2004

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JOURNAL OF ENDOUROLOGY
Volume 18, Number 3, April 2004

Laparoscopic Radical Prostatectomy: Washington University Initial Experience and Prospective Evaluation of Quality of Life

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ABSTRACT

***Background and Purpose*: The laparoscopic approach to radical prostatectomy offers an alternative to the open surgical procedure with less morbidity. We prospectively collected data including a validated quality-of-life questionnaires on our first 38 laparoscopic radical prostatectomies (LRPs). The first 10 patients (group 1), second 10 patients (group II), and the most recent 18 patients (group III) were examined separately to study the learning curve for this procedure. In addition, we determined the pattern of recovery of urinary continence, potency, and quality of life.**

***Patients and Methods*: Between July 1999 and July 2002, 38 consecutive transperitoneal laparoscopic radical prostatectomies were performed for clinically localized prostate carcinoma. Patients completed quality-of-life questionnaires (Rand 36 Health Survey) before surgery as well as at 1, 3, 6, and 12 months and every 6 months thereafter. The patients were also interviewed by an individual not directly involved in patient care.**

***Results*: One patient (the second in our experience) was converted to the open approach because of failure to progress. The average operating time for the whole series was 423 ± 137.6 minutes (range 215–825 minutes), the last 10 procedures taking 305 ± 63 minutes (range 215–420 minutes). Complications consisted of one case each of intraoperative bladder injury, transient superficial peroneal nerve palsy, pulmonary embolism, and bladder neck obstruction. The bladder injury was closed laparoscopically without further complication. Bladder neck obstruction was secondary to a bladder wall fold that was treated with transurethral resection 14 months after surgery with good results. Four patients in group 1 had minor anastomotic leaks, while only one patient after that had a leak (group III). Four patients required transfusion, two intraoperatively and two postoperatively. In group III, the urethral catheter remained in place for an average of 8 days (range 6–10 days). With a mean follow-up of 22.8 months (range 9–43 months), 84.8% of the patients had perfect urinary control. Postoperatively, 9 patients (27%) were fully continent on removal of the Foley catheter. At 1, 3, 6, and 9 months postoperatively, diurnal urinary control was reported by 30.3%, 48%, 72.7%, and 84.8% of the patients, respectively. One patient needed an artificial urinary sphincter. Among the incontinent patients, 24.2% had urinary urgency, and one third of these patients reported urge incontinence.**

***Conclusions*: Laparoscopic prostatectomy is a reproducible technique with a steep learning curve. Operating times and the incidence of anastomotic leaks and urinary incontinence decrease significantly after the initial 10 patients.**

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INTRODUCTION

LAPAROSCOPIC RADICAL PROSTATECTOMY (LRP) remains a difficult intervention and continues to be called into question as traditional retropubic prostatectomy sets higher standards in terms of reduced operative time, small incision, lower postoperative morbidity, and improved efficacy. The laparoscopic approach facilitates better visibility of the surgical anatomy, precise dissection because of the magnification, less blood loss secondary to the tamponading effect of the pneumoperitoneum, and a better urethrovesical anastomosis because the sutures are all applied and tied under direct vision. This in turn may improve continence and potency by better preservation of the urethral sphincter and neurovascular bundles. All these advantages could provide shorter postoperative convalescence, decreased blood transfusion rates, possibly shorter hospitalization, and early return to work and other normal activities.

As more centers begin to offer the laparoscopic approach, the results, possible complications, and operative difficulties during the early experience need to be determined. As surgical cure rates for localized prostate cancer have improved considerably, the functional sequelae of the treatment—urinary continence and potency—have moved to the forefront. Most of the results described for LRP have been from European centers after extensive surgical experience. The aim of this study was to analyze our preliminary results with LRP, including complications, technical difficulties, and short-term oncologic control, functional outcome, and health-related quality of life (QOL).

