Mahrad Paymani, MD
Lake Medical Imaging

Background:

My name is Mahrad Paymani. I am an Interventional and General Radiologist. I attended four years of college (at UNC Greensboro), four years of medical school (at UNC Chapel Hill), one year of internship (at the University of Pittsburgh Medical Center), four years of radiology residency (at UPMC), and one year of fellowship in interventional radiology (at Pittsburgh Vascular Institute). I have been practicing as an Interventional and General Radiologist for approximately 15 years since my fellowship.

I first started RFA while in Pittsburgh, which used to be the liver transplant center of the world. As the result, RFA services were primarily needed for liver tumors. Often, I was asked to ablate a liver tumor in order to give the patient a chance to await liver transplantation.

I have been doing Radiofrequency Tumor Ablation (RFA) for the past 14 years. One of the reasons I was sought by the Lake Medical Imaging/Lake Vascular Institute was to bring this relatively new technology to this area.

Since my arrival here, most of my RFA services have centered around kidney tumor ablation. It seems that in this area more people are in need of this service than any other ablative procedure. I started RFA of renal tumors when the procedure was not well-known. Now, RFA of renal tumors is well-recognized, and research documents that it is an effective nephron sparing procedure.

Prior to renal tumor ablative procedures, the patients would undergo radical nephrectomy (complete surgical removal of the affected kidney), or partial nephrectomy (surgical removal of a portion of the kidney). Most commonly these operations were done without prior biopsy of the tumor, since percutaneous biopsies were shown to have a risk of tumor seeding.

There are several different ablative procedures. Some physicians use a freezing technique (cryoablation), others use thermal ablation. There are several thermal ablative techniques. I have been very satisfied with the success of Radiofrequency ablation. This was first described in the 1990's for the percutaneous tumor ablation. Presently there is a variety of equipment choices. The radiofrequency waves passing through tissue increases local tissue temperature. This is accomplished by placing a probe into the tissue of interest. Skin surface adhesive pads are used to close the circuit. As with any technology and procedure, there are limitations and risks which need to be assessed.

Procedure:

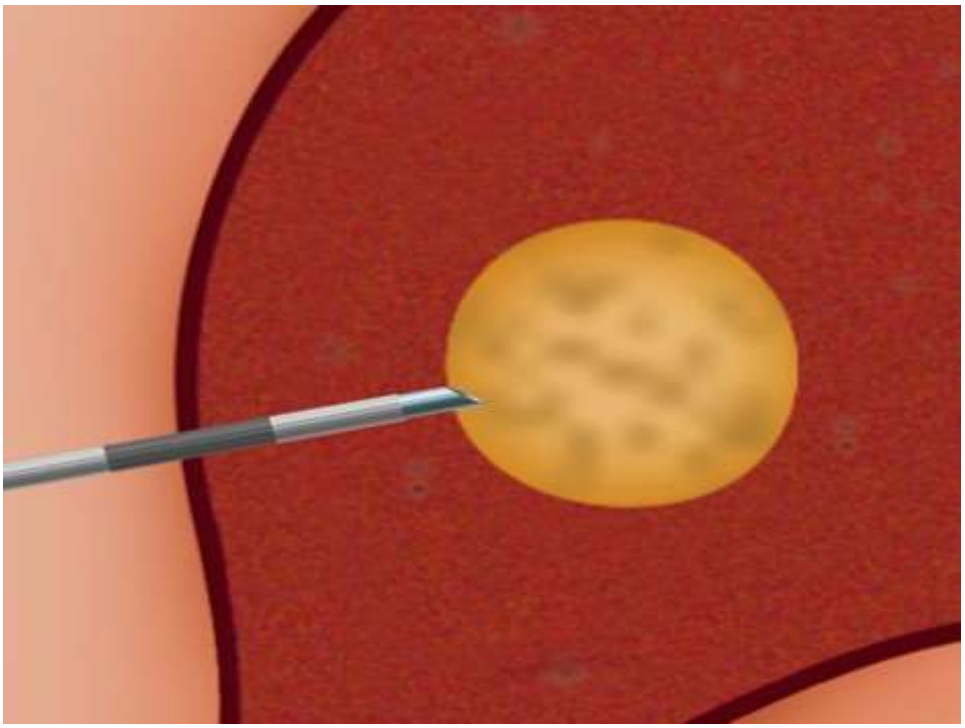
RFA can be performed intra-operatively under laparoscopic and ultrasonographic guidance, or via an image-guided percutaneous approach. I perform RFA of renal tumors via a percutaneous approach, under CT guidance. Over the years, I have found this to be a very effective approach to renal tumor ablations.

