



ISUOG Basic Training

Examining Fetal Anatomy from Longitudinal Sections

Learning objectives

At the end of the lecture you will be able to:

- Describe how to obtain the 3 planes required to assess the fetal anatomy in longitudinal section
- Recognise the differences between the normal & most common abnormal ultrasound appearances of the 3 planes

Key questions

1. What is the purpose of starting the scan with overview 1?
2. What are the key ultrasound features of plane 1?
3. What probe movements are required to move from plane 1 to plane 2?
4. Which abnormalities should be excluded after correct assessment of planes 1, 2 & 3?

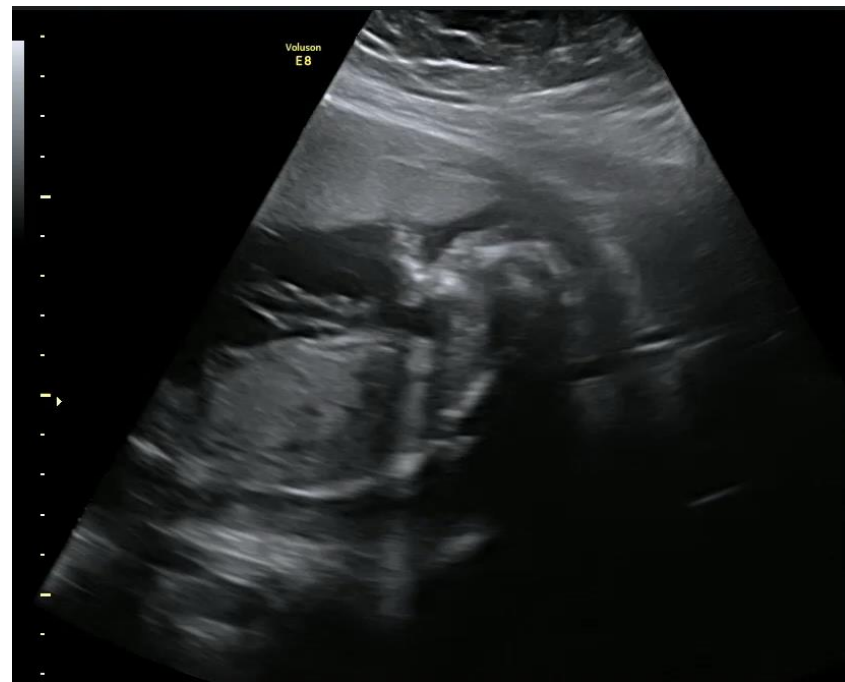
Fetal lie and anatomy

- Longitudinal scan – sagittal and coronal planes
 - Fetal heartbeat
 - Fetal head
 - Spine
 - Thoraco-intestinal anatomy and situs

