Pelvic Exenteration for Advanced Rectal Carcinoma

Frederic E. Eckhauser, MD, * Ann Arbor, Michigan
S. Martin Lindenauer, MD, * Ann Arbor, Michigan
George W. Morley, MD, † Ann Arbor, Michigan

Long-term cure rates for advanced rectal cancer are disappointing [1,2]. Extensive local growth of rectal carcinoma without evidence of extrapelvic dissemination occurs infrequently but does represent a small number of potentially curable neoplasms. Such lesions may present with bulk-related problems such as pelvic pain and lower colonic obstruction or with abnormal fistulous communication between the rectum, the vagina, or the bladder [3–5]. Efficacious surgical therapy requires radical en bloc removal of all pelvic viscera if cure is to be achieved in this selected group of patients. Pelvic exenteration is a formidable surgical challenge (with potentially prohibitive morbidity and mortality) and should be considered only in centers where multidisciplinary expertise [6] is available.

This report describes a group of patients with locally advanced rectal cancer confined to the pelvis who underwent pelvic exenteration at the University of Michigan Medical Center and the Ann Arbor Veterans Administration Hospital.

Material and Methods

Between 1964 and 1976, 12 patients underwent synchronous pelvic exenteration for locally advanced (Dukes' B and C class) cancers of the rectum. There were five women and seven men. The age distribution was 46 to 68 years, with a mean age of 56.5 years. None of the patients had undergone previous pelvic irradiation or had a history of precancerous colorectal lesions.

Passage of blood per rectum was the most frequent presenting symptom (10 of 12 patients), and genitourinary complaints were limited to those patients (7 of 12) with

rectovesical or vaginal fistulas. Other common complaints included changes in bowel habits and weight loss (Table I).

All lesions were solitary and situated in the distal sigmoid and rectum with approximately equal site distribution. Resected lesions were either Dukes' B (7 of 12) or C (5 of 12) classification and none were deemed incurable on the basis of local mestastases (Table I).

Supravesical urinary diversion was required in 10 of 12 patients and was accomplished by construction of ileal (4 of 10) and sigmoid conduits (6 of 10).

Treatment and Results

Ten patients underwent total pelvic exenteration; the remaining 2 underwent posterior pelvic exenteration alone. Resectability was determined at operation and assessed by (1) meticulous abdominal exploration to rule out distal metastases, (2) excision and frozen section evaluation of inferior mesenteric and para-aortic lymph nodes, (3) perivesical exploration to determine lateral and anterior fixation, and (4) presacral exploration to assess posterior fixation. After en bloc resection of pelvic viscera, the peritoneal floor was reconstructed with a free peritoneal graft [7]. Ureteroenteric anastomoses to an isolated ileal or sigmoid conduit were created with a three-point triangulation technique and interrupted absorbable sutures [8].

One operative death occurred 2 days after pelvic exenteration, yielding an operative mortality rate of 8.3 per cent. Follow-up was complete in the remaining 11 patients.

Fourteen postoperative complications occurred in nine patients (1.5 complications per patient). Mechanical small bowel obstruction (3 of 14) and wound infection (2 of 14) accounted for the majority of early complications. Late complications included pelvic recurrence (4 of 14), stomal stenosis (2 of 14), pyelonephritis or urinary calculi, or both (2 of 14), and metachronous cancer (1 of 14).

Six patients are alive and free of disease with an average survival of 48 months (range 10 to 76). Table II correlates survival with the Dukes' stage of the primary tumor. Cumulative 3 and 5 year survival rates were 67 per cent and

TABLE I   Clinical Data

Patients	Age (yr) & Sex	Signs GI Only	Signs GU Only	Signs GI/GU	Indication for Operation Local Ext	Indication for Operation Fistula	Location of Lesion (cm)	Dukes' Class	Nodes + or −	Type of Resection	Status	Survival (mo)
BD	63F			+		+	10	C	+	TPE	NED	62
DR	56F	+			+		15	B	−	TPE	NED	12
EL	66F			+		+	8	B	−	PPE	DOD	48
GB	68F			+		+	4	B	−	PPE	DOD	38
MP	64F			+		+	12	B	−	TPE	NED	76
WW	55M	+			+		15	C	+	TPE	NED	10
FK	54M	+			+		3	C	+	TPE	DOD	30
JY	47M	+			+		4	C	+	TPE	NED	60
JS	46M			+		+	11	B	−	TPE	DOD	12
FP	49M			+		+	12	B	−	TPE	NED	68
GH	49M	+			+		6	C	+	TPE	DOC	10
AN	61M			+		+	6	B	−	TPE	DOC	Death at Op

