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Guidelines on Antenatal Care (Part II)

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1 SCREENING FOR HAEMATOLOGICAL CONDITIONS

1.1 Anemia and haemoglobinopathies

In the Territory-Wide Obstetrics and Gynaecology Audit[1] of the Hong Kong College of Obstetricians and Gynaecologists (2004), 4% of pregnant women were noted to have haemoglobin (Hb) concentration of less than 10 g/dl. Worldwide, antenatal anemia is an important risk factor for maternal mortality[2] and morbidity[3]. A very low or high level of Hb concentration is associated with adverse fetal outcomes[4] such as preterm birth and low birth weight[5]. Pregnant women should be offered screening for anemia. Screening is preferably performed in early pregnancy to allow enough time for treatment if anemia is detected.

Thalassaemia is a common genetic disease in Southern China and other countries in Southeast Asia. In Hong Kong, the prevalence of α-thalassaemia carrier and β-thalassaemia is 5% and 3.4% respectively[6]. For screening of thalassaemia, reference can be made to the Guidelines of Antenatal Thalassaemia Screening issued by the Hong Kong College of Obstetricians and Gynaecologists in October 2003[7]. Sickle cell disorders, another genetically transmitted haematological condition, is common among the black Caribbean populations and black African populations. Screening should be based on the ethnicity of a pregnant woman[8].

1.2 Blood grouping and red cell alloantibodies

Determination of ABO blood group and Rhesus (Rh) status should be done in the first antenatal visit[9] to identify women with possible transfusion problems and detect clinically significant antibodies that might affect the fetus/newborn. Woman detected to have red cell antibodies must be informed of the significance including adverse transfusion reaction and potential adverse effect on the baby. Subsequent management of the pregnancy will depend on the titre of an antibody detected.

RhD negative women should be given appropriate antenatal[10] and postnatal immunoprophylaxis[11] to prevent RhD immunization in subsequent pregnancies. Events likely to be associated with feto-maternal haemorrhage such as miscarriage, antepartum

haemorrhage, invasive prenatal diagnostic procedures, maternal abdominal injury or stillbirth should be followed by anti-D prophylaxis.

2 SCREENING FOR FETAL STRUCTURAL ANOMALIES

2.1 Antenatal ultrasonography

Antenatal ultrasonography has become an integral part of obstetric care after a rapid development in the past few decades. Screening of fetal structural anomalies by antenatal ultrasonography has become part of a routine antenatal care in many developed countries[12], although reported detection rates vary widely among different studies[13-15], ranging from 35% to 77%. The detection rate also varies with different anatomical systems, with a higher detection rate for abnormalities of the central nervous system and urinary tract (>85%), but a lower detection rate for abnormalities of the heart and great vessels (<25%). Furthermore, the skill of an operator and the quality of an ultrasound machine are also important factors. It is important that pregnant women be made aware of the limitations of ultrasonography in the detection of fetal structural abnormalities.

Gestational age is an important factor affecting the effectiveness of ultrasonography in the detection of fetal structural abnormalities. Although there are potential benefits of scanning for structural abnormalities at 12-14 weeks' gestation when fetal nuchal translucency is measured for Down syndrome screening, a significant proportion of additional structural abnormalities can be detected at a subsequent 18-20 week scan[16].

A negative result will give reassurance of an absence of fetal structural abnormality. A positive result should be followed by further assessment and diagnostic procedures which may include an assessment for fetal aneuploidy. The objective of a scan should therefore be explained so that women can opt for, or opt out of having a scan.

Information obtained from a fetal structural anomaly scan at 20 weeks' gestation varies widely, depending on the experience of a sonographer, the type of ultrasound equipment used and the protocol employed by an institution. The minimum standard (Table 1) proposed by the Working Party[17] on Ultrasound Screening for Fetal Abnormalities of the Royal College of Obstetricians and Gynaecologists can be used for local reference.

2.2 Recommendation

All pregnant women should ideally be offered screening of fetal structural abnormalities by ultrasound scan at 18-20 weeks' gestation and its limitation explained.