The patient is seen for an interview and assessment in the office, prior to the procedure. If possible, an MRI of the kidneys is evaluated. The decision is made as to whether the patient is a candidate for the percutaneous RFA. The risk and benefits of the procedure and other treatment options, such as surgery or follow-up, are discussed. The option of percutaneous biopsy at the same time as the ablation is discussed. If the patient decides to proceed with RFA, a request for the procedure is submitted to the LRMC or TVRH.

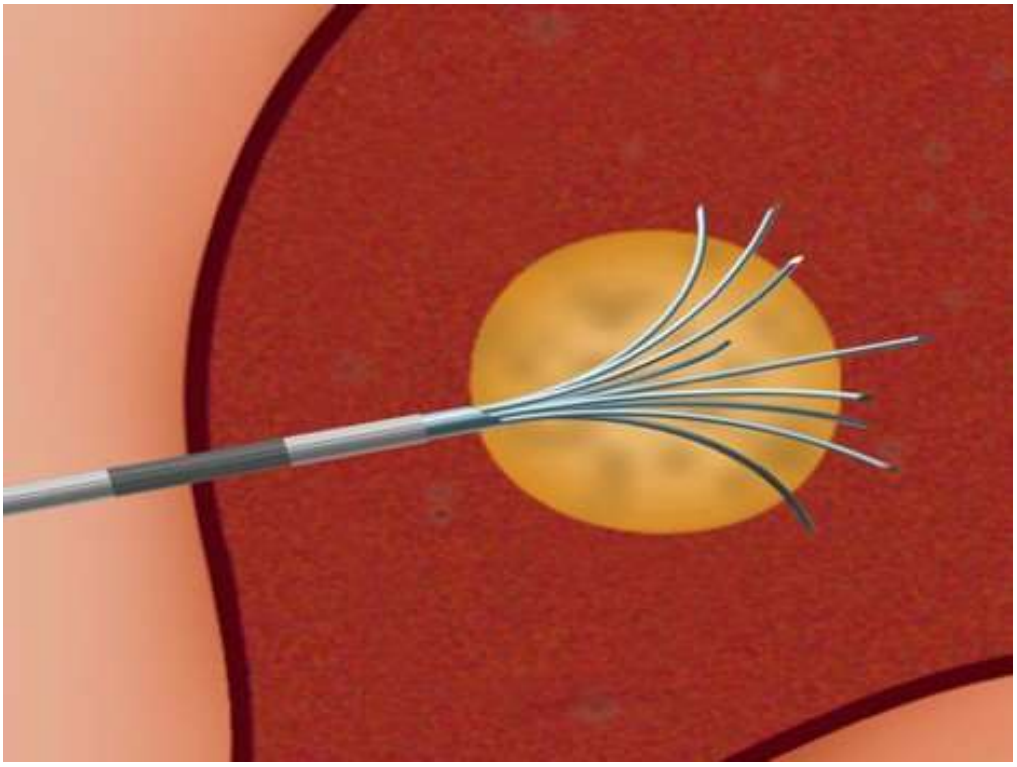
Five days prior to the procedure, the patient stops taking anticoagulants (if they are on anticoagulants and only if approved by the patient's primary physician, cardiologist and/ or neurologist). Appropriate labs are drawn a day or two prior to the procedure. On the day of the procedure, the patient is admitted to the hospital, has an IV started, and receives a dose of IV antibiotics in a pre-procedure unit. I see the patient prior to the procedure. Then the patient is transferred to the CT scanner. Most commonly the patient will be lying on the CT table on his/her belly. The patient will be awake for this part of the procedure. We provide the patient breath hold instructions for imaging. The tumor is localized. Grounding skin pads are placed on an appropriate area on the patient's skin.

