ANNALS OF SURGERY
Vol. 220, No. 4, 586-597

Pelvic Resection of Recurrent Rectal Cancer

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Objective

The authors describe their experience with pelvic resection of recurrent rectal cancer with emphasis on patient selection for curative intent based on known tumor risk factors.

Summary Background Data

Pelvic recurrence is a formidable problem in 30% of patients who have undergone a curative resection of primary rectal cancer. Although radiation can reduce the development of local recurrence and can provide palliation to many patients with localized disease, it is not curative. The authors and others have used the technique of abdominal sacral resection (ABSR) with or without pelvic exenteration to resect pelvic recurrence and its musculoskeletal extensions in selected patients with satisfactory long-term survival.

Methods

The technique of ABSR with or without pelvic exenteration or resection of pelvic viscera, which the authors have described previously, was used in 53 patients with recurrent rectal cancer—47 patients for curative intent and 6 for palliation. Previous surgeries were abdominal perineal resections (APRs) in 26 patients, anterior resections in 19 patients, and other procedures in 2 patients; original primary Dukes' stage was B in 52% and C in 48%. Almost all patients had been irradiated previously, generally in the 4000 to 5900 cGy range. Preoperative carcinoembryonic antigen (CEA) levels (before ABSR) were elevated (>5 ng/mL) in 54%.

Results

Postoperative morbidity was encountered in most patients. Mortality was 8.5% in the curative group. Long-term survival for 4 years was achieved in 14 of 43 patients (33%), and 10 patients were alive with an acceptable quality of life after 5 years. Patients who had previous anterior resections or whose preoperative CEA levels were less than 10 ng/mL had a survival rate of approximately 45%, whereas patients with previous APRs and preoperative CEA levels greater than 10 ng/mL had a survival rate of only 15% to 18%. Patients with bone marrow invasion, positive margins, or pelvic node metastases had a median survival of only 10 months.

Conclusions

Pelvic recurrence of rectal cancer can be resected safely with expectation of long-term survival of 33%. Patient selection based on known risk factors can identify patients most likely to benefit from resection and eliminate those who should be treated for palliation only.

Pelvic recurrence is a formidable problem in 30% of patients who have undergone curative resections of primary rectal cancer. Although radiation can reduce the development of local recurrence and can provide palliation to many with localized disease, it is not curative. We and others have used the technique of abdominal sacral resection (ABSR) with or without exenteration to resect pelvic recurrence and its musculoskeletal extensions in selected patients and are reporting a long-term survival in 33% of these patients. The major emphasis in the current study is an assessment of the factors that are correlated with risk for recurrence after ABSR in an effort to improve patient selection. Such risk factors include the free interval between the original primary surgery and the recurrence, the Dukes' stage of the primary cancer, the type of surgery done for the primary cancer, and the carcinoembryonic antigen (CEA) level before abdominal sacral resection. Also of additional importance to patient outcome are the local tumor factors demonstrated at surgery, including nodal status, marrow involvement, and whether clear margins can be obtained at resection.

Local regional disease in the pelvis is the most common pattern of recurrence from rectal cancer. A review of several large series demonstrates that isolated local recurrences were found in 16% (7–33%) of patients after curative resection of rectal cancer, combined local and systemic recurrences were found in 17% (7–30%), and systemic recurrences alone were found in 13% (6–19%).[1,2,5–12] In the original study by Gunderson and Sosin of patients who had second-look surgery for recurrent disease after curative resection of rectal cancer, 33% had local recurrences only, 30% had systemic and local recurrences, and 7% had systemic recurrences only. In the study by Cass et al.,[6] the incidence of local recurrence was related to the original stage of the primary cancer and ranged from 15% for B1 to 27% for B2, 21% for C1, and 52% for C2. The survival rate after local regional recurrence is <4% at 4 years for patients with rectal cancer treated without surgery. Most patients die from isolated disease. In the series by Gunderson and Sosin, recurrence of pelvic disease resulted in a median life expectancy of 7 months; half of the patients died with disease confined to the pelvis.[8] In the series by Rao et al.,[9] survival after recurrent colorectal cancer was 13 months, with a much less favorable survival time for patients with regional recurrences. In a review by Pilipshen et al.[10] of 105 patients with pelvic recurrence, 89% of the patients died of their disease, 7% were alive with disease, and only 4% were clinically free of disease at the close of the study.

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Accepted for publication April 11, 1994.