DOC = died of other causes; DOD = died of disease; Ext = extent; GI = gastrointestinal; GU = genitourinary; NED = no evidence of disease; Op = operation; PPE = posterior pelvic exenteration; TPE = total pelvic exenteration.

50 per cent, respectively (Figure 1). Although the number of patients was small, extended survival and pelvic recurrence did not correlate with local extent of spread if all disease was confined to the pelvis. Tumor differentiation (Table III) appeared to correlate best with survival although lymph node metastases were present with almost equal frequency in each group.

Comments

Although the incidence of rectal cancer among whites has decreased by 25 per cent over the last 25 years, the 5 year survival rate (40 per cent overall) [9] remains essentially unchanged. Gilbertsen [10] has demonstrated that in terms of potential clinical cure, the standard Miles procedure is superior to operations that preserve the anal sphincter for advanced rectal lesions, but the high recurrence rate (30 to 41 per cent) [10,11] and suboptimal survival (26 per cent at 5 years) reflect the continuing need for improved diagnostic and therapeutic methods.

The tendency of some rectal cancers to exhibit early transmural spread but at the same time to stay

confined to the pelvis accounts for the high percentage (35 per cent Dukes' B and 50 per cent Dukes' C) [12] of locally advanced lesions in some patients with anatomically resectable lesions. The observation that 5 year survival rates correlate directly with extent of spread (30 per cent for combined B and C lesions and 85 per cent for A lesions) [10] mandates early, aggressive surgical intervention for these lesions.

Local adherence of extensive rectal cancer to contiguous pelvic structures occurs infrequently (in 5 to 6 per cent of cases) [3,13] and may require extended surgical excision to encompass the neoplasm. Appelby in 1950 observed that in 13 of 19 such patients treated with standard abdominoperineal resection "everyone had eventually extensive local recurrence with miserably invasive growths, fistulous abscesses, strangury, prolonged agony and stench" [13]. The 33 to 75 per cent [3,14] occurence of neoplastic (as opposed to inflammatory) fixation plus the

TABLE II   Survival and Local Recurrence After Pelvic Exenteration by Dukes' Stage of Primary Tumor

	Stage of Primary Lesion Dukes' B	Stage of Primary Lesion Dukes' C
No. of patients	7	5
Mean survival (mo)	42	34
3 year survival*	4/6 (67%)	2/5 (40%)
5 year survival*	2/6 (33%)	2/5 (40%)
Local recurrence	3/6 (50%)	1/5 (20%)

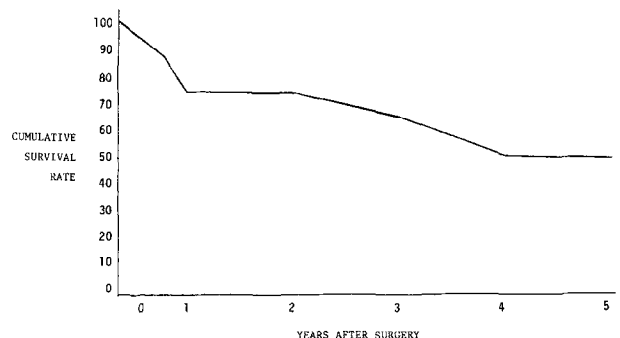* Determinate survival, excluding one operative death.

Figure 1. Cumulative survival rate after pelvic exenteration for advanced rectal cancer.

anatomic limitations imposed by the bony pelvis precludes curative en bloc resection without multivisceral excision. Since recurrence rates, and thus 5 year clinical cure rates, are influenced by the clinical and pathologic tumor stage, extended surgical excision (pelvic exenteration) may result in improved survival in this subpopulation.