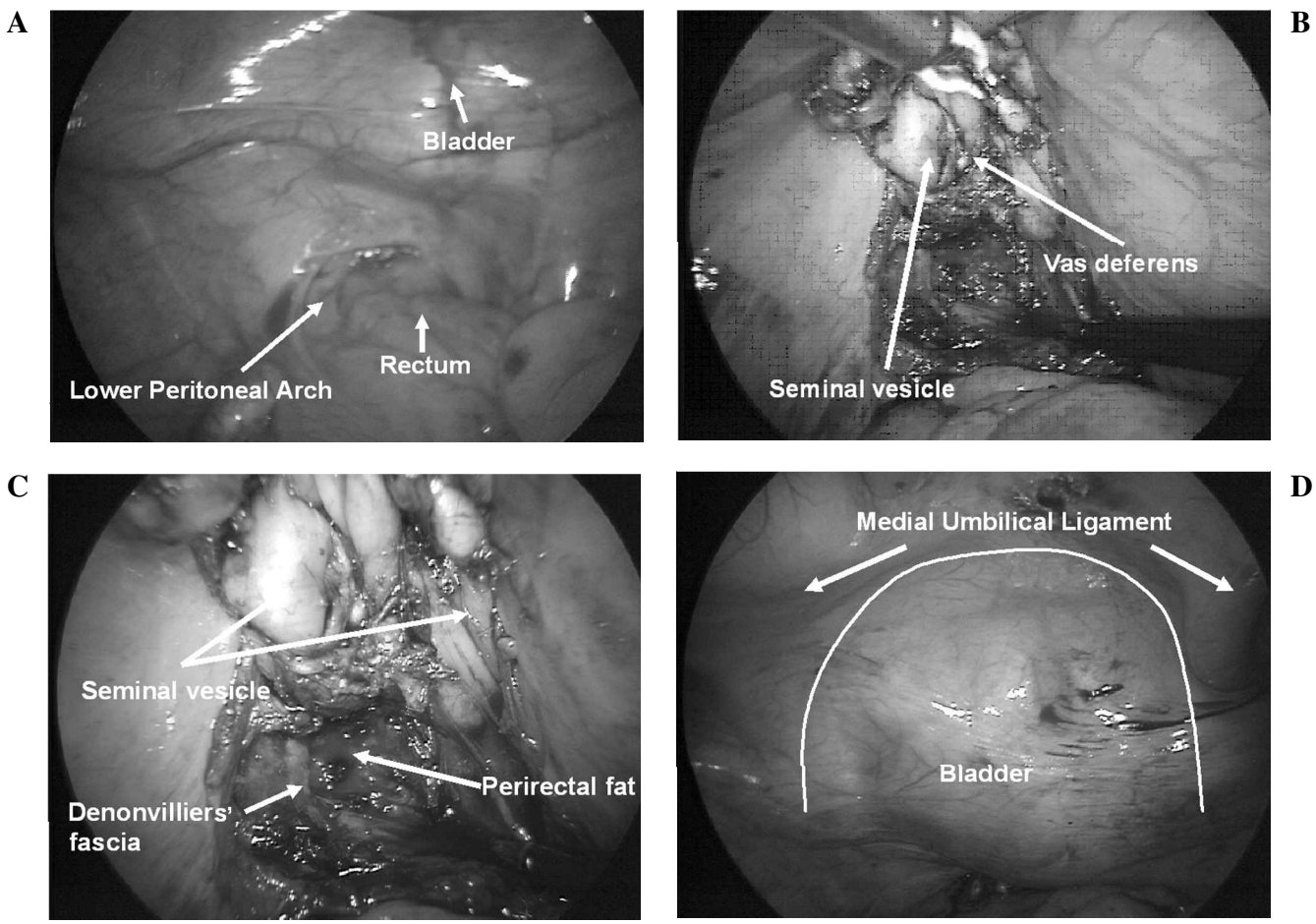


FIG. 1. Technique of LRP. (**A**) Superior peritoneal fold represents approximate location of ureters and base of bladder. Inferior arch, nearly at depth of peritoneal reflection, is created by coming together of vasa in the midline, with seminal vesicles lying just laterally. (**B**) Retrovesical dissection of seminal vesicle and vas deferens directly at bottom of lower peritoneal reflection (ureter lies just lateral and posterior to vas deferens). Foley tip is useful landmark, as it lies anterior to two arches. (**C**) Superior layer of Denonvilliers' fascia has sagittal (cephalocaudal) striations caused by muscle fibers, whereas posterior layer is fibrous. Denonvilliers' fascia is cut horizontally immediately below the prostate, close to ampulla of vas and seminal vesicles. Following cutting of inferior layer, yellow rectal fat becomes visible. (**D**) Anterior retropubic dissection to drop bladder. Important landmarks are obliterated urachus (median umbilical ligament) in midline, Foley balloon and tip in bladder, the two obliterated umbilical ligaments (medial umbilical ligaments), and vas deferens. Filling bladder facilitates dissection by identifying contours. Bladder is dropped by incising parietal peritoneum lateral to bladder but medial to medial umbilical ligament.

PATIENTS AND METHODS

Patients

From July 1999 to July 2002, 38 men underwent LRP for localized prostate cancer. The mean preoperative serum prostate specific antigen concentration was 4.5 ± 2.08 ng/mL (Hybritech assay), and the mean prostate volume on ultrasound scan was 32.6 ± 10.4 cc.

The patients completed the Rand 36 Health Survey 1.0 quality-of-life questionnaire (SF-36) before surgery as well as at 1, 3, 6, and 12 months and every 6 months thereafter. To complete the postoperative information, patients were also interviewed by an individual not directly involved in patient care.

Histopathology examination

The weight of the specimen, tumor volume, pathologic stage, and surgical margin status were assessed. The radical prostatectomy specimen was coated with India ink, and 2-mm shave margins were obtained from the bladder neck and distal urethral margins. After fixation of the prostatectomy specimen in 10% Formalin, the seminal vesicles were cut and put in separate cassettes. The prostate was sectioned at 3-mm intervals, bisected, and submitted in an apical to basal examination, with each block designated by quadrant (right apex, right base, left apex, and left base.[1] Gleason histologic grade was established,[2] and the primary and secondary Gleason grades and Gleason scores were recorded.

Surgical technique

All patients were treated by a single surgeon (CPS). In the first 10 patients (group 1) the surgery was assisted by a senior laparoscopic surgeon (R.V. Clayman). In groups 2 (the second group of 10) and 3 (the most recent 18), the assistant was a senior resident or a laparoscopy fellow. The transperitoneal LRP

