2 Prenatally Detected Renal Tumors: Comparison of MRI Findings and Review of the Literature

Leann E Linam, MD; Maria A Calvo-Garcia, MD; Eva I Rubio, MD; Timothy M Crombleholme, MD; Beth M Kline-Fath, MD.

Department of Radiology, Cincinnati Children's Hospital Medical Center

Introduction

Diagnosis of kidney and bladder anomalies is usually achieved by ultrasound in the neonatal period, especially in newborn screening for polycystic kidney disease. Ultrasound has limited sensitivity to evaluate the renal parenchyma and to assess renal function. In the neonatal period, the findings on ultrasound are usually definitive, and further imaging modalities are not needed to make a diagnosis.

Ultrasound remains the gold standard for the detection of renal masses, but it has limitations due to its operator dependence and the difficulty in accurately assessing the size and extent of the lesions. Magnetic resonance imaging (MRI) offers superior contrast resolution and multi-planar imaging capabilities, which make it an ideal modality for the evaluation of renal masses in children.

Conventional MRI sequences, such as T1- and T2-weighted images, are usually performed to assess the lesion's characteristics, including signal intensity, size, and extent. However, conventional MRI may not be able to provide enough information to differentiate between different types of renal masses, especially if the mass is small or if there are subtle findings.

Recent advances in MRI technology, such as diffusion-weighted imaging (DWI) and functional MRI (fMRI), have provided additional information about the mass's characteristics, allowing for a more accurate diagnosis. DWI can provide information about the mass's diffusion properties, which can be used to differentiate between benign and malignant masses. fMRI can provide functional information about the mass's blood flow and oxygenation, which can be used to differentiate between different types of renal masses.

Postnatal MRI

There are two major considerations when determining the best imaging modality for the evaluation of renal masses in children. The first is the need to avoid the use of contrast agents, especially in neonates and infants. The second is the need to ensure that the imaging protocol is as brief as possible to minimize the time spent in the imaging room.

Diffusion-weighted imaging (DWI) can provide additional information about the mass's characteristics, allowing for a more accurate diagnosis. DWI can provide information about the mass's diffusion properties, which can be used to differentiate between benign and malignant masses. fMRI can provide functional information about the mass's blood flow and oxygenation, which can be used to differentiate between different types of renal masses.

Postnatal CT

In cases where MRI is not feasible or not available, such as in neonates or infants, CT imaging can be used as an alternative. CT imaging provides excellent contrast resolution and multi-planar imaging capabilities, but it uses ionizing radiation, which can be a concern for children.

Postnatal Ultrasound

Ultrasound remains the gold standard for the evaluation of renal masses in children. However, ultrasound has limitations due to its operator dependence and the difficulty in accurately assessing the size and extent of the lesions. Ultrasound can provide real-time imaging, allowing for the assessment of the lesion's characteristics, including size, shape, and vascularity.

Conclusions

The use of advanced imaging modalities, such as DWI and fMRI, has improved the accuracy of the diagnosis of renal masses in children. However, further research is needed to validate the use of these techniques in clinical practice.

References