Pelvic exenteration for advanced rectal cancer was first reported in 1948 by Brunschwig [5]. Early obstacles included excessive operative mortality (16 to 23 per cent) [4,15,16], inadequate techniques for supravesical urinary diversion, and poor patient selection.

Ureterosigmoidostomy to the intact colon was associated with prohibitive complications [17]. The incidence of problems such as hyperchloremic acidosis, fecal-urinary reflux with recurrent pyelonephritis, and calculous formation was reduced to 15 to 20 per cent [16,18] with the development of Bricker's isolated ileal conduit and subsequently Mogg's [19] and Symmonds's [20] isolated sigmoid conduit. Comparable long-term results with both methods presently provide alternative means of suitable supravesical urinary diversion.

Preoperative clinical assessment of resectability and potential curability remains a problem. The contraindications to total pelvic exenteration include extrapelvic metastases, bilateral obstructive uropathy, sciatic nerve pain, leg edema, and invasion of the bony pelvis [21]. The contraindications must be individualized because palliation can often be achieved. Several authors have reported 2 year survival rates of up to 22 per cent after palliative pelvic extenteration [22,23]. The use of preoperative pelvic lymphangiography, pelvic skeletal tomography, and radionuclide bone scans may further improve survival by allowing better patient selection.

The biologic peculiarities of locally advanced rectal carcinoma that is confined entirely to the pelvis warrant aggressive surgical therapy in this small group of patients. McSherry et al [1] demonstrated that palliative diversion alone or incomplete resection with restoration of bowel continuity results in a mean survival of 8.9 or 12.4 months, respectively. A survey of the literature shows an overall reported 5 year survival of 35 per cent (range 20 to 60 per cent) and an acceptable operative mortality of 12 per cent (range 5 to 20 per cent) (Table IV), and thus provides some degree of optimism to a group of patients previously labelled terminal.

The potential value of adjunctive radiation therapy is unclear. Stevens et al [24] demonstrated a 55 per cent resectability rate after high dose (5,000 rads) pelvic irradiation in 34 patients considered inoper-

TABLE III Survival After Pelvic Exenteration by Degree of Tumor Differentiation

Degree of Tumor Differentiation	No. of Patients	Average Survival (mo)
Well differentiated	3	58.6
Moderately well differentiated	5	40.5
Poorly differentiated	3	24
Total	11*	

* Excluding one operative death.

TABLE IV Survey of the Literature: Morbidity and Mortality From Pelvic Exenteration for Advanced Colorectal Cancer

Reference	Year	No. of Patients	Operative Mortality (%)	Overall 5 Year Survival (%)
Appleby [13]	1950	6	17	67*
Brunschwig and Daniel [16]	1959	21	5	23
Bricker et al [4]	1960	31	6	31
Kiselow et al [15]	1967	43	16	30
Deckers et al [22]	1975	5	20	20
University of Michigan series	1979	12	8	36
Total patients		118	12†	35†

* Shortest follow-up 4.5 years.
† Average.

able because of pelvic fixation. Five of 20 patients (20 per cent) survived after operation for various periods of time. In spite of improved resectability rates after high dose pelvic irradiation, studies from the Veterans Administration [25] and by Stearns et al [26] have shown no improvement in overall survival among patients with lymph node metastases and no tumor fixation after pelvic irradiation followed by surgery. More conclusive randomized prospective studies are required to either refute or affirm the role of radiation therapy in managing cancers of the rectum and rectosigmoid.

It is difficult to define the term inoperable in reference to extensive pelvic cancers. Other than symptoms and signs of major vascular, neural, or skeletal invasion, sheer bulk does not preclude curative resection. Surgical endeavors become self-defeating when en bloc resectional therapy is compromised by shaving tumor off adjacent structures, a practice that should be discouraged. Synchronous multivisceral pelvic excision [27] is an established method of managing pelvic cancers; acceptable methods of supravesical urinary diversion further enhance the quality of life for these patients.

Summary

Twelve patients with advanced rectal cancer and no evidence of extrapelvic metastases underwent pelvic exenteration. The operative mortality rate was 8.3 per cent. Determinate 3 and 5 year survival rates of 54 and 37 per cent were achieved. Criteria for the selection of patients and techniques of supravesical urinary diversion are discussed.

