Providence Cancer Center
PROVIDENCE HEALTH CARE

Cancer Currents

Fall 2005

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Introduction

This issue of *Cancer Currents* is dedicated to new and innovative methods of minimally-invasive surgical procedures primarily for urologic malignancies. Over the past decade there has been a progressive acceptance of laparoscopic techniques for multiple surgical problems, including urologic malignancies. Articles in this publication discuss laparoscopic nephrectomy, laparoscopic partial nephrectomy with and without the use of thermal ablation, and finally, laparoscopic prostatectomy performed specifically with Sacred Heart's daVinci™ robotic system. The fourth article highlights a recent innovation in the management of male stress incontinence with the use of a male urinary sling.

Laparoscopic nephrectomy

Mihai Alexianu, MD

As medicine moves toward minimally-invasive methods, it is no wonder the laparoscopic approach to the kidney is becoming more popular. As with gallbladder surgery, avoiding a large flank or subcostal incision that transects numerous abdominal muscles benefits patients with faster recovery, less pain and decreased risk of incisional hernias.

Due to the widespread utilization of CT scan and ultrasound, the vast majority of renal tumors are diagnosed in Stage I, less than 7cm in size. A radical nephrectomy is still the gold standard and these patients are great candidates for a laparoscopic approach. In the past, it was questioned whether laparoscopic radical nephrectomy staging and cancer control was equivocal to open nephrectomy. That question has been answered by several studies that followed hundreds of patients for five years showing identical low recurrence rates.

In order to remove the specimen intact (with the perinephric fat), a three-inch incision around the umbilicus is required. Most of us prefer to use that incision to place the hand in the abdominal cavity to help with the retraction and dissection. There is no instrument as good as the surgeon hand. This hand-assisted laparoscopic technique adds another crucial dimension to the safety of the procedure: palpation of anatomical structures, mainly the renal pedicle. This solves one of the biggest drawbacks of laparoscopy: lack of tactile information.

Another big technological advantage is the use of vascular staplers. These devices secure the renal artery and renal vein better than the classic triple ligation decreasing the incidence of post-operative bleeding. There are still risks associated with this approach, mainly bowel injury from the use of electrocautery; however, once familiar with the procedure, it seems an easier, safer and faster way of doing the old nephrectomy. But the biggest advantage is, again, for the patient's recovery.

IRA KODNER ENDO D LECTURE
November 18, 2005 • Noon
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Thermal ablation with laparoscopy

An effective, minimally-invasive method to treat small (4 cm or less) renal cell carcinoma

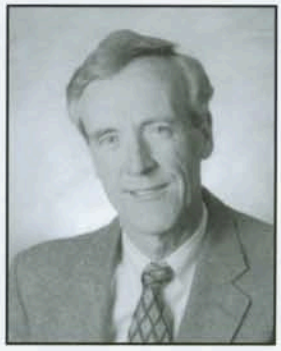
Michael G. Oefelein, MD

Historically, surgical oncologists embraced the dogma that cure was possible only through a radical operation which required a large incision, the removal of the entire neoplastic organ (including a non-neoplastic margin) and the corresponding lymph nodes. A prolonged convalescence, the potential for significant morbidity, mortality and psychological and physical disfigurement were justified by a chance to cure the cancer before it metastasized. Fortunately, due to novel technologies, pioneering physicians and patient interest, this century-old paradigm is rapidly eroding.

Localized renal cell cancer is a surgical disease. Laparoscopic radical and partial nephrectomy (LPN) were introduced in the 1990s. LPN reduces morbidity, shortens convalescence and—in the intermediate-term follow-up—is as effective as traditional "open" surgical techniques. Technical challenges limiting the application of LPN include hemorrhage, surgical margin assessment and intracoporeal suturing techniques. A variety of techniques and technologies have been introduced to overcome these challenges. Radio-frequency ablation (RFA) assisted LPN is the most promising approach.

RFA permits the delivery of heat to tissue that results in coagulation necrosis of neoplastic tissue. Thermal ablation before LPN has significantly reduced hemorrhage and has the potential to improve the surgical margin.

The ideal candidate for RFA assisted LPN has an exophytic kidney mass 4 cm or less (see figure). Obesity, prior abdominal surgery and non-exophytic lesions represent relative contraindication. The two-hour procedure is performed under a general anesthetic. Following RFA, LPN is performed and the excised specimen is removed. Hospital convalescence averages two days and oral narcotic analgesic requirements average seven days.



The male sling

A new treatment for post-prostatectomy urinary incontinence

Michael Henneberry, MD

Urinary stress incontinence can be a very troubling problem for patients who have undergone a radical prostatectomy.