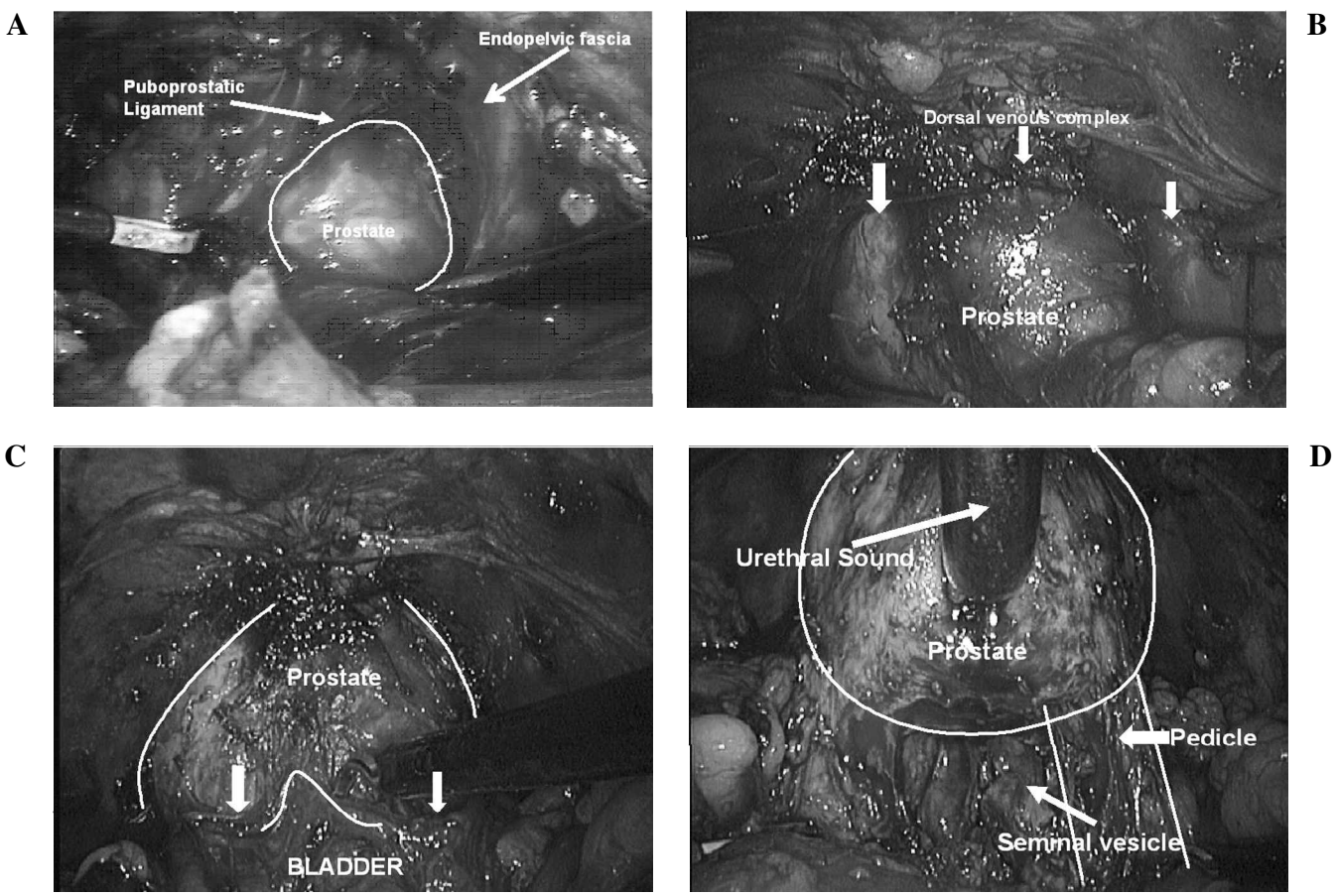


FIG. 2. Technique of LRP (continued). (**A**) Incision of endopelvic fascia and division of puboprostatic ligaments. Superficial veins coursing over prostate are coagulated using bipolar forceps and cut. Endopelvic fascia are incised with curved scissors on both sides toward puboprostatic ligaments. (**B**) Ligation of deep dorsal venous complex with figure-of-eight Vicryl suture on 5/6 CT needle. (**C**) Bladder neck opening and its dissection. Retraction of prevesical fat superiorly will cause faint outline of prostatovesical plane. Bladder neck is further identified with laparoscopic scissors that distinguish mobile bladder wall from solid prostate gland. With further sharp and blunt dissection, circular detrusor fibers are seen, and bladder neck is preserved. Surgeon identifies urethra and incises anterior wall to expose Foley catheter. (**D**) Posterior bladder neck dissection. With meticulous dissection, posterior bladder neck is incised, allowing access to previously dissected retrovesical space. Prostatic pedicles become apparent at this point, as they have been completely dissected.

