The role of fetal mri in diagnosis of intrauterine neurological congenital anomalies

Mohamed El- Hagrasy Abdalla El-Khodary

Fast MR imaging of the fetus appears to be a valuable, safe, and reliable modality to detect anomalies the fetal brain and spinal cord that could be missed by ultrasound.The superior spatial and contrast resolution of MR imaging has the potential to provide anatomic information not previously available for patient counseling and decision making, to help in identifying those who may potentially benefit from prenatal intervention, and to aid in fetal surgical planning.Since the early descriptions of normal fetal brain morphology and maturation with MR imaging, the clinical utility of fetal MR imaging as an adjunct to screening sonography has been well documented.MR studies establishing the superb diagnostic capabilities of MR imaging, particularly in assessing disorders of neuronal migration and in defining the structures of the corpus callosum and posterior fossa.The ability of MR imaging to detect waves of migrating cells in the fetal brain and to clearly differentiate gray matter from white matter in the developing brain suggests an important role for this technique in the assessment of fetal malformations or suspected brain malformations identified by sonography. Developmental abnormalities, such as ventriculomegaly, agenesis of the corpus callosum, and Dandy-Walker malformation, are associated with significantly better prognoses when they are not accompanied by cortical malformations.The posterior fossa can be reliably visualized by fetal MR imaging, accurate assessment of the posterior fossa is difficult by fetal sonography. As the fetal skull becomes progressively ossified, accurate assessment of the cerebellum is made more problematic. Occasionally, a prominent vallecula may be mistaken for inferior vermian agenesis on antenatal sonograms. In addition, distinguishing the more severe forms of the Dandy-Walker complex (true vermian agenesis and cerebellar hypoplasia) from the incidental finding of a mega-cisterna magna cannot always be done unerringly, even by the most skilled observer. The diagnosis of cerebellar hemispheric hypoplasia may also be more difficult as the skull base matures. The normal development of the cerebellar vermis progresses into the second trimester and, as a result, the prenatal diagnosis of Dandy-Walker malformation should not be considered before a well-documented gestational age of 18 weeks. Before then, the normal appearance of the incompletely developed cerebellum should not be overinterpreted as anomalous.Detailed prenatal diagnoses are mandatory for planning and follow-up of fetal surgery, such as myelomeningocele repair. Assessment of the degree of hindbrain herniation and posterior fossa development

is one of the necessary tools for determining the efficacy of this procedure these measurements are accurate and easily reproduced by MR imaging. The frequent occurrence of postsurgical oligohydramnios also favors MR imaging in the postsurgical radiologic assessment.Prenatal MR imaging could eliminate the need for postnatal MR imaging, which typically requires patient sedation. Current technology does not accord fetal MR imaging the same diagnostic quality and variety of pulse sequences as are available in the sedated postnatal examination; however, in a critically ill neonate, treatment can readily be based on the information available from prenatal imaging, thus potentially eliminating delays