Although numerous series have reported aggressive surgical resection for localized recurrence after primary colon cancer resection, the options for the patient with rectal cancer are much less. In a study by Vassilopoulos et al., re-resection of an anastomotic recurrence was done in 30 patients, 19 for recurrence in the colon and 11 for recurrence after anterior resection of rectal cancer.[3] Survival was dictated by completeness of resection. The median and 5-year survivals were 59 months and 49%, respectively, for 15 patients having complete resection, 17 months for the 10 patients with residual microscopic tumors after resections, and 8 months for those patients with gross residual disease after residual disease after resections.

There are several series that report resection of local recurrence from rectal cancer.[19–23] In a collected series of 45 patients who had local recurrences after previous anterior resections and who were then re-resected by abdominal perineal resection (APR), 19 (42%) were surviving at the time of this report (median 6–20 months).[19–21] Re-resection of perineal recurrence in patients after APR had a more ominous outcome, with all patients dying of disease, with a median survival of 12 months.[22] In a mixed series of patients reported by Schiessel et al.,[23] who failed after anterior resection or APR, re-resection by either APR or extended resections including sacral resection of nine patients resulted in a 30%, 3-year survival. Most of the recurrences after APRs and a large number of those after low anterior resections are true pelvic re-

Table 1. PELVIC RESECTION OF RECURRENT RECTAL CANCER—PREVIOUS SURGERY AND STAGE OF ORIGINAL PRIMARY CANCER

Previous resection of rectal cancer*	No. of Patients
APR	25
APR + Hepatic Lobectomy	1
Anterior-(Low) Resection	17
AR + Trisegmentectomy	1
Advanced Primary	3
Stage of primary cancer	**No. of Patients (%)**
A	1 (2%)
B	2 (5%)
B1	2 (5%)
B2	14 (33%)
B3	3 (7%)
C	10 (24%)
C1	1 (2%)
C2	9 (21%)
Stage missing	5

* Recestions without curative intent.

47 patients; 29 men, 18 women; average age = 59 years of age (range = 40–77 yr).

Table 2. PREVIOUS RADIATION

cGy	Patients	Percent
3000	2	4
4000–4600	19	42
5000–5900	17	38
6000–6500	1	9
8300	1	2
11613	1	2
None/unknown	3	

Table 4. CEA LEVEL BEFORE PELVIC RESECTION

CEA Level (ng/mL)	Patients
0.5–5	18 (46%)
6–10	3 (7.7%)
10–50	11 (28%)
50–100	4 (10%)
100–1000	3 (7.7%)
Unknown = 8	39

currences, involving the posterior pelvis with invasion into the sacrum or the posterior pelvic side wall and are amenable to resection only, by a composite resection of the involved viscera and musculoskeletal elements. There are now several published series incorporating abdominal sacral resection for recurrent rectal cancer.[24–28] This concept was advanced years ago by Brunschwig. who combined exenteration with resection of the bony segments of the pelvis.[29]

This current report focuses on patient selection factors with an emphasis on indicators of tumor aggressiveness, including the free interval period after primary resection, the initial type of resection required (APR *vs.* low anterior resection), the tumor stage, and the preoperative CEA level.

METHODS AND MATERIALS

Fifty-four patients underwent posterior pelvic resections for recurrent rectal cancer between 1976 and 1993; techniques previously described were used.[14,17,30] Forty-seven had resections with curative intent and seven underwent palliative resections. The group that underwent palliative resections has been discussed previously, and the focus is on the 47 patients who underwent curative resections. There were 29 men and 18 women; the average age was 59 years (range 40–77 years). Previous resections included APRs for 24 patients plus an hepatic lobectomy for 1, low anterior resections for 18 patients with an additional low anterior resection and trisegmentectomy in 1 patient (Table 1), and resections for advanced primary cancer for 2 patients (Tables 1). The stage of the primary cancers staged are shown in Table 1. Approximately half were Dukes' stage B, and the remainder were Dukes' stage C. All but three had been radiated according to the factors given in Table 2. Approximately 42% had received between 4000 and 4600 cGy, and 38% had received between 5000 and 5900 cGy, with outliers on both sides of this dose. For three patients, the radiation dosage was unknown.

