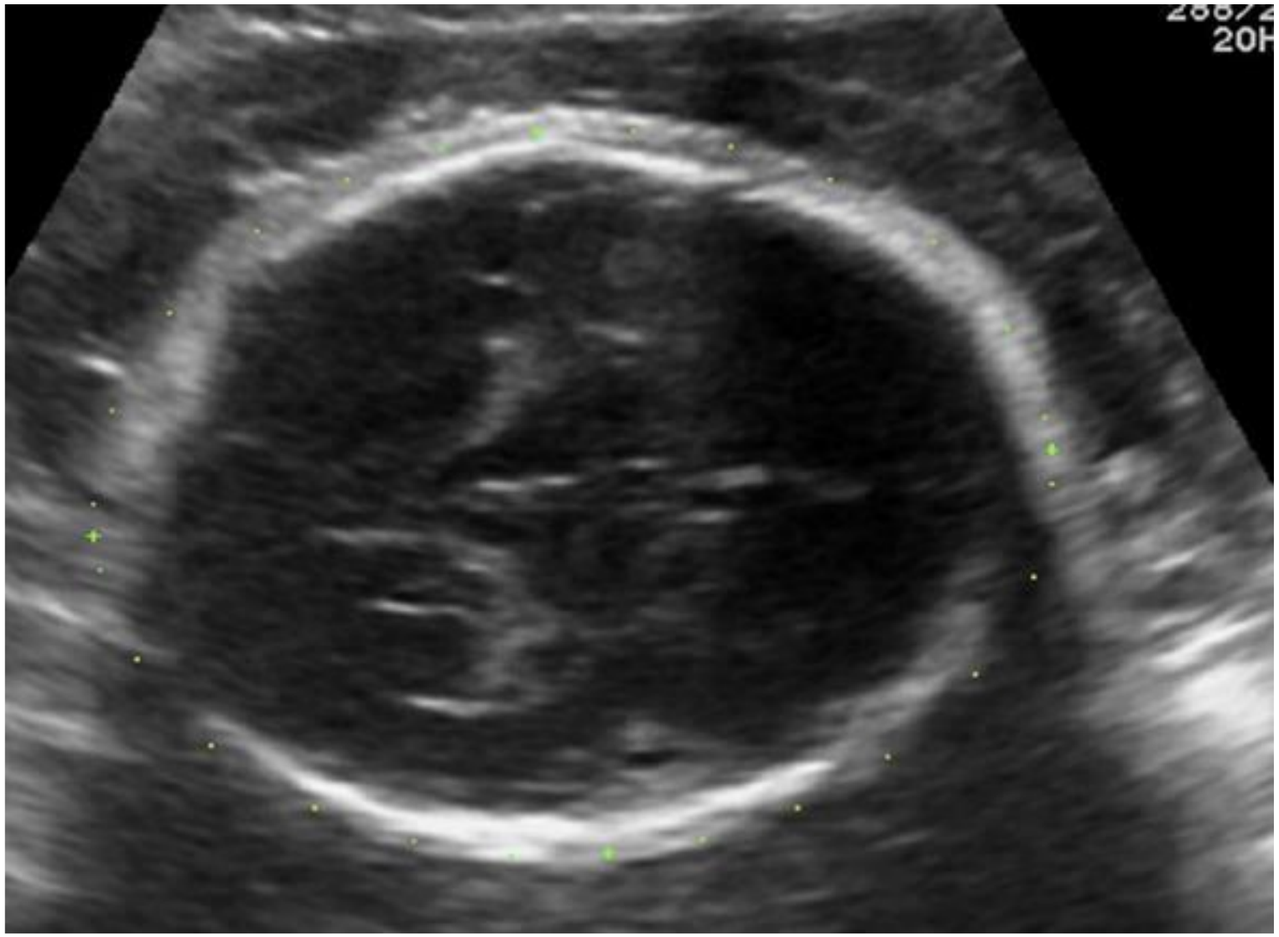
- *Failing to identify a VSD ≥3mm &/or marked difference of vessel size in 3VT view falls below standard expected of a reasonably competent sonographer*

- *Failing to identify significant aortic override in the presence of other features of ToF below standard expected of a reasonably competent sonographer*

