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## **Preface**

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Noam Lazebnik and Roe S. Lazebnik

## **The Utilization of Three and Four Dimensional Technology in Fetal Neurosonology**

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Eran Bornstein, Ana Monteagudo, and Ilan E. Timor-Tritsch

This article discusses the clinical use of three-dimensional technology while performing a fetal neuroscan. This technique allows us to better define the spatial relationship of brain structures and possible malformations. The varieties of display modes and the infinite number of different planes that can be generated facilitate the diagnostic process. Additional values of this technology include an off-line analysis of the volume by the sonographer or sonologist to obtain the necessary planes, as well as an electronic transmittal for an off-site expert to provide a second opinion consultation. This modality requires a short acquisition time, allowing high patient through-put and increased patient satisfaction. In addition, it is an excellent teaching tool and provides valuable information to consulting such experts as pediatric surgeons, plastic surgeons, neonatologists, neurologists and neurosurgeons.

## **3-D and 4-D Fetal Neuroscan: Sharing the Know-how and Tricks of the Trade**

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Eran Bornstein, Ana Monteagudo, and Ilan E. Timor-Tritsch

Visual information from 2-D images may be limited in reflecting a 3-D structural reality. 3-D techniques have emerged enabling acquisition of an entire volume of spatial ultrasound information that can be analyzed and displayed in multiple planes and display modes that exceed the capacities of 2-D US and better reflect the 3-D nature of a structure or anomaly. In the future 3-D evaluation of the fetal body will be an inherent part of fetal study in cases of congenital anomaly, specifically fetal brain abnormality. This article focuses on the technique for obtaining and analyzing acquired volumes and displaying them.

## **The Utility of Volume Sonography for the Detection of Fetal Spine Abnormalities**

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Noam Lazebnik, Eran Bornstein, and Ilan E. Timor-Tritsch

Sonographic evaluation of the fetal vertebral column is essential for fetal central nervous system evaluation and valuable for ruling out genetic conditions. This article provides an overview for obtaining and manipulating fetal vertebrae three-dimensional data as to obtain the necessary diagnostic views. Additional technical information is provided elsewhere in this issue. This discussion is limited to include only the most common fetal vertebral abnormalities. The same technical principals, however, enable detection of many additional abnormalities.

## **Fetal Neuroimaging of Neural Migration Disorder**

**541**

Ritsuko K. Pooh

Prenatal diagnosis of migration disorder is among the most difficult challenges of an antenatal sonographic examination. Anterior coronal demonstration of the sylvian fissures

is recommended as the screening of cortical development and maldevelopment. Once suspicion of a migration disorder develops, MR imaging is the preferred modality for demonstration of cortical development. Considering that migration disorders occur before fetal viability but detection of brain lesions is most commonly performed in the third trimester, this presents a diagnostic dilemma. Early detection of migration disorder with severe prognosis is among the central missions of fetal neuroimaging.

### **The Differential Diagnosis of Fetal Intracranial Cystic Lesions**

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Gustavo Malinger, Edgardo Corral Sereño, and Tally Lerman-Sagie

Fetal Intracranial cysts can be diagnosed during pregnancy by the use of ultrasound scan. The cysts can be found in different brain compartments and may be of diverse origins. Choroid plexus and arachnoid cysts are the most commonly diagnosed lesions and when isolated carry a good prognosis. Intraparenchymal cysts may have different etiologies, and the prognosis depends largely on the location and the extent of the lesion.

### **Magnetic Resonance Imaging Following Suspicion for Fetal Brain Anomalies**

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Alice B. Smith and Orit A. Glenn

Fetal MR imaging provides a useful adjunct in the evaluation of anomalies of the fetal brain noted on ultrasound. The higher resolution of fetal MR imaging allows for improved assessment of cortical malformations and other anomalies. The use of fetal MR imaging is relatively new, however, and understanding of the imaging findings continues to evolve. In addition, the improvement of newer techniques, such as diffusion weighted MR imaging, should lead to improved understanding of the developing fetal brain and the impact of ischemic, infectious, and developmental insults.

### **Ultrasound of the Fetal Cranium: Review of Current Literature**

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Eyal Sheiner and Jacques S. Abramowicz

Fetal cranial defects and abnormal skull shape are amenable to ultrasound study diagnosis. Correct identification of the nature of the abnormality is extremely important and helpful in establishing diagnosis and longterm prognosis. In addition it might direct the care provider to apply the correct genetic study, chromosome or DNA related, for final diagnosis confirmation. This article discusses normal and abnormal fetal skull anatomy as observed using ultrasound technology.

### **Diagnostic Approach to Prenatally Diagnosed Limb Abnormalities**

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Arie Koifman, Ori Nevo, Ants Toi, and David Chitayat

Limb formation occurs at 4–12 weeks gestation and involves many genes and gene families. The prevalence of limb abnormalities is approximately 6/10,000 live births, with higher incidence in the upper limbs compared to the lower limbs (3.4/10,000 and 1.1/10,000 respectively). Limb abnormalities are morphologically and etiologically heterogeneous group of abnormalities and most are amenable for prenatal diagnosis. The investigation and counselling of woman/couple with prenatally diagnosed fetal limb abnormality requires a multidisciplinary team including obstetrician, radiologist, clinical geneticist, neonatologist/pediatrician and a pediatric orthopedic surgeon. Other specialties may be needed if other abnormalities are detected.