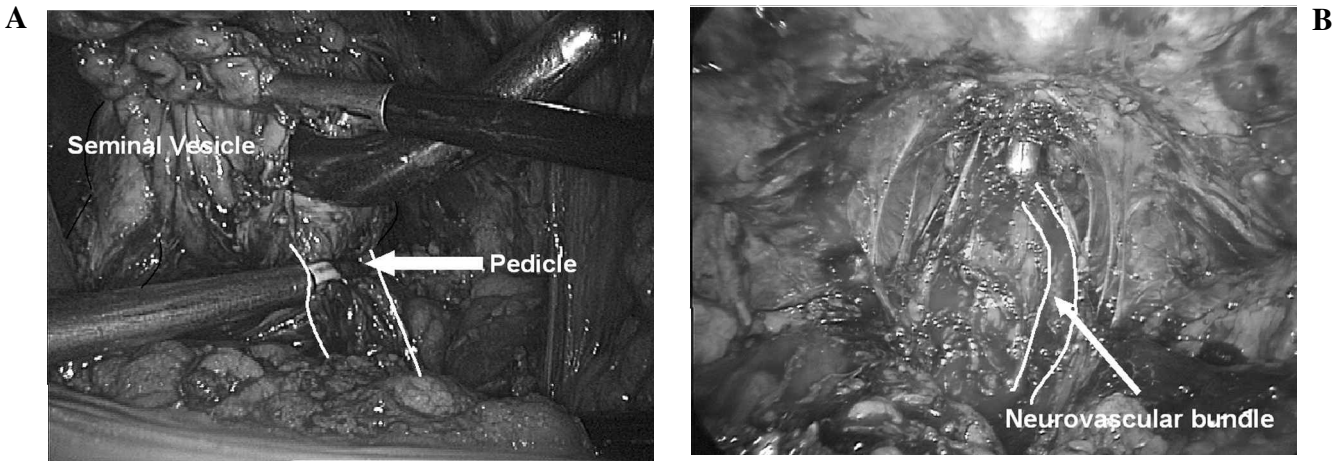


FIG. 3. Technique of LRP (continued). (**A**) Division of prostatic pedicles with or without preservation of neurovascular bundles. If nerve sparing is desired, before bladder neck dissection, the dissection is accomplished between the two layers of lateral pelvic fascia: levator ani fascia (outer fascial layer) and prostatic fascia proper (inner fascial layer covering prostate) The levator fascia is divided, being released first at bladder neck and then toward apex of prostate. A subtle groove then appears on posterolateral edge of prostate, which helps direct dissection of bundle toward urethra. Neurovascular bundles are identified by retracting prostate anteriorly. Prostate vascular pedicles are separated by thin fat plane from posterolateral neurovascular bundles. Upward traction on vas deferens and seminal vesicle exposes lateral pedicles. As pedicles are cut and dissection progresses to apex, metal sound in urethra helps retract prostate away from either pedicle and define anatomy. (**B**) Prostate is removed after cutting urethra and dividing rectourethralis muscle while applying gentle traction. Preserved neurovascular bundle is shown. (**C**) Urethrovesical anastomosis with 6 to 12 interrupted 2-0 Vicryl sutures on RB, or SH needle (5/8 or UR-6).

was performed in all patients using the Montsouris technique (Figs. 1-3).[3]

Some minor modifications were used during the initial experience. The AESOP 3000 voice-activated robot helps maneuver the laparoscope and provide a steady image. During the anastomosis, the assistant could help with the laparoscope because frequent movement is required, which could be done in less time by an assistant than by the robot. In group 1 patients, a rectal bougie was used to avoid rectal injury. During retrovesical dissection, the vas deferens was traced to the prostate, and the seminal vesicle was identified before transection of the vas to avoid ureteral injury. If the vas deferens was not easily identified in the pouch of Douglas, it could be found more easily along the lateral pelvic wall and traced posteriorly. In two

TABLE 1. OPERATIVE DATA AND POSTOPERATIVE RECOVERY

	Group 1 *mean (range)*	*Group 2* *mean (range)*	*Group 3* *mean (range)*
Conversion (N)	1	0	0
Operating time (min)	591 (465–825)	427 (420–540)	305 (250–420)[a]
Positive margins (%)	4 (40)	2 (20)	4 (22)
Urethral catheterization (days)	18.4 (14–30)	11.7 (10–14)	8 (6–10)
Hospital stay (days)	2.4 (2–4)	2.7 (2–7)	2.3 (1–6)
EBL (mL)	340 (200–500)	320 (100–500)	500 (100–1700)
Blood transfusion (N)			
Intraoperative	2	0	0
Postopeative	0	1	1

[a]$P < 0.001$.

Table 2. Complications and Morbidity

	Group 1	*Group 2*	*Group 3*
Bladder injury	1	0	0
Anastomotic leak (extravasation)	4	0	1
Pulmonary embolus	0	1	0
Bladder neck obstruction (stricture)	1	0	0

Table 3. Pathology Data

	Group 1	*Group 2*	*Group 3*
Stage (%)	T_{1c} (80) T_{2a} (20)	T_{1c} (70) T_{2a} (30)	T_{1c} (43) T_{2a} (21) T_{2b} (29) T_{3a} (7)
Mean Gleason score	6	6	6
Positive margins (%)	40	20	22
Apex (N)	0	0	2
Urethra (N)	2	2	2
Posterolateral (N)	2	0	0
Bladder neck (N)	0	0	0
Seminal vesicle (N)	0	0	0

patients, initial cystoscopic circumferential bladder-neck incision between the prostatic base and the bladder neck was performed to help with bladder-neck dissection. However, this maneuver was not particularly helpful, especially as the bladder neck is clearly visible with a little experience. A 24F curved urethral sound and perineal pressure with a sponge stick helps reveal the urethral stump clearly during anastomosis. Bilateral nerve sparing was done in all patients who were potent preoperatively.

Follow-up

A cystogram was performed 5 to 7 days after the surgery. If no extravasation occurred at the anastomosis with Valsalva maneuvers, the catheter was removed. If a leak was detected at the anastomosis, the catheter was not removed, and the cystogram was repeated after a week.

RESULTS

All but one of the procedures was completed laparoscopically. The operative time became significantly shorter with experience, decreasing from an average of 591 minutes to an average of 305 minutes ($P < 0.001$)(Table 1). With increasing experience, there also was a decline in the likelihood of anastomotic leak (Table 2) and positive surgical margins (Table 3) and an improvement in the rate of urinary continence (no pads required) (Table 4). The SF-36 questionnaire indicated stability or improvement of most measures of quality of life at 6 months or later postoperatively (Fig. 4).

DISCUSSION

In 1991, Schuessler and colleagues[4] performed the first laparoscopic prostatectomy. They later reported their experience with nine patients.[5] They found that this technique did not offer any advantages over open surgery. In 1997, Raboy and associates[6] reported their first experience with extraperitoneal LRP, with subsequent publication of the results in two patients.[7] In 1999, Guillonneau and associates described the results of 65 patients undergoing transperitoneal LRP, of whom 91% were treated exclusively with a laparoscopic approach.[8] The mean operating time was 265 minutes, which is similar to that of conventional radical prostatectomy. In some centers, this procedure is performed extraperitoneally,[9,10] which currently is the preferred technique of one of authors (JR).

In our study, all procedures except one were completed laparoscopically as planned. This is very similar to the outcome of the initial series by Guillonneau and Vallancien.[11] The av-

Table 4. Functional and Oncologic Results

	Group 1	*Group 2*	*Group 3*
Mean follow-up (mos) (range)	27.3 (9–34)	13.5 (8–18)	4.38 (1–8)
Continence (no pads) (%)	80	70	92.3[a]
Potency (%)			
Preop	40	50	70
Postop	25 with Viagra (without Viagra 0)	35 (without Viagra 10%; with Viagra 25%)	45 (without Viagra 20%; with Viagra 25%)
Serum PSA (ng/dL)			
Preop	4.2 (1–6.7)	3.9 (2–5.7)	5.25 (1–12)
Postop	<0.1[b]	<0.1	<0.1[c]

[a] $P < 0.0001$.

