**Title:** Role of Prenatal Ultrasound and Fetal MRI in Diagnosing Congenital Anomalies of the Kidney and Urinary Tract: A Comparative Diagnostic Study


**Introduction:**
Prenatal diagnoses of Congenital Anomalies of the Kidney and Urinary Tract (CAKUT) are critical for counseling families about potential postnatal outcomes. While ultrasound (US) remains the gold standard for prenatal diagnosis of CAKUT, fetal magnetic resonance imaging (MRI) has been increasingly used for complex anomalies. However, diagnostic accuracy of fetal MRI for CAKUT remains uncertain. This study aims to compare prenatal US and MRI for the diagnosis of CAKUT.

**Methods:**
We reviewed charts of gravid mothers and their infants with suspected CAKUT seen at a tertiary fetal care center between 2012-2020. Data included prenatal US, fetal MRI, prenatal intervention, postnatal US, postnatal MRI, postnatal voiding cystourethrogram, postnatal diagnosis, and postnatal surgical intervention. Prenatal imaging and postnatal diagnoses were categorized into kidney, ureteral, and/or bladder anomalies. Diagnostic accuracy of prenatal imaging for identifying postnatal anomalies was evaluated using sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). Anatomic categories were stratified based on concordance between prenatal imaging findings and postnatal diagnosis (concordant, incomplete - imaging that captured accurate details but missed key nuances-, or discordant).

**Results:**
Fetal MRI had significantly lower rates of incomplete results compared to US. When anatomic categories were grouped together, fetal MRI had greater sensitivity, PPV, and NPV, and equivalent specificity compared to US. This relationship held true for kidney and ureteral anomalies. In the bladder, MRI and US had equivalent diagnostic accuracy.

**Conclusion:**
Fetal MRI has greater sensitivity, PPV, and NPV for kidney and ureteral anomalies and should be considered complementary to prenatal US as it may provide more detailed information, particularly for complex congenital kidney and ureteral anomalies. The data demonstrate clinically useful differences in the diagnostic accuracy of US and MRI in identifying CAKUT; however, results were not statistically significant. Further work is needed to validate findings in a larger cohort.