

A COMPARISON OF MINIMALLY INVASIVE OPEN AND LAPAROSCOPIC RADICAL RETROPUBIC PROSTATECTOMY

THOMAS K. SLABAUGH, JR. AND FRAY F. MARSHALL

From the Department of Urology, Emory University Hospital, Atlanta, Georgia

ABSTRACT

Purpose: A cohort of more than 1,000 patients undergoing open minimally invasive radical retropubic prostatectomy (mini-lap RRP, 8.0 cm incision) is compared to published series of laparoscopic radical retropubic prostatectomy (RRP).

Materials and Methods: A cohort of 209 consecutive patients undergoing mini-lap RRP at Emory University Hospital was evaluated. Characteristics noted were patient age, comorbidity status, preoperative prostate specific antigen, operative time, perioperative complications, blood transfusions, pathological staging, potency and continence. Postoperative analgesia was analyzed in a cohort of 30 consecutive recent patients. These data were compared to published reports of similar perioperative characteristics in laparoscopic RRP series.

Results: Differences between the cohorts of patients reviewed were found in age, preoperative prostate specific antigen, operative time and rate of blood transfusion. The series were comparable in comorbidity status, postoperative complications, rates of incontinence, rates of impotence and margin positivity. Analgesic use was quantified in a small group of patients according to the amount of narcotic analgesia required during the postoperative hospital stay.

Conclusions: Mini-lap RRP can generally be performed in less time and at less cost than most laparoscopic radical prostatectomies. It can be performed with regional anesthesia and has excellent postoperative results compared to contemporary laparoscopic procedures. Mini-lap RRP requires less training than laparoscopic RRP. With its minimal morbidity, mini-lap RRP remains an attractive technique that can easily be adopted by the experienced retropubic surgeon.

KEY WORDS: prostatic neoplasms, prostatectomy, laparotomy

Radical prostatectomy is the most commonly performed operation for localized adenocarcinoma of the prostate. Refinements in the understanding of prostate and pelvic anatomy have decreased the morbidity of the procedure and have led to a more widespread acceptance. The mini-laparotomy radical retropubic prostatectomy (mini-lap RRP) using a 7 to 8 cm incision and a customized retractor system has been previously described.¹ This approach to radical retropubic prostatectomy (RRP) compares favorably in biochemical outcome and complication rates to the classically described radical retropubic approach.² Mini-lap RRP also has the advantages of extraperitoneal exposure and regional anesthesia.

Today, as more urologists become familiar with laparoscopic approaches to open operations there is interest in perfecting the laparoscopic radical prostatectomy. Several pioneers have refined the laparoscopic procedure with comparable results to the open operation. Guilloneau et al presented a series of 1,000 patients who had undergone laparoscopic radical prostatectomy with satisfactory local tumor control and biochemical outcome.³ Potential advantages of the laparoscopic approach theoretically include shorter hospital stay, decreased pain medicine requirements, decreased catheter time and accelerated return to daily activities.

We analyzed a cohort of 209 patients treated with mini-lap RRP by a single surgeon at our university. We then compared these results to published reports from the literature regarding outcomes of the laparoscopic radical prostatectomy. Our analysis showed that mini-lap RRP compares favorably with published laparoscopic series.

MATERIALS AND METHODS

A retrospective review was performed on 209 consecutive patients undergoing mini-lap radical prostatectomy and pel-

vic lymphadenectomy by a single surgeon from February 1999 through August 2001. Patient characteristics were reviewed including age, comorbid status, body mass index, preoperative/postoperative prostate specific antigen (PSA), preoperative/postoperative continence, and preoperative/postoperative potency. Operative characteristics noted included time of operation, estimated blood loss, transfusion rate, nerve sparing procedure, pain medicine requirements and hospital length of stay. Finally, pathological features were reviewed, including preoperative/postoperative Gleason grade, clinical and pathological stage, margin positivity and rate of biochemical recurrence.

A literature search was performed identifying similar series in the laparoscopic prostatectomy data. The key words "prostate cancer," "prostatectomy" and "laparoscopy" were used in the search and 93 related articles were identified. Data from the mini-lap RRP cohort were compared to data in the selected series of Guilloneau^{3,4} and Rassweiler⁵ et al.

Using a chi-square test, statistical analysis was performed to compare the mini-lap data to the 2 laparoscopic series, and *p* values were calculated to determine statistical significance between the data. The groups were compared in clinical stage, Gleason grade, preoperative PSA, operating room (OR) time, estimated blood loss, transfusion rate, conversion rate, complication profile, catheter days, hospital stay, pathological stage, continence and erectile function.