[b] Except one patient, who had rising PSA and was treated with radiotherapy. His PSA is 0.1 ng/mL.

[c] Except one patient, whose patient PSA is stable at 0.4 ng/mL. This patient had perineural invasion.

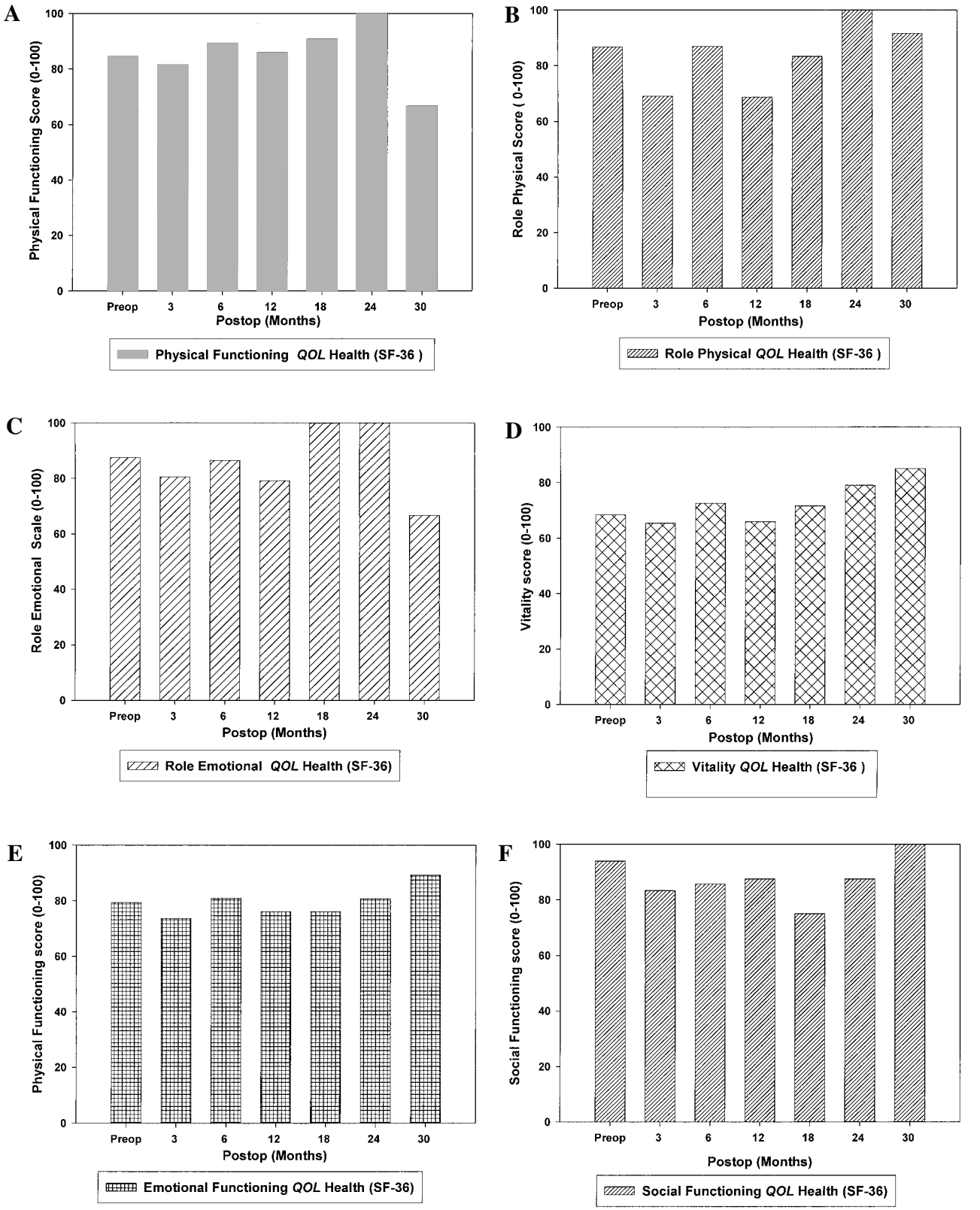
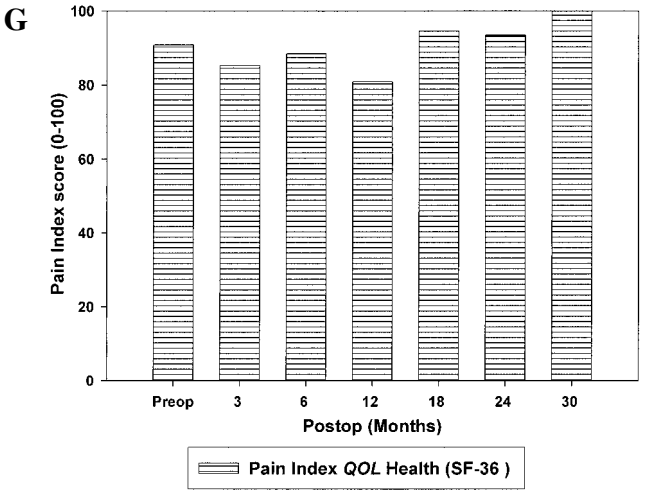
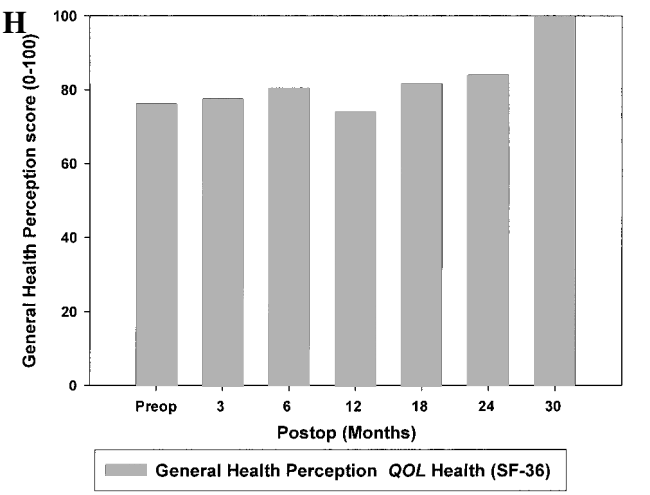
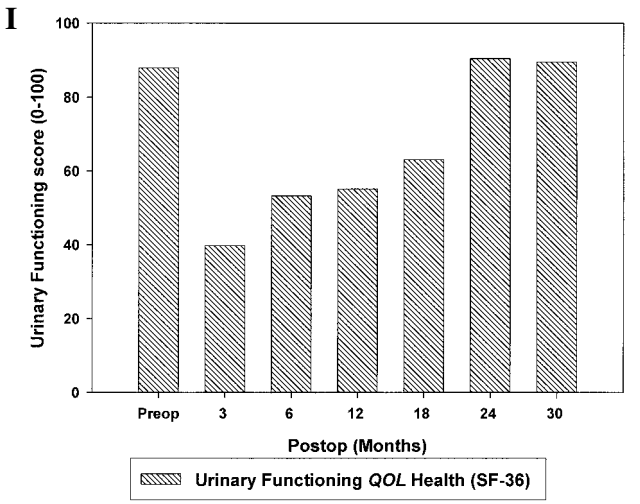
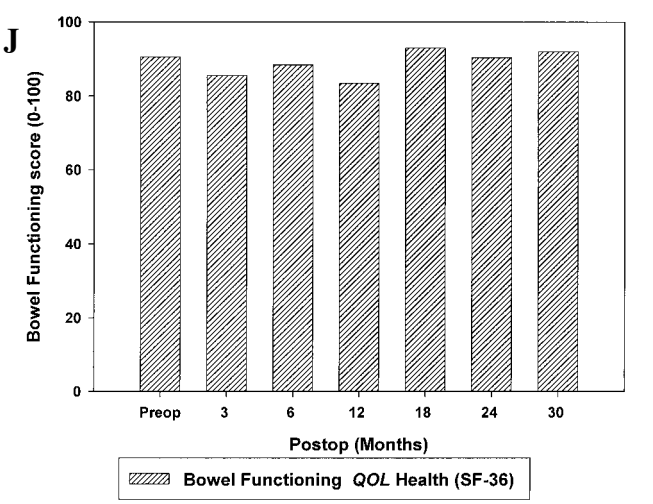


