ISUOG Basic Training

Assessing normal and abnormal findings between 10 & 14 weeks in singleton and twin pregnancies
Learning objective

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

• Compare the differences between the typical normal & the common abnormal appearances of singleton, dichorionic & monochorionic diamniotic twin pregnancies between 10 & 14 weeks of gestation
Key questions

1. How should gestational age be assessed, & the EDD assigned, between 10 & 14 weeks?
2. What is the normal ultrasound appearance of a fetus at 10-14 weeks?
3. What structural abnormalities can be diagnosed in the first trimester?
4. What are the principal differences in the ultrasound appearances of a dichorionic twin pregnancy & a monochorionic twin pregnancy?
Pregnant women should be offered an early ultrasound scan between 10 + 0 and 13 + 6 weeks to establish accurate gestational age. *(Grade A recommendation)*

It is recommended that CRL should be used to determine gestational age < 84 mm. After this stage, HC can be used, as it becomes slightly more precise than the BPD. *(GOOD PRACTICE POINT)*
## Gestational age ranges

<table>
<thead>
<tr>
<th>Gestational age</th>
<th>Terminology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 weeks</td>
<td>Embryo</td>
</tr>
<tr>
<td>&gt;10 weeks</td>
<td>Fetus</td>
</tr>
</tbody>
</table>
Pregnancy dating at 10-14 weeks: a practical approach

Pregnancy resulting from assisted reproductive technology (ART)

ART-derived gestational age should be used to assign the EDD

Pregnancy resulting from assisted reproductive technology (ART)

Spontaneous pregnancy

Reliable last menstrual period?

No

Pregnancy dating by ultrasound

Yes

Change EDD only if difference ≥ 5-7 days
Expected date of delivery (EDD) should be clearly documented

<table>
<thead>
<tr>
<th>Weeks of amenorrhea</th>
<th>12+3</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDD (amenorrhea)</td>
<td>15/01/2019</td>
</tr>
<tr>
<td>Gestational weeks (US)</td>
<td>11+0</td>
</tr>
<tr>
<td>EDD (US)</td>
<td>25/01/2019</td>
</tr>
</tbody>
</table>

- ...fetal dimensions correspond to the menstrual age

**OR**

- ...fetal dimensions show discrepancy of +/- X days in respect to amenorrhea
Table 2: Suggested anatomical assessment at time of 11 to 13 + 6-week scan

<table>
<thead>
<tr>
<th>Organ/anatomical area</th>
<th>Present and/or normal?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Head</strong></td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>Cranial bones</td>
</tr>
<tr>
<td></td>
<td>Midline falx</td>
</tr>
<tr>
<td></td>
<td>Choroid-plexus-filled ventricles</td>
</tr>
<tr>
<td></td>
<td>Normal appearance</td>
</tr>
<tr>
<td></td>
<td>Nuchal translucency thickness (if accepted after informed consent and trained/certified operator available)*</td>
</tr>
<tr>
<td><strong>Face</strong></td>
<td>Eyes with lens*</td>
</tr>
<tr>
<td></td>
<td>Nasal bone*</td>
</tr>
<tr>
<td></td>
<td>Normal profile/mandible*</td>
</tr>
<tr>
<td></td>
<td>Intact lips*</td>
</tr>
<tr>
<td></td>
<td>Vertebrae (longitudinal and axial)*</td>
</tr>
<tr>
<td></td>
<td>Intact overlying skin*</td>
</tr>
<tr>
<td></td>
<td>Symmetrical lung fields</td>
</tr>
<tr>
<td></td>
<td>No effusions or masses</td>
</tr>
<tr>
<td></td>
<td>Cardiac regular activity</td>
</tr>
<tr>
<td><strong>Spine</strong></td>
<td>Four symmetrical chambers*</td>
</tr>
<tr>
<td><strong>Chest</strong></td>
<td>Stomach present in left upper quadrant</td>
</tr>
<tr>
<td></td>
<td>Bladder*</td>
</tr>
<tr>
<td></td>
<td>Kidneys*</td>
</tr>
<tr>
<td><strong>Heart</strong></td>
<td>Four symmetrical chambers*</td>
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<td>Bladder*</td>
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<tr>
<td></td>
<td>Kidneys*</td>
</tr>
<tr>
<td><strong>Abdomen</strong></td>
<td>Normal cord insertion</td>
</tr>
<tr>
<td></td>
<td>No umbilical defects</td>
</tr>
<tr>
<td></td>
<td>Four limbs each with three segments</td>
</tr>
<tr>
<td></td>
<td>Hands and feet with normal orientation*</td>
</tr>
<tr>
<td><strong>Abdominal wall</strong></td>
<td>Size and texture</td>
</tr>
<tr>
<td></td>
<td>Three-vessel cord*</td>
</tr>
</tbody>
</table>

