ISUOG Basic Training
Assessing the Neck & Chest
Learning objectives

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

• Recognise the differences between the normal & most common abnormal ultrasound appearances of the neck (plane 6)

• Recognise the differences between the normal & most common abnormal ultrasound appearances of the chest (planes 7-10), excluding the heart
Key questions

• What are the key ultrasound features that describe the normal appearance of the fetal neck?

• What probe movements should be used to distinguish between true & a false positive suspicion of nuchal abnormality?

• What are the key ultrasound features that distinguish between normal & abnormal appearances of the fetal lungs?

• Which abnormalities should be excluded after correct assessment of the neck & chest, excluding the heart?
# Neck & Chest

<table>
<thead>
<tr>
<th>Anatomical area</th>
<th>Plane</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>6</td>
<td>transcerebellar plane*</td>
</tr>
<tr>
<td>Thorax</td>
<td>7</td>
<td>lungs, (4 chamber view of heart)</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>3 vessel trachea (3VT) view of heart</td>
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</tbody>
</table>

* measurement required
### 20 + 2 planes & abnormal appearances

<table>
<thead>
<tr>
<th>Plane</th>
<th>Area</th>
<th>Abnormal appearances (50+IUD) excluded by the correct 2+20 approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep 1</td>
<td>Anencephaly, IUD</td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>Spine</td>
<td>Abnormal abdominal situs, left sided diaphragmatic hernia, meningocoele, Open spina bifida, sacral agenesis, sacral coccygeal teratoma,</td>
</tr>
<tr>
<td>4-6</td>
<td>Head</td>
<td>Alobar holoprosencephaly, banana shaped cerebellum, cystic hygroma, large posterior fossa cyst, lemon shaped skull, occipital encephalocele, skin edema, ventriculomegaly, lymphangioma...</td>
</tr>
<tr>
<td>7-10</td>
<td>Thorax</td>
<td>AVSD, CPAM, double aortic arch, ectopia cordis, overriding aorta, persistent left vena cava*, right aortic arch, severe aortic stenosis, coarctation &amp; pulmonary stenosis, significant pericardial effusion (&gt;4.0mm) &amp; pleural effusion (&gt;4.0mm), hydrothorax, situs inversus/ambiguous, tetralogy of fallot, transposition, univentricular heart, CCAM, sequestration CDH,</td>
</tr>
<tr>
<td>11-13</td>
<td>Abdomen</td>
<td>Ascites, bilateral renal agenesis, duodenal atresia, echogenic bowel*, gastroschisis, omphalocoele, renal pelvic dilatation (&gt;7.0mm AP), small/absent stomach</td>
</tr>
<tr>
<td>14</td>
<td>Pelvis</td>
<td>Cystic renal dysplasia, lower urinary tract obstruction, 2 vessel cord</td>
</tr>
<tr>
<td>15-17</td>
<td>Limbs</td>
<td>Fixed flexion deformities wrist, severe skeletal dysplasia (some), talipes</td>
</tr>
<tr>
<td>18-20</td>
<td>Face</td>
<td>Anophthalmia, cataract*, cleft lip, proboscis*, severe micrognathia</td>
</tr>
</tbody>
</table>

AVSD – atrioventricular septal defect  
CPAM – congenital pulmonary airway malformation  
IUD - intrauterine death  
* optional, for local decision as to whether or not included
### Basic Training

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<td>Sagittal complete spine with skin covering</td>
</tr>
<tr>
<td>2</td>
<td>Coronal complete spine</td>
</tr>
<tr>
<td>3</td>
<td>Coronal section of body</td>
</tr>
<tr>
<td>4</td>
<td>Transventricular plane*</td>
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<td>Lungs, 4 chamber view of heart</td>
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<td>8</td>
<td>Left ventricular outflow tract (LVOT)</td>
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<td>9</td>
<td>Right ventricular outflow tract (RVOT) &amp; crossover of LVOT</td>
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**Moving through the 20 planes**

- From plane 4 to 5 – (rotate &) slide minimally
- From plane 4 to 6 - rotate
Plane 6

- Focal zone at appropriate level
- Image at appropriate depth
- Angled axial plane of the head
- Symmetric appearance of cerebellar
- Midline falx imaged
- Thalami imaged
- CSP imaged
- Cerebellar vermis and 4th ventricle imaged
- Cisterna magna imaged
## Moving through the 20 planes

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- From plane 6 to 7 – slide towards the feet
- From plane 7 to 10 – slide towards head
- From plane 6 to 10 – slide towards the feet
What are the key ultrasound features that describe the normal appearance of the fetal neck?
What are the key ultrasound features that describe the normal appearance of the fetal chest?

