

ISMRM SYLLABUS: Acute Abdominal Pain – Is there a potential role for MRI in the setting of the Emergency Room (ER) in a patient with renal calculi?

Diego R. Martin MD PhD, Director of MRI and the Clinically Applied Research Body MRI Program, Emory University School of Medicine, Atlanta, Ga., USA. dmartin@emory.edu

Overview of this presentation and the learning objectives

1. The current state-of-the-art for evaluation of renal function and structure using MRI will be reviewed

Functional MRI is referred to as “MR Urography” or “MR Nephrourography” and is based upon gadolinium enhanced dynamic gradient echo imaging of the kidneys. From these images both information on renal structure and function can be extracted, including glomerular filtration. Applications include the evaluation of urinary tract obstruction, as occurs in renal calculi. The basic approach and examples of utility of MRU techniques will be shown. It will be shown that MRU has been finding utility particularly in the setting of renal transplantation and in urinary obstruction from congenital causes. Case studies of patients with renal calculi will be shown. Rapid scanning methodology will be shown that is applicable to the acute care setting.

2. The potential for use of MRU in the setting of renal calculi will be discussed.

There is potential for application of MRU in the setting of complex cases of renal obstruction where individual or regional renal functional and structural information may alter management decisions. In the ER setting consideration for MRU would generally only be after consultation by the urology specialist. The patients will generally be those with complex histories. Considerations include:

- Prior renal, urological, retroperitoneal surgeries and possible urological disruption or infection
- Additional history of malignancy, urological or other with potential for renal or retroperitoneal spread
- Complex infectious cases
- Require more detailed documentation and/or monitoring of renal function before/after intervention
- Prior non-enhanced CT showing soft-tissue abnormality non-specific in a renal insufficiency patient, not answered by ultrasound
- Excessive use of CT (patient with greater than a prescribed dose) and question not answered by ultrasound

The relative risk of gadolinium contrast versus iodinated contrast in the setting of renal insufficiency will be reviewed.

3. The role of MRI is restricted to selective patients and the information from MRI, versus ultrasound and CT, is different.

Limitations of MRI include the relatively low sensitivity for renal or uretic calculi. Generally, only stones larger than 7-10 mm and surrounded or bordered by urine (water signal) will be detectable. However, the relative strengths derive from the degree of soft tissue contrast achievable provide excellent visualization of inflammatory processes, and visualization of soft tissue within the kidney, or related to the bladder wall. This is particularly applicable when the diagnosis of renal calculi is uncertain or when there may be other disease processes confounding the diagnosis and decisions on management.

References

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