Antenatal Cardiac Assessment

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Congenital heart diseases (CHDs) represent an important health problem due to their consequences on perinatal morbidity and mortality, affecting about 8 per 1000 live-born infants (1). The prevalence is likely to be substantially greater in the fetal population because of the associations with intrauterine death, extracardiac malformations (25–30%) and chromosomal abnormalities (22%) (2, 3).

Numerous studies have demonstrated no significant improvement in long-term outcome following prenatal diagnosis (4, 5). However, prenatal detection of a critical CHD is suggested highly relevant for good prenatal and perinatal care for several primary reasons:

- Accurate and appropriate counseling of the family.
- Directing the delivery to a center that has the necessary support capabilities.
- Administration of prostaglandin E1 to maintain ductal patency, avoid hemodynamic compromise and hypoxic injury.
- Further evaluation of the fetus for associated extracardiac defects or chromosomal abnormalities that may further impact obstetrical or postnatal management.

Malformations thought to have a better outcome when the diagnosis is established before birth are the ductus dependent pulmonary or systemic circulation, and especially the hypoplastic left heart syndrome and the transposition of the great arteries (6, 7).

A recently published study from 20 European countries has shown that the detection rate of CHD varies considerably depending on the ultrasound screening policies, from 17.9% in countries without routine screening (as in The Netherlands and Denmark) to 46.0% in countries with only one routine fetal scan and 55.6% in countries with two or three routine fetal scans, but also between countries with the same screening recommendations (8, 9). The presence of associated malformations significantly increases the prenatal detection rate. Cardiac defects affecting the size of the ventricles have the highest detection rate. The mean gestational age at discovery is 20–24 weeks (8).

Ultrasound scans in the mid trimester of pregnancy are now a routine part of antenatal care in most European countries. Cardiac malformations are, however, among the most frequently overlooked lesions during prenatal ultrasound scanning (10). Fetal echocardiography is time consuming and costly. It requires tremendous technical expertise and knowledge of both fetal circulatory anatomy and physiology. A normal fetal echocardiography early in gestation does not exclude the possibility of a CHD present at birth. Although ultrasound is generally considered safe for the fetus, sound energy is delivered. It has been recommended not to expose the human embryo unnecessarily to Doppler ultrasound and to practice it with prudence (11).

Some authors have suggested the inclusion of the “four-chamber view” in the routine scan in the second trimester as an effective method of screening for CHD (12). Inclusion of the “five-short-axis views” is, however, thought to give a better detection rate (13). Early fetal echocardiography (<16 weeks) may be a feasible alternative to mid second trimester scanning for families at risk of CHD. The recognition of the association between increased nuchal translucency and CHD has increased the identification of a high-risk group at 11–14 weeks of gestation. Major structural heart defects can be diagnosed from the late first trimester, but some lesions may evolve throughout pregnancy. Early scans should therefore not replace the mid trimester fetal echocardiography (14).

The debate continues in the developed countries regarding screening for fetal anomalies. Ethical considerations and cost–benefit ratio of prenatal echocardiography are still under consideration. It is important to have a continuous evaluation of the actual practice and its consequences. The technique is by no means available to the general obstetric population. Most
centers in Europe believe that specialized fetal echocardiography should be centralized in a tertiary center and be reserved for recognized high-risk groups. The high-risk groups will include previous child with CHD, parents with CHD, abnormal cardiac examination on routine ultrasound, abnormal heart rate or rhythm identified, abnormal fetal growth or evidence of fetal distress, identification of other congenital malformation, identification of chromosomal abnormality, exposure to known teratogens and high-risk maternal conditions (15). The specialized fetal echocardiography must be highly sensitive and specific for the major cardiac abnormalities.

The primary goal must be that an extended cardiac examination or at least a “four-chamber view” and a “five-short-axis view” should be an integral part of the general second trimester fetal screening. This allows parents the option of karyotyping the fetus and/or elective termination if indicated. However, emotional and ethical issues and the allocation of medical resources will continue to be major factors in the progress of the management of the fetus with CHD.

REFERENCES