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LAPAROSCOPIC RADICAL PROSTATECTOMY: INITIAL SHORT-TERM EXPERIENCE

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ABSTRACT

Objectives. To determine the feasibility and efficacy of a laparoscopic approach to the radical retropubic prostatectomy (RRP).

Methods. A transperitoneal laparoscopic technique was developed to perform an RRP. Intra-abdominal access was obtained through five 10-mm trocars. After dissection of the prostate, the urethrovesical anastomosis was created via a transvesical approach. The prostate was removed by extending the umbilical incision.

Results. Between September 1991 and May 1995, nine laparoscopic RRPs were performed. The operative time averaged 9.4 hours. Only 1 of 9 patients had a positive surgical margin that involved the urethra. Six of 9 patients were completely continent postoperatively. Of the 4 patients who were potent preoperatively, 2 continued to have erections. There were three complications: cholecystitis, thrombophlebitis associated with a pulmonary embolism, and a small bowel hernia into a trocar site.

Conclusions. Laparoscopic radical prostatectomy is feasible but currently offers no advantage over open surgery with regard to tumor removal, continence, potency, length of stay, convalescence, and cosmetic result. UROLOGY **50**: 854–857, 1997. © 1997, Elsevier Science Inc. All rights reserved.

Over the past 10 years, the number of radical prostatectomies performed in the United States has increased sixfold.[1] During this same time period, the advent of managed care has led to a critical cost analysis of health care delivery. Because of its prevalence, a significant percentage of health care dollars are consumed in the treatment of localized prostate cancer, and modalities for treatment, such as surgery, are being closely assessed.[2] Several changes in operative and postoperative management have been made over the past 10 years to decrease patient morbidity and reduce cost.[3,4]

Minimally invasive surgical techniques have received a great deal of attention because of the potential for decreased postoperative discomfort, minimal disfigurement, and quicker recovery than traditional techniques. In several applications, however, there have been concerns over the cost of the procedure secondary to operative time and instrumentation. Rapid recovery resulting in quicker return to work has provided the economic impetus to offer these procedures to patients. As a minimally invasive technique, laparoscopy has been used to treat many urologic disease entities and has demonstrated both clinical and economic advantages in several settings.

In the present report, we describe our experience with laparoscopic radical retropubic prostatectomy (RRP). We describe our initial 9 cases and discuss the feasibility and efficacy of laparoscopic prostatectomy.

MATERIAL AND METHODS

Between September 1991 and May 1995, 9 patients with clinically localized prostate cancer (Table I) presented for laparoscopic radical prostatectomy. Four patients had undergone a previous pelvic lymphadenectomy and had no evidence of metastasis. Patients at low risk for nodule disease (Gleason score less than 6, prostate-specific antigen (PSA) less than 10 ng/mL, nonpalpable disease) did not undergo a lymphadenectomy. All patients had the procedure performed under general endotracheal anesthesia with placement of a nasogastric tube and Foley catheter. Insufflation to 15 mm Hg was achieved with a Veress needle, and a 10-mm trocar was inserted into the umbilicus. Four accessory trocars, all 10 mm in size, were inserted in a fan configuration: one on each side at the level of

TABLE I. *Clinical characteristics of 9 patients with Stage B1 prostate cancer undergoing radical retropubic prostatectomy*

Pt No.	Gleason Score	PSA (ng/mL)	Operative Time (hr)	EBL (cc)	Pathologic Findings	Length of Stay (days)	Continent	Potent
1	4	49	8	600	Organ con	6	Sphincter	Yes
2	7	5.4	9.5	500	Cap pen	4	Yes	No
3	5	0.8	9.5	750	Cap pen	3	Yes	N/A
4	6	4.4	9	400	Organ con	1	Yes	Yes
5	6	7.3	9	500	+Sur mar	3	Yes	N/A
6	7	10.2	11	700	Organ con	4	Yes	N/A
7	5	24.8	8.5	500	Cap pen	3	Yes	N/A
8	6	21	9	800	Organ con	20	1 Pad	No
9	5	11	9.5	500	Organ con	22	1 Pad	N/A

KEY: Pt = patient; EBL = estimated blood loss; Organ con = organ confined; Cap pen = capsular penetration; N/A = not applicable; +Sur mar = positive surgical margin.

the anterior superior iliac spine, just lateral to the epigastric vessels, and one on each side, 8 cm cephalad and slightly medial to the initial lower lateral trocars.