3 SCREENING FOR DOWN'S SYNDROME

3.1 Screening tests

Down's syndrome is the most common chromosomal abnormality in newborn. It is also the most common genetic cause of mental

retardation in children. Other features of Down's syndrome include congenital cardiac abnormalities, gastro-intestinal tract malformations and thyroid disorders. The local incidence is 1.28-1.30 per 1000[18,19].

Conventionally, maternal age alone was used to classify pregnant women into high-risk or low-risk of carrying a baby with Down's syndrome. However, it is a poor screening test with a detection rate of 51% at a false positive rate of 14%[20]. In the 1980s, an association between Down's syndrome and low maternal serum alpha-fetoprotein (AFP) was reported[21]. This was followed by reports on more feto-placental markers, notably human chorionic gonadotrophin[22] (HCG), unconjugated oestriol[23] (uE_3) and inhibin-A. Screening programmes using different combinations of various serum markers in the second trimester of pregnancy have been used with a detection rate of 57-80%[24-26]. In the 1990s, an association between fetal aneuploidy and increased nuchal translucency (NT) was recognized[27,28]. Combination of ultrasound marker and serum markers including pregnancy associated plasma protein-A (PAPP-A) and freeβ-HCG in the first trimester of pregnancy resulted in a detection rate of more than 90%[29].

The multiplicity of different screening strategies (Table 2), including screening in the first or second trimester and using integrated, sequential[30] or contingent[31] approach, allows an obstetrician to provide many options to pregnant women who are understandably confused. The SURUSS[32] and FASTER[33] trials help provide a basis for the comparison of various strategies. Combination of markers from both the first and second trimester yield a higher detection rate and a lower false positive rate, as compared to the first trimester combined test, which is an effective screening test[34] by itself. Women with a positive screening test result in the first trimester can opt for chorionic villous sampling which can allow an early diagnosis, but nuchal translucency sonography is heavily technique dependent and proper training is required.

Provision of evidence based information to pregnant woman during antenatal period should include information on Down's syndrome, available screening tests, implication of test results, reproductive choice and an optimal care during pregnancy and childbirth. The nature of screening should be clearly explained together with the possibilities of false positive and false negative test results.

3.2 Recommendation

All pregnant women should have an access to information on Down's syndrome screening. A screening test offered should have a detection rate of not less than 60% and a false positive rate of not more than 5%. Information on further diagnostic tests should be provided.

4 SCREENING FOR INFECTION, PRE-ECLAMPSIA, PRETERM DELIVERY, AND PLACENTA PREVIA

4.1. Screening for Infection

4.1.1 Routine screening is useful

Serological screening for hepatitis B virus should be offered to pregnant women so that effective postnatal intervention can be offered to infected women to decrease the risk of mother-to-child transmission[35,36].

Pregnant women should be offered screening for HIV infection early in antenatal care because appropriate antenatal interventions can reduce mother-to-child transmission of HIV infection[37,38]. A bedside rapid HIV test for those presenting in labour with unknown HIV status is being implemented locally.

Rubella susceptibility screening should be offered early in antenatal care to identify women at risk of contracting rubella infection and to enable vaccination in the postnatal period for the protection of future pregnancies[39].

Screening for syphilis should be offered to all pregnant women at an early stage in antenatal care because treatment of syphilis is beneficial to the mother and fetus[40].

4.1.2 Routine screening is not useful

Pregnant women should not be offered routine screening for bacterial vaginosis because the evidence suggests that the identification and treatment of asymptomatic bacterial vaginosis does not lower the risk for preterm birth and other adverse reproductive outcomes[41-44].

Pregnant women should not be offered routine screening for asymptomatic Chlamydia because there is insufficient evidence on its effectiveness and cost effectiveness[45,46].

The available evidence does not support routine cytomegalovirus screening in pregnant women[47].

Pregnant women should not be offered routine screening for hepatitis C virus because there is insufficient evidence on its effectiveness and cost effectiveness[48].

Routine antenatal serological screening for toxoplasmosis should not be offered because the harms of screening may outweigh the potential benefits[49-51].