FIG. 4. Mean values on SF-36 QOL Health Survey Measurement (scale 0–100 for each measure) over time. (**A**) Physical functioning. (**B**) Role physical. (**C**) Role emotional. (**D**) Vitality. (**E**) Emotional functioning. (**F**) Social functioning. (**G**) Pain index. (**H**) General health perception. (**I**) Urinary functioning. (**J**) Bowel functioning. (**K**) Sexual functioning.









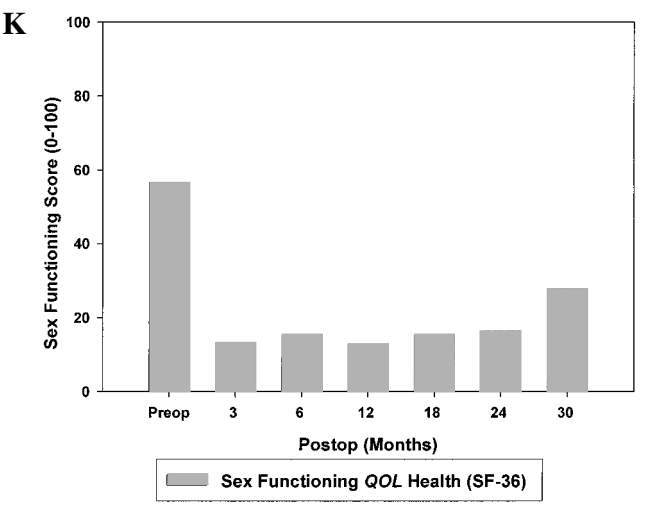


FIG. 4. (continued)

erage operating time was 423 ± 137.6 minutes (range 215–825 minutes), with the last 10 procedures taking 305 ± 63 minutes (range 215–420 minutes). The considerable learning curve of this technique is reflected in the sequential reduction of the operative times. The mean time in published series was 4 hours,[11] 4.7 hours,[12] 4.2 hours,[13] and 5 hours.[9] As experience becomes more extensive, time decreases, and in those centers with experience beyond 100 cases, operative times of 3 to 4 hours have become routine. For example, in the Cleveland Clinic experience, the mean operating time in the initial 50 cases was 5.2 hours, but it was reduced to 3.9 hours in the second 50 cases (I.S. Gill, personal communication). The operating time is likely to be shorter in the future as residents and fellows are exposed to this procedure during their training. Mentorship also can reduce the operating time and complications associated with early surgical experience.