Longitudinal scan



Fetal head



Anencephaly

Always confirm any suspected anomaly in more than one plane



Encephalocele

Sagittal plane



Coronal plane

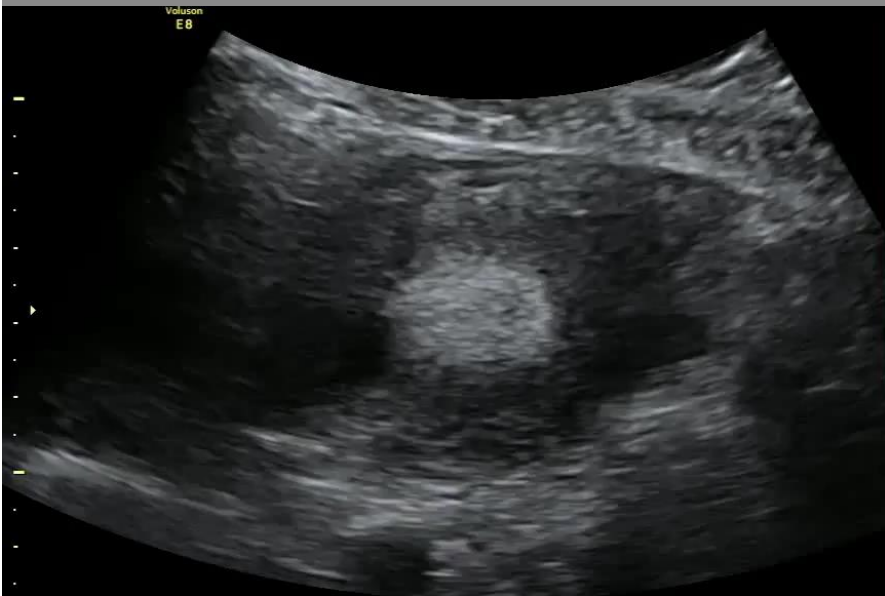


Encephalocele

Coronal plane



Transverse plane

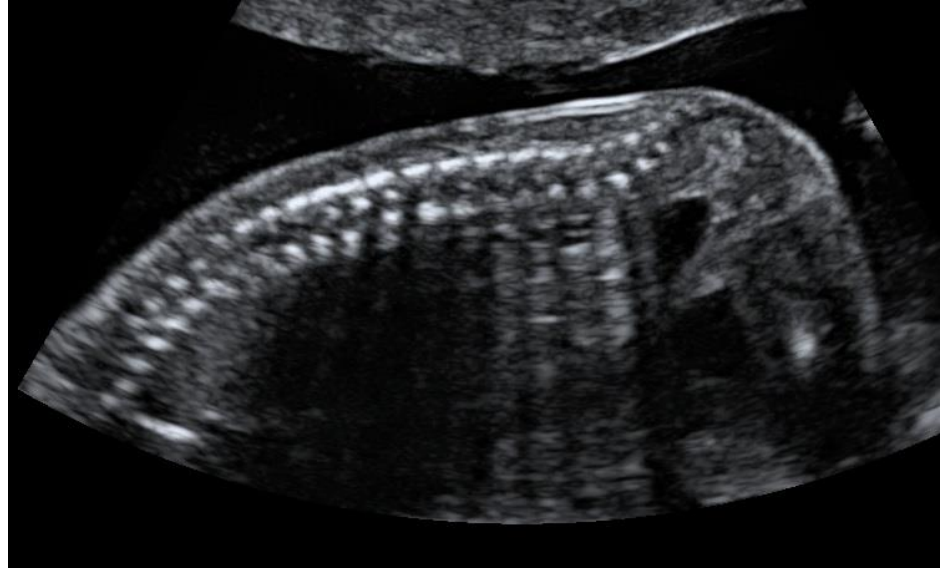
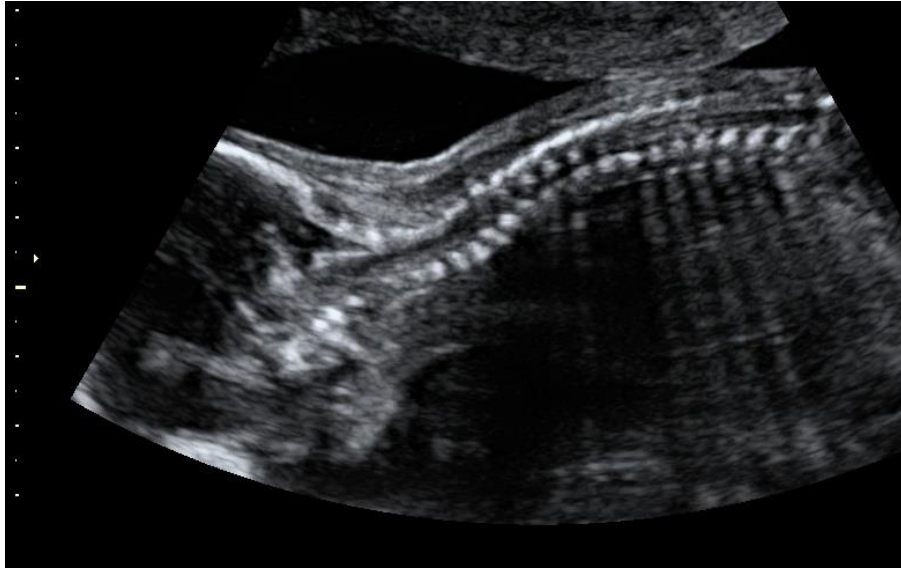


Prevalence neural tube defects

- All NTD 9.1:10 000
 - Anencephaly 3.3:10 000
 - Spina bifida 4.6:10 000
 - Encephalocele 1.2:10 000
- Features of spina bifida
 - U-shaped open vertebra
 - Meningocele - cyst
 - Myelomeningocele - cyst with neural tissue

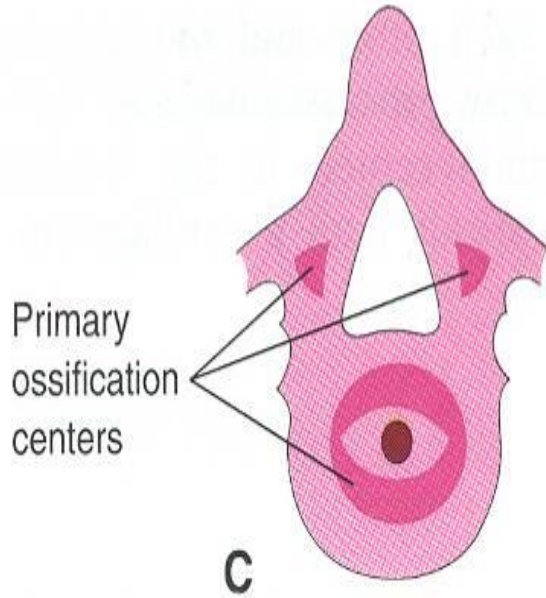
Koshood et al. BMJ 2015, 351:5949

Plane 1 (sagittal spine)

