Ultrasound of the Neonatal Thorax

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12.1 Introduction

As reflected by the other issues in this volume diseases of the newborn chest are commonly evaluated by means of the three dominant imaging modalities: conventional chest radiographs, computed tomography (CT) and magnetic resonance (MR).

Thorax ultrasound is not often performed mainly because bone and air are traditionally considered natural barriers for the ultrasound beam. However, the unique thoracic anatomy of the neonate as well as certain pathologic conditions provides many acoustic windows into the chest. Little effort is needed to evaluate and diagnose a wide range of clinical problems in the thorax without the radiation exposure from frequent chest radiographs and CT, or the need for sedation sometimes required for CT and MR imaging. In particular, ultrasound is quickly implemented in the remote intensive care situation where patients can be examined in any given position and location minimizing the need to move or transfer patients who are on life support devices.

Ultrasound is particularly useful in differentiating pulmonary from pleural lesions, in visualizing diseased parenchyma hidden by a pleural effusion on chest radiographs, and in detecting and characterizing pleural fluid collections. It can also delineate anomalies of mediastinum and great vessels and, last but not least, assess malposition and complications of central vein catheters.

12.2 Technique

To correlate findings it is always helpful to review the patient’s most recent chest radiograph prior to ultra-
sound examination. In general transducers are selected according to the size of the patient and position of the lesion being evaluated. Small infants and neonates are easily examined with high-frequency linear or sector transducers. Small transducers are valuable to insonate from the supraclavicular or suprasternal notch. Manoeuvring the patient into different positions will delineate the position dependency of a lesion and can help to move intestinal air out of sight. It may be helpful for the abdominal approach to feed the patient prior to or during examination, since a fluid-filled stomach provides an excellent acoustic window.

12.2.1 Imaging Approach to the Mediastinum

To analyse mediastinal structures a supraclavicular, suprasternal, transsternal, parasternal, subcostal and subxiphoidal approach is used (Fig. 12.1).

Fig. 12.1a–i. Normal ultrasound (US) appearance of the mediastinum. a Normal thymus. Transsternal transverse scan shows the normal echo pattern with multiple linear echogenic lines and foci. Arrows Border of the two thymic lobes. b Suprasternal longitudinal scan shows the trachea with the echo-poor cartilages (arrowheads). c Transsternal longitudinal scan demonstrates the oesophagus (arrows) with echogenic mucosa and submucosa, sonoluent muscle and intraluminal air. d Normal left aortic arch. Schematic diagram.