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

- What is the purpose of starting the scan with overview 1?
- What are the key ultrasound features of plane 1?
- What probe movements are required to move from plane 1 to plane 2?
- 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 heartbeat
Fetal head
Anencephaly

Always confirm any anomaly in a different 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 spina bifida
  - U-shaped open vertebra
  - Meningocele - cyst
  - Myelomeningocele – cyst with neural tissue

Koshood et al. BMJ 2015;351:5949
Sagittal spine – plane 1
Embryology spine

7 weeks’

Primary ossification centers

40 weeks’

Cartilage
Vertebral arch
Costovertebral synchondrosis
Neurocentral joint
Rib
Centrum
Ossification centers of the spine

Sagittal plane

Coronal plane
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
Sagittal plane spine – plane 1
Incorrect sagittal planes of the spine
Features sagittal spine - plane 1

- 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 and Smith. Obstetrical and Gynaecological Ultrasound How, Why and When. 4th edition 2017
From sagittal to coronal plane
Coronal plane spine – plane 2
Coronal spine - sacral segments
Features coronal spine – plane 2

- Three echo’s from the ossification center of the vertebral body, centrally, and 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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Sacral agenesis – sagittal plane 1
Sacroccocygeal teratoma – plane 1
Sacroccocygeal 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
Coronal plane - body
Features coronal plane - body

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

Prevalence 1:3000
• Location:
  - left 85%
  - right 13%
  - bilateral 2%
Coronal plane – diaphragm
Coronal plane - intestines

Echogenic bowel = as white as bone, never decide on your own
Key points

1. Fetal head and heartbeat visible on first longitudinal plane
2. You can exclude anencephaly and encephalocele
3. With the sagittal plane you can exclude spina bifida, sacrococcygeal teratoma and sacral agenesis
4. The coronal plane of the spine allows you to confirm your assessment of the spine and recognition of abnormal findings
5. With the coronal plane of the body assessment of the fetal stomach position, diaphragm and intestines is achieved
6. Abnormal situs and left sided diaphragmatic hernia can be excluded
7. Echogenic bowel is a subtle finding, always consult with a supervisor
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