4.1.3 Routine screening is controversial

The role of routine antenatal screening for group B streptococcus remains controversoial[52-54], and awaits further local data to support the implementation of such a scheme in Hong Kong. Antenatal treatment of maternal GBS colonization does not prevent neonatal group B streptococcus disease[54,55].

Screening for asymptomatic bacteriuria by midstream urine

culture in pregnancy can allow identification and treatment of the condition and hence reduce the risks of preterm birth[56,57]. However, we do not have local data to support or dispute routine screening for asymptomatic bacteriuria.

4.2 Screening for antenatal clinical conditions (excluding GDM)

4.2.1 Pre-eclampsia

4.2.1.1 At first contact, a woman's level of risk for pre-eclampsia should be evaluated so that a plan for her subsequent schedule of antenatal appointments can be formulated[58].

4.2.1.2 Whenever blood pressure is measured in pregnancy, a urine sample should be tested at the same time for proteinuria. Standardized equipment, techniques & conditions for blood-pressure measurement should be used[59].

4.2.2 Preterm birth

4.2.2.1 Routine vaginal examination to assess the cervix is not an effective method of predicting preterm birth and should not be offered.

4.2.2.2 Although cervical shortening identified by transvaginal ultrasound examination (+/- increased levels of fetal fibronectin) are associated with an increased risk for preterm birth, the evidence does not indicate that this information improves fetal outcomes; therefore neither routine antenatal cervical assessment by transvaginal ultrasound should be used to predict preterm birth in healthy pregnant women[60,61].

4.2.3 Placenta praevia

4.2.3.1 Because most low-lying placentas detected at a 20-week anomaly scan will resolve by the time the baby is born, only a woman whose placenta extends over the internal cervical os should be offered another transabdominal scan at 36 weeks[62,63].

4.2.3.2 If the transabdominal scan is unclear, a transvaginal scan should be offered[62].

5 FETAL GROWTH, WELL-BEING AND PRESENTATION

5.1 Fetal growth

5.1.1 Which screening method is the best?

Both fetal growth restriction and overgrowth cause significant perinatal morbidity and mortality, and should be screened regularly from 24 weeks onwards. While there is not enough good evidence to evaluate which is the most effective screening method[64,65], symphysial-fundal height (SFH) measurement is the conventional, the simplest and cheapest method with acceptable sensitivity (65%) and false positive rate (10%) for small - for - gestation fetuses[66]. Routine ultrasound for fetal biometry[64] or uterine Doppler[65] is not necessary.

5.1.2 How to measure SFH?

SFH is the distance between the uterine fundus and the upper border of the symphysis pubis. To minimize measuring error and bias, the method should be standardized and following should be noted:

1. the bladder should be emptied before measuring[67].
2. Patient lies supine[68].
3. Start the measurement by first identifying the variable point, the fundus, and then measure to the fixed point, the symphysis pubis.
4. Hide the cm values from the examiner[69].

5.1.3 When to use SFH to screen fetal growth?

SFH is the method of choice of low risk cases. For those high risk cases or cases with known abnormalities that may affect accuracy of SFH such as huge fibroids, multiple pregnancy, extreme maternal obesity, additional assistance from ultrasound is warranted.

Between 24-38 weeks of gestation, SFH in cm is approximately equal to gestation in week. SFH can be used during this period of time. It can be measured routinely every 2 to 4 weeks, but more frequent measurement is unnecessary.

Before 24 weeks, SFH does not correlate gestation week well. Clinical palpation to assess uterine size is acceptable:

- At 12 weeks, the uterus is just palpable above the pubic symphsis
- At 22 weeks, the fundus is around umbilical level
- At 16 weeks, the fundus is between pubic symphsis and umbilicus

Moreover, date problem or multiple pregnancy is a more likely cause of discrepancy between uterine size and gestation than fetal growth disorder before 24 weeks.

After 38 weeks, due to the fetal engagement and physiological reduction of liquor volume. Hence SFH may become smaller and may be difficult to interpret.