• Contents:
  – Lung
  – Mediastinum:
    • Heart
    • Thymus
    • Internal structures: trachea, esophagus
    • Arteries & veins: aorta, SCV, IVC, PA
  – Bones
  – Xiphoid process and diaphragm
Probe movements
Parasagittal plane
What probe movements should be used to distinguish between true & a false positive suspicion of nuchal abnormality?
Which abnormalities should be excluded after correct assessment of the neck?

- Nuchal edema
- Encephalocele
- Lymphangioma
- Thyroid problems
- Hypoplastic Thymus
Thymic hypoplasia- aplasia

Dr JM Levaillant
Thyroid

Dr JM Levaillant

Basic Training
Lymphangioma
What are the key ultrasound features that distinguish between normal & abnormal appearances of the fetal lungs?

• Types of anomalies:
  – Abnormal hyperechogenicity of pulmonary tissue (CCAM, sequestration, …)
  – Anechogenous:
    • Free-fluid:
      – Pleural effusion
      – Hydrothorax
    • Cystic lesions:
      – Pulmonary origin (CCAM, bronchogenic cyst, …)
      – Extra-thoracic origin (CDH)
  – Association of cystic and echogenicity anomalies (CDH, CCAM)
What are the key ultrasound features that distinguish between normal & abnormal appearances of the fetal lungs?

- Types of anomalies:
  - Abnormal echogenicity of pulmonary tissue:
    - Hyperechogenicity:
      - Diffuse
      - Localized
    - Anechogenous images:
      - Cysts
      - Presence of extra-thoracic structures (stomach…)
  - Pleural effusion
Which abnormalities should be excluded after correct assessment of the chest, excluding the heart?

- **Lung Malformations:**
  - Congenital Cystic Adenomatoid Malformation (CCAM)
  - Broncho-pulmonary Sequestration (BPS) (Arteriovenous malformation)
  - Bronchogenic Cyst, Bronchiol stenosis, Congenital lobar emphysema…

- **Unilateral Pulmonary Hypoplasia or Aplasia**
- **Congenital diaphragmatic hernia**
- **Hydrothorax (pleural effusion)**
Abnormal echogenicity of pulmonary tissue: CCAM

- Most commonly diagnosed lung Malformation in prenatal
- Abnormal branching of immature bronchioles
- Both cystic and solid areas
  - Type I: Single or multiple cyst (3-10 cm diam.) surrounded by smaller cysts and a compressed normal parenchyma
  - Type II: Various smaller cyst (0.5-2 cm) lined cuboidal or cubulonar epithelial cells
  - Type III: Small cystic lesions rarely larger than 0.2 cm.
Abnormal echogenicity of pulmonary tissue (diffuse and localized): CCAM

- **Transcription in Ultrasound Finding:**
  - **Type I:** Single or multiple large anechoic cysts with usually mediastinal shift
  - **Type II:** Variable appearances depending on the composition of the malformation
  - **Type III:** Homogeneously solid masses with normal adjacent parenchyma
Abnormal echogenicity of pulmonary tissue (diffuse and localized): Right CDH
Abnormal echogenicity of pulmonary tissue
Bronchopulmonary sequestration

• Embryonic mass composed of non-functioning primitive lung tissue that does not communicate with the tracheobronchial tree and has anomalous systemic blood supply (supply by a systemic artery and drained by a pulmonary or a systemic vein)

• Extralobar (25%) or intralobar (75%)

• Usually on the base of lungs
Bronchopulmonary sequestration
Pleural effusion: minimal to hydrothorax
Association of cystic and echogenicity anomalies
CDH: left CDH
Echogenicity anomalies: CDH
1. Sliding between planes 6, 7, and 10 allows identification of the most common pathologies of the neck and the chest.
2. Always double check the structures with a sagittal and parasagittal sweep.
3. Verify echogenicity and homogeneity of the lungs.
4. Your role is to distinguish between the range of normal & abnormal appearances.
5. Any appearance which you cannot confirm as normal should be referred for a more experienced opinion.
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