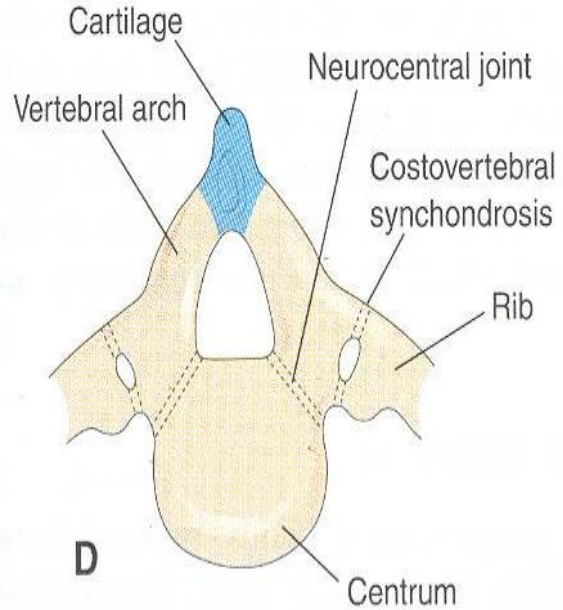


Embryology spine

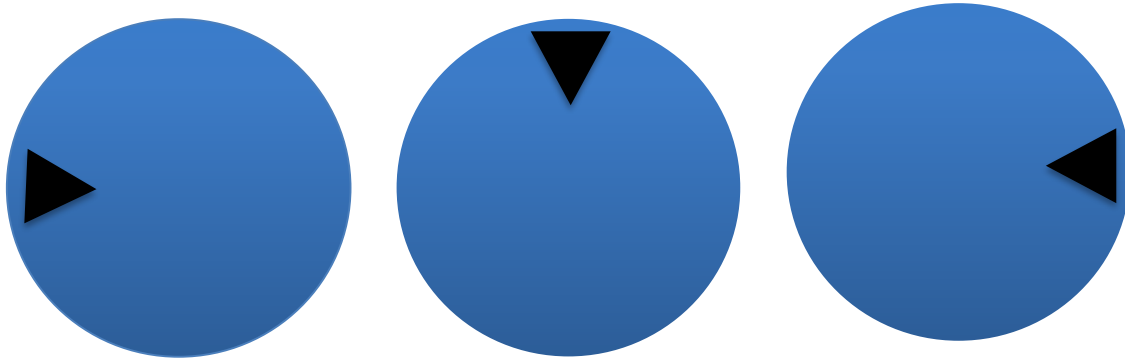
7 weeks



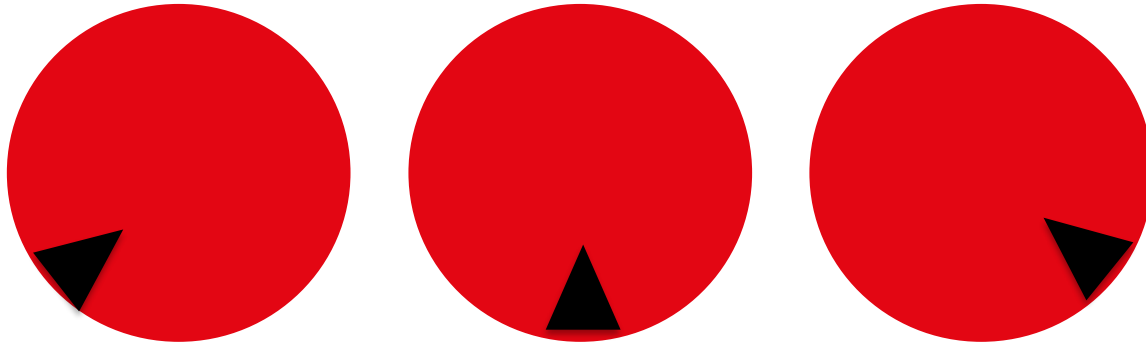
40 weeks



Sagittal plane and position of spine in utero

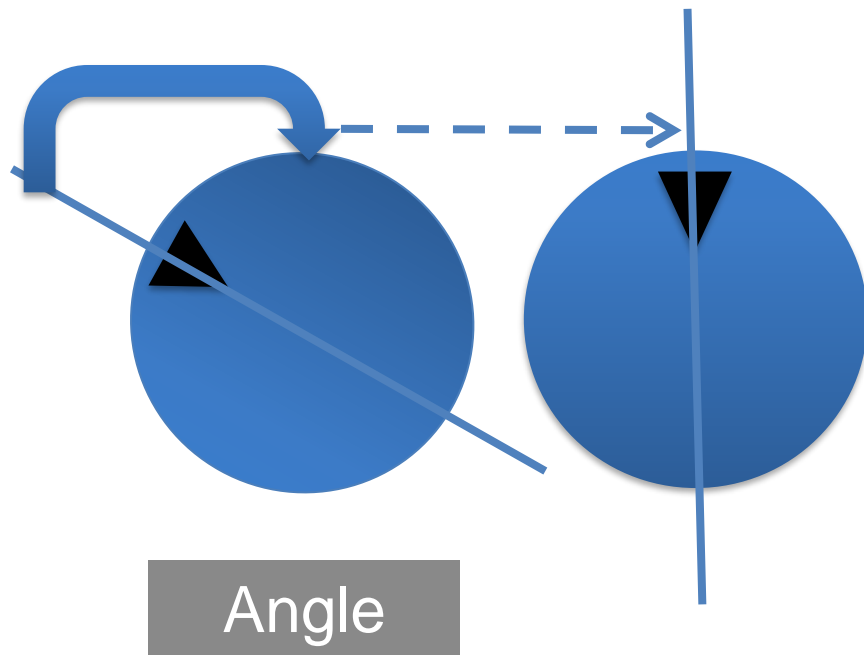


Possible to obtain
sagittal plane