Table 3. FREE INTERVAL AFTER PRIMARY RESECTION

Interval	Percent
<12 mo	28
13–24 mo	36
25–36 mo	17
37–60 mo	13
61–84 mo	2

The free interval after the curative resection was less than 12 months in 28% of the patients, 13 to 24 months in 36%, and more than 24 months in 32% (Table 3). Carcinoembryonic antigen levels were obtained in all but eight patients undergoing posterior pelvic resections (Table 4). Eighteen patients (46%) had presacral resection levels of 0.5 to 5 ng/mL, 3 (7.7%) had values in the 6 to 10 ng/mL range, and the remaining 46% had values > 10 ng/mL. The overall group of 54 patients (47 for cure and 7 for palliation) underwent posterior pelvic resections; There were four operative deaths in the overall group (7.4%). The postoperative deaths (60-day deaths) occurred in 47 patients who had curative resections (rate 8.5%). Almost all of the patients required other organ resections, and more than half required exenterative-type procedures, as noted in Table 5. More than half required ileal conduits. The extent of the resections are shown in Table 6. In most cases, a mid-level (S2 or S3) or high (between S1 and 2) resection was done, with one patient requiring an L5, S1 resection. Pelvic node dissections were done in all patients but one, as part of the initial intraoperative staging maneuver. Pathologic findings are shown in Table 7. Other organ invasions including bladder, ureters, and internal reproductive organs in women, were observed in three quarters of the patients. Extension into the periosteum of the sacrum was noted in 17 patients, and marrow involvement was noted in 6. The surgical margins were clear in 39 patients, but were microscopically close (2 mm) in 6 patients and were microscopically involved in 7 patients. (Table 7) Mean operative blood loss was 7393 mL in the first 24 patients and 11,700 mL in patients 25 through 47. Mean opera-

Table 5. PELVIC RESECTION OF RECURRENT RECTAL CANCER

Other Organs Resected	No. of Patients
Rectum	18
Bladder*	25
Partial bladder resection	2
Prostate/seminal vesicles	19
Vagina	7
TAH†	8
Segmental Bowel Resection	8
	8

Total-multiple visceral resection on 47 patients.
* All required ileal conduit.
† Total abdominal hysterectomy.

Table 6. LEVEL OF SACRAL RESECTION IN PELVIC RESECTION GROUP

Level of Sacral Resection	No. of Patients (47)
L5-S1	1
High S1 or S1-2	26
Mid S2 or S3	14
Low S4-5*	6
Added resection	
Pelvic vessels—sidewall	2
Pelvic lymph node dissection	46

* 4 patients resected via anterior approach

Table 7. PATHOLOGIC EXTENT OF DISEASE IN PELVIC RESECTION GROUP

Extent of Tumor Invasion	No. of Patients
Organ invasion	
Sacrum	
Periosteum	17
Marrow	6
Plus sidewall	6
Bladder/ureters	23
With prostate/seminal vesicles	9
With uterus/vagina	6
Pelvic lymph nodes* (46 dissections; lateral hypogastric and obturator nodes)	
lymph nodes negative	
Obturator node positive	
Para aorta node positive	
Surgical margins (histologic)	
Clear	34
Close (2 mm)	6
Margin involved	7

Table 8. OPERATIVE BLOOD LOSS AND TIME

	Patients
Operative blood loss	
Estimated Blood Loss	
7,393 cc	1–24
11,700 cc	25–47
Operative time*	
18.5 (7.5–25) hr	1–24
20.13 (10–26) hr	25–47

* 1st stage = 12 hr (9–18 h); 2nd stage = 8.3 hr (4–12 h).
4 patients—single stage = average 11.26 hr (7 1/2 = 14 hrs.)

tive time was 12 hours for first stage and 8.3 hours for second stage; overall mean time was 18.5 hours in the first 24 patients and 20 hours in the second group (patients 25–47) (Table 8). Complications were common in many patients and included cardiopulmonary, sepsis, fistula, major wound complications (infection), and flap separations. Six patients had peroneal nerve palsy (all resolved) and five had venous thromboses or arterial ischemia (Table 9).

RESULTS

Long-term survival was obtained in 14 patients (living 46–206 months) (Table 10). These 14 patients make up 33% of the 43 patients with more than 48 months follow-up. The overall survival was 33%, and disease-free survival was 27%.(Figs. 1 and 2). Among the survivors, ten patients were alive with no evidence of disease (NED) from 60 to 206 months—one had a recurrence at 61 months and died of disease at 82 months; one had a recurrence and is living with disease at 61 months; and one patient who was NED at 60 months died of disease at 102 months. One patient was NED at 60 months, but required a liver resection for metastases at 48 months. There were four patients who died between the fourth to the fifth years (46, 51, 53, and 57 months).

