Robotic Kidney Surgery at Mount Sinai

Dr. Ketan K. Badani
• Vice Chairman of Urology and Robotic Operations for the Mount Sinai Health System
• Director, Comprehensive Kidney Cancer Program
"...For the secret of the care of the patient is in caring for the patient." — Dr. Francis W. Peabody

Overview

Our Comprehensive Kidney Cancer and Robotic Kidney Cancer Surgery Program is led by Dr. Ketan Badani, Vice Chairman of Urology and Robotic Operations for the Mount Sinai Health System and Director of Robotic Surgery for Mount Sinai, St. Luke’s and Roosevelt Hospitals. Dr. Badani is recognized as a world leader in the research and treatment of prostate, kidney and bladder cancer.

Dr. Badani has performed nearly 4,000 robotic procedures in his career, placing him in the top 1% of urologists worldwide for kidney and prostate surgery. He is one of the preeminent practitioners in the world for robotic partial nephrectomy for complex kidney tumors — expertise that is especially important if you are considering robotic kidney cancer surgery where success depends more on the skill and experience of the surgeon than on the technology. Dr. Badani performs all aspects of the surgery himself and ensures that all patients receive the best possible care.

The Comprehensive Kidney Cancer Program is multispecialty and spans service areas such as nephrology, medical oncology, interventional radiology and complementary medicine. We offer all treatment modalities for kidney cancer including radical and partial nephrectomy, ablation, and active surveillance. Dr. Badani and his team collaborate very closely with radiation therapy and medical oncology experts to provide every currently available treatment. The program offers individualized care to each patient with kidney cancer based on tumor stage, grade and overall patient health.

In collaboration with the Tisch Cancer Institute, we lead clinical trials and coordinate advanced cancer treatment, providing cutting-edge care in the hands of our physicians.
Dr. Badani is a pioneer in robotic kidney cancer surgery. He has led teams that first developed and published techniques for minimally invasive robotic kidney surgery. His technique of robotic partial nephrectomy, the F.A.S.T. procedure, has been published and taught around the world to treat patients with renal tumors. Dr. Badani heads a team that seeks to improve treatment of these cancers by finding effective and less invasive therapies while maintaining an excellent quality of life after surgery.

**Dr. Badani has the largest combined experience in robotic kidney and prostate cancer surgery in the New York area.** Dr. Badani’s clinical expertise spans both surgical and non-surgical approaches to treatment of urologic cancers. He has just completed one of the largest decision impact studies evaluating genomic biomarkers for active surveillance in men with low-risk prostate cancer.

As a Visiting Professor, Dr. Badani has given lectures and demonstrated surgery at prominent institutions in the United States, Canada, Brazil, Japan, India, Malaysia, Taiwan, Azerbaijan, Venezuela, China, Spain, and Turkey to teach his technique. He is the author of over 150 peer-reviewed publications and has presented over 200 abstracts at national and international meetings. Dr. Badani is involved in numerous clinical trials, feasibility and safety studies of new technology, and health related quality of life outcomes research. He serves as an editor and/or reviewer for numerous publications including *Cancer, Journal of Urology, Urologic Oncology*, and *Journal of Endourology*, among others.

Dr. Badani graduated in the top of his class from Case Western Reserve University School of Medicine in Cleveland, Ohio. He went on to complete his urology residency at the world-renowned Vattikuti Urology Institute at Henry Ford Hospital in Detroit, MI (his hometown). He also completed a fellowship in minimally invasive urologic oncology at the Vattikuti Urology Institute, where robotic urologic surgery was first performed in the United States. Upon completion of his training, Dr. Badani joined the faculty of New York Presbyterian Columbia University Medical Center as Director of Robotic Surgery.
F.A.S.T. Robotic Partial Nephrectomy

Dr. Badani developed F.A.S.T. as a means to shorten partial nephrectomy surgery time, a critical factor in the success of this surgery. Historically, robotic surgeries involved the surgeon plus any number of assistants that were called on to carry out parts of the operation. In a F.A.S.T. robotic partial nephrectomy, the robotic surgeon never leaves the controls. Dr. Badani’s technique takes certain steps out of the hands of the assistant, and puts them back into the hands of the surgeon. That shaves minutes off the procedure and reduces the amount of time in which blood flow to the kidney is stopped (ischemia time). If you have kidney cancer, that’s better for your kidney, and better for you.

The robotic partial nephrectomy is already quite an advancement from the days when the entire kidney was removed to treat a tumor. A F.A.S.T. robotic partial nephrectomy is yet another milestone in curing cancer while preserving as much of the healthy, functioning kidney as possible.

