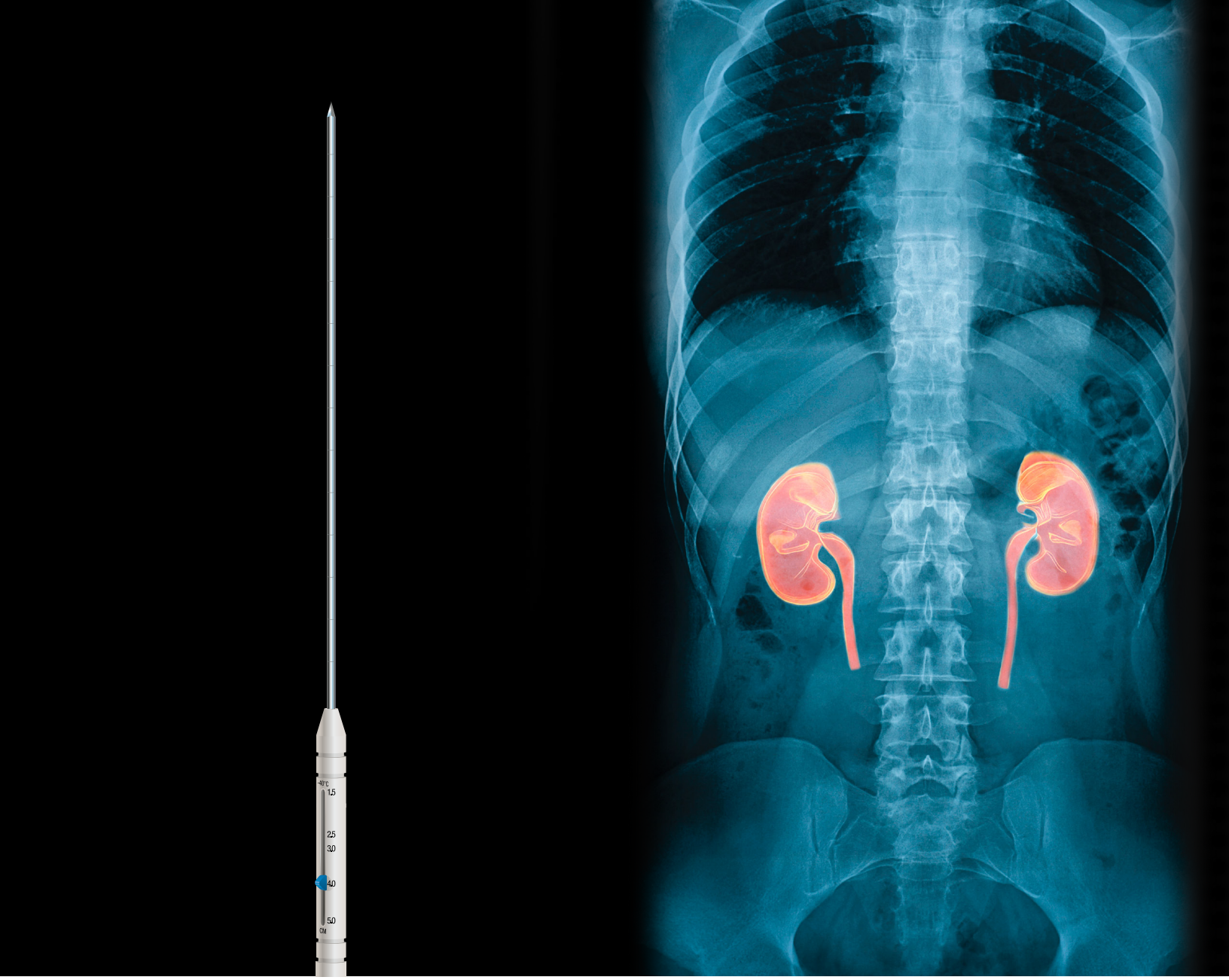

V-PROBE cryoprobe case series

Cryoablation of a Left Renal Mass

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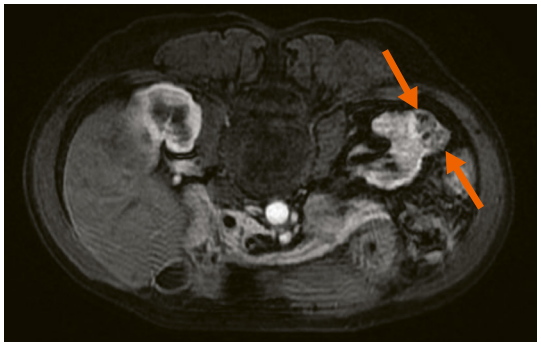
Background