The following prognostic factors were examined: disease-free interval after the initial survey, Dukes' stage of the primary cancer, type of initial operative procedures for the primary cancer, and CEA level before resection of the recurrence. The disease-free interval—using either the 12-month break point or the 24-month break point—showed no significant relationship to outcome.(Table 11) There were 22 patients who previously had APRs *versus* 16 who had anterior resections, all of whom were observed for follow-up for more than 4 years (Table 12). The median survival in the patients who had previous APRs was 22 months (5-yr = 15%) *versus* 57

Table 9. PELVIC RESECTION—MORBIDITY AND MORTALITY IN 47 PATIENTS

Perioperative mortality	4 (8.5%)
Complications	
Cardiovascular	
Myocardial ischemia arrthymia	2
Pneumonia	2
Pulmonary insufficiency (prolonged enturbation/ARDS)	9
Intraoperative coagulopathy	1
Postoperative hemorrhage	6
Fistula	
Small bowel/large bowel	6
Bladder/ureteral	3
Infection	
Sepsis	16
Urinary tract	6
Wound complications	
Wound infection	9
Posterior wound infection/flap separation	18
Bowel/urinary dehiscence	
Small bowel obstruction	4
Renal failure	7
Hydronephrosis, ureteral stricture	2
Bowel/urinary dehiscence	
Urinary incontinence	4
Vascular/nerve (Ileal conduit leak)	1
Perineal nerve palsy	6
Deep venous thrombosis	5
Arterial transection/ischemia	2
Myonecrosis	1
Hepatic failure	1

n = 47.

months (5-yr = 46%) in the group that had anterior resections ($p = < 0.001$, Table 12, Fig. 3). The comparison of the Dukes' stage of the primary cancer with outcome after ABSR showed an approximate equivalent failure rate overall for Dukes' BVC cancer. The median survival was 51 months for patients who were initially Dukes' stage B *versus* 31 months for the patients who were initially Dukes' stage C (p = NS; Table 13). The preoperative CEA level, as measured before abdominal sacral resection, was related to outcome (Table 14, Fig 4). A significantly more favorable survival was seen in patients with low CEA levels. Patients with CEA levels less than 10 ng/mL had a median survival of 57 months (5-yr = 44%) compared with those with CEA greater than 10 ng/mL, in which the median survival was 31 months (5-yr = 17.8%; p = 0.04 by log rank, and p = 0.07 by Wilcoxon). A very high-risk group consisted of ten patients who had combination marrow invasion (four patients), positive margins (four patients), or who had peripelvic nodal metastases (two patients), in whom median survival was 10 months (Table 15). Re-recurrence after abdominal sacral resection was documented in 27 patients (Table 16). One third were local failure; 15% each had liver, intra-abdominal, or lung metastases (+/− other organ involvement). Four patients (15%) had bone metastases.

DISCUSSION

Abdominal sacral resection with exenteration is a viable option for patients who develop pelvic recurrences of primary resection of rectal cancer. In addition to conventional selection factors based on medical and patient physiologic concerns, certain tumor related factors appear to have long-term impact. The overall salvage in these patients is 33%, with a 29% disease-free survival at 5 years. Fourteen of the patients in these series were alive beyond 46 months and ten were alive at 60 months. However, there continues to be an ongoing diminution in survival because of recurrence. The sites of recurrence include local or regional +/− bone involvement in about one third of the patients, with the remaining showing metastases to the liver, lung, or viscera or soft tissues within the abdominal cavity. Among the clinical factors that had a major survival impact are the type of initial primary surgery (APR *vs.* AR) and the preoperative CEA at the time of recurrence or at the time of the pelvic resection. Patients who underwent operations for recurrences after initial anterior resections or whose preoperative CEAs were less than 10 ng/mL had an actuarial survival of 44% compared with patients who had initial APRs or whose CEAs were less than 10 ng/mL, in which the survival was 15%. Other factors of importance include the adequacy of the resection margins (whether microscopically clear), the status of the peripelvic nodes, and whether bone marrow invasion is present. Among the patients who had presence of the latter adverse tumor factors, the median survival was only 10 months. Sur-

Table 10. PELVIC RESECTION—LONG-TERM SURVIVORS

Long-Term Survivors
5 Years
10 patients were NED at 60 mo.
1 patient recurred at 61 mo; DOD 82 mo
1 patient recurred at 61 mo; LWD > 64 mo
1 patient was DOD at 102 mo
1 patient was NED at 60 mo (resected liver metastases at 48 mo)
4 years
4 patients DOD—46 mo–51 mo
—53 mo–57 mo

NED = no evidence of disease; DOD = dead of disease; LWD = living with disease.
14 patients survived 46–206 mo; represents 33% of 43 with > 48 mo follow-up.

