First Trimester Anomaly Scan

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Abstract: The goal of pregnancy ultrasound scans during the first trimester is to provide accurate information for optimised antenatal care, ensuring the best outcomes for both mother and foetus. Divided into early and late stages, early scans between 6 to 8 weeks focus on determining gestational sac implantation, viability and identifying multiple pregnancies. First-trimester screening, conducted at 11 + 0 to 13 + 6 weeks, includes biometry, anomaly scan, chromosomal abnormality assesment and screening for pre-eclampsia through maternal serum biochemistry. This pictorial essay emphasises the importance of a systematic examination of foetal anatomy during first-trimester screening, aiding in the early detection of structural anomalies. The protocol-based approach ensures reliability in detecting or ruling out abnormalities, allowing for timely counselling and further testing if necessary. While both transabdominal and transvaginal approaches may be utilised, the latter may offer better resolution, especially in certain patient populations. Despite limitations, a comprehensive first-trimester anomaly scan serves as a crucial tool in detecting major foetal abnormalities and providing reassurance to expecting mothers.

Key words: Ultrasound scan, pregnancy, first-trimester pregnancy

Introduction

The goal of a pregnancy ultrasound scan is to provide accurate information which will facilitate optimised antenatal care and ensure the best possible outcomes both for the mother and foetus. The first trimester is divided into early (6-8 weeks) and late first (11 + 0 to 13 + 6 weeks) trimester. During an early first trimester scan, which is performed typically between 6 to 8 weeks of gestation, the site of implantation of the gestational sac, viability along with the number of foetuses and in the presence of multiple pregnancy chorionicity and amnionicity, must be determined. First-trimester screening is performed at 11 + 0 to 13 + 6 weeks' gestation with the crown rump measurement between 45mm and 84mm.[1]

First-trimester anomaly scan

While we all are well aware of the significance of nuchal translucency and other markers for the assessment of chromosomal abnormalities, this pictorial essay gives an insight into the various anatomical landmarks that must be assessed during first-trimester screening. A detailed, systematic examination of foetal anatomy at 11 + 0 to 13 + 6 weeks' gestation helps rule out a significant proportion of structural anomalies.[3] A protocol that includes a head-to-toe structural survey of the foetus ensures better reliability in detecting or ruling out structural abnormalities.[4]

First trimester screening includes:

- Biometry (BPD, HC, AC, FL and CRL)
- Anomaly scan
- Assessment for chromosomal abnormalities (NT, NB, DV, TVD)[2]
- Screening for Pre-Eclampsia (Mean UAD PI)
- Maternal serum biochemistry (First trimester quadruple test/NIPT)

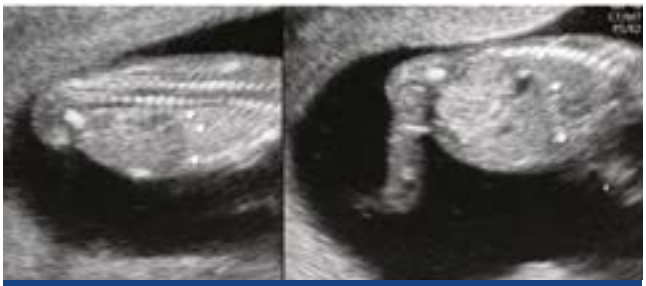
Table 1. First-trimester screening

Figure 1: First trimester 2D and 3D image

Figure 2: Head and Brain Axial View [(Cranial calcification, two brain halves separated by interhemispheric falx(F), Choroid plexus-Butterfly sign (Arrows)]

Four chamber view

Four chamber view

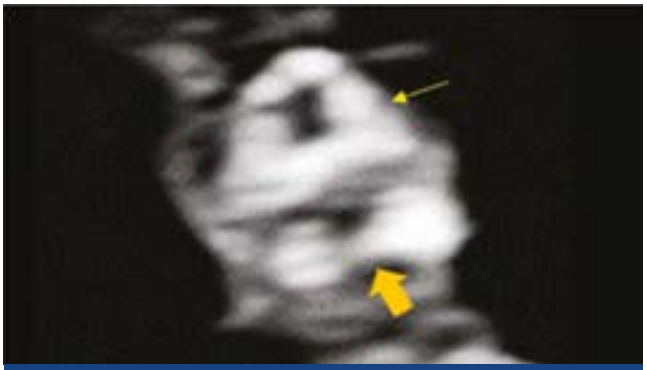


Diaphragm marked by arrows

Figure 3: Cardia - Axial View (Four-chamber view with two distinct ventricles on grayscale and colour doppler in diastole, Three Vessel view -Y sign, Thorax - axial and sagittal view, symmetry with cardia occupying 1/3rd of the chest, Diaphragmatic continuity)

