

Should Renal Mass Biopsy Be Performed prior to or Concomitantly with Thermal Ablation?

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ABSTRACT

Purpose: To determine diagnostic yield of renal biopsies performed in patients referred for image-guided tumor ablation (IGTA) and the frequency with which biopsy results would have obviated the need for subsequent ablation.

Materials and Methods: Retrospective review of an internal ablation database of a single institution revealed 401 consecutive percutaneous renal mass IGTA performed from April 2000 to April 2015. Of 401 ablations, 32 were excluded, yielding 369 ablation events in 342 patients, which represented the study cohort. Patients were subdivided into groups according to whether or not biopsy was performed. Lesions were categorized according to size, malignancy/benignity, and pathology.

Results: IGTA was performed with biopsy for 317/369 (85.9%) and without biopsy for 52/369 (14.1%) lesions. Overall diagnostic yield for percutaneous biopsy was 94.3% (299/317). Based on biopsy results, 82.6% (262/317) were classified as malignant or suspicious, 9.5% (30/317) were classified as likely benign, and 2.2% (7/317) were classified as definitively benign. Only definitively benign lesions were designated as obviating the need for IGTA. IGTA was supported by biopsy results in the remaining 97.8% (310/317), including renal cell carcinomas, oncocytic neoplasms, metastases, and nondiagnostic biopsy results.

Conclusions: Biopsy of renal masses with suspicious imaging features rarely (2.2%) obviated the need for IGTA. For patients for who have undergone counseling and have elected to forgo active surveillance and surgical options, biopsy can safely be performed concomitantly with ablation.

ABBREVIATIONS

CI = confidence interval, IGTA = image-guided thermal ablation, RCC = renal cell carcinoma

Partial nephrectomy is the standard of care for localized renal cell carcinomas (RCCs) measuring up to 7 cm (clinical stage 1) (1). However, given the aging population demographics, the detection of incidental renal masses poses new challenges to traditional clinical pathways, and for certain populations, nephron-sparing alternatives, including image-guided thermal ablation (IGTA) and active surveillance, are accepted alternatives to surgery (2,3). Tumor size (> 4 cm) (4) and imaging features such as a solid enhancing

component and tumor renal vein extension have a high likelihood of malignancy (5), and hence surgical resection is traditionally performed on the basis of clinical suspicion and imaging, with pathologic diagnosis made postoperatively from nephrectomy specimens. In contrast, current guidelines from several societies, including the American Urological Association, European Association of Urology, and American Society of Clinical Oncology, recommend renal mass biopsy for all patients undergoing IGTA with the rationale

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being that biopsy will provide a pathologic diagnosis and histologic data that can be used in prognostic models and to guide subsequent surveillance (5–7). Biopsy can be performed before or concomitant with IGTA; however, the optimal timing for biopsy remains unclear and is not specified by aforementioned societies. Biopsy performed before ablation can provide histologic information that may influence treatment planning, whereas cost, safety, and convenience are considerations for concurrent biopsy and ablation. The purpose of this study was to determine the diagnostic yield of renal biopsies performed for patients referred for IGTA and the frequency with which biopsy results would have obviated the need for subsequent ablation.

MATERIALS AND METHODS

This study was approved by the hospital institutional review board and is compliant with the Health Insurance Portability and Accountability Act. Informed consent was waived by the hospital institutional review board. A retrospective review of the internal procedure database was conducted to identify all percutaneous renal mass IGTA procedures performed over a 15-year period from April 2000 to April 2015. This represented the entire dataset available at the time of study design. Of 401 consecutive renal ablation procedures identified, 32 procedures were performed for locally recurrent disease and were excluded. This yielded 369 ablation procedures in 342 patients, which represented the study cohort. Of the 342 patients, 129 were women with a median patient age of 78 years (range, 35–94 y), and 213 were men with a median patient age of 73 years (range, 32–90 y).