spine

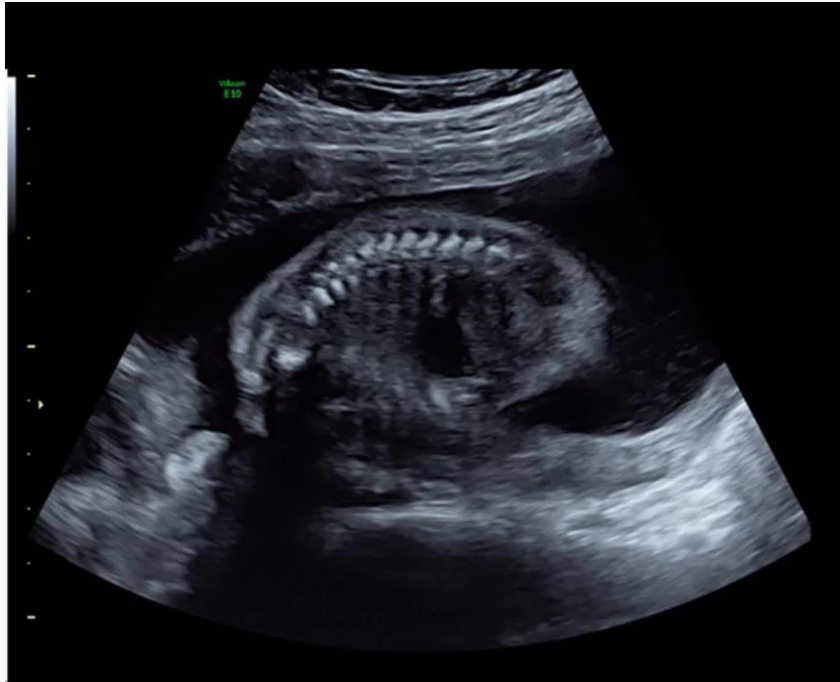


Impossible to
obtain sagittal
plane spine

Find the sagittal plane example



Plane 1 (sagittal spine)



Incorrect sagittal planes of the spine

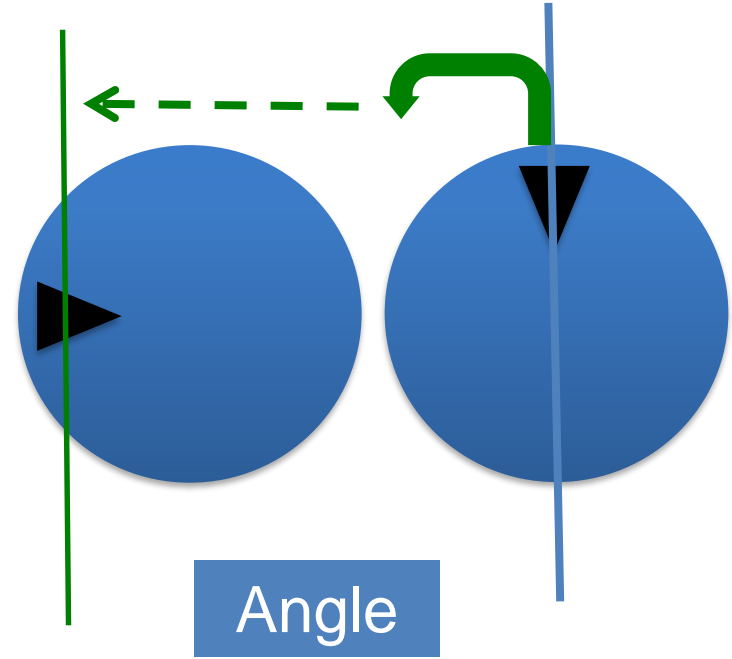


Features of plane 1 (sagittal spine)