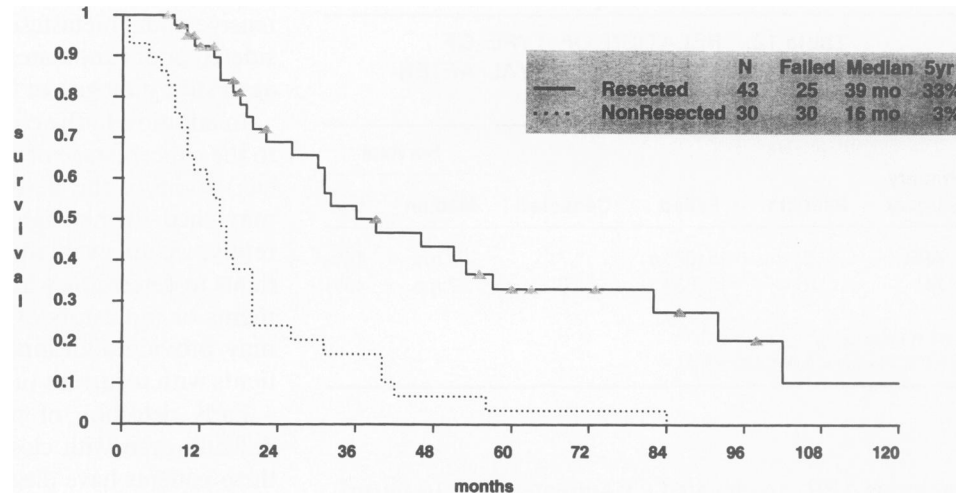

Figure 1. Overall survival in patients after pelvic resection for recurrent rectal cancer, compared with an historic nonresected group of patients treated by radiation alone for pelvic recurrence.[14]

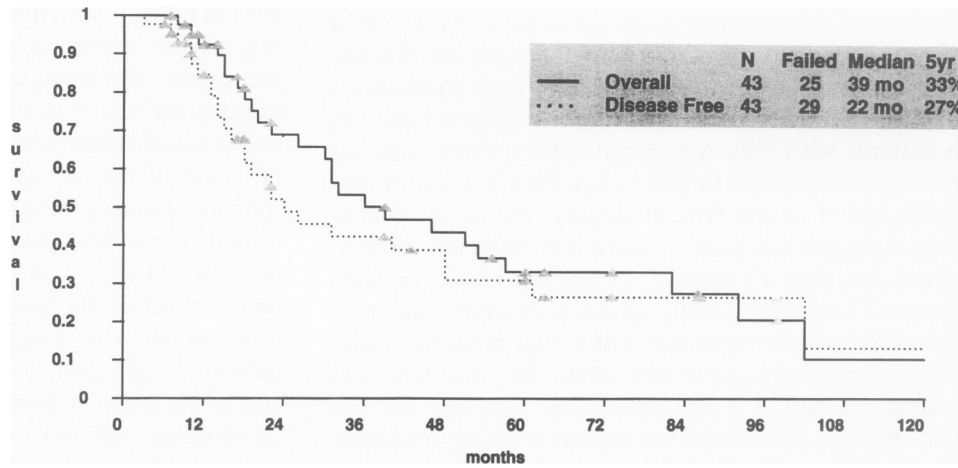

Figure 2. Comparison of overall survival and disease-free survival after pelvic resection for recurrent rectal cancer.

prisingly, the initial Dukes' stage of the primary cancer and the tumor-free interval after primary resection did not have significant survival impact.

Our review suggests that in the preoperative assessment of these patients, certain biologically related tumor factors of the patient will be important in their selection for pelvic resections. Factors associated with worsened outcome from tumor recurrence and death include a

Table 11. RELATION OF DISEASE-FREE INTERVAL AFTER PRIMARY RESECTION OF SURVIVAL AFTER PELVIC RESECTION OF RECURRENT RECTAL CANCER*

				Survival	
Disease-Free Interval	**Patients**	**Failed**	**Censored**	**Median**	**5-yr**
<12 mo†	11	6 (38%)	5	92 mo	53%
>12 mo†	32	19 (63%)	13	32 mo	27%
<24 mo‡	25	15 (53%)	10	46 mo	36%
>24 mo‡	18	10 (64%)	8	36 mo	29%

* >4-yr follow-up.
† p = 0.2503 log rank, 0.4407 Wilcoxon.
‡ p = 0.6316 log rank, 0.6905 Wilcoxon.

