Computed Tomography Urography (CTU) for Evaluation of Asymptomatic microscopic hematuria. Is intravenous contrast administration warranted for all patients? A retrospective evaluation utilizing ACR’s Appropriateness Criteria and ACR Select Clinical Decision Support Tool

L. Alexandre Frigini MD; Aaron Thomas, MD; Veronica Lenge de Rosen, MD

Department of Radiology
Baylor College of Medicine,
Houston, Texas

No Disclosures
BACKGROUND

• CT urography (without and with contrast) has been used in the evaluation of microscopic hematuria and is very sensitive in identifying an etiology, however, the majority of studies are negative. When a study is positive, the finding is almost always diagnosed with the non-enhanced portion of the exam, without the need of IV contrast administration (i.e. urolithiasis). Many patients presenting with microscopic hematuria are pre-menopausal females and/or younger than 40 years of age.

• Several recent published studies have claimed that CTU is not warranted for evaluation of asymptomatic microscopic hematuria and that using unenhanced CT will greatly reduce radiation exposure, cost and risks associated with IV contrast administration with a minimal risk of missing a malignant neoplasm.
OBJECTIVE

We aimed to evaluate claims by recently published scientific studies that CT Urography (CT abdomen and pelvis without and with intravenous contrast) may not be warranted in specific patient cohorts, particularly young individuals without risk factors for urinary tract malignancy, who may be evaluated with a CT exam without contrast only (CT renal stone protocol).
MATERIALS AND METHODS

We retrospectively reviewed 367 CT Urography exams (without and with contrast) performed between August 2013 and August 2014.

Patients were categorized according to age, sex (females were further categorized as pre and post-menopausal), and results of CT Urography.

CTU results were categorized as negative or positive. The positive exams were sub-categorized as either benign (including non neoplastic etiologies) or malignant etiologies.
The exams were then classified as either as appropriate or inappropriate using the American College of Radiology and National Decision Support Company (NDSC) ACR-Select Clinical Decision Support Tool.

ACR Select™, a licensed product of the ACR, is the digitally consumable version of the ACR Appropriateness Criteria®, ready to incorporate into computerized ordering and EHR systems to guide providers when ordering medical imaging scans

The patient’s age, sex, body area and either clinical indication or clinical scenario are entered into the support tool which generates a list of imaging exams in order of most appropriate to least appropriate (or inappropriate). Any study with a score on less than 6 is considered inappropriate.
Clinical Decision Support: Inappropriate Exam
Clinical Decision Support: Appropriate Exam
RESULTS

• Negative CTU exams: 266

• Positive CTU exams: 101 (97 benign and 4 malignant etiology):

• Benign Etiology:

  • 20 Bosniak Type 1 or 2 cysts,
  • 4 Angiomyelolipomas,
  • 3 nonspecific urinary bladder wall thickening/UTI/Cystitis
  • 3 BPH (Benign Prostatic Hyperplasia)
  • 58 Nephrolithiasis,
  • 9 Miscellaneous (Benign bladder mass, ureteral stricture)
RESULTS

- **Malignant Etiology:**
  - 4 Renal Cell Carcinoma
  - 3 Hodgkin’s Lymphoma

- The majority of cases were negative (72.48%). 96% of exams were deemed appropriate by ACR-Select Clinical Decision Support Tool.

- 27.52% of total exams were positive (26.43% and 1.09% of total were benign and malignant respectively).

- The patients with malignant etiologies ranged in age from 44 to 62 years old.

- Nephrolithiasis was the most common etiology (15.8%).
<table>
<thead>
<tr>
<th>Condition</th>
<th>Positive CT Urogram</th>
</tr>
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<tbody>
<tr>
<td>RCC</td>
<td>0.00%</td>
</tr>
<tr>
<td>Lymphoma Bosniak 1-2 cyst</td>
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</tr>
<tr>
<td>AML</td>
<td>0.00%</td>
</tr>
<tr>
<td>UTI/Cystitis</td>
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<tr>
<td>BPH</td>
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<tr>
<td>Urolithiasis</td>
<td>60.00%</td>
</tr>
<tr>
<td>Urothelial</td>
<td>0.00%</td>
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</tbody>
</table>

**RESULTS**
DISCUSSION

- 96% of the CTUs were retrospectively deemed appropriate by current ACR appropriateness criteria and ACR-Select Clinical Decision Support Tool. This high rate was felt to be partly due to the fact that if there was a history of recent/current urinary tract infection, vigorous exercise or menstruation, it was not clearly documented on the patient’s Electronic Medical Record (EMR). If CDS had been used at the point of care for patient’s with these clinical scenarios, CTU would have been deemed inappropriate (not indicated).
DISCUSSION

The majority of CT Urogram examinations were negative (72.48%). Of the positive studies, only 4 exams (1.09%) revealed a malignant etiology, none of which was an urothelial lesion. The youngest patient with a malignancy was 44 years old. Of the benign etiologies, the majority of cases was due to urolithiasis which could be identified on the pre-contrast portion of the CTU, therefore there was no additional information (value) added by performing the urography phase following administration of intravenous contrast.
CONCLUSION

We conclude that is reasonable to evaluate asymptomatic microscopic hematuria initially with a CT without IV contrast (CT renal stone protocol) and if urolithiasis is diagnosed, post contrast scans are unwarranted, particularly in patients younger than 40 years of age. However, such algorithm which would decrease overutilization, its potential side effects and costs is not available using current ACR’s Appropriateness criteria and Clinical decision support tools. Is it time for a revision?
THANK YOU FOR YOUR ATTENTION!
lfrigini@bcm.edu