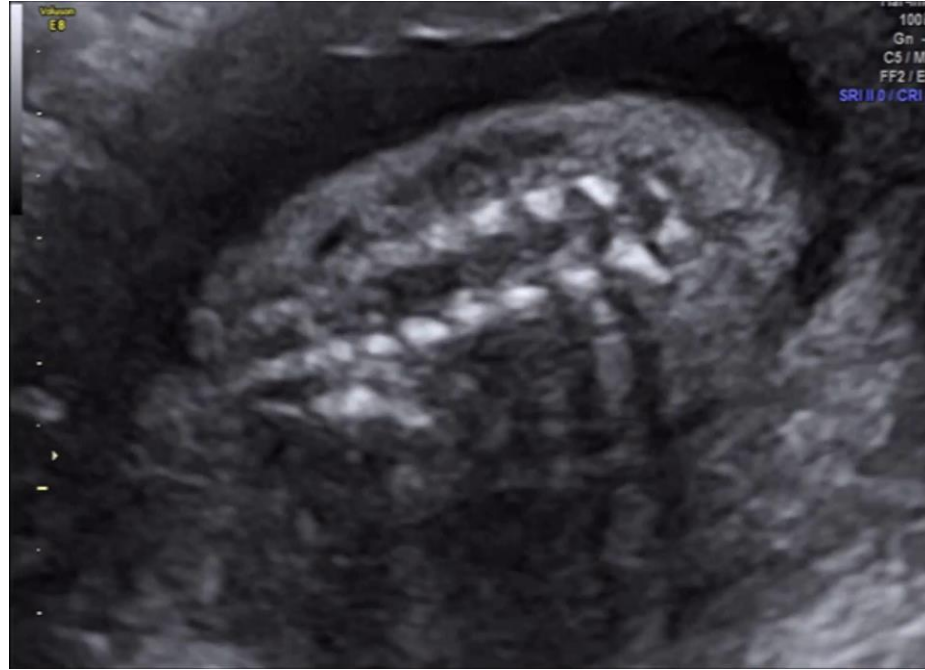
- Normal curve of the spine
- 2 parallel lines of small hyperechoic dots, gradually tapering at base of the sacrum (vertebral body and lamina)
- Upsweep of the sacrum
- Integrity of the skin overlying the spine
- Small distance between spine and fetal skin consistent along the length of the spine
- Amniotic fluid between the fetal skin and the wall of the uterus

Chudleigh, Smith & Cumming, Obstetrical and Gynaecological Ultrasound: How, Why and When, 4th edition, 2016