After sterile preparation and use of local anesthetic during patient breath holds, the RF probe is introduced into the renal tumor and the tines are deployed. This is similar to an umbrella being opened within the tumor (please refer to images below). Typically no sedation or very little sedation is provided up to this point because if the patient falls asleep and cannot hold his/her breath, then localization will be impossible and the procedure will have to be postponed to another day. Note should be made that kidneys move up and down with breathing. After probe deployment, if the patient has requested simultaneous biopsy of the renal tumor, an additional needle is placed adjacent to the RF probe into the tumor. Position of the RF probe and the coaxial biopsy needle within the tumor are confirmed by CT and adjustment to the position of the probe and the coaxial needle are made, as needed. Through the coaxial biopsy needle, a biopsy device (needle) is introduced and several tissue samples are obtained and are submitted to pathology for diagnosis. However, the diagnosis will not be available until several days later.

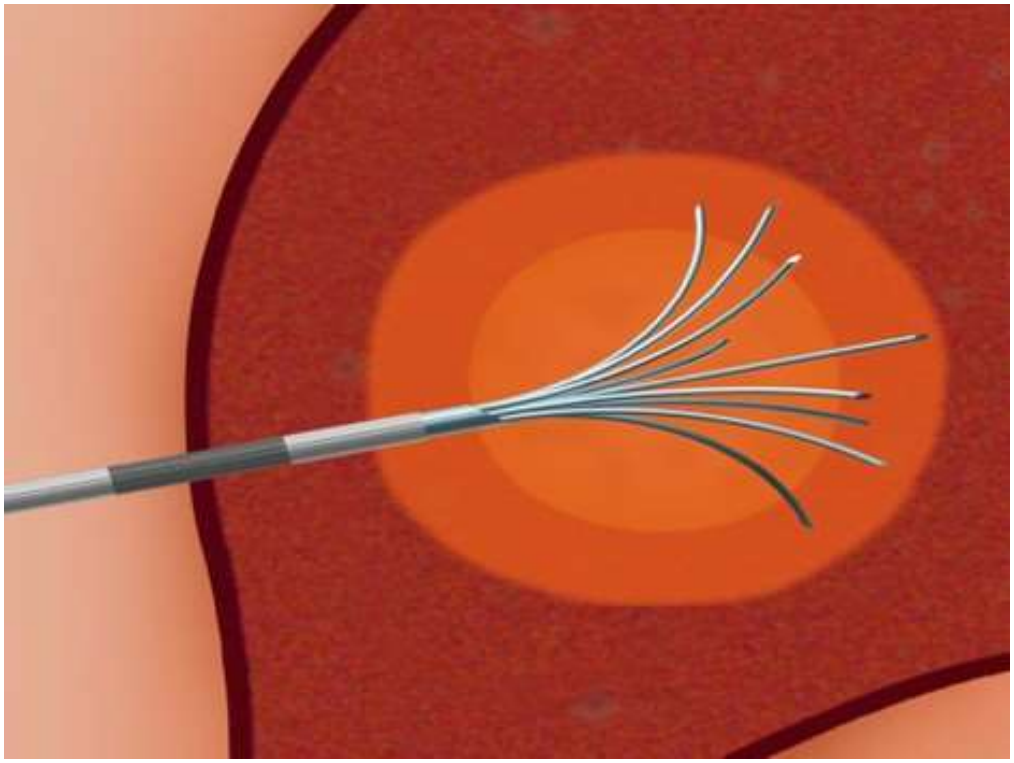
Then the coaxial biopsy needle is removed and RFA is performed. Sometimes several ablations during the same setting are required in order to properly ablate the entire tumor and a small rim of normal surrounding tissue in order to prevent recurrence. After ablation is completed the tines of the probe are retracted and the probe is slowly pulled back while the tract of the probe and adjacent region is heat cauterized, thus ablating any tumor cells which may have been displaced during probe and needle biopsy placement. This is the reason I prefer biopsy of the tumor at the same time as the RFA. This, so far, has prevented tract seeding with tumor cells. Not everyone choses to have a biopsy, but this procedure keeps the option available. Also, after completion of the ablation, I typically place a small dose of anesthetic and steroid around the ablation site in order to minimize post-ablation discomfort.



RF probe tip at the tumor prior to deployment of the tines.