The F.A.S.T. technique also allows Dr. Badani’s team at Mount Sinai to perform robotic partial nephrectomies on increasing numbers of complex cancers rather than having to remove the entire kidney in such cases (which would have been the only option previously).

The benefits of F.A.S.T. are many:

- Surgery is performed through small “keyhole” incisions instead of a major incision, resulting in less blood loss and a faster recovery.
- Warm ischemia time and operative time during robot-assisted partial nephrectomy can adversely affect kidney function and clinical outcomes. With F.A.S.T., ischemia time can be minimized to an average of 15 minutes, and as short as 7 minutes.
- Robotic controlled ultrasound in real time provides the surgeon with enhanced...
F.A.S.T. at Mount Sinai

- Lower complication rates
- Shorter ischemia time
- Faster recovery
- More healthy kidney preserved
visualization and tumor identification; the surgeon can see both the operative field and ultrasound images simultaneously.

- Immunofluorescence imaging allows the team to perform F.A.S.T. and selective arterial clamping. Instead of clamping the main artery, cutting the entire kidney off from blood flow, immunofluorescence imaging helps the surgeon find the specific branch that feeds the tumor. This artery can then be clamped and blood flow maintained to the rest of the kidney, eliminating ischemia time in most cases, depending upon tumor size and location.
The da Vinci Surgical System is a sophisticated robotic platform designed to expand the surgeon's capabilities and offer a state-of-the-art minimally invasive option for prostate and kidney cancer surgery. With da Vinci, small incisions are used to insert miniaturized wristed instruments and a high-definition 3D camera. Seated comfortably at the da Vinci console, Dr. Badani is able to view a magnified, high-resolution 3D image of the surgical site inside your body.

At the same time, the latest robotic and computer technologies scale, filter and seamlessly translate Dr. Badani's hand movements into precise micro-movements of the da Vinci instruments. Although it is often called a “robot”, the da Vinci System cannot move or operate on its own; Dr. Badani is 100% in control. Robotic experience is the key to a successful outcome and Dr. Badani is one of the most experienced robotic surgeons in the world; he has been performing robotic surgery since its inception in 2001.
Treatment Approaches to Kidney Cancer

Active Surveillance
There are some cases where the appropriate course of action is no action. For selected patients with small early cancers, the Comprehensive Kidney Cancer Program team may recommend active surveillance because if a tumor is indolent (or slow-growing), it might not require treatment. Active surveillance is an especially good option when the patient is older or has other health problems that indicate he or she is not a good candidate for surgery. Active surveillance is different from “watchful waiting.” Patients are seen on a regular schedule to monitor their condition.

Partial Nephrectomy
Partial nephrectomy refers to the surgical removal of cancerous kidney tissue while leaving the healthy kidney intact. A partial nephrectomy can be performed robotically or laparoscopically, but the robotic procedure takes less time, helping to ensure the ischemia time (time kidney is without blood flow) is short enough to prevent damage to the kidney. Additionally, the robotic procedure results in less blood loss and a faster recovery in most cases.

Radical Nephrectomy
If a kidney tumor is large or located close to the main kidney artery or vein, a partial nephrectomy to just remove the tumor may not be feasible. In these cases, the surgeon will perform a radical nephrectomy for the complete removal of the cancerous kidney. Fortunately, if the patient's other kidney is healthy, there is minimal impact on his or her quality of life or lifestyle. A radical nephrectomy can be performed via open surgery, robotically, or traditional laparoscopic technique.

Ablation
For patients who are not surgical candidates (too ill for surgery, older, or whose tumor is very small), tumors can sometimes be destroyed using cold or heat. These procedures are relatively quick, preserve healthy tissue, and do not involve
a large incision (if done percutaneously – through the skin – no incision is needed). As the data is limited on long-term results for cancer control, long-term imaging surveillance and/or biopsies are required subsequent to this procedure.

**Cryoablation** involves freezing the tumor using needles inserted through small incisions. Dr. Badani's research has found that cryoablation is equally effective as partial nephrectomy for treatment of small renal cortical tumors when followed up in the short term. Dr. Badani and colleagues also found that use of a standard needle core biopsy technique before laparoscopic cryoablation for small renal cortical tumors resulted in the most accurate tumor diagnosis. Increased biopsy accuracy was also found when the patients were younger and had larger tumors.