* Optional structures. Modified from Fong et al., McAuliffe et al., Taipele et al., and von Kaisenberg et al.
ISUOG Practice Guidelines: performance of first-trimester fetal ultrasound scan

**Head**
- Cranial bones
- Midline falx
- Choroid-plexus-filled ventricles
ISUOG Practice Guidelines: performance of first-trimester fetal ultrasound scan

**Neck**

- Normal appearance
- Nuchal translucency thickness *(if accepted after informed consent and trained/certified operator available)*

* OPTIONAL
ISUOG Practice Guidelines: performance of first-trimester fetal ultrasound scan

Face

- Eyes with lens*
- Nasal bone*
- Normal profile/mandible*
- Intact lips*
Spine

- Vertebrea (longitudinal and axial)*
- Intact overlying skin*
Chest

- Symmetrical lung fields
- No effusions or masses
Heart

- Cardiac regular activity
- Four symmetrical chambers*
Abdomen
• Stomach present in left upper quadrant
• Bladder*
• Kidneys*
ISUOG Practice Guidelines: performance of first-trimester fetal ultrasound scan

Abdominal wall

- Normal cord insertion
- No umbilical defects
Extremities

- Four limbs each with three segments
- Hands and feet with normal orientation*
- Placenta Size and texture
- Three-vessel cord*

**High percentage detection rate**
- Acrania, anencephaly, ectopia cordis, encephalocele

**50–99% detection rate**
- Cystic hygroma
- Double-outlet right ventricular flow, Fallot’s, hypoplastic left heart syndrome, septal defects, transposition of great vessels, valvular disease
- Gastroschisis, omphalocele
- Holoprosencephaly, megacystis
- Limb reduction, polydactyly

**1–49% detection rate**
- Spina bifida, hydrocephalus, skeletal dysplasia, facial cleft, Dandy-Walker, aortic coarctation, arthrogryposis

**0% detection rate**
- Corpus callosum agenesis, cerebellar hypoplasia
- Duplex kidneys, hydronephrosis, renal agenesis
- Congenital pulmonary adenomatoid malformation, extralobar sequestration
- Duodenal atresia, bowel obstruction
Detection rate of structural abnormalities by gestational age

Rossi & Prefumo, Obstetrics & Gynecology, 2013
Acrania/exencephaly/anencephaly sequence
Basic Training

<table>
<thead>
<tr>
<th>Normal</th>
<th>Alobar holoprosencephaly</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Normal Image]</td>
<td>![Alobar Holoprosencephaly Image]</td>
</tr>
</tbody>
</table>
Other neural tube defects

- Encephalocele
- Encephalocele and severe spinal malformation
Lethal skeletal dysplasia
Micrognathia
Megacystis (Longitudinal bladder diameter of 7 mm or more)
Exomphalos (omphalocele) $\neq$ Physiological bowel herniation (<11 weeks)
Abdominal wall defect: gastroschisis
Sacroccocygeal teratoma
Scanning twins at 10-14 weeks: Objectives

1. Dating
   - In pregnancies conceived spontaneously, the larger of the two CRLs should be used to estimate gestational age

2. Labelling
   - Site (left/right, upper/lower)
   - Cord insertion relative to the placental edges

3. Chorionicity
   - Membrane thickness at the site of insertion of the amniotic membrane into the placenta (Lambda vs. T-sign)
Scanning twins at 10-14 weeks: chorionicity

**Lambda sign =**
Dichorionic diamniotic (DCDA)

**T sign =**
Monochorionic diamniotic (MCDA)

**No membrane =**
Monochorionic monoamniotic (MCMA)
Chorionicity and zygosity

- **Chorionicity**: number of placentas
- **Zygosity**: number of zygotes (are the twins “identical”?)

**Twins**

- **Dizygotic (70%)** ('non-identical', fraternal)
  - Dichorionic diamniotic (DCDA)

- **Monozygotic (30%)** ('identical' twins)
  - Dichorionic diamniotic (DCDA)
  - Monochorionic diamniotic (MCDA)
  - Monochorionic monoamniotic (MCMA)

- **“Conjoined”**
  - Monochorionic monoamniotic (MCMA)
Key points

1. Pregnant women should be offered an early scan between 10+0 & 13+6 wks

2. The aims of the first trimester scan are to:
   - confirm viability
   - establish gestational age accurately
   - determine the number of viable fetuses
   - if requested, evaluate fetal gross anatomy and risk of aneuploidy (after proper counselling)

3. Many gross malformations may develop later in pregnancy, or may not be detected even with appropriate equipment & in the most experienced of hands

4. In twin pregnancies chorionicity should be accurately determined & documented.
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