Table 12. RELATION OF TYPE OF PRIMARY SURGERY TO SURVIVAL AFTER PELVIC RESECTION*

Primary Surgery	Patients	Failed	Censored	Survival	
				Median	5-yr
APR	22	15 (69%)	7	22 mo	15%
AR	16	10 (63%)	6	57 mo	46%

* >4-yr follow-up.
p = 0.001 log rank, 0.001 Wilcoxon.

previous APR, an elevated CEA greater than 10 ng/mL, evidence of bone marrow invasion by bone scan, magnetic resonance imaging, or computed tomography, and presence of macroscopic nodal metastases. An elevated CEA and evidence of marrow involvement are predictable, ominous signs, mitigating against performance of a major procedure such as an abdominal sacral resection in patients with recurrent rectal cancer. Other options should be considered in this group. Relative contraindication would be the type of surgery, the initial Dukes' stage of the primary cancer, and a very short free interval period, less than 12 months. In this regard, the patients who had had large locally invasive primary cancer, a high-grade tumor associated with nodal metastases who initially required a more extended APR, and who had recurrences within a few months of resection are less than optimal candidates for posterior pelvic resection. Although the initial Dukes' stage of the primary cancer did not show statistical significance in our review, a numeric survival difference favored the patients with initial Dukes' stage B cancers. Intuitively, patients that had extensive nodal metastases and initial APRs would be considered poor candidates for this procedure because of the aggressive biologies of their cancers.

In addition to the conventional staging factors related to the cancer (stage of disease, free interval period, CEA, etc.) some of the newer molecular biology techniques may shed further light on tumor aggressiveness. Currently, we are evaluating the tissue samples of these patients to determine whether selective oncogene measurements or indicators of high-growth phase in the tumor may provide additional independent selection for patients with recurrent tumors.

Early detection of patients with pelvic recurrence is difficult; even with close surveillance, more than half of these patients have diagnoses of recurrence only after the onset of symptoms. As noted in this study, half had normal CEA levels, in contrast to the commonly elevated CEA level in patients with liver metastases. The CEA level may remain low or normal, even with gross manifestations of recurrence. The most common symptom of pelvic recurrence is perineal, lower back, or pelvic pain, which commonly is associated with palpable disease by vaginal or rectal exam (if this is possible). In patients who have had sphincter-saving procedures, early demonstration of anastomotic recurrences may lend themselves to a re-resection by APRs. However, in most cases, an anastomotic recurrence at the fingertip is the tip of the iceberg, and the recurrence usually is more regional. The presence of deep-seated pelvic or sciatic pain or weakness, hypesthesia, or parasthesia of the lower extremity is suggestive of encasement of sacral nerve roots and more extensive disease.

Careful clinical examination still is the most useful diagnostic tool, even in this highly technical era. Rectal examination, if possible, and certainly a vaginal examination in the woman are very useful in assessing tumor extent, in-

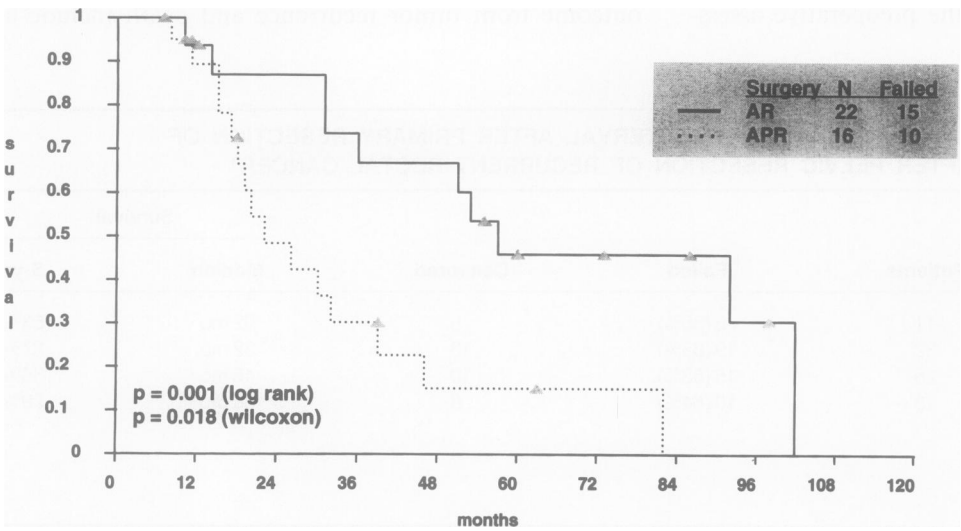

Figure 3. Relation of initial primary surgery, (abdominal perineal resection *versus* anterior resection) to survival after pelvic resection of recurrent rectal cancer.

Table 13. RELATION OF STAGE OF PRIMARY CANCER TO SURVIVAL AFTER PELVIC RESECTION

				Survival	
Dukes	Patients	Failed	Censored	Median	5-yr
B	20	11 (55%)	9	51 mo	48%
C	18	11 (61%)	7	31 mo	22%

p = 0.39 log rank, 0.41 Wilcoxon.