**Radiofrequency Ablation** is the method of destroying a tumor with heat. It is similar to cryoablation in that several needles are inserted through small incisions under guidance of imaging.
Recovery and Post-Operative Surveillance

Post-Surgical Recovery
For most patients, only one night in the hospital is necessary following surgery. Mount Sinai Health System offers optional private rooms with concierge service at our Mount Sinai and Mount Sinai Roosevelt hospitals. Dr. Badani sees all patients personally in the hospital and one week after surgery to check and discuss pathology results.

Physical Recovery
The typical recovery from robotic kidney surgery is about twice as fast as the open procedure. Time to return to work depends on the amount of physical activity required by the job, but ranges from one to four weeks. On average, patients return to work and resume normal activities around two to three weeks following surgery. With respect to eating and drinking, patients are served a light dinner the night of surgery and should be eating normally within a day or two after surgery. Moderate exercise is encouraged and non-resistance exercises such as walking, jogging, and swimming can start after two weeks. We do not want patients lifting weights until three to four weeks following surgery.

Post-Operative Surveillance
Four or five months following surgery, patients are seen by Dr. Badani for imaging testing. This includes either a CAT scan or MRI to assess the kidneys and surrounding areas. A chest x-ray is also taken. The frequency of visits and surveillance tests depends upon tumor pathology (i.e., benign vs. malignant, aggressive, etc.). Generally, patients come in twice yearly for blood tests and once per year for imaging. Many patients travel to Mount Sinai for their surgery. These patients can have follow up tests performed near their homes. Dr. Badani stays in close personal touch with his patients’ personal physicians to ensure that follow-up is seamless and up-to-date.
"The 59th street location is one of the nicest urology offices in New York. I had a great experience there, and Dr. Badani’s staff was pleasant and made my visit very comforting."—M.A.
Imaging Techniques and Expertise

At the Comprehensive Kidney Cancer Program, Dr. Badani and team work very closely with key members in the department of Radiology who specialize in imaging of the kidney and abdomen. The program utilizes high-resolution CAT scan and MRI technology to provide highly detailed images of the kidney. This level of detail will allow the team to determine the selective arterial branches of the kidney that feed the tumor, and suitability for partial nephrectomy. Additionally, images can be rendered in 3-Dimensions to allow Dr. Badani to have an accurate “map” of the kidney anatomy at the time of surgery.

Close collaboration is required to maximize clinical outcomes when offering percutaneous ablation (cryoablation or “freezing”) of the tumor. Typical centers have the interventional radiologists perform this treatment, but we recommend involving both our cancer specialists and the radiologist.

Dr. Badani using real-time intraoperative ultrasound during robotic partial nephrectomy.
Outcomes

There are three primary goals when performing a partial nephrectomy. First, to cure the cancer by removing the tumor completely, referred to as a negative surgical margin. Second, the warm ischemia time (time the kidney is without blood flow) should be less than 25 minutes to prevent any long-term kidney function damage. Third, no surgical complications during or after the procedure. These three factors are referred to as the "trifecta." The F.A.S.T. technique, developed by Dr. Badani, has an overall trifecta success rate of 97%. In addition, over 90% of patients are able to go home the next day after surgery, and 97% return home on day 2.

Outcomes Summary Analysis
F.A.S.T. Robotic Partial Nephrectomy

Average Warm Ischemia Time: 15.2 Minutes
Est. Blood Loss: 86cc (range 30–226)
Hospital Stay: 91% home post-op day 1; 97% home post-op day 2
Overall Complication Rate: 1.4%
OVERALL TRIFECTA SUCCESS RATE
(Negative surgical margins, average WIT <25 mins., no complications): 97%

Dr. Art Rastinehad
Director of Focal Therapy and Interventional Urologic Oncology

Dr. Bachir Taouli
Director, Cancer Imaging
Mount Sinai Hospital

Dr. Alexander Kagen
Site Chair, Radiology, Mount Sinai Roosevelt Hospital
Kidney Reconstructive Surgery

There are conditions of the kidney that require surgery that are not related to cancer. In these situations, either the kidney is obstructed or not functioning properly. Dr. Badani has extensive experience in treating these reconstructive conditions.

**Robotic Pyeloplasty** – A condition called Ureteropelvic Junction Obstruction (UPJ), where the connection between the kidney and the ureter (the tube that drains urine down to the bladder) is narrowed or blocked. This procedure, robotic pyeloplasty, requires a repair to remove the narrow segment and reconnect the healthy ends together. This procedure restores normal drainage of urine flow, and importantly, prevents future decline in kidney function.