The problem may be troublesome for the urologist to correct. The percentage of men who experience urinary stress incontinence after a radical prostatectomy is difficult to quantify. Approximately 10 percent of post- prostatectomy patients have incontinence that requires wearing at least one pad per day. Stress incontinence also occurs after a TUR prostate, but only in a very small percentage of patients (historically less than 1 percent). The initial method to correct post-prostatectomy incontinence relied on fixed urethral compression; the first device was described in 1750 and was similar to a Cunningham clamp. Dr. Joseph Kaufman refined this technique by developing a silicone gel prosthesis implanted over the bulbar urethra via a perineal incision. Dynamic compression devices gained popularity in the early 1970s with the introduction of the artificial urinary

sphincter. This procedure employs a cuff implanted around the urethra, a reservoir, and a deflating and inflating pump mechanism.

Recently there has been renewed interest in fixed compression devices, with the most popular current operation being a male sling. This entails a 60-minute outpatient procedure utilizing one bone screw in each superior pubic ramus and two additional screws in each inferior pubic ramus. The attached prolene sutures are used to anchor a silicone coated polyethylene mesh. Allographs and xenographs have been used as well, but the success of this operation (unlike female sling procedures for stress incontinence) relies on tension of the sling to compress the urethra. Avoidance of sling breakage, stretching or resorption, therefore favors usage of synthetic sling materials for the male sling. Conversely, synthetic materials are now rarely used for female sling procedures.

The implantable artificial urinary sphincter is still the procedure of choice for severe post-prostatectomy urinary incontinence. The male sling has found a niche for those patients with mild to moderate post-prostatectomy incontinence who previously were unwilling to undergo implantation of a hydraulic-type sphincter mechanism. Now such patients have an alternative surgical option. Patient satisfaction is similar with both techniques (80 to 90 percent improved). The male sling has the advantage of a lower re-operation rate and a negligible risk of urethral erosion.

Robotic-assisted laparoscopic radical prostatectomy

David J. Mikkelsen, MD
Thomas N. Fairchild, MD

Robotic surgical systems fall into three categories; active, semi-active or master-slave systems. Active systems have artificial intelligence allowing a procedure to be performed autonomously under the supervision of the surgeon. Semi-active systems have an automatic and surgeon driven component. Master-slave systems, on the other hand, are passive in that they allow the surgeon to control the robot from a local or remote control center. The daVinci™ robotic surgical system available at Sacred Heart Medical Center falls into the master-slave category.

The daVinci system consists of a freestanding tower and a surgeon console. The robotic tower has a camera arm and two or three instrument arms. The surgeon console provides a 6 to 10 times magnified three-dimensional image of the surgical field and an ergonomically-designed interface that provides control of instrumentation.

During the past decade, there has been widespread advancement and acceptance of laparoscopic procedures among urologists treating both oncologic and reconstructive problems. Using robotic assistance for laparoscopic procedures offers several potential advantages, particularly for radical prostate surgery, which can present a challenging learning curve.

One important benefit of robotic assistance is a vision advantage. Traditional laparoscopy has depended upon an assistant to "drive the camera" and provide a clear and steady image of the operating field. In addition, standard laparoscopic camera systems provide two-dimensional views that can pose problems with depth perception. The daVinci robotic system provides a steady tireless magnified three-dimensional view which is controlled by the primary surgeon.

Another potential benefit is that of surgical precision. Compared to standard laparoscopic instruments that allow the surgeon 4 degrees of freedom, robotic instruments provide 7 degrees of freedom approximating the actual movements of a human hand and wrist. This feature is particularly important in radical prostate surgery as it allows for the fine maneuvers in tight confined pelvic spaces.

Potential problems with robotic assisted laparoscopy (RLRP) include a cost disadvantage. Not only is the daVinci system expensive (more than $1 million), additional costs include yearly service contracts and the cost of instruments that have a limited lifespan. As with most forms of new technology, there is hope that prices will decrease over time. In the short term, it is also possible that shorter hospital stays may reduce the cost. In fact, several centers now list RLRP as an outpatient procedure since the average hospital stay is 23-27 hours.

In addition, it is still unknown if the greater precision and improved visualization will translate into superior outcomes. Data on potency, continence and disease margins are relatively immature. Regardless of these issues, it would appear that RLRP is gaining favor. During the past two years, the number of RLRPs done in the U.S. tripled, from 800 to 2,500. Another doubling or tripling is anticipated by the end of 2005.

At Providence Cancer Center 35 RLRP cases have been completed as of July 2005. Operative times have decreased from six hours initially to three and half hours. With further experience, times of less than three hours may be realized, more closely approximating typical open operative times of two hours. On average, blood loss appears to be less compared to open radical prostatectomy and although not yet critically evaluated, continence and margin outcomes appear to be similar to open radical prostatectomy. Finally, although our patients are not yet treated as outpatients, several of our more recent patients have been discharged within two days of admission. In conclusion, RLRP appears to be an exciting option in the surgical management of prostate cancer.