We focused on cancer control, continence, and potency, in that order. The effectiveness of radical prostatectomy is measured acutely by margin status (pathology) and in the longer term by serum PSA concentration (biochemical) and cancer-specific survival (biologic). Our cancer control results were at least equivalent to those of conventional procedures. All but two patients had postoperative PSA values <0.1 ng/mL. One patient in group I had rising PSA and received radiotherapy; he now has a serum PSA concentration <0.1 ng/mL. The second patient (group III) has a PSA value stable at 0.4 ng/mL. In the most recent update of the Guillonneau and Vallancien series,[14] with all 1000 consecutive patients having a minimum follow-up of 1 year, the pathologic stage was $pT_{2a}N_0/N_x$ in 203 patients (20.3%), $pT_{2b}N_0/N_x$ in 572 (57.2%), $pT_{3a}N_0/N_x$ in 142 (14.2%), $pT_{3b}N_0/N_x$ in 77 (7.7%), and $pT_{1-3}N_1$ in 6 (0.6%). The positive surgical margin rate was 6.9%, 18.6%, 30%, and 34% for stages pT_{2a}, pT_{2b}, pT_{3a}, and pT_{3b}, respectively. The main predictors of a positive surgical margin were preoperative PSA, clinical stage, pathologic stage, and Gleason score. The overall actuarial biochemical progression-free survival rate was 90.5% at 3 years. Our positive surgical margins rate was 20% to 22% after the initial 10 cases. This rate decreased significantly after we became more meticulous about the apical dissection. Moreover, the positive margin rate in some large open retropubic prostatectomy series has been 20% to 39%.[15,16] In a recent publication comparing radical retropubic prostatectomy, radical perineal prostatectomy, and LRP, there was no difference in oncologic control in the three groups.[17] Preservation of the neurovascular bundles in patients with localized tumors had no significant effect on the subsequent risk of positive surgical margins or progression-free survival.

An important advantage of laparoscopic prostatectomy is the reduced blood loss. Our mean blood loss was 393.5 mL (range 100–1700 mL), and only four patients required autologous blood transfusion. The low blood loss is probably a result of the compression of small and medium-sized veins by the intraperitoneal pressure (10–15 mm Hg) and the excellent identification of details under laparoscopic magnification. Bleeding vessels are individually distinguishable and can be selectively coagulated. The blood loss reported by other groups is 402 mL (transfusion rate 10%),[11] 574 mL (transfusion rate 9%),[9] and 185 mL (transfusion rate 2%).[13] The transfusion rate was 31% with an average of 2.1 units being given in the Heilbronn series,[30] while the blood loss in series of Eden and colleagues averaged 313 mL (range 50–1300 mL) with a transfusion rate of 3%.[18] The average blood loss in open prostatectomy series is 800 to 1500 mL.[15,16]

Our mean hospital stay was 2.3 days (median 2 days). After the first 20 patients, the urethral catheter remained in place for an average of 8 days (range 6–10 days). This is similar to European series, where times of 6.6 days,[11] 8 days,[12] 5.5 to 19 days,[13] 4.2 days,[18] and 7 days[9] have been reported. Four patients in group I had a small anastomotic leak, while only one patient in group III had a leak.

TABLE 5. INTRAOPERATIVE DATA ON LRP FROM MAJOR EUROPEAN AND US CENTERS

Series	*No. pts.*	*Mean OR time (hours)*	*Mean blood loss (mL)*	*Transfusion (%)*	*Open conversion (%)*
Montsouris Institute, Paris Guillonneau et al, 1999[8] Guillonneau et al, 2001[38]	350	3.6	354	5.7	2.0
Creteil, Paris Hoznek et al, 2001[39]	134	3.5[a]	NR[b]	2.9	0
Brussels Bollens et al, 2001[9]	50	5.3	680	13	2.0
Heilbronn, Germany Rassweiler et al, 2001[12]	100	4.6	NR	31	5.0
Berlin Turk et al, 2001[29]	145	4.3	185	1.3	0
Cleveland Clinic Zippe et al, 2001[40]	50	5.4	225	2.0	2.0
Eden series (UK) Eden et al, 2002[18]	100	4.08	313	3.0	1.0
Washington University Current series, 2002	38	7.0	393	11	2.0

[a]Excluding first 20 patients, in which operative time was 6.5 hours.
[b]Not reported.

Urinary continence is a significant concern after open prostatectomy and remains a cause of serious morbidity in a small number of patients. In our study, 84.8% of the patients used no pads. Postoperatively, 27% were fully continent on removal of the Foley catheter; and at 1, 3, 6, and 9 months postoperatively, diurnal urinary control was reported by 30.3%, 48%, 72.7%, and 84.8% of patients, respectively. After the first 20 cases, our urinary control rate was 92.3%, which coincides with the modified and meticulous apical dissection. One patient needed an artificial urinary sphincter. Among the incontinent patients, 24.2% had urinary urgency, and one third of these patients reported urge incontinence.

Litwin and colleagues, using standardized questionnaires, found that only 61% of patients undergoing open prostatectomy return to baseline urinary function by 1 year postoperatively.[19] However, Walsh and associates[20] found "urinary bother" to be either "no problem" or only a "small problem" for 95% of patients at 1 year. In a similar study after open radical prostatec-