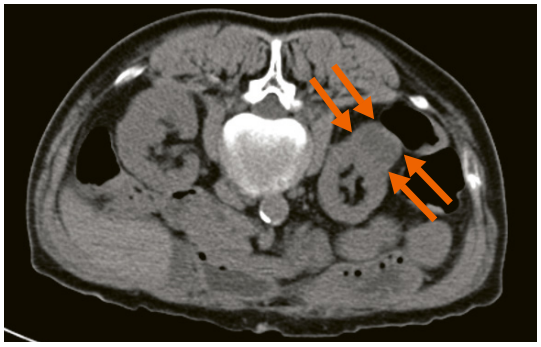
Renal cell carcinoma (RCC) is the most common type of kidney cancer, accounting for approximately 9 out of 10 kidney cancers.[1] The majority of renal masses are <4cm (stage T1a) and localized within the renal capsule.[2] While nephron-sparing partial nephrectomy is the standard of care for treating small localized renal tumors, many patients have contraindications to surgery which necessitate alternative treatment approaches.[1]

Minimally invasive, percutaneous image-guided cryoablation and radiofrequency (RF) ablation and microwave (MW) ablation are considered safe and effective non-surgical treatment options for patients with small renal tumors (stage T1a).[1,3] Their use is associated with a reduction in complications compared to surgical nephrectomy with acceptable long-term oncological and survival outcomes.[1] While most studies have reported similar clinical outcomes between thermal ablative therapies in patients with cT1a RCC, a recent analysis of over 6,000 patients treated with cryoablation or heat-based thermal ablation demonstrated a significant improvement in 10 year overall survival rate for patients with tumors >2 cm treated with cryoablation.[4]



Pre-procedure MRI Scan

Arrow above shows location of renal mass



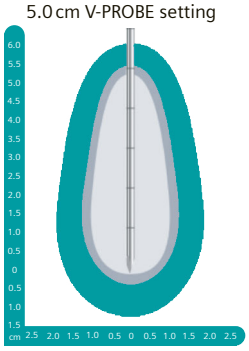
Pre-procedure CT Scan

Arrow highlights the close proximity of the renal mass to the bowel

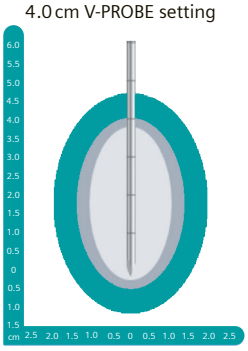
V-PROBE with ice ball isotherms

The ability to visualize and accurately control the size of the ice ball and associated ablative zone when using the V-PROBE cryoprobe reduces the risk of damage to the ureter with more centrally located tumors, the skin surface, and structures adjacent to the kidneys like the bowel or the genitofemoral nerve compared to heat-based thermal ablation techniques. Cryoabalation is considered a safer alternative than heat-based thermal ablation in this setting because the edge of the hypodense area produced by the ice ball can easily be visualized. Whereas the extent of heat-based energy cannot be visualized and increases the risk of heat-related injury to adjacent structures. The use of hydrodissection to displace organs near the renal tumor being treated further decreases these risks.[5] Cryoablation also produces less pain than thermal ablation, decreasing patient discomfort.[3]