Patients were subdivided into groups according to whether or not biopsy was performed, and the timing of the biopsy relative to the ablation event was noted (same-day vs separate-day biopsy and ablation). Because the initial database included only patients treated with IGTA, biopsies performed for the purpose of triaging patients to active surveillance versus IGTA were inherently excluded. Candidacy for thermal ablation was based on (i) imaging documentation of a suspicious enhancing (≥ 20 HU) solid renal mass or cystic mass with an enhancing solid component; (ii) referral from a urologist who determined the patient was not an optimal surgical candidate based on comorbidities, advanced age, or patient unwillingness to undergo surgery; (iii) review of cross-sectional imaging by the ablation operator to confirm complete ablation could be achieved, to evaluate risk of adjacent organ injury, and for treatment planning; and (iv) patient evaluation by the ablation operator to assess overall health, review treatment options (including option for active surveillance), and discuss risks and benefits of ablation (including risk of incomplete ablation and potential need for repeat ablation) and the role of biopsy and need for continued imaging surveillance.

Data Collection

Imaging studies and pathology reports were reviewed to categorize lesions according to size, malignancy/benignity, and pathology. All malignant lesions, lesions suspicious for

malignancy, and oncocytic neoplasms were indications for IGTA, whereas angiomyolipomas were not. Adverse events were classified according to the Society of Interventional Radiology (SIR) classification of adverse events (8).

Biopsy Procedure

All biopsies used computed tomography (CT) fluoroscopy guidance and were performed by 2 radiologists with 18 and 20 years of experience (W.W.M., D.E.D.; at the initiation of the study period in 2000) in interventional radiology at the time of the procedure. On-site cytopathology was not used. For lesions for which biopsy was performed concomitantly with ablation, the ablation was completed without histopathology diagnosis.

Needle type was reported for 275 of 317 biopsy procedures and was not reported for 42 of 317 biopsy procedures. The Temno 20-gauge coaxial biopsy device (Becton, Dickinson and Company, Franklin Lakes, New Jersey) was used to perform 249 of 317 (78.5%) biopsies. A 20-gauge Franseen needle (Cook, Inc, Bloomington, Indiana) was used to perform 17 of 317 (5.4%) biopsies. The Achieve 20-gauge automated biopsy device (Becton, Dickinson and Company) was used to perform 8 of 317 (2.5%) biopsies. The SuperCore 20-gauge semiautomatic biopsy instrument (Argon Medical Devices, Plano, Texas) was used to perform 1 of 317 biopsies (0.32%).

Statistical Methods

Descriptive statistical analysis was performed. Mean, median, and range estimates were provided along with frequency counts and percentages. A paired *t* test was used to compare lesion size for diagnostic and nondiagnostic biopsies. Significance was established at the .05 level, and 95% confidence interval (CI) was calculated for all interval estimates.

RESULTS

Ablation was performed with biopsy for 317 of 369 (85.9%) suspicious renal masses and without biopsy for 52 of 369 (14.1%) suspicious renal masses. Of the 317 lesions, biopsy was performed concomitantly with ablation in 165 (52.1%), and biopsy was performed before ablation in 152 (47.9%) (Fig 1). Mean and median diameter of lesions that received biopsy was 2.6 cm and 2.5 cm, respectively (range, 1.0–6.8 cm; 95% CI for the mean, 2.5–2.7 cm). Mean and median diameter of lesions that did not receive biopsy was 3.1 cm and 3.0 cm, respectively (range, 0.9–6.4 cm; 95% CI for the mean, 2.6–3.6 cm). Biopsies were performed using 20-gauge needles with a mean of 2.5 passes per lesion. A coaxial technique was used for 269 of 317 (84.9%) lesions, and a tandem technique was used for 19 of 317 (6.0%) lesions. Technique was not reported for the remaining 29 of 317 (9.1%) biopsies.

Nondiagnostic results were found with 5.7% (18 of 317) of lesions that received biopsy for an overall diagnostic yield of 94.3% (299 of 317) for percutaneous biopsy. Pathology for 1 lesion yielded benign renal tissue. This was discordant with imaging findings of a renal mass with

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