TABLE 6. PATHOLOGIC AND POSTOPERATIVE DATA FROM MAJOR EUROPEAN AND US CENTERS

Series	*Path stage (%)*	*Positive margins (%)*	*Hospital stay (days)*	*Catheter (days)*	*Continence (%) (mos postop)*
Montsouris Institute, Paris Guillonneau and Vallencien 2000[3,11]	T_{2a} (30.8) T_{2b} (56.8) T_{3a} (5.8) T_{3b} (5)	15	6	6.6	72 (6)
Heilbronn, Germany Rassweiler 2001[29]	$T_{1a/b}$ (1) T_{2a} (20) T_{2b} (29) T_{3a} (26) T_{3b} (20) T_4 (4)	16 (pT_2 2.3, pT_{3a} 15, pT_{3b} 34)	NR[a]	8	81 (6)
Berlin Turk 2001[13,29]	T_2 (61.6) T_{2c} (38.4)	26.4	8	5.5	86 (6)
Brussels Bollens et al, 2001[9]	T^{1a} (2.2) T^{2b} (8.5) T^{2b} (42.5) T^{2c} (2.2) T^{3a} (34) T^{3b} (10.6)	22	NR	7 (10.1 for initial 10 patients; decreased to 5.5 in last 10 patients	85 (6)
Creteil, Paris Abbou 2000,[28,41]	T_{2a} (88) T_{3a} (6.9) T_{3b} (5.1)	27.7 (16.8 in pT_2, 48.8 pT_3)	7.8 (6.1 after first 10 cases)	4	84 (1)
Cleveland Clinic Gill 2002 (personal communication) ≈300 LRP performed	1st 50	29.5	2.1	15	91 (6)
	2nd 50	25	1.6	4	94 (6)
Eden series (UK) Eden et al[18]	T_{1a} (2) T_{1a} (1) T_{2b} (57) T_{2b} (28) T_{2c} (9) T_{3a} (1) T_{3b} (2)	16 (pT_1, 15, pT_2 16, pT_3 33)	4.2	1st 32 patients 2–3 weeks; next 12 patients 1–4 days; remaining patients 10 days	90 (12)
Washington University Current series, 2002	Group I T_{1c} (80) T_{2a} (20)	40	2.4 (2–4)	18.4 (14–30)	80 (9)
	Group II T_{1c} (70) T_{2a} (30)	20	2.7 (2–7)	11.7 (10–14)	70 (9)
	Group III T_{1c} (43) T_{2a} (21) T_{2b} (29) T_{3a} (7)	22	2.3 (1–6)	8 (6–10)[b]	92.3 (4)

[a]NR = not reported.
[b]One patient, who had a catheter for 24 days for urinary incontinence, was excluded.

tomy, only 73.5% of patients listed urinary continence as "no problem" or a "small problem" at 1 year.[21] In the series reported by Catalona and colleagues,[22] recovery of continence was strongly correlated with younger age. Using the validated International Continence Society (ICS) male self-reported questionnaire, Guillonneau and Vallancien[23] found that among their first 133 patients with a minimum follow-up of 1 year, total continence (no pads needed during the day or night) was reported by 114 (85.5%), and another 14 (10.7%) were still wearing one pad every 24 hours. Five patients (3.8%) were severely incontinent. The continence rate in the literature has been between 78.3% and 93% at 1 year; however, the ICS questionnaire was not completed by the patients in all studies.[12,13,18,25] A study using the ICS questionnaire[24] found a much higher incidence of incontinence than is reported in the literature.

Laparoscopy, which offers optimal visibility, allows excellent identification and dissection of the neurovascular bundles and offers the potential for higher postoperative potency rates.[25] Guillonneau and associates[23] report an erection rate of 59% at 6 months postoperatively, and Bollens and colleagues[9] found a 9-month potency rate of 75% in patients who were potent preoperatively. Salomon and colleagues[26] reported erections at 1 month in 40% of patients undergoing bilateral nerve-sparing operation and in 22.2% of patients having a unilateral nerve-sparing procedure. Subsequent follow-up showed a potency rate of 53.8% compared with open surgery.[27] In the series described by Eden and associates,[18] 62% of patients were potent by 1 year if bilateral nerve sparing was used. Since the initial 20 cases, our potency rate in preoperatively potent patients is 45% with Viagra (sildenafil). This is attributable to initial case selection. The majority of our patients had moderate to severe erectile dysfunction preoperatively.

Our initial complication rate is similar to that in other LRP series. Complications consisted of one case each of intraoperative bladder injury, transient superficial peroneal nerve palsy, and bladder neck obstruction. The bladder injury was closed laparoscopically. The obstruction was caused by a bladder wall fold that was treated with transurethral resection with good results 14 months after surgery. In the series reported by Abbou and colleagues,[28] the anastomotic stricture rate was 1.3%. At the Annual Meeting of the EAU in 2002, Guillonneau and Vallancien reported overall complication rates of 5% (major) and 18% (minor). Turk[29] and Rassweiler[30] and their associates noted overall complications rates of 12% and 19%, with the majority of being minor.

Health-related QOL is important consideration when comparing different treatment modalities.[31,32] The SF-36[33] is a self-administered questionnaire that measures general health-related QOL utilizing eight scales: physical function, social function, bodily pain, emotional well being, energy fatigue, general health perceptions, role limitations caused by physical problems, and role limitations attributable to emotional problems. These scales are scored separately from 0 to 100, with higher scores signifying a better outcome. This questionnaire has been validated in several populations.[34] Surgery is still associated with pain and morbidity during recovery from the incision. Three months after open radical retropubic prostatectomy, 30% to 40% of patients have returned to their preoperative physical, mental, and social functioning, and this rate increases to 70% at 6 months and 86% to 97% by 1 year.[19,35] Quality-of-life issues related to LRP have not been studied, but the reduced morbidity from surgery and consequent faster full recovery resulted in much better QOL measurements at each time point than are seen in open-surgery series. Sexual functioning is low because a high percentage of the patients selected for this initial series had moderate to severe erectile difficulties preoperatively and because during one's initial experience, the nerve-sparing technique is difficult via a laparoscopic approach.

Robotic assistance could help shorten the learning curve associated with LRP.[36,37] However, the cost of the robot and its instrumentation may limit its application at this time.

CONCLUSION

The initial surgical experience with the LRP involves long operating times and a steep and long learning curve. The operating times for laparoscopic prostatectomy decrease significantly after the first 20 patients and will continue to decline with increasing experience. The continence rate improves significantly after the initial 20 patients, becoming similar to that following open surgery. Minimal bleeding, reduced blood transfusion rates, shorter hospitalization, and faster recovery are additional advantages for laparoscopic procedures. In sum, in experienced hands, LRP provides results equal to those of open surgery, as judged by local tumor control and the biochemical recurrence rate, with reduced morbidity (Tables 5 and 6).

ACKNOWLEDGMENT

Dr. Ralph V. Clayman helped start the laparoscopic radical prostatectomy program at Washington University, assisted with the first group of patients, and provided unending support.

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