The peritoneum medial to the medial umbilical ligament was incised and the vas deferens transected on each side. The distal portion of the vas deferens was then followed down to the seminal vesicle by incising the peritoneum in the retrovesical space. The tip of the seminal vesicle was identified, and the arteries supplying the seminal vesicle were clipped and transected. With sharp and blunt dissection, the seminal vesicles were freed anteriorly, laterally, and posteriorly. Denovillier's fascia was then perforated just behind the bladder neck in the midline. Using blunt dissection with a 10-mm right-angle dissector, the rectum was freed from the posterior portion of the prostate. The prostatic pedicles could be identified by retracting the prostate anteriorly and transected with a vascular endoscopic gastrointestinal anastomotic stapler. The anterior portion of the prostate was the approach by connecting both peritonotomies anteriorly. Blunt dissection and posterior retraction were used to identify the puboprostatic ligaments, which were sharply transected. The dorsal vein was then cut sharply without the need for hemostasis.

The bladder neck was then incised posteriorly onto the catheter, and the incision was carried around anteriorly until the entire bladder neck was freed from the prostate. The bladder neck was not preserved. The dissection then returned toward the urethra, and the apex of the prostate and urethra were identified. The urethra was incised with 5-mm scissors anteriorly; the catheter was removed; and the urethra was incised posteriorly, with care taken to make an even cut. In the last 3 patients, the neurovascular bundles were identified at this point and dissected off the prostate. The remaining posterior lateral attachments at the apex were then cut, and the prostate was placed in a specimen bag and left in the peritoneal cavity.

The anastomosis was created by making a transverse incision through the dome of the bladder. The incision was made with electrocautery and was extended for a distance of 8 cm. The bladder neck was reconstructed over a 20F Foley catheter with interrupted 3.0 Vicryl. The sutures were placed through the urethra and bladder neck and tied inside the bladder using an intracorporeal technique.

With a needle holder through the right superior trocar, anastomotic sutures were placed outside-in on the urethra at the 3, 5, 7, 9, and 12 o'clock locations. A needle driver was then inserted through the dome of the bladder, and the sutures were passed inside-out on the urethra. The sutures were tied intracorporally, starting with the posterior sutures. An 18F Coude Foley catheter was then passed, and the balloon inflated with 10 mL of saline. The incision in the bladder was

closed with two layers of running 3-0 Vicryl. A 10-mm flat drain was placed through one of the inferior trocar sites and left posterior to the anastomosis. The peritoneum was closed with a hernia stapler, and all trocar sites, including the drain sites, were closed using 1 Vicryl. The prostate was removed through extension of the umbilical incision 3 cm.

The pelvic drain was removed on the second postoperative day, and the Foley catheter was removed 14 days postoperatively. Diet and activity were advanced as tolerated. Return to normal activity occurred when patients felt capable of returning to usual daily activities.

RESULTS

Nine completely laparoscopic RRPs were attempted and successfully completed (Table I). All patients were followed up for a mean of 26 months. The average age of the patients was 65.6 years, with an average Gleason score of 5.7 and a PSA level of 14.9 ng/mL. The operative time averaged 9.4 hours. Average pain medication was 31.5 mg morphine sulfate (range 6.7 to 53.3), and average convalescence was 4.4 weeks (range 3 to 6).

Only 1 of 9 specimens had a positive surgical margin that involved the urethra. The remaining specimens were either organ confined or had capsular penetration. Of the 9 patients, only 4 were potent preoperatively, and 2 remained potent after surgery (50%). Six of the 9 patients were completely continent postoperatively, 2 required one pad a day, and 1 required placement of an artificial sphincter. The average length of stay for the 9 patients was 7.3 days, including 2 with a prolonged hospital stay secondary to postoperative complications (cholecystitis [20 days] and right femoral thrombophlebitis associated with a pulmonary embolism [22 days]). When these 2 patients were excluded, the average length of stay was 3.4 days. In addition, 1 patient had a small bowel herniation into a trocar site. A laparoscopic reduction of the hernia was performed 10 days postoperatively without complication.

COMMENT

Minimally invasive surgery is appealing to patients, and their demand can drive the availability of a particular surgical procedure. There is no better demonstration of this than laparoscopic cholecystectomy, which was introduced in the late 1980s. By the early 1990s, patient demand caused this technique to be offered in both the private and academic sectors without previous prospective studies supporting efficacy.[5,6] Amid the concerns regarding cosmetic results and convalescence, there needs to be a persistent evaluation of surgical procedures with respect to long-term cure rate, acute complications, and long-term functional outcome.

The advent of managed care has dictated that not only should physicians focus on clinical outcomes when making treatment recommendations, but they should also incorporate cost considerations. An area in urology that has received considerable attention in this regard is the treatment of localized prostate cancer. Over the past several years, the rate of radical prostatectomy in the United States has increased sixfold.[1] For radical prostatectomy to maintain its position as a treatment modality for localized prostate cancer, it has become necessary to critically evaluate the management strategy of this operation. Several centers have constructed critical pathways that have greatly reduced the cost of the procedure while maintaining patient satisfaction and decreasing morbidity. Palmer et al.[7] reported on a critical pathway for RRP at the University of Chicago that reduced length of stay to 1.7 days while maintaining patient satisfaction at 96%. In addition, Klein et al.,[4] at the Cleveland Clinic, reported on a similar critical pathway that resulted in a median length of stay of 2 days. Both studies underscore the ability to perform an open RRP with a minimal hospital stay, thereby directly decreasing inpatient costs while maintaining patient satisfaction with minimal morbidity.