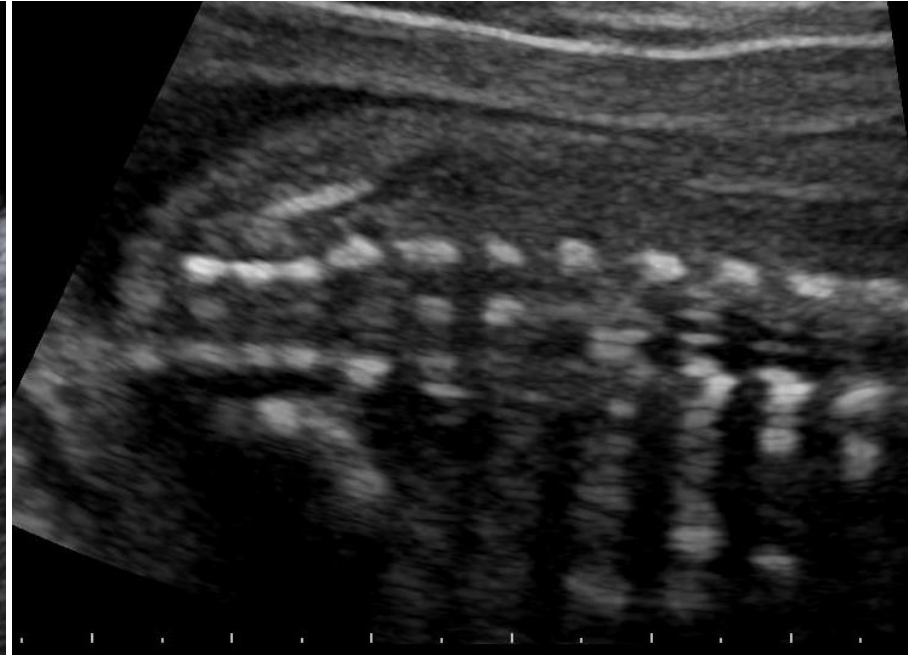
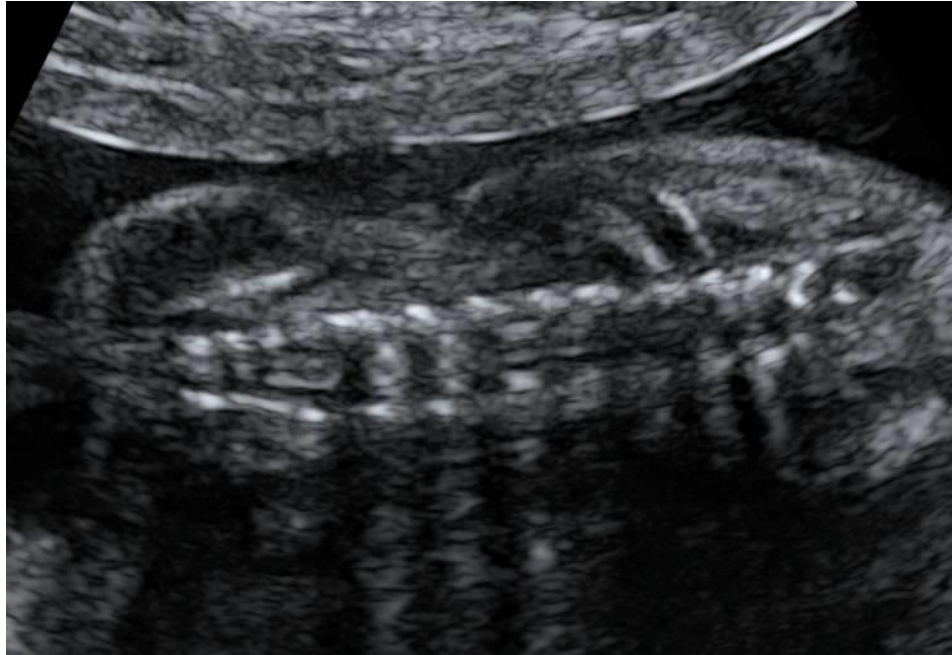
From sagittal to coronal plane



Plane 2 (coronal spine)

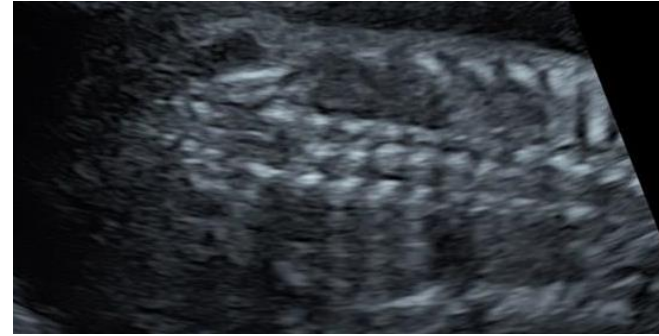


Plane 2 (coronal spine) - sacral segments



Features of plane 2 (coronal spine)

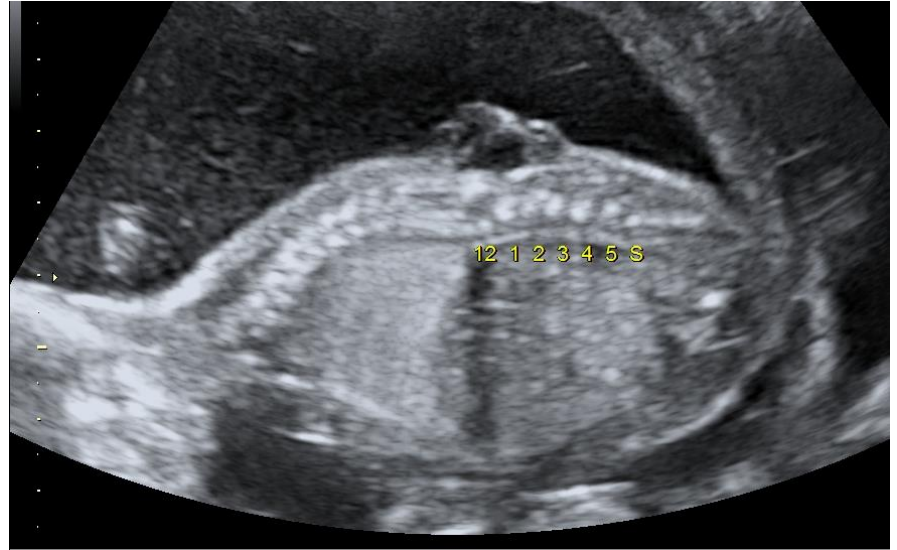
- Three echoes from the ossification center of the vertebral body, centrally, & both lamina, laterally
- Equal distance between lateral ossification centers
- *Splaying of the ossification centers indicates spina bifida*
- 4 – 5 sacral vertebra visible between both iliac crests from the proximal rim of the os iliaca