Growth scan
images

Growth scan – HC sections

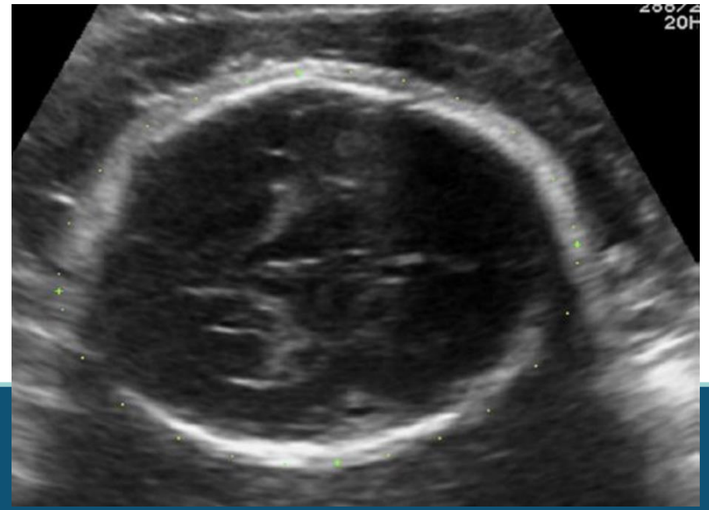


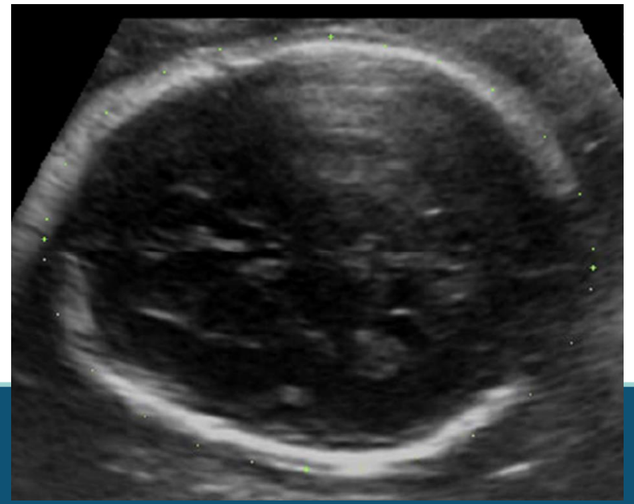


Should a reasonably competent sonographer use either or both sections for HC measurement?

Best, Acceptable or Poor Practice?

- Should a reasonably competent sonographer assess the anatomy within the sections sought for growth measurements?
- If something looks unusually large, should a reasonably competent sonographer measure it?
- Is a reasonably competent sonographer able to distinguish between a 9.5mm posterior horn & a 10.1mm posterior horn only by eyeballing?
- If the section is not ‘perfect’ but the measurement is outside the normal range, what should a reasonably competent sonographer do?





Court Room Scenarios

Court Room Scenarios

- All the examples presented have formed part of expert sonographer reports

- Four Court appearances, each for the Claimant, three of which were found for the Claimant & one for the Defendant

Court Room Scenarios

Main ultrasound issue in each case:

1. Combined screening – was the nasal bone present or not? (main evidence -15 stills from video), judge's opinion related to whiteness of skin line v that of the 'nasal bone'
2. Was the Vp 10.0mm or greater at growth scan?
3. Should a decision to decline screening be taken at face value?
4. Could the 'LVOT' & 'RVOT' labelled images be correct in a case of common arterial trunk?

Court Room Scenarios

- It is the judge who decides whether my evidence is more persuasive than that of my opposing expert

- Words are to barristers as ultrasound imaging is to sonographers

- The ability of barristers to interrogate even the smallest written &/or spoken discrepancies of the witness, thereby discrediting the evidence of the witness, is impressive but disconcerting

Court Room Scenarios

- My clinical practice was based on national & local guidelines, but my opinion is based on my actual clinical experience as a (hopefully) reasonably competent sonographer against the background of those requirements
- Presenting my opinion coherently is easier said than done - but I have found that the key is firmly believing that my opinion is right
- This (usually) allows me to stay calm & to remain confident of my opinion under (usually) unpleasant, aggressive & persistent cross examination
- Imagining the cross-examining barrister as a rather annoying medical student or recently qualified doctor helps enormously

Take Home Messages

Take Home Messages

A reasonably competent sonographer performing obstetric ultrasound scans:

- provides images & measurements to the standards required for that individual examination
- interprets the scan findings correctly against the clinical background relevant to that pregnancy at that time
- does so because they possess & apply the necessary clinical expertise & experience, relevant current knowledge & understanding, interest & motivation
- expects to be given appropriate time to evaluate their own current practice, to seek help &/or guidance as required & to develop new skills relevant to the role
- understands they have a personal professional responsibility to ensure their daily practice fulfils the legal description of reasonable competence
- questions management decisions which challenge any of the above

Thank you for your kind invitation

&

for your attention