PRENATAL DIAGNOSIS IMAGING

ULTRASOUND

EMBRYOSCOPY

FETAL MEDICINE
ULTRASOUND IMAGING

DATING
MULTIPLE PREGNANCY
ANOMALY SCREENING
FETAL GROWTH

AMNIOTIC FLUID VOLUME
PLACENTAL LOCALISATION

DOPPLER STUDIES
FETAL WELL-BEING
GUIDANCE OF INVASIVE PROCEDURES
PSYCHOLOGICAL ASPECTS

FETAL MEDICINE
ULTRASOUND IMAGING

ULTRASOUND SCREENING DURING PREGNANCY

I : 11 - 14 WKS

II : 19 – 21 WKS

III: 32 - 36 WKS

ULTRASOUND SCREENING DURING PREGNANCY

FIRST EXAMINATION (11-14 WKS)

- UTERUS, ADNEXAE
- GESTATIONAL AGE
- CHORIONICITY IN MULTIPLE PREGNANCIES
- NUCHAL TRANSLUCENCY (NT)
- EARLY MORPHOLOGY

ASSESSMENT OF GESTATIONAL AGE

MEAN GESTATIONAL SAC DIAMETER	+/- 7d	
CROWN RUMP LENGTH (CRL)	+/- 5d	
BIPARIETAL DIAMETER (BPD)	+/- 7 d	≤ 20 wks
	+/- 10d	20-26 wks
	+/- 2 wks	27-29 wks
	+/- 2.5 wks	30-32 wks
	+/- 3 wks	≥ 33 wks
FEMUR LENGTH (FL)		

OTHER PARAMETERS (CEPHALIC CIRCUMFERENCE, HUMERUS LENGTH, CEREBELLUM, FOOT LENGTH)

ULTRASOUND SCREENING DURING PREGNANCY

FIRST EXAMINATION (11-14 WKS)

- UTERUS, ADNEXAE
- GESTATIONAL AGE
- CHORIONICITY IN MULTIPLE PREGNANCIES
- NUCHAL TRANSLUCENCY (NT)
- EARLY MORPHOLOGY

FIRST-TRIMESTER SCREENING FOR FETAL ANEUPLOIDIES

NUCHAL TRANSLUCENCY MEASUREMENT:

1. CRL 41 - 80 mm
2. MEDIAN SAGITTAL SECTION OT THE FETUS IN NEUTRAL POSITION
3. DISTINCTION BETWEEN FETAL SKIN AND AMNION
4. THE FETUS SHOULD OCCUPY AT LEAST 75% OF THE IMAGE
5. MAXIMUM THICKNESS OF NT SHOULD BE MEASURED
6. CALLIPERS SHOULD BE PLACED ON THE LINES

Snijders RJM et al. Lancet 1998; 352: 343-6

FIRST-TRIMESTER SCREENING FOR FETAL ANEUPLOIDIES

SECONDARY BENEFITS OF NT MEASUREMENT:

WHEN THE FETAL KARYOTYPE IS NORMAL, A NT ≥ 95th CENTILE MAY BE ASSOCIATED WITH:

1. **CONGENITAL CARDIOPATHIES**

2. **OTHER FETAL ANOMALIES (ORGANIC / SYNDROMIC)**

ULTRASOUND SCREENING DURING PREGNANCY

SECOND EXAMINATION (19-21 WKS)

GESTATIONAL AGE
MARKERS OF ANOMALY / ANEUPLOIDY
FETAL MORPHOLOGY I
PLACENTAL LOCALISATION

FETAL MORPHOLOGY SCAN

FETAL ANOMALY SCREENING

FETAL MORPHOLOGY SCAN

HEAD
SPINE
THORAX (HEART)
DIAPHRAGMA
ABDOMEN
EXTREMITIES
UMBILICAL CORD
FETAL GENDER (?)

FETAL MORPHOLOGY SCAN

HEAD

CRANIUM
CEREBRAL STRUCTURES
VENTRICLES, POSTERIOR FOSSA
ADDITIONNAL STRUCTURES ?

BIPARIETAL DIAMETER
OTHER MEASUREMENTS WHEN NEEDED

FACIAL STRUCTURES, PROFILE

FETAL MORPHOLOGY SCAN

RACHIS

LONGITUDINAL, TRANSVERSE AND FRONTAL VIEWS

FETAL MORPHOLOGY SCAN

THORAX

HEART: POSITION / AXIS, DIMENSIONS, RHYTHM,
4 CHAMBERS, OUTFLOW TRACTS

THORACIC WALL, RIBS

THORACIC CIRCUMFERENCE IF NEEDED

ADDITIONNAL STRUCTURES ?

