Renal mass fine needle aspiration: takes two

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Purpose

PURPOSES:

The purposes of this work are:

• To review renal mass fine needle aspiration (FNA) indications.
• To illustrate how we do the procedure with the partnership of the radiologist and the cytologist.
• To analyze the results at our hospital in the last 5 years.

RENAL MASS FINE NEEDLE ASPIRATION INDICATIONS:

Renal mass FNA indications can be divided in established and emergent.

Established indications:

• Renal mass in a patient with known primary tumor to differentiate between primary tumor or metastatic.
• Unresectable renal tumor to confirm the histology and begin oncologic treatment.
• Patients with high comorbidity to confirm the diagnosis before surgery.
• Renal mass that can be cause by an infection.

Emergent indications and less established:

• Patients with small renal tumor, less than 3 cm with homogenous enhancement.
• Renal masses considered for percutaneous treatment to confirm malignancy before treatment.
• Indeterminate cystic renal mass.

DIAGNOSTIC EFFECTIVENESS OF RENAL MASS FNA.

Several studies have evaluated diagnostic effectiveness of renal mass FNA. Most of the studies that report the results of FNA, with needles greater than 20G, refer a sensibility of the procedure for the diagnosis of malignancy between 75-90%. Similar results have been reported with wider needles, 18 G. Most of the false negatives cases are due to needle tip bad positioning and necrotic samples of the tumor. These two problems can be reduced by performing the procedure with CT guidance and with the presence of a cytologist at the moment of the puncture. The diagnosis of tumor subtype has been reported to be of 74%.
Methods and Materials

METHODS AND MATERIALS.

BIOPSY PROCEDURE:

Before accepting the procedure there are several facts that need to be established:

1. It is paramount to evaluate if the procedure is indicated. Clinical history and medical images of the patient must be revised. Coagulation status must also be evaluated. Any treatment that can alter patient’s coagulation should be suspended.

2. Once decided that the procedure is indicated the next step is to evaluate needle access to the mass. Posterior or lateral approaches, with the patient in the prone position, are preferred. The shorter and subpleural way that avoids traversing the pleura is the ideal to elude pneumothorax. Other organs such as normal renal parenchyma, liver or colon should also be avoided. A perpendicular course is also desired as the needle tip is easier to place. Sometimes some cloth placed under the patient may favor a vertical path.

3. Informed consent a few days before the procedure must be given to the patient.

Role of the radiologist:

1. Localize the mass. The CT is routinely performed without contrast media. The contrast enhanced CT obtained before biopsy is used as reference Fig. 1 on page 6.

2. Mark the point where the needle is going to be introduced.

3. Take the aseptic measures. Clean the skin with an antiseptic and place an sterile cloth around the point.

4. Perform the puncture. Depending on the distance the radiologist selects the needle. Different needle types can be used: the most commonly used at our institution is the 9 cm 25G needle. Sometimes a 15 cm 23 or 25 G can be used for very deep masses Fig. 2 on page 6. It is important that the needle track is straight Fig. 3 on page 7.

5. Confirm that the needle tip is placed in the lesion.

6. No more than three needle passes are recommended.

Role of the cytologist:

1. It is very important that the cytologist is present in the room during the procedure.

2. Performs the extraction of the sample.
3. Extends and stains the sample with a May-Grünwald-Giemsa or Diff-Quick preparation for a first impression.
4. Some of the sample can be kept for immunohistochemical staining methods
   Fig. 4:
   1. AE1/AE2 are related with carcinoma.
   2. CD10 and Vimentine with reanal carcinoma.
   3. HMB with angiomyolipomas.
5. Determines the need of another sample.

**Complications:**

More frequent complications have been referred with thicker needles. They can be classified in immediate or late complications.

Immediate complications:

1. Bleeding: usually subclinical, it can appear in 91% of the procedures.
2. Microscopic hematuria. Macroscopic hematuria is sporadic (5-7%).
3. Pneumothorax very unusual.
4. Infection: avoided by employing aseptic measures.

Late complications:

1. Pseudoanerusym.
2. Needle track tumor seeding: it has been mentioned to be less than 0.001%, not more frequent than in other tumors. Some authors consider it more likely with transitional cell carcinomas.

**PATIENTS**

For this study we have retrospectively reviewed the medical records and images of all patients who underwent CT guided renal mass aspiration during the period 2007-2012. A total of 42 patients were biopsied under CT guidance in this period. All were biopsied by the same team of radiologists and cytologists using the same technique. The mean age of the patients was 65 years (from 17 to 87). Most of the patients were men (28). The average size of the mass was 59 mm.
**Fig. 1:** 78 year old woman with known primary malignancy (melanoma) and a renal mass in the left kidney (arrow).

