Conclusion

The main purpose of prenatal diagnosis is to gather genetic, anatomical, biochemical and physiological information about the fetus to detect potential abnormalities that may have impacts both during the fetal period and after birth. Thus, we can provide families with information, genetic counselling, and/or therapeutic alternatives for any anomalies detected.

Ultrasonography (US) is the primary imaging modality for the evaluation of the fetus. It is safe for both fetus and mother, is relatively inexpensive, allows real-time imaging, and is readily available. However, US may be limited in cases of oligohydraminos, large maternal body habitus, or complex fetal anomalies, particularly when scanning is performed late in gestation. In these cases, Magnetic resonance (MR) imaging appears as a good alternative imaging modality that provide additional information that can improve diagnostic accuracy and facilitate treatment decisions.

MRI examination allows a global evaluation of a case, through the analysis of both anatomy of the district of interest and its possible disruption expressed by modifications in signal intensity of parenchyma and affected organs.

MRI is definitely a valuable addition to the diagnostic list in the assessment of fetal lung development, due its ability not only to provide detailed structural, but also biochemical and functional information, which cannot be obtained by ultrasound.

The main MRI techniques, used to analyze the process of the fetal lung growth and abnormalities are MRI volumetry, assessment of signal intensities, and MR spectroscopy .

MRI can be used accurately for early diagnosis of different fetal anomalies (Pulmonary hypoplasia, congenital diaphragmatic hernia, cystic adenomatoid malformation, bronchogenic cyst, tracheal or bronchial atresia).

Fetal MRI might be useful in the evaluation of the signal intensity in lungs, considering that some studies have indicated a relationship between the signal intensity and the characterization of pulmonary hypoplasia. Lung volume calculation has shown to be a better marker than the signal analysis in the evaluation of pulmonary hypoplasia.

MRI is a method of choice for distinguishing congenital diaphragmatic hernia from congenital cystic adenomatoid malformations.

In cases of congenital diaphragmatic hernias, the localization of the left hepatic lobe plays a relevant role in the determination of the perinatal prognosis because isolated "liver-up" and "liver-down" congenital diaphragmatic hernias are related to a perinatal mortality rate of respectively 57% and 7%.

The additional use of other than T2-weighted sequences allows specifying fetal tissue characteristics and may provide information related to functional qualities of organs.

The knowledge gained about fetal lung fluid dynamics has led to the development of new strategies in fetuses with congenital diaphragmatic (CDH). The surgical technique of fetoscopic tracheal occlusion (FETO) is now available to prenatally treat severe pulmonary hypoplasia in CDH.

Conclusion

Recent developments of new real-time sequences during free breathing without cardiac triggering have established a potential role of MRI in the study of fetal heart: MRI can study the morphology using steady-state free precession (True FISP) sequences on sagittal, coronal and axial planes, orthogonally oriented to the fetal diaphragm and allows to identify the viscero-atrial situs, the heart and its axis. It is also possible to perform a dynamic study, through the acquisition of cine-MR sequences with real-time steady state free precession (SSFP) oriented according to the standard projections used in fetal echocardiographic scanning. MRI can analyze the normal anatomy by transverse, long axis and angulated views to visualize the principal cardiac planes.

However, the use MRI in evaluating fetal heart still reveals some diagnostic limitations secondary to two typologies of factors: intrinsic and extrinsic.

- The first intrinsic limitation concerns technical problems: it is still necessary to develop the equipment in order to overcome some lacks such as the low spatial and temporal resolution. Because of these limitations it is not possible to reproduce or give direct information about valvular or rate diseases.

- The second extrinsic limitation is the still limited experience that is based on the few data still available in the literature. Multicentric studies are therefore necessary to acquire more experience, to construct biometric reference limits and generate diagnostic guidelines.

In the immediate future the use of dedicated sequences, with potential pseudo-angiographic study, might open new horizons. Similarly the application of new 3T magnet field equipments might increase spatial resolution. New possibilities of therapeutic treatments during prenatal period will undoubtedly require further efforts to reach higher image quality.

Conclusion

At the moment MRI can be performed in accurately selected cases, for unsure or multi-organ disease, where accurate counselling is necessary to plan clinic therapeutic iter of baby patient.

Although MR imaging provided valuable information for some fetuses, it should not replace US for routine screening of the fetus or for the diagnosis of all fetal anomalies.

Fetal MR imaging is a third-level diagnostic tool for the study of fetal malformations and should be considered only in fetuses with anomalies for additional evaluation of structures that are sub-optimally visualized at US but about which information is critical.

In conclusion, MR imaging as an adjunct to prenatal US may provide valuable information that could add to the prenatal evaluation and treatment of some fetal anomalies.