Spina bifida in sagittal plane spine



Cervical



Thoracic

Spina bifida prevalence



Cervical spine	1%
Thoracic spine	9%
Lumbar spine	73%
Sacral spine	17%

Spina bifida coronal plane



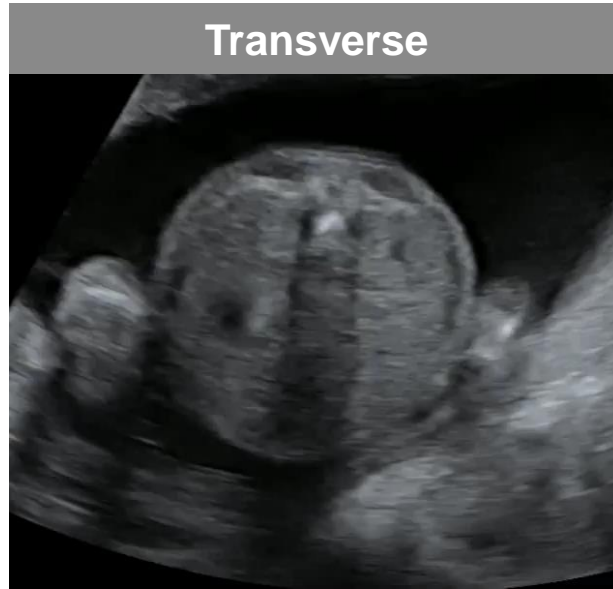
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Koshood et al. BMJ 2015, 351:5949

Sacral agenesis – Plane 1 (sagittal spine)



Sacrococcygeal teratoma – Plane 1 (sagittal spine)

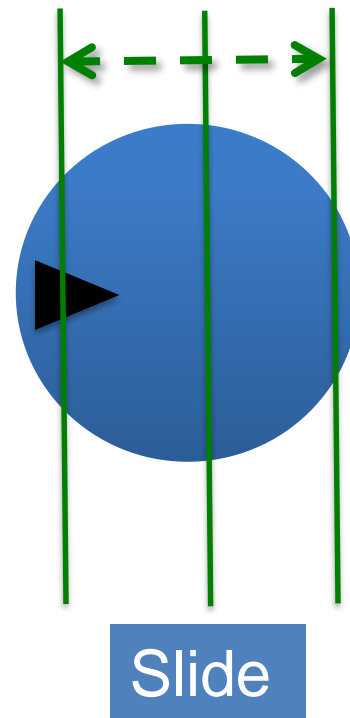


Sacrococcygeal teratoma – features

- Prevalence 1:40.000
- Location midline
- Uniformly attached to coccyx
- Tumors may be cystic solid or mixed
- Location
 - Predominantly external with minor intrapelvic component
 - Predominantly external with substantial intrapelvic component
 - Predominantly internal



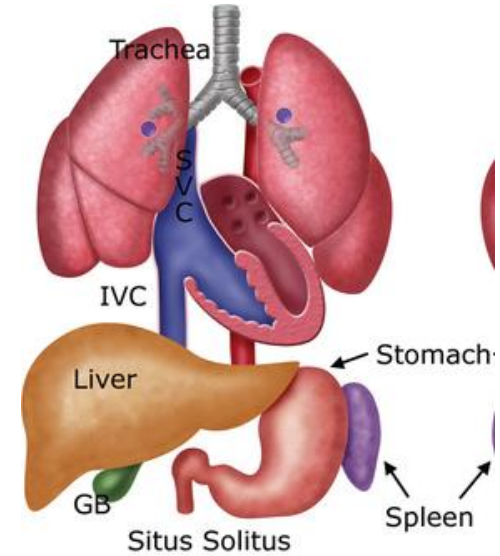
Plane 3 (Coronal body)