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**Fig. 2:** Different types of needles used at our institution.

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**Fig. 3:** FNA of the renal mass shown in figure 1. The cytologic diagnosis was oncocytoma.

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Results

RESULTS:

The majority of the masses were punctured because of one of the established indications (80%). Most of them were performed in patients with known primary malignancy and concomitant renal mass. The second most frequent indication was in patients with unresectable renal tumors. Elevated comorbidity was another common indication, Fig. 4 on page 10.

FNA results obtained in this work are shown in Fig. 5 on page 10. The majority of renal masses were renal cell carcinomas (RCC) (40%) most of them clear cell carcinoma. Metastasis were the second most common renal masses (16%). Primary tumors were most frequently of lung origin. In one case the patient had a history of colon carcinoma and another patient presented a diffuse infiltration by lymphoma. Hemorrhagic samples were basically obtained in large renal tumors.

Diagnostic effectiveness of the technique was high. In 80% of the procedures a pathologic diagnosis could be established. Only in 20% of the procedures there were no diagnostic results due to hemorrhagic or indeterminate samples and absence of malignancy signs Fig. 6 on page 11. In the group of patients with a known primary malignancy the diagnostic effectiveness rose to 93%. In most of these patients the renal mass was secondary to metastatic disease. This information changed the therapeutic approach Fig. 7 on page 12 Fig. 8 on page 13. In the subgroup of patients with unresectable disease the effectiveness was lower (66%) probably due to the larger size of the lesion and the bleeding tendency. In these patients FNA of other metastasis outside the kidney (liver or bone) obtained good results Fig. 9 on page 14 Fig. 10 on page 15.

No acute or delayed complications were registered. Needle track seeding has also not been recorded at our institution. The low incidence of complications may be due to the small needle size (23G and 25G).
<table>
<thead>
<tr>
<th>Indications</th>
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<tbody>
<tr>
<td>Known primary malignancy</td>
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<tr>
<td>Unresectable tumor</td>
<td>12</td>
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<tr>
<td>Surgical comorbidity</td>
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<tr>
<td>Infection</td>
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<td>Small homogeneous lesion</td>
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<td>Percutaneous ablation</td>
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<td>Complex cystic mass</td>
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<td>Others</td>
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Fig. 4

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<table>
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<th>FNA results</th>
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<td>RCC clear cell</td>
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</tr>
<tr>
<td>RCC papillary</td>
<td>3</td>
</tr>
<tr>
<td>RCC chromophobe cell</td>
<td>3</td>
</tr>
<tr>
<td>Metastasis (lung/colon/lymphoma)</td>
<td>7</td>
</tr>
<tr>
<td>Large cell carcinoma</td>
<td>3</td>
</tr>
<tr>
<td>Benign cystic lesion</td>
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<tr>
<td>Inflammatory</td>
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<tr>
<td>Oncocytoma</td>
<td>2</td>
</tr>
<tr>
<td>No malignancy signs</td>
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<tr>
<td>Indeterminate</td>
<td>2</td>
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<tr>
<td>Hemorrhagic</td>
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Fig. 5

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### FNA results

<table>
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<td>RCC chromophobe cell</td>
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<tr>
<td>Metastasis (lung/colon/lymphoma)</td>
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<tr>
<td>Large cell carcinoma</td>
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<td>Inflammatory</td>
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<td>Oncocytoma</td>
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<tr>
<td>No malignancy signs</td>
<td>20%</td>
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<td>Indeterminate</td>
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<tr>
<td>Hemorrhagic</td>
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</tr>
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</table>

Fig. 6

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**Fig. 7:** 70 year old patient with a previous history of lung carcinoma. A solid mass is shown in the right kidney. FNA was performed and it corresponded to a lung metastasis.

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Fig. 8: Patient with unresectable renal carcinoma and a concomitant gastric adenocarcinoma. FNA aspiration of the renal mass was performed and it corresponded to a clear cell renal carcinoma.

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Fig. 9: Another patient with an unresectable renal mass with bone metastasis shown in figure 10. FNA of the renal mass was performed but hemorrhagic sample was obtained. A second FNA of the bone metastasis was done and it corresponded to clear cell renal carcinoma.

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Fig. 10: Osseous lesions in a patient with a renal mass, shown in figure 9. FNA was performed in the bone lesions and it resulted in clear cell renal carcinoma metastasis.

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Conclusion

CONCLUSIONS:

Renal mass FNA is a secure procedure specially indicated in patients with oncologic history, elevated surgical risk and metastatic disease. The presence of the cytologist at the moment of the procedure is essential. This technique obtains good results and avoids biopsy or surgery in most patients.
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