

Too Cold for Cancer

Kidney Cancer Cryosurgery Proves Excellent Alternative

By William Harmon, MD

Renal cell carcinoma, or kidney cancer, remains a challenge for physicians to treat.

Although surgery is the gold standard for treating localized kidney cancer, an innovative, less invasive surgical technique known as cryosurgery is now enabling surgeons to cure cancer while preserving more kidney tissue and function as well as offering lower rates of complication.

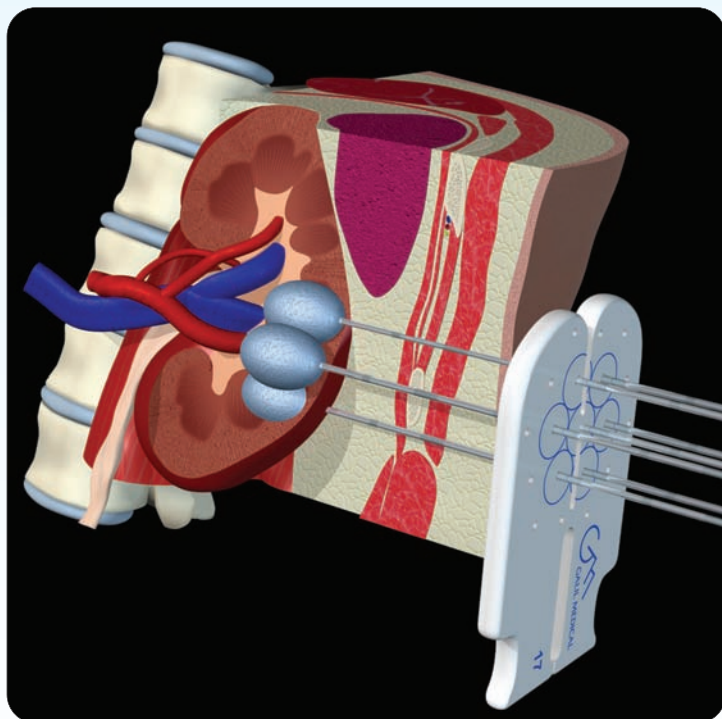
Cryosurgery, or the freezing of tumors, was first developed for older patients with relatively small lesions and for patients with diabetes or hypertension for whom removal of the entire kidney was problematic because of a higher chance of renal failure. Cryosurgery is also indicated for

patients in whom surgery is risky, such as patients with heart and lung diseases. Now, cryosurgery is used more often to treat younger patients who have small, localized tumors, and results have been excellent.

Moreover, with the increased use of diagnostic imaging in the last decade, physicians are catching more kidney tumors at an earlier stage, causing the demand for cryosurgery to increase. As the demand increases, more surgeons across the country are learning the treatment technique. Since 2002, when I performed the first kidney cryosurgery in South Texas, I have trained four fellows who are now offering this procedure in cities across the United States.

laparoscopic kidney surgery — one to one and a half hours as compared with two to three hours, respectively — and therefore requires less anesthesia for the patient.

Additionally, laparoscopic cryoablation greatly reduces blood loss and the need for transfusions and lowers the incidence of other complications associated with the more traditional kidney surgeries, such as heart attacks and blood clots. With cryosurgery, patients often experience less postsurgical pain, have a shorter in-hospital stay — leaving the hospital usually within 23 hours instead of the usual two to three days — and have a shorter recovery time. Patients having cryosurgery generally resume normal activity within a week or two.



Each cryoprobe contains liquid argon, which creates ice balls that kill the cancer and surrounding cells.

Cryosurgery Benefits

Cancers that measure 4 cm or smaller and/or those that are exophytic — located more on the surface than inside the parenchyma — are best suited to cryosurgery.

A major benefit of cryoablation of localized kidney cancer is that it takes less time to perform than the more traditional

The Procedure and Technique

In performing laparoscopic cryosurgery, the surgeon makes three to four small incisions into the abdomen and, using an ultrasound probe, determines the exact location and dimensions of the tumor. The surgeon then places three to five cryosurgery probes, or tiny needles, into the lesion and around its perimeter to create a border between the cancer cells and the normal cells.

As an alternative to the laparoscopic procedure described above, the surgeon can perform the procedure percutaneously or directly through the skin using an MRI for guidance. Surgeons at Urology San Antonio prefer the

laparoscopic approach since the physicians can better target the tumor being treated and move surrounding structures away from the tumor to avoid injuring them.

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For most patients with kidney cancer, urologists perform laparoscopic radical nephrectomy or complete kidney and tumor removal through “key-hole” incisions. A laparoscopic partial nephrectomy, in which the surgeon removes only the diseased part of the kidney, is an improvement on the regular laparoscopic nephrectomy because more of the functioning part of the kidney is preserved. Cryosurgery improves on the benefits of the partial nephrectomy even further by offering the same preservation of healthy renal tissue with a lower rate of surgical complication.

Each cryoprobe, which is inserted into the tumor, contains liquid argon. When run through the needle, the liquid

argon creates an ice ball the shape of an egg. Inside the ice ball, the temperature plummets to below 40°C, the temperature at which predictable cell death occurs.

The ice balls freeze the cancer and surrounding rim of normal kidney tissue in a matter of minutes. This temperature is then held for approximately 10 minutes. Then the tissue is allowed to thaw, and a second freeze cycle is performed. This second cycle assures cell death. After the cancerous cells die, they are absorbed by the body and a scar forms in the previous location of the tumor.

Successful Outcomes


Potential complications or side effects of cryoablation of kidney cancer are less than 5% — less than laparoscopic partial kidney removal — and may include hematoma, bleeding, or incomplete tumor treatment. For the latter, the procedure is repeated a second time.

With cryosurgery, the rate of cancer recurrence in the same kidney is 6%, a rate equal to that of laparoscopic partial nephrectomy. Moreover, in the

case of recurrence with cryosurgery, the procedure can be repeated at a later date.

Looking Forward

While tumors measuring up to approximately 4 cm are generally thought of as most appropriate for cryosurgery, larger tumors in selective patients are also appropriate. For these patients, cryosurgery means a significant improvement in quality of life since the only other alternative is dialysis if the kidney is removed and renal failure results.

The use of radiofrequency energy is also being explored for ablation of kidney cancer, but results with this technique, which heats the cancer via radiofrequency energy to kill cancerous cells, are more preliminary. 

William Harmon, MD, performs approximately 200 laparoscopic procedures each year for patients at Urology San Antonio. A board-certified urologist, Dr. Harmon earned his medical degree from the University of Chicago School of Medicine. Following the completion of his urologic residency at the Mayo Clinic, he served in the U.S. Air Force Medical Corps from 1997 to 2001.