The mini-lap RRP is executed through a 7 to 8 cm infraumbilical incision. In all of our patients a bilateral pelvic lymph node dissection was performed. A customized retractor system was used to provide exposure. A laparoscopic lens and camera were used for visualization as well as to aid surgical assistants. The details of the procedure have been described previously.¹

We also retrospectively analyzed a separate, recent cohort

of 30 consecutive men undergoing mini-lap RRP with respect to the amount of narcotic required for analgesia. This group was selected secondary to a change in our template postoperative orders to include a nonsteroidal anti-inflammatory agent, ketorolac tromethamine. All patients undergoing the mini-lap RRP now receive ketorolac in the absence of renal insufficiency and/or an estimated blood loss (EBL) of greater than 800 cc. The amount of intravenous and oral narcotic agent was quantified by reviewing the medication administration records. Narcotics were given in the form of intravenous morphine and oral oxycodone/acetaminophen (5mg/325 mg). Patients who did not have renal insufficiency and/or greater than 800 cc EBL were given 30 mg ketorolac intravenously every 6 hours for 48 hours. We now actually have decreased the amount of ketorolac given to a maximum of 6 doses in 2 days.

RESULTS

Mini-lap RRP with pelvic lymphadenectomy was performed by a single surgeon in 209 patients from February 1999 to August 2001. Preoperative characteristics were compared between the mini-lap cohort and the laparoscopic groups (table 1). Preoperative clinical stage in the mini-lap cohort was similar to that found in the large cohort of patients studied by Guillonnet al.³ Gleason score and preoperative PSA were also similar among all of the groups.

Perioperative characteristics were also examined in the 3 groups of patients (table 2). Operating room time was noticeably shorter in the mini-lap group compared to the 2 laparoscopic groups. It should also be noted that a pelvic lymph node dissection was performed in all cases of the mini-lap prostatectomy and not in some patients in comparison groups. Mean EBL in the mini-lap cohort was 995 cc, which was significantly higher than that of the cohort presented by Guillonnet al.³ The allogenic transfusion rate in the mini-lap group was 4% which is comparable to the laparoscopic studies. Previously, autologous transfusion did occur at a higher rate if blood had been donated preoperatively, although autologous blood donation is no longer recommended.

Postoperative complications were also compared (table 2). Complications such as urinary retention, pelvic hematoma, ureteral injury, urinoma, bowel injury, wound infection, ileus, incisional hernia, anastomotic leak, thromboembolism and pneumonia occurred with low frequency or not at all. The patients in the mini-lap cohort retained a Foley catheter for a mean of 14 days. A cystogram was not performed before removal on any patient. The number of catheter days was significantly lower for the laparoscopic groups that did have a cystogram performed before catheter removal.

Patients in the mini-lap group stayed in the hospital for a mean of 3 days, although a 48-hour hospital stay is now common. In the 2 cohorts from the laparoscopic literature the hospital stay was much longer (table 2). It is difficult to draw

any conclusions from this difference because of variances in the European and American health care systems.

Postoperative pathological characteristics revealed that those of the mini-lap group were similar to those of the laparoscopic groups with the majority of cases in the range of pT2a–pT3a (table 3). Margin positivity in the mini-lap group was 10%, which was significantly lower than that of the series of Rassweiler et al (21%)⁵ ($p < 0.01$).

PSA recurrence was 4% in the mini-lap group (table 3). Followup for the mini-lap group was 20.5 months. This rate is similar, if not slightly lower than that of the laparoscopic cohort of Guillonnet al.³ but the difference was not statistically significant. Our patients (36) who were lost to followup were not included in the study.

Postoperative continence and potency were also evaluated in the mini-lap cohort. With a mean followup of 20.5 months 97.3% of patients were continent, as defined by 0 to 1 pad per day. In the series of Rassweiler et al the continence rates at 12 months were 90.3% and 91.7% ($p < 0.01$, 0.02). Potency, as defined by vaginal penetration with or without sildenafil, was 58% in the mini-lap group overall. If the patients with preoperative erectile dysfunction were excluded from analysis, the postoperative potency rate was 78%. Nerve sparing was performed in 91% of the patients in the mini-lap group (bilateral 61%, unilateral 30%) which is a much higher percentage than that in the series of Rassweiler et al (16.9% early and 33.8% late groups, $p < 0.001$). Of the mini-lap cases 30% were designated unilateral nerve sparing during an assessment after the prostate was removed. Many of these patients actually underwent only partial resection of the bundle on 1 side rather than complete excision.

We quantified the use of narcotics for postoperative analgesia in a group of 30 recent patients (table 4). These results are not directly compared to the laparoscopic data due to a lack of consistency with medications and methods.