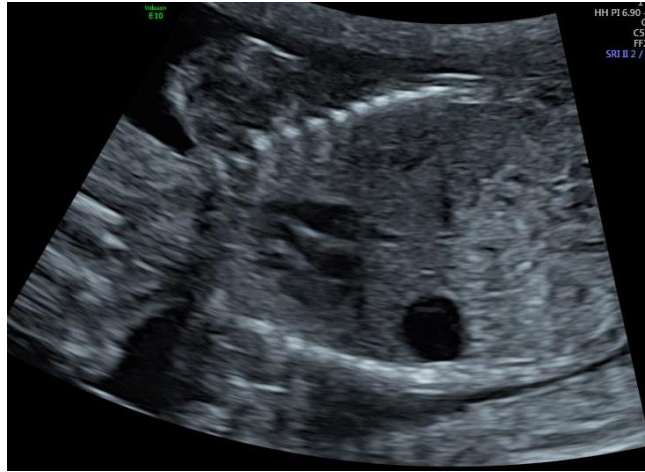
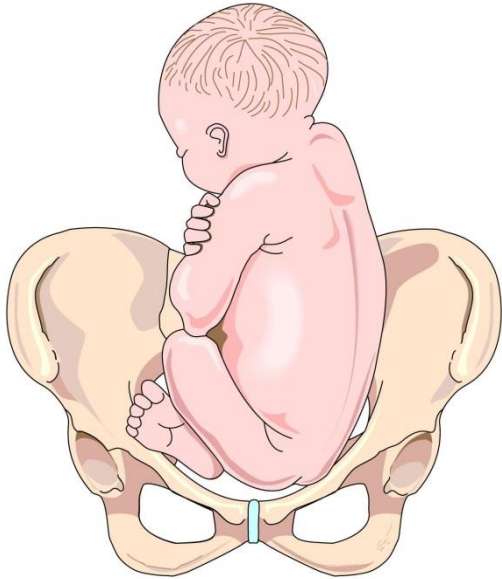
Features of plane 3 (Coronal body)

- Both lungs similar echogenicity
- Fetal heartbeat
- Continuous diaphragm from left to right between thorax & abdomen
- Stomach intra-abdominal, on left side of fetal body
- Two kidneys, adjacent to the fetal spine
- Abdominal aorta & inferior vena cava
- Intestines with mixed echogenicity – not as bright as bone
- Bladder

Fetal lie and presentation



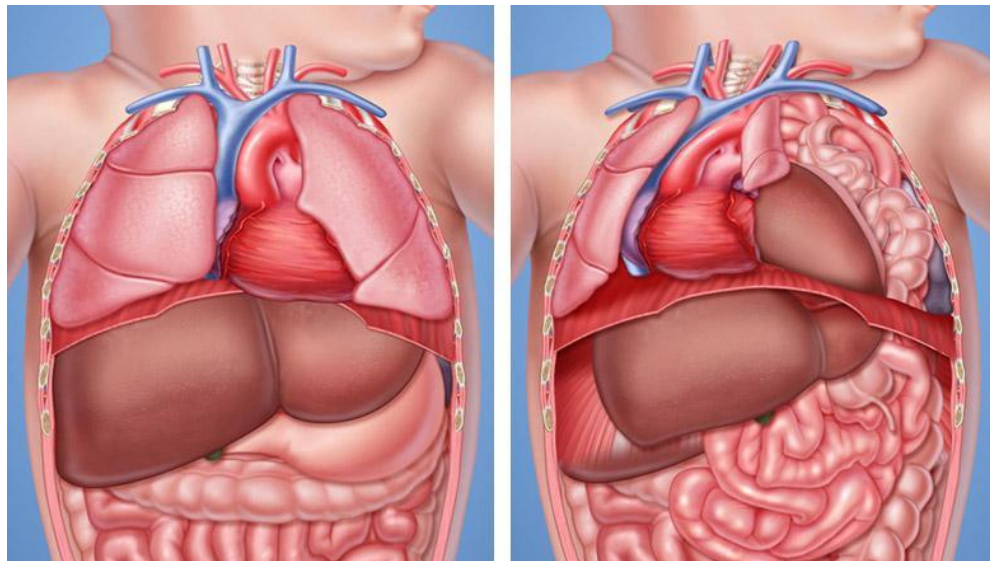
Fetal lie and presentation



Diaphragmatic hernia

Prevalence 1:3000

- Location:
 - Left 85%
 - Right 13%
 - Bilateral 2%



Plane 3 (Coronal body) – diaphragm



Plane 3 (Coronal body) - intestines



Echogenic bowel = as white as bone (iliac crest or femur)
never decide on your own

Key points

1. Fetal head & heartbeat are visible in the first longitudinal plane
2. This plane excludes anencephaly & encephalocele
3. The sagittal plane allows exclusion of spina bifida, sacrococcygeal teratoma & sacral agenesis
4. The coronal plane of the spine allows confirmation of the assessment of the spine & recognition of abnormal findings
5. The coronal plane of the body allows assessment of the fetal stomach position, diaphragm & intestines
6. Abnormal situs & left sided diaphragmatic hernia can be excluded
7. Echogenic bowel is a subtle finding, always seek the opinion of a supervisor



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