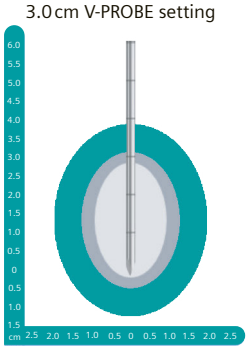
5.0 cm V-PROBE setting



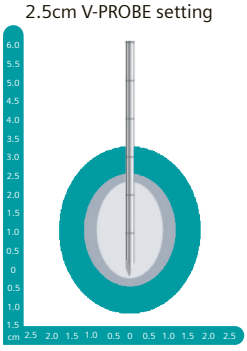
4.0 cm V-PROBE setting



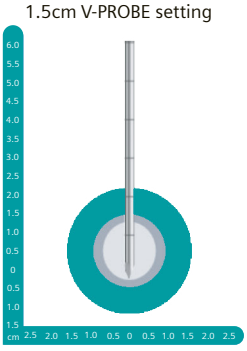
3.0 cm V-PROBE setting



2.5cm V-PROBE setting



1.5cm V-PROBE setting



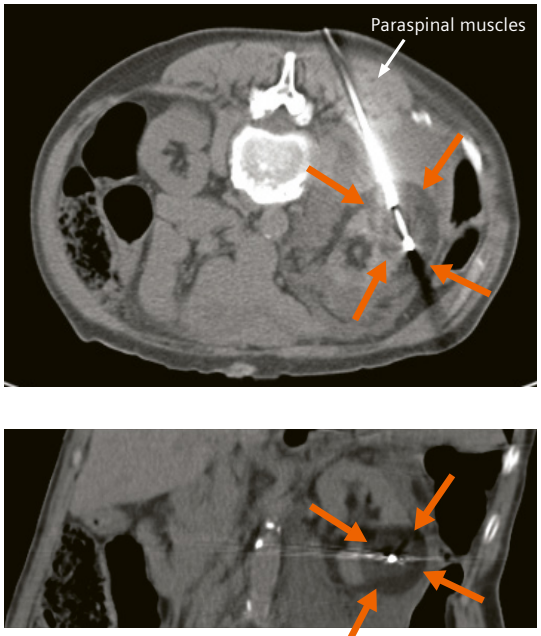
Patient History

A 65 year-old female presented with a 2.8 cm left lower pole renal mass. CT and MRI images showed the mass was abutting the bowel. Since the patient was not a candidate for surgery and given the proximity of the tumor to the bowel, a decision was made to treat the tumor with cryoablation therapy. Pre-procedural planning was performed to facilitate the appropriate positioning of the V-PROBE cryoprobe, anticipating the need to adjust the ice ball size during the procedure dependent on the displacement of the bowel away from the tumor with hydrodissection. The ability of the V-PROBE cryoprobe to customize the size of the ice ball intraprocedurally is important to account for the two variables of hydrodissection and probe position.

Procedure

A single V-PROBE cryoprobe (Varian Medical Systems, Palo Alto, CA) was inserted percutaneously through the paraspinal muscles and positioned within the renal tumor. Hydrodissection was used to displace the bowel away from the area to be treated and the isotherm of the probe was adjusted to compensate for the safest treatment zone. The V-PROBE cryoprobe was initially set at 5.0 cm, but changed to 4.0 cm (a unique feature of the V-PROBE compared to other available probes) based on the location of the probe as seen on intraoperative imaging. A freeze setting of 50% was also utilized to slow the time of ice ball development in order to avoid damage to vital areas near the tumor. The progression of the visible ice ball was monitored using CT imaging until it encompassed the entire tumor. Cryoablation was performed utilizing a standard dual freeze protocol with a minimum of 10 minutes per freeze cycle. No side effects were encountered during the procedure.

Left Renal Mass Cryoablation



Cryoablation with the V-PROBE Cryoprobe

A) Axial view. Image shows bowel displaced during procedure following hydrodissection. Yellow arrowhead identifies paraspinal muscles.

B) Coronal view. White arrows in both images indicate the outer edge of ice ball.

Post-procedural results

The cryoablation procedure was deemed successful based on post-procedural MRI and CT scans showing complete ablation of the renal mass with no evidence of residual or recurrent tumor. There was also no evidence of injury to any of the adjacent structures.

Discussion

The use of the V-PROBE cryoprobe enabled the ability to visualize and precisely tailor the size of the ice ball to avoid damage to the bowel and nerves which were adjacent to the tumor. The sturdy needle shaft of the V-PROBE cryoprobe facilitated insertion through the paraspinal muscles without damage to the probe and permitted lateral manipulation to easily adjust the location of the probe tip without bending the needle. The V-PROBE is also the only probe available that enables the ability to adjust the size of the ice ball intraoperatively. The result of the above was a well tolerated and successful ablation of the patient's tumor.

Procedure performed by

Navid Eghbalieh, M.D.

Medical Director of Interventional Oncology
Providence Holy Cross Medical Center, Mission Hills, CA
Assistant Professor of Radiology
UCLA Medical Center, Los Angeles, CA

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4. Wu J, et al. J Vasc Interv Radiol. 2019 Jul;30(7):1027-1033.e3.
5. Yamagami T, et al. Int J Urol. 2019 Aug;26(8):785-790.

The CryoCare® System is intended for use in open, minimally invasive or endoscopic surgical procedures in the areas in general surgery, urology, gynecology, oncology, neurology (including cryoanalgesia), dermatology, ENT, proctology, pulmonary surgery and thoracic surgery. The system is designed to freeze/ablate tissue by the application of extreme cold temperatures, including prostate and kidney tissue, liver metastases, tumors, skin lesions, and warts. Use only as directed. As with all surgical procedures, the possibility of adverse reactions such as pain, fever, chills, sepsis, edema, perforation, ulceration, and hemorrhage may occur. Individual results may vary. For more information, please visit www.varian.com/safety.

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Varian Medical Systems USA,
Corporate Headquarters
Palo Alto, CA
Tel: 650.424.5700
800.544.4636

Varian Medical Systems
Interventional Solutions
Headquarters and manufacturer
9825 Spectrum Drive
Building 2
Austin, TX 78
Tel: 877.467.2009

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