DISCUSSION

Radical prostatectomy remains an effective treatment for localized prostate cancer, and the retroperitoneal approach is the most frequent method of choice. The mini-lap radical retroperitoneal prostatectomy and laparoscopic prostatectomy are procedures designed to minimize morbidity while still provide the same standard of care. The mini-lap and laparoscopic approaches have been shown to be comparable to the classic RRP. Despite great advances in the field of laparoscopy, popularity of laparoscopic prostatectomy is lower because of the increased difficulty of the operation, a steep learning curve and longer operating times.

The mini-lap RRP has several advantages that contribute to decreased morbidity. The procedure is performed through a small (8 cm) infraumbilical incision. It is a completely extraperitoneal procedure that can be performed with regional anesthesia. Recently, a laparoscopic technique for extraperitoneal prostatectomy has been described.^{6,7}

TABLE 1. Preoperative characteristics

	Mini-Lap	Laparoscopic		
		Guillonnet al ⁴	Rassweiler et al (early group) ⁵	Rassweiler et al (late group) ⁵
No. pts	209	1,000	219	219
Pt age (range)	58 (43–72)	63 (44–77)	64 (43–76)	64 (44–81)
% Clinical stage (No.):				
T1a/b	0.5 (1)	0.9 (9)	–	–
T1c	64 (133)	66 (660)	–	–
T2a	29 (61)	30.4 (304)	–	–
T2b	6 (13)	2.7 (27)	–	–
T3	0.5 (1)	–	–	–
Mean Gleason score	6	6	6	6
Mean preop PSA	7	10	14.6	10.6

TABLE 2. Operative and perioperative characteristics

	Mini-Lap	Laparoscopic		
		Guillemot et al ³	Rassweiler et al (early group) ⁵	Rassweiler et al (late group) ⁵
No. pts	209	567	219	219
Mean OR (mins)	166*	244*	288	218
Mean EBL (cc)	995	380	1,100	800
% Transfusion rate	4 (8 allogenic)	4.9 (28 total)	30.1 (14.2 mean)	9.6 (5.5 mean)
% Conversion to open	0		3.7	0.5
% Complications (No.):				
Retention	0	4.6 (26)	—	
Hematoma	0.5 (1)	—	(7)	(3)
Ureteral injury/urinoma	0	0.5 (3)		
Bowel injury	0	1.4 (11)	(3)	(0)
Wound infection	0	0.7 (4)	—	
Ileus	1 (2)	1 (6)	2.8	
Incisional hernia	0			
Anastomotic leak	0 (clinical)	10 (57)	2.2	
Deep venous thrombosis	0.8 (1)	0.3		
Pulmonary embolism/pneumonia	0		(1)	(1)
Mean catheter days	14.0	5.8	7	7
Mean hospital days	3.0	6.2	12	11

* Includes lymph node dissection.

TABLE 3. Postoperative characteristics

	Mini-Lap	Laparoscopic		
		Guillemot et al ⁴	Rassweiler et al (early group) ⁵	Rassweiler et al (late group) ⁵
No. pts	209	1,000	219	219
% Stage (No.):				
PIN	0.5 (1)	—	—	
pT1a/b	0.5 (1)	—	2.3 (5)	0.5 (1)
pT2a	21 (43)	20.3 (203)	19.9 (43)	17.8 (39)
pT2b	61 (128)	57.2 (572)	33.3 (73)	47 (103)
pT3a	12 (25)	14.2 (142)	24.2 (63)	22.4 (49)
pT3b	4 (9)	7.7 (77)	16.2 (35)	10 (22)
pT4	1 (2)	—	4.6 (10)	2.3 (5)
Mean Gleason score	6	—	6	6
% Pos margins (No.)	10 (20) (p <0.01, p <0.001)	19.2 (192)	21 (46) (p <0.01)	23.7 (52) (p <0.001)
% PSA recurrence-free (No.)	96 (201)	90.5 (905)	86.8 (190)	—

TABLE 4. Total use of narcotics for postoperative analgesia in most recent 30 patients during hospital stay

	EBL Less Than 800 (24 pts)	EBL Greater Than 800 (6 pts)*
Mean EBL vol (cc)	661	1,141
Mean morphine (mg)	3.87	5.33
Mean No. oxycodone tablets	8.83	10.83

* Did not receive ketorolac.