If an open procedure can offer a shortened length of stay with acceptable patient satisfaction, is there a need for a laparoscopic approach in the treatment of prostate cancer? The laparoscopic literature is replete with data demonstrating its superiority to open surgery with respect to length of stay, convalescence, postoperative pain requirements, and cosmetic result.[8,9] However, the urologic surgeon is obligated to focus on procedures that maximize long-term cure rates, minimize the occurrence of acute complications, and optimize long-term functional outcomes.

The goals of surgery are many, but foremost is the need to cure. For surgery of prostate cancer, the goals are (1) remove the cancer; (2) maintain continency, and (3) maintain potency.[10] Once these goals have been met, concerns over convalescence, cosmetic result, and finally, cost can be addressed. In evaluating laparoscopic prostatectomy, the most important outcome is cure. In reviewing the 9 cases presented, it is apparent that laparoscopy can offer the patient an adequate dissection for safe tumor removal. In no case was the prostate capsule violated surgically. There was only one pathologic specimen that had a positive surgical margin. The remaining specimens were either organ confined or had capsular penetration. Thus, in this limited number of patients, it appears that both laparoscopy and open surgery offer comparable pathologic specimens.

In evaluating the outcomes of continency and potency, there appeared to be no significant advantage to laparoscopic prostatectomy; however, the numbers are too small to allow definitive results regarding the laparoscopic approach.[11,12] Four patients were potent before surgery, and 2 remained potent after surgery. Of note, in the initial 6 cases, the neurovascular bundles were not identified; however, in the last 3 cases, magnification allowed identification and preservation. Of note, both potent patients were in the group without identification of the nerves.

Continence after radical prostatectomy is difficult to compare because the definition varies by investigator. In our cohort, 6 of 9 patients were completely dry, and 2 required a single pad per day. Only 1 patient required an artificial sphincter because of severe urinary incontinence. On the basis of our initial limited experience, laparoscopy appears to be equivalent to an open prostatectomy with respect to tumor removal, continency, and potency.

If two surgical approaches offer equivalent surgical outcome, it then becomes reasonable to compare perioperative outcomes, including length of stay, convalescence, and cosmetic result. In our experience, laparoscopy currently offers little benefit over an open RRP. The length of stay for the open procedure is diminishing, with pathways established for a 2-day stay. There is a lack of data regarding convalescence in the published reports. In our own experience, patients did not appear to progress faster than those undergoing a standard retropubic prostatectomy. Postoperative pain medication is minimal; however, data regarding pain medication utilized after an open prostatectomy is lacking in published reports. Because both procedures yield a similar surgical anastomosis, both require a similar convalescence. With respect to cosmetic appearance, many would argue that in the patient population requiring radical prostatectomy, a 9-cm midline infraumbilical incision is minimally deforming, and five 1-cm incisions offer very little advantage. In addition, there are those

who now perform an open RRP through a mini-laparotomy incision (less than 7 cm).[13] Thus, laparoscopy offers little improvement in perioperative outcomes relative to open prostate surgery.

A final point of comparison is the operative procedure itself. The laparoscopic approach was time-consuming and technically challenging. Of note, there was little progress in operative time with the given experience, implying a relatively long learning curve. The procedure was primarily performed by an experienced laparoscopist (W.W.S.), and the average operative time was 9.4 hours. The length of time not only reflects the technical demands of this approach, but also the lack of appropriate laparoscopic instrumentation. The part of the procedure requiring the greatest time was the creation of the ureterovesical anastomosis, which took twice as long as removal of the prostate. With innovative and task-specific instrument design, this portion of the operation may be simplified. The cost of instrumentation and the length of operating time required for the laparoscopic approach further support an argument against laparoscopic RRP, especially when the procedure offers little advantage in the way of surgical outcome and perioperative results.

Laparoscopy is an exciting and revolutionary surgical approach. The decreased invasiveness of this technique can affect length of stay, convalescence, postoperative pain, and cosmetic results. Improved visualization through magnification has the potential to offer an improved dissection. However, the cost of this new technology includes significant technical training, specialized instrumentation, and longer operative times. Currently, laparoscopic prostatectomy is a technically challenging procedure, offering the patient surgical results comparable to that of open surgery, with little or no effect on length of stay, convalescence, or cosmetic result. Therefore, we currently believe that laparoscopy is not an efficacious surgical alternative to open prostatectomy for malignancy. This does not exclude its future potential utility because technical advances and surgical experience may develop a procedure that is shorter, simpler, and possibly superior.

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