Evaluation and Risk Stratification of Renal Masses with $^{99m}$Tc-sestambini SPECT/CT

Golmehr Sistani¹, Jennifer Bjazevic², Zahra Kassam¹, Jonathan Romsa¹, Stephen Pautler²

¹. Department of Radiology 2. Division of Urology; Western University, London, ON, Canada

AUA 2020: PD45-01
Evaluation of Renal Masses with $^{99m}$Tc-sestamibi

- Multiple types of renal masses
  - Different malignancy potentials
  - Significant overlap in imaging characteristics
- May result in:
  - Diagnostic uncertainty
  - Unnecessary surgical resection
- Difference in abundance of mitochondria between different renal masses
  - Mitochondria rich
    - Oncocytoma
    - Chromophone RCC
  - Mitochondria poor
    - Clear cell RCC
    - Papillary RCC
Evaluation of Renal Masses with $^{99m}$Tc-sestamibi

- $^{99m}$Tc-sestamibi (MIBI) SPECT/CT imaging
  - Localize tracer within the mitochondria
  - Potential imaging modality to characterize renal masses
  - May allow for identification of low risk renal lesions obviating the need for renal biopsy or surgical excision

This study aimed to evaluate the utility of MIBI SPEC/CT in the assessment and risk stratification of indeterminate renal masses
Evaluation of Renal Masses with $^{99m}$Tc-sestamibi

- Single-site comparative study from Dec 2018 to Aug 2019

- Included 25 indeterminate renal masses

- All patients underwent:
  - Standard of care cross-sectional imaging with contrast-enhanced CT scan or MRI
  - $^{99m}$Tc-sestamibi SPECT/CT scan (GE Discovery NM/CT 670)
  - Histological examination of the renal mass with percutaneous biopsy or surgical excision with partial or radical nephrectomy
Evaluation of Renal Masses with $^{99m}$Tc-sestamibi

- MIBI image interpretation:
  - Undertaken independently by two separate radiologists and diagnostic interpretation was made through consensus
  - Qualitative analysis of MIBI uptake
  - Quantitative analysis with mean and maximum lesion MIBI uptake
  - Lesions with any degree of MIBI uptake were defined as positive

- MIBI imaging diagnosis was correlated with histopathological diagnosis
Evaluation of Renal Masses with $^{99m}$Tc-sestamibi

25 renal masses:

- 20 – solid masses
- 5 – Bosniak 4 cysts with measurable solid components
- Median size 3.0cm (range 1.6 to 6.0cm)

Oncocytoma with positive MIBI scan

RCC with negative MIBI scan
Evaluation of Renal Masses with $^{99m}$Tc-sestamibi

**Positive MIBI Scan:**
- 7 Renal masses
- Relative tumor uptake
  - Mean: 0.60
  - Maximum: 0.75
- 6 – Oncocytomas
- 1 – Hybrid Oncocytic/Chromophobe Tumor (HOCT)

**Negative MIBI Scan:**
- 18 Renal masses
- Relative tumor uptake
  - Mean: 0.26
  - Maximum: 0.33
- 13 – Clear cell RCC
- 3 – Papillary RCC
- 1 – Chromophobe RCC
- 1 – Mixed clear cell and papillary RCC
Evaluation of Renal Masses with $^{99m}$Tc-sestamibi

Ability of MIBI to detect oncocyтомa:

- Using a threshold of mean MIBI uptake of 0.44
- No false positives or negatives
- Sensitivity and specificity of 100%

Limitations:

- Single-center
- Non-prospective
- Non-blinded
Our study demonstrates that MIBI imaging:

- Distinguishing imaging characteristics for different renal masses
- Represents a novel imaging approach which can risk stratify incompletely characterized renal masses
- May allow for identification of low risk renal lesions obviating the need for renal biopsy or surgical excision
- Further validation of this technique is required
Evaluation and Risk Stratification of Renal Masses with $^{99m}$Tc-sestambini SPECT/CT

Golmehr Sistani$^1$, Jennifer Bjazevic$^2$, Zahra Kassam$^1$, Jonathan Romsa$^1$, Stephen Pautler$^2$

1. Department of Radiology 2. Division of Urology; Western University, London, ON, Canada

AUA 2020: PD45-01