The patients tend to do well postoperatively with minimal use of narcotics. In a recent cohort 30 patients undergoing mini-lap prostatectomy used an average of 3.87 mg of intravenous narcotic and 8.83 tablets of oxycodone/acetaminophen during the entire hospital stay (48 to 72 hours). Postoperative pain seems to be well controlled using nonsteroidal anti-inflammatory agents as evidence by the decreased narcotic use after exclusion of the high blood loss group greater than 800 cc, table 4. In addition, a local anesthetic (1% bupivacaine) is used routinely before the skin incision. Although it is difficult to draw direct comparison, this level of narcotic use seems to approximate that of the laparoscopic groups. These factors contribute to decreased morbidity and decreased hospital stay following mini-lap RRP. Pathological parameters must also be considered when comparing oncologic surgical procedures. The mini-lap RRP has similar postoperative parameters compared to conventional and laparoscopic prostatectomy but the margin positivity appears to be significantly lower in the mini-lap group (10%).

Perioperative characteristics, such as operating room time, blood loss and transfusion rate, were examined. The OR time for mini-lap RRP was significantly shorter than that for the

laparoscopic procedure. On the other hand, estimated blood loss favors the laparoscopic groups but transfusion rates were similar. Both procedures have a learning curve, which is illustrated by the improvement in OR time in the laparoscopic group. We also saw improvement in blood loss in the mini-lap group. On review of 30 recent procedures mean blood loss was 661 cc. This improvement in blood loss is likely due to a more fastidious approach with regard to bleeding and the adjunctive use of surgical hemostatic devices such as bipolar electrocautery.

A lack of intra-institutional comparison is a shortcoming of our analysis. Such an analysis would allow us to control for variables such as surgeon, postoperative care, analgesic administration and analysis of outcomes, and provide for a direct comparison of the techniques. We hope in the future to be able to perform such an analysis.

The mini-lap and laparoscopic approaches to radical prostatectomy are effective procedures. Because of the similarities between conventional prostatectomy and mini-lap RRP, the mini-lap can be easily adopted by urologists not familiar with laparoscopy. On the other hand, the laparoscopic technique entails a steeper learning curve, often requiring a mentor,⁸ and necessitates performance of a large number of cases before more acceptable results are obtained.

As time progresses, substantial progress will continue to be made in the field of laparoscopic prostatectomy. Robotic prostatectomy with stereoscopic vision and improved instrumentation may prove to be significantly better than the more typical laparoscopic operation.⁹ Until then, a clear advantage of laparoscopic prostatectomy has not been shown. The mini-lap, with its decreased morbidity, remains an attractive tech-

nique that can be easily adopted by the experienced retropubic surgeon.

REFERENCES

1. Marshall, F. F., Chan, D., Partin, A. W., Gurganus, R. and Hortopan, S. C.: Minilaparotomy radical retropubic prostatectomy: technique and results. *J Urol*, **160**: 2440, 1998
2. Walsh, P. C., Retik, A. B., Vaughan, E. D., Jr. and Wein, A. J.: *Campbell's Urology*, 8th ed. Philadelphia: W. B. Saunders Co., vol. 4, pp. 3128, 3954, 2002
3. Guillonneau, B., El-Fettouh, H., Baumert, H., Cathelineau, X., Doublet, J. D., Fromont, G. et al: Laparoscopic radical prostatectomy: oncological evaluation after 1,000 cases a Montsouris Institute. *J Urol*, **169**: 1261, 2003
4. Guillonneau, B., Rozet, F., Cathelineau, X., Lay, F., Barret, E., Doublet, J.-D. et al: Perioperative complications of laparoscopic radical prostatectomy: the Montsouris 3-year experience. *J Urol*, **167**: 51, 2002
5. Rassweiler, J., Seemann, O., Schulze, M., Teber, D., Hatzinger, M. and Frede, T.: Laparoscopic versus open radical prostatectomy: a comparative study at a single institution. *J Urol*, **169**: 1689, 2003
6. Stolzenburg, J.-U., Do, M., Rabenalt, R., Pfeiffer, H., Horn, L., Truss, M. C. et al: Endoscopic extraperitoneal radical prostatectomy: initial experience after 70 procedures. *J Urol*, **169**: 2066, 2003
7. Gettman, M. T., Hoznek, A., Salomon, L., Katz, R., Borkowski, T., Antiphon, P. et al: Laparoscopic radical prostatectomy: description of the extraperitoneal approach using the da Vinci robotic system. *J Urol*, **170**: 416, 2003
8. Fabrizio, M. D., Tüerk, I. and Schellhammer, P. F.: Laparoscopic radical prostatectomy: decreasing the learning curve using a mentor initiated approach. *J Urol*, **169**: 2063, 2003
9. Menon, M., Shrivastava, A., Tewari, A., Saple, R., Hemal, A., Peabody, J. O. et al: Laparoscopic and robot assisted radical prostatectomy: establishment of a structured program and preliminary analysis of outcomes. *J Urol*, **168**: 945, 2002