5.1.4 What is an abnormal SFH?

As SFH in cm is approximately equal to gestation in week between 24-38 weeks of gestation, the simplest way to define screened positive is a discrepancy of more than 2 cm (SFH smaller or larger than expected).

Other criteria have also been proposed, such as derivation from population-based normal curve[70] or customized normal curve of SFH[71]. The latter is preferred if Chinese data is available.

5.1.5 What to do if screened positive?

SFH smaller or larger for date may indicate abnormal fetal growth, which should be confirmed with ultrasound fetal biometry. Other possibilities such as date problem, abnormal liquor volume, multiple pregnancy, uterine fibroids should also be ruled out with clinical and ultrasound assessment.

5.2 Fetal well-being

Any form of routine monitoring of fetal well-being in low risk pregnancies is not recommended. Monitoring methods including fetal movements[72], cardiotocogram[73], and Doppler study of umbilical arterial flow[64] are not shown to reduce intra-uterine death, which is of low prevalence and unpredictable.

Auscultation of the fetal heart may be included as one of the components of standard antenatal abdominal examination. However, it only helps to reassure a live fetus at the time of an examination, or detect fetal arrhythmia in rare occasions.

5.3 Fetal malpresentation

Fetal presentation should be assessed at 36-38 weeks of gestation, but it is not routinely required before that period. Clinical palpation by trained personnel has 70% sensitivity and 5% false positive rate in detecting malpresentation[74]. The accuracy can be further improved with selective ultrasound examination in difficult cases, or routine ultrasound in all cases provided resources are available.

When fetal malpresentation is suspected clinically, ultrasound confirmation and investigation of the underlying cause is required. For those with breech presentation, option of external cephalic version should be offered unless it is contraindicated[75].

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This guideline was produced by the Hong Kong College of Obstetricians and Gynaecologists as an educational aid and reference for obstetricians and gynaecologists practicing in Hong Kong. The guideline does not define a standard of care, nor is it intended to dictate an exclusive course of management. It presents recognized clinical methods and techniques for consideration by practitioners for incorporation into their practice. It is acknowledged that clinical management may vary and must always be responsive to the need of individual patients, resources, and limitations unique to the institution or type of practice. Particular attention is drawn to areas of clinical uncertainty where further research may be indicated.

Table 1

Minimum standards for a 20-week anomaly scan
Fetal normality:
- head shape and size and internal structures including: cavum septum pellucidum, cerebellum, ventricular size at atrium <10mm
- spine; longitudinal and transverse
- abdominal shape and content at level of stomach
- abdominal shape and content at level of kidneys and umbilicus
- renal pelvis <5mm antero-posterior diameter
- longitudinal axis abdominal-thoracic appearance (diaphragm and bladder)
- thorax at level of four-chamber cardiac view
- arms: three bones and hand (not counting fingers)
- legs: three bones and foot (not counting toes)
Optimal standard for a 20-week anomaly scan
- cardiac outflow tracts
- face and lips

Table 2 - List of Screening Tests

Name of test		Definition	Detection rate at 5% false positive
Maternal age		Maternal age as the only information	30-35%
Double test		AFP & HCG (16w-19w6d)	60-65%
Triple test		AFP, HCG & uE_3 (16w-19w6d)	70-75%
Quadruple test		AFP, HCG, uE_3 & inhibin-A (16w-19w6d)	75-80%
Combined test (OSCAR)		Nuchal translucency (NT) + PAPP-A & freeβHCG (11w-13w6d)	85%
Hospital Authority integrated test		NT + AFP & HCG (16w-19w6d)	85%
HKU Integrated test		NT + PAPP-A (11w-13w6d) + AFP & HCG (16w-19w6d)	85% (at false positive rate 2%)
Serum integrated test		PAPP-A (11w-13w6d) + quadruple test	85%
Full integrated test		Combined test + quadruple test	95%
Sequential screening	stepwise sequential	Combined test done, result disclosed, followed by second trimester serum markers	95%
	contingent sequential	Combined test done, result disclosed. If the results show a borderline risk, two options: (a) second trimester serum markers or (b) first trimester ultrasound features including nasal bone, and ductus venosus Doppler	