Table 14. RELATION OF PREOPERATIVE CEA TO SURVIVAL AFTER PELVIC RESECTION*

				Survival	
CEA Level	Patients	Failed	Censored	Median	5-yr
<10 ng/ML	19	9 (47%)	10	57 mo	44%
>10 ng/mL	18	11 (61%)	7	31 mo	17.8%

* Six observations missing.
p = 0.04 log rank, 0.07 Wilcoxon.

cluding the lateral posterior sidewall and associated viscera, such as bladder fixation. Examination of the male pelvis after APR essentially is impossible and requires a good radiologic examination. Although posterior pelvic and perineal pain are strong indicators of recurrence, full assessment by careful radiologic imaging is needed.

Essential radiologic studies include computed tomography of the pelvis and abdomen (to stage local and possible hepatic disease), and a computed tomography of the chest. Careful computed tomography examinations of the pelvis, with emphasis on the lumbosacral spine, and bone scan to exclude sacral marrow involvement, which would indicate unresectability, are very important. Magnetic resonance imaging is useful in displaying the proximal extent of sacral involvement.[15] Tissue diagnosis is essential, and a computed tomography-directed fine-needle aspiration can confirm the diagnosis in almost all cases. In the event that this is unsuccessful, a directed presacral biopsy with a corecutting needle (True Cut Rx, Baxter Health Care Corp., Vallencia, CA) will provide the diagnosis. Cystoscopy may be needed to evaluate bladder wall involvement and is used at the time of resection in conjunction with ureteral stent placement to complete the examination and the planning for possible bladder resection.

Careful examination at the time of the exploration to ensure the curability of the disease is important. We initially perform a pelvic node dissection beginning at the bifurcation of aorta and if there is periaortic node involvement or macroscopic node involvement at the bifurcation, this is an indication to stop this procedure. We commonly have staged the procedure performing the abdominal procedure on day 1, which usually includes node dissection, pelvic devascularization, and urinary diversion with ileal conduit formation, returning to the operating room on day 3 for the posterior pelvic resection. This usually gives the patient an opportunity to equilibrate, especially in the event of unusual bleeding or fluid shifts. Patients with low lying recurrence, however, may be treated from within the abdomen with the patient supine in the lithotomy position by using a osteotome to transect the mid sacrum from S3 or below. During such time, hemorrhage can be avoided by cross-clamping the aorta and the inferior vena cava during the period of transection, until adequate control is obtained. In other cases, the patient initially is positioned supine, which facilitates the pelvic dissection, then is turned to

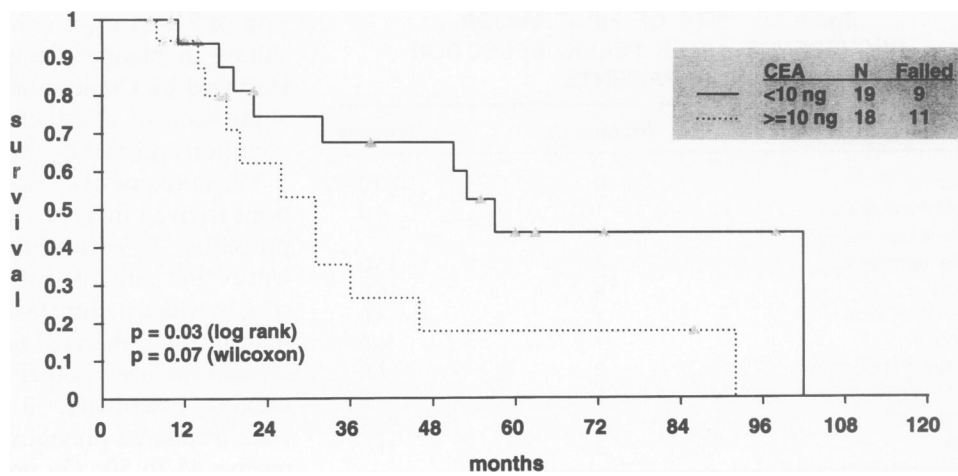

Figure 4. Relation of preoperative carcinoembryonic antigen level to survival after posterior resection of recurrent rectal cancer.

Table 15. SURVIVAL IN HIGH-RISK PATIENTS—INVOLVEMENT OF MARROW, MARGINS, EXTRA PELVIC NODES

Involved Area	Survival
Marrow involved	
GF*	14 DOD
ND	13 DOD
GM	6 Mo. REC
AL	12 Mo. LWD
Lymph nodes (obturator/para aortic)	
RD	11 Mo.
RM	10 Mo.
Positive margin (soft tissue/bone)	
CA	5 Mo. DOC
LWD	6 Mo. DOD
VS	POD
MK	24 DOD

* Patient initials.

