7 Antenatal Imaging of Chest Malformations

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Primum non nocere.
(Attributed to Hippocrates or Galen)

7.1 Introduction

Congenital chest anomalies were considered rare lesions prior to the era of fetal imaging. Routine obstetric sonograms have contributed to a sharp increase in the number of diagnosed cases in the last two decades; the antenatal recognition of congenital lung malformations and anomalies has consequently raised the controversial issue of their management in asymptomatic newborns (PILLING 1998).

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7.3 Sonography of the Fetal Chest

The most informative scan is provided by the transverse four-chamber view of the fetal thorax which is always part of obstetric sonogram protocols (Fig. 7.2).

Normally the heart occupies 25–30% of the volume of the fetal thorax; with regard to the midline (as outlined by the line from mid-spine to mid-anterior wall), the axis of the heart is approximately 45°, and most of the right ventricle, the left atrium and the left ventricle are located into the left chest. The lungs appear homogeneous and symmetric in appearance throughout gestation with a medium level echogenicity slightly greater in the 3rd trimester than in the 2nd trimester. The fetal diaphragm is seen on longitudinal or oblique scans as an hypoechoic band, concave inferiorly, interposed between the lungs and the liver or spleen. The abdominal position of the liver and stomach is indeed assessed routinely. The thymus is sometimes displayed, anterior to the heart and great vessels roots, slightly less echoic than the lungs.

Fetal lung malformations will present sonographically as an area of abnormal echogenicity exerting a mass effect on the adjacent structures. The induced cardiac shift (position and/or axis of the heart) is best recognized on the transverse four-chamber view (Fig. 7.3). The mass is hyperechoic, either homogeneously (Fig. 7.3a) or with coexisting cysts of various size (Fig. 7.3b). The mass effect due to the malformation can also take place on the adjacent lung that can be considered falsely as being part of the lesion because of its compression-induced hyperechogenicity. A great deal of information regarding the natural history of thoracic fetal malformations has been gathered thanks to the widespread use of routine mid-second trimester ultrasound and follow-up sonograms. Such knowledge has significantly shaded the various prognostic predictors at presentation that were reported in the literature (BROMLEY et al. 1995; ADZICK et al. 1998; BUNDUKI et al. 2000; THORPE-BEESTON and NICOLAIDES 1994), such as: early gestational age at diagnosis, large size of the lesion, importance of the mediastinal shift, polyhydramnios, bilaterality of lesions, subtypes of lesion (e.g., Stocker classification of CCAM; STOCKER et al. 1977), pulmonary hypoplasia, associated anomalies, and hydrops fetalis.

Among these historical predictors at presentation, only the presence of hydrops fetalis remains as an absolute indicator of a dismal prognosis (ADZICK et al. 1998).