RF probe tines deployed into the tumor



Post RFA zone of ablation

Often times bowel loops are in close proximity to the tumor and could sustain injury at the time of ablation. Sometimes this cannot be avoided and the procedure may need to be cancelled (this is rare). When a bowel loop is in close proximity to the tumor, a small caliber needle is place between the tumor and the bowel loop under CT guidance and the bowel is displaced with sterile water and the needle is removed prior to the RFA.

Depending on the complexity, the entire procedure may take one to two hours. The patient will receive conscious sedation with drugs such as Versed and Fentanyl for this procedure. If the patient has any type of implantable electronic device, it will have to be turned off during this procedure and turned back on after the procedure.

After completion of the procedure the patient goes to the recovery unit. If the patient is doing well after a couple of hours, the patient will go home with family or someone to drive them. Because of sedation, patient cannot drive for 24-48 hours. If they are on anticoagulants, they can resume them. The only restriction is no immersion of the puncture site in a pool of water for 3 to 5 days, in order to minimize chances of infection. Showering is allowed.

If a biopsy has been obtained, the results will be available in 3 to 5 days. Thus we set up an appointment to discuss the findings in a week or two after the procedure. Otherwise, unless there is any reason to see me sooner, the patient is contacted for a 3 month follow-up MRI of kidneys. Subsequent follow-up MRIs are every six months for two years. If all is well with the kidneys after two years and three months post ablation then follow-up MRIs are once per year for two years, and then once every two years. The patient does not need to come for office visits unless concerns arise.

It should be noted that 48 to 66% of Renal Cell Cancers (RCC) are reported to be incidental findings during imaging investigation for other complaints. I find this to be an underestimation. In my practice, almost 95% of the patients have no symptoms associated with their renal tumor. Tumors are often found before symptoms have developed.

What is the gold standard treatment for Renal Cell Cancer (RCC)?

Surgical excision of smaller lesions with a nephron-sparing approach, which has shown a 97% 5-year survival rate is the gold standard. However, a number of patients are not optimal candidates for surgery. Thus, thermal ablation plays a significant role in this group of patients.

What types of circumstances makes the patient a better candidate for RFA than surgical intervention?

Serious medical conditions, limited renal function (patient at risk for hemodialysis after resection), having a single kidney.

Are all renal tumors RCC?

No. One pathology review article of 349 resected renal tumors found that 29.6% of 1-2 cm renal lesions and 24.1%of 2-3 cm renal lesions are benign.

How rapidly do Renal Cell Cancers grow?

Most RCC's are indolent with an average growth rate of 3 mm per year.

What is the risk of metastasis with RCC?

The risk of RCC metastasis is 1% for tumors less than 3 cm.

If the renal tumor is less than 2 cm can we just observe it?

Yes. For renal tumors less than 2 cm surveillance with imaging study every 6-12 months is a reasonable consideration. However, if the tumor has shown greater than 3 mm of growth in any one year, or continued growth on serial imaging studies, then intervention should be considered. Also, if there is significant anxiety associated with the renal tumor, then ablation should be considered.

Why does the ablated tumor look larger on the follow-up imaging studies when compared to the pre-ablation imaging study?

The ablation zone is larger than the actual tumor in order to ablate adequate surrounding tissue and prevent recurrence. Over time, the tumor will very gradually decrease in size. However, size is not the criterion used to determine tumor viability. At the present time, our best way to determine adequate ablation of a renal tumor is via MRI with contrast. An MRI with a protocol specifically designed to asses this is extremely important. For those who cannot have MRI, we perform CT without and with contrast. However, CT is less reliable and has radiation associated with it, as well as contrast use in patients who often already have suboptimal renal function, especially if the patient has a single kidney. Unfortunately, in certain circumstances such as patients with a cardiac pacemaker, CT is the only means of follow-up.

What happens if there is recurrence of my renal tumor or part of the tumor did not ablate?

This is rare. However, when this happens, we often go back and perform the RFA again.

Should there be any pain after renal tumor RFA?

Occasionally, there are minor aches and discomfort which can be relieved by Tylenol or non-steroidal anti-inflammatory medication for a day or two after the procedure.

Should there be any chill or fever after the procedure?

If there is, notify me or your primary physician.

Prepared by:

Mahrad Paymani, MD
10-02-2010
Revised 1/28/2015