Table 17. RECURRENT RECTAL CARCINOMA: ABDOMINAL SACRAL RESECTIONS FOR CURE

Reference Year	No. of Patients	Results
Takagi et al. 1986	7	4 patients NED; one LWD at 32 mo
Schiessel et al. 1986	9	3-yr survival, approx 30%
Pearlman et al. 1987	8	3 patients NED; 1 patient dead of other causes at 46 mo
Touran et al. 1990	12	12-mo survival, 62%; 24-mo survival was 14%
Temple and Ketcham 1992	9	Local control, 45%; 5-yr disease-free survival was 18%
Maetani et al. 1992	23	5-yr survival, 23%
Wanebo et al. Current Series	47	Median overall survival, 39 mo (43 operative survivors); 5-yr estimated survival, 33%

the lateral thoracotomy position to allow combined access to the anterior and posterior portion of the pelvis. In such cases, the assistant can perform the parasacral dissection posteriorly, and the anterior positioned surgeon can place a Steinman pin through the sacrum to mark the level of planned transection. Working together, the two surgeons can accomplish a more rapid resection. Although we have used this approach on selected patients, we generally find it easier to do the sacral resection from the posterior approach because a wide-field exposure is possible, the surgeon can do a careful laminectomy and can outline the perineal and perisacral phases of the dissection more easily and probably with less blood loss. Whichever technique is chosen, this is still a substantial operation and carries a potential for mortality (approximately 8%), with major morbidity in a large number of the patients after surgery. The major complications have included cardiopulmonary renal insufficiency and wound infection or dehiscence (especially of the posterior wound), presumably related to previous irradiation. An additional problem has been occasional perineal nerve palsy. A major effort is required to carry out successful physical rehabilitation in these patients and return them to functional states. The functional result after ASBR for recurrent rectal cancer depends on the extent of resection. Transection at the S3 level for low-lying tumors essentially is associated with normal urinary continence if the bladder is retained. Proximal transection to the level of the S1 is a more formidable procedure required frequently for the larger or bulky and higher placed lesions. One still can maintain pelvic stability without added reconstruction if the lumbosarcral facets roots are preserved bilaterally and there is no major neuromuscular locomotive defect. The division of S1,2,3 roots compromises bladder function, resulting in bladder denervation. Although this can be managed by Crede's method of voiding and the use of alpha agonists or self-catheterization, it requires careful attention and care by the attending physician.

Table 16. SITE OF FIRST MAJOR RECURRENCE AFTER PELVIC RESECTION IN 27 PATIENTS

Recurrence	Frequency	Percent
Local	9	30.0
+Intra-abdominal	1	4.0
Intra-abdominal +/− retroperitoneal	4	15.0
Liver	4	15.0
+Bone, local	1	4.0
Lung	1	4.0
+Intra-abdominal	2	7.0
+Liver, local	1	4.0
+Local	1	4.0
Bone	3	11.0

The outcome of several series of posterior pelvic resections is given in Table 17. In addition to the use of this procedure for recurrent tumors, its most favorable use will be for patients with locally advanced primary cancers, in which a more favorable outcome can be expected than in those resected for recurrence. We have not addressed the use of other modalities, especially radiation therapy. Essentially, all of the patients with recurrence were irradiated previously. If not, we required them to receive 45 to 50 cGy preoperatively to help reduce the

chance of recurrence. The use of intraoperative radiation is another consideration.[16] Pelvic perfusion also is being explored as an alternative method and may have value as a preoperative treatment of these patients.[31]

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Discussion

DR. ROBERT J. SCHWEITZER (Oakland, California): The authors must be commended for their excellent results in this very desperate situation. I would like to direct my questions to Dr. Wanebo about what he thinks could be done at the primary surgery for rectal cancer (we're turning this around a bit) that would lower the 30% incidence of later recurrence and thereby avoid the necessity for this extensive pelvic sacral excision for massive recurrences. Certainly we appreciate that judicious use of preoperative radiation therapy and perhaps better chemotherapeutic agents might be helpful.

My own personal experience with advanced or recurrent pelvic cancer includes 176 pelvic exenterations between 1957 and 1994; however, only 15 patients with rectal cancer were in this group. The reason for that low percentage is due to the fact that most patients with bulky locally invasive rectal cancer rarely are candidates for pelvic exenteration because of associated liver metastasis, massive nodal disease, positive periaortic nodes, et cetera, which contraindicate exenteration.

However, occasionally bulky primary rectal cancer can remain localized. In the male, for instance, anterior infiltration may invade just into the prostatic capsule, the prostate or bladder. In the female, anterior lesions will often infiltrate into the vagina and onto the pelvic floor. And in both sexes there can be infiltration posteriorly into the pre-sacral pre-coccygeal area.