References

1. McSherry CK, Cronell GN, Flenn F: Carcinoma of the colon and rectum. Ann Surg 169: 502, 1969.
2. Falterman KW, Hill CB, Markey JC, Fox JW, Cohn I Jr: Cancer of the colon, rectum, and anus: a review of 2,313 cases. Cancer 34: 951, 1974.
3. Butcher HR, Spjut JH: An evaluation of pelvic exenteration for advanced carcinoma of the lower colon. Cancer 12: 681, 1959.
4. Bricker EM, Butcher HR, Lawler WH, McAfee CA: Surgical treatment of advanced and recurrent cancer of the pelvic viscera. Ann Surg 152: 388, 1960.
5. Brunschwig A: Complete excision of pelvic viscera for advanced cancer. Cancer 1: 177, 1948.
6. Lindenauer SM, Morley GW, Cerny JC: Multidiscipline approach to treatment of recurrent pelvic neoplasms. Arch Surg 96: 493, 1968.
7. Morley GW, Lindenauer SM: Peritoneal graft in total pelvic exenteration. Am J Obstet Gynecol 110: 696, 1971.
8. Lindenauer SM, Cerny JC, Morley GW: Ureterosigmoid conduit urinary diversion. Surgery 75: 705, 1974.
9. Silverberg E, Holleb AI: Major trends in cancer: twenty-five year survey. Cancer 25: 2, 1975.
10. Gilbertsen VA: Adenocarcinoma of the rectum: a 15 year study with evaluation of the results of curative therapy. AMA Arch Surg 80: 143, 1960.
11. Sterns MW, Binkley GE: The influence of location on prognosis in operable rectal cancer. Surg Gynecol Obstet 96: 368, 1953.
12. Dukes CE: Cancer of the rectum: an analysis of 1,000 cases. J Pathol 50: 527, 1940.
13. Appleby LH: Proctocystectomy: management of colostomy with ureteral transplants. Am J Surg 79: 57, 1950.
14. Goligher JC: Treatment of carcinoma of the rectum. Surgery of the Anus, Rectum, and Colon, third edition. Springfield, IL, Charles C Thomas, 1975.
15. Kiselow M, Butcher HR, Bricker EM: Results of radical surgical treatment of advanced pelvic cancer. Ann Surg 166: 428, 1967.
16. Brunschwig A, Daniel W: Pelvic exenteration operations: with summary of 66 cases surviving more than 5 years. Ann Surg 151: 571, 1960.
17. Marchant DJ: A report upon urinary diversion; historical review. Obstet Gynecol Surv 19: 469, 1964.
18. Bricker EM: Symposium on clinical surgery: bladder substitution after pelvic evisceration. Surg Clin North Am 30: 1511, 1950.
19. Mogg RA: Urinary diversion using the colonic conduit. Br J Urol 39: 687, 1967.
20. Symmonds RE, Gibbs CP: Urinary diversion by way of sigmoid conduit. Surg Gynecol Obstet 131: 687, 1970.
21. Mattingly RF: Indications, contraindications, and method of total pelvic exenteration. Oncology 21: 241, 1967.
22. Deckers PJ, Olsson C, Williams LA, Mozden AJ: Pelvic exenteration as palliation of malignant disease. Am J Surg 131: 509, 1976.
23. Brunschwig A, Barber H: Pelvic exenteration combined with resection of segments of bony pelvis. Surgery 65: 417, 1969.
24. Stevens K, Allen C, Fletcher WS: Preoperative radiotherapy for adenocarcinoma of the rectosigmoid. Cancer 37: 2866, 1976.
25. Higgins GA, Dwight RW: The role of preoperative irradiation in cancer of the rectum and rectosigmoid. Surg Clin North Am 52: 847, 1972.
26. Stearns MW, Deddish MR, Quan SH: Preoperative irradiation for cancer of the rectum and rectosigmoid. Dis Colon Rectum 11: 281, 1968.
27. Schmitz HE, Schmitz RL, Smith CJ, et al: The technique of synchronous (two team) abdominoperineal pelvic exenteration. Surg Gynecol Obstet 108: 351, 1959.