**Robotic Simple Nephrectomy for Non-Functional Kidney** – In some instances, a kidney is not working any longer due to long-standing obstruction, kidney stones, or infection. Many times, these diseased kidneys need to be removed before they cause more trouble in the future. Dr. Badani performs this operation through three to four small incisions and most patients go home the next day.

Holistic Medicine /Diet and Nutrition/ Acupuncture/Yoga

A key member of the Comprehensive Kidney Cancer Program is Jillian Capodice, LAC, Assistant Professor and Director of the Integrative Urology and Wellness Program at Mount Sinai. Jillian develops customized nutrition, exercise and stress management programs for patients to facilitate post-surgery recovery, promote future kidney health, and to help them maintain the highest degree of wellness moving forward. As obesity and high blood pressure are risk factors for kidney cancer, she also consults with individuals who are interested in working on lifestyle changes.
Advanced Kidney Cancer

Although the majority of patients diagnosed with kidney cancer are found early and the cancer is confined to the kidney, there are patients who are diagnosed with either locally advanced kidney cancer (where the cancer has spread beyond the confines of the kidney) or metastatic disease (where cancer has traveled to other areas of the body). There are several types of treatment available for these situations, and Dr. Badani individualizes treatment programs based on several personalized factors. The program has highly specialized medical oncologists, trained specifically to treat advanced cancer, who work closely with Dr. Badani to develop individualized treatment plans. Some of these treatments include:

Immunotherapy: Since renal cell carcinoma is not typically sensitive to traditional chemotherapy, several well-established studies have shown good response to immunotherapy. In this treatment, the body’s own immune system is revved up to fight cancer cells and has shown to be highly effective in many patients. Most commonly, Interleukin-2 (IL-2) is used for this purpose.

Targeted therapy: Recent scientific breakthroughs have occurred utilizing a family of drugs that specifically target the pathway a kidney cancer cell uses to grow. These drugs are taken in pill form, and therefore do not require hospitalization or IV infusions. They are very well tolerated, and have become the most commonly prescribed treatment for advanced kidney cancer.

Surgery: In many instances, surgery is used as part of the treatment program in advanced kidney cancer. This procedure, called a cytoreductive nephrectomy, can also be performed robotically, and offers improved survival for selective patients with metastatic kidney cancer who are on either immunotherapy or targeted medications.
Research

“Somewhere, something incredible is waiting to be known.”

— Dr. Carl Sagan

The Comprehensive Kidney Cancer Program at Mount Sinai has one of the most robust research and clinical trials programs in the country. Dr. Badani has published extensively on surgical technique, and outcomes of treatment for kidney and prostate cancer. His philosophy is that new discovery and innovation are the cornerstones of medical advancement and improvement in survival and quality of life for the patient.

Our clinical database includes thousands of patients with kidney cancer. We are performing high-level research to determine novel treatments both surgical and non-surgical to benefit men and women facing kidney cancer. Dr. Badani's state-of-the-art laboratory is working hard at testing new technology to determine its value in real practice. This includes not only testing new surgical tools, but also innovative genomic sequencing to determine how to individualize treatment specific to a patient’s particular cancer biology.

We partner with our colleagues in Medical Oncology on trials testing new drug regimens against the current standards. We also offer trials to some patients who otherwise would not have any other options.

The program is not only on the cutting edge of science and technology, we are leading the way through innovative research.
Our Offices

Our offices are dedicated to serving men and women with kidney cancer. Our highly specialized and experienced urologic cancer team includes physicians and medical assistants, registered nurses, nurse practitioners, and clinical fellows. Our practice manager and surgical scheduler are dedicated to making your office visit with us easy and stress-free.

Patients are seen at our spacious and modern offices at 425 West 59th Street between 9th and 10th Avenues (on the campus of Mount Sinai Roosevelt Hospital) and 5 East 98th Street (on the campus of Mount Sinai Hospital). These offices are convenient to both subway and bus transit with ample on-site parking.

We welcome your inquiry. Please feel free to ask us questions at any time. We can be contacted at 212-241-3919. For more information about Dr. Badani and the Comprehensive Kidney Cancer Program at Mount Sinai, please visit www.mountsinai.org/robotickidney.
Select Publications


Our Team

Dr. Badani’s robotic surgical team is one of the most experienced in the country.

Notes
Robotic Kidney Surgery at Mount Sinai

425 West 59th Street
New York, New York 10019

5 East 98th Street
New York, New York 10029

212-241-3919

www.mountsinai.org/robotickidney