FETAL MORPHOLOGY SCAN

DIAPHRAGMA

FETAL MORPHOLOGY SCAN

ABDOMEN

DIAMETERS AND/OR CIRCUMFERENCE

CORD INSERTION
STOMAC, LIVER, GALLBLADER, UMBILICAL VEIN

KIDNEYS: DIMENSIONS, STRUCTURES
BLADDER: PRESENCE (DYNAMIC EVALUATION)

ADDITIONNAL IMAGES ?

FETAL MORPHOLOGY SCAN

EXTREMITIES

FEMORAL LENGTH
MEASUREMENTS OF OTHER LONG BONES WHEN NEEDED

PRESENCE OF ALL 4 EXTREMITIES AND THEIR SEGMENTS
MOBILITY
ATTITUDE
POLYDACTILY ?

FETAL MORPHOLOGY SCAN

UMBILICAL CORD

NUMBER OF VESSELS

FETAL MORPHOLOGY SCAN

FETAL SEX (?)

FETAL MORPHOLOGY SCAN CRITICAL POINTS

1. TIMING
2. COMPREHENSIVE AND SYSTEMATIC EXAMINATION
3. EXPERIENCE OF NORMAL FETAL IMAGES
4. ONLY ADEQUATELY VISUALISED STRUCTURES SHOULD BE EVALUATED
5. IMAGING CONDITIONS

US MARKERS OF FETAL ANOMALIES

OLIGOHYDRAMNIOS
POLYHYDRAMNIOS
EARLY GROWTH RETARDATION
DYSHARMONIOUS FETAL GROWTH
ABNORMAL MOTOR ACTIVITY
CARDIAC ARRYTHMIAS

US MARKERS OF FETAL ANEUPLOIDY

2ND-TRIMESTER OLIGOHYDRAMNIOS
POLYHYDRAMNIOS
EARLY GROWTH RETARDATION
DYSHARMONIOUS GROWTH
NON-IMMUNOLOGIC HYDROPS
ABNORMAL PROFILE
STRUCTURAL ANOMALIES
SINGLE UMBILICAL ARTERY
ABNORMAL MOTOR ACTIVITY

ULTRASOUND SCREENING DURING PREGNANCY

THIRD EXAMINATION (32-36 WKS)

FETAL GROWTH
FETAL MORPHOLOGY II (CNS, HEART, URINARY AND DIGESTIVE TRACTS, DIAPHRAGMA)
AMNIOTIC FLUID
PLACENTAL LOCALISATION

ULTRASOUND IN OBSTETRICS

DOPPLER EVALUATION OF FETAL AND UTERO-PLACENTAL CIRCULATIONS

PRENATAL DIAGNOSIS

EMBRYOSCOPY

DIRECT, DETAILED OBSERVATION OF FETAL ANATOMY AND INTEGUMENT

TRANSCERVICAL / TRANSABDOMINAL

FETAL MEDICINE
ULTRASOUND IMAGING

ACCEPTED (PROVEN) BENEFITS

1. BETTER GESTATIONAL AGE ASSESSEMENT

2. EARLIER DETECTION OF MULTIPLE PREGNANCIES

3. EARLIER DETECTION OF CLINICALLY UNSUSPECTED FETAL MALFORMATIONS

FETAL MEDICINE
ULTRASOUND IMAGING

ANOMALY SCREENING REMAINS A CONTROVERSIAL ISSUE

BUT

A DIAGNOSTIC TEST DEPENDS ON PROPER MANAGEMENT AFTER DIAGNOSIS TO BECOME EFFICIENT

REFERENCES

1. Eik-Nes SH, Okland O, Aure JC, Ulstein M.
   Ultrasound screening in pregnancy: a randomised controlled trial.
   Lancet 1984; 1: 1347.
2. Saari-Kemppainen A, Karjalainen O, Yloslato P, Heinonen OP.
   Ultrasound screening and perinatal mortality: controlled trial of systematic one-stage screening in pregnancy.
   Lancet 1990; 336: 387-91.
3. Ewigman BG, Crane JP, Frigoletto FD, LeFevre ML, Bain RP, McNellis D, and the RADIUS study group.
   Effect of prenatal ultrasound screening on perinatal outcome.
   NEJM 1993; 329: 821-7.
4. Neilson JP. Ultrasound for fetal assessment in early pregnancy (Cochrane Review).
   In: The Cochrane Library, Issue 4, 2002. Oxford: Update Software.