Orbits with lenses marked by arrows

Nasal bone and Nuchal translucency



Maxilla and Mandible

Figure 4: Face and neck (Bilateral orbits, Nasal bone, Nuchal translucency thicknes, maxilla, mandible)

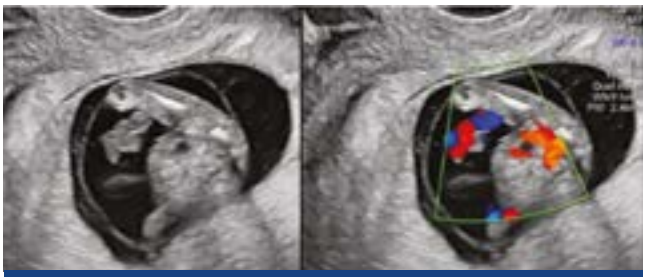
Sagittal

Coronal

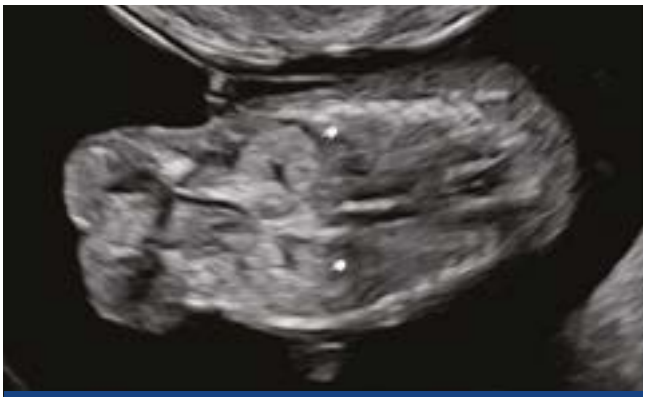
Figure 5: Spine-Sagittal and coronal view [Regular shape and continuity of spine].

Stomach bubble

Anterior abdominal wall



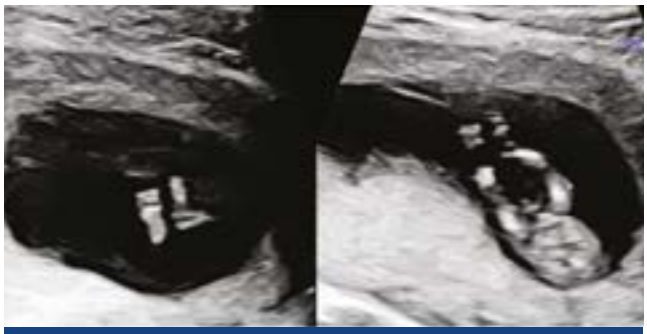
Bladder with two umbilical arteries



Kidneys

Figure 6: Abdomen- Axial View [Stomach bubble, intact anterior abdominal wall, foetal bladder (<7mm longest diameter) with 3 vessel cords, Kidneys]

Upper limb with palms



Feet Lower limbs

Figure 7: Extremities (Upper limbs with three segments, Lower limbs with three segments)

Placenta

Figure 8: Placenta [Size and texture normal, without cystic appearance]

Conclusion

The first-trimester anomaly scan provides an opportunity to assess foetal structural abnormalities and their presence or absence should be assessed as a minimum standard in all patients presenting for an 11 + 0 to 14 + 0-week scan, providing early reassurance. Early detection allows ample time for counselling and further testing if needed.

Both transabdominal and transvaginal approaches may be required to complete a systematic evaluation. A Transvaginal approach may provide better image resolution for the assessment of foetal anatomy, especially in women with high body mass index, uterine fibroids or retroverted uterus.[5]

Many major malformations may develop later in pregnancy or may not be detected even with appropriate equipment and in the most experienced of hands. However, a protocol-based, detailed first-trimester anomaly scan allows detection of major foetal abnormalities and reassurance to the expecting mother.

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