Original

Total Pelvic Exenteration For Locally Advanced Rectal Cancer

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Key Words
Advanced rectal cancer;
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Purpose. Total pelvic exenteration is an option for selected patients with locally advanced or recurrent rectal cancer. This ultra-radical procedure was originally performed in the 1940s and was reported to have high operative mortality and morbidity. This report shows the experience of total pelvic exenteration for locally advanced rectal cancer and compares the results of the survival and oncologic outcome with less extensive surgical procedures.

Methods. We reviewed the medical records from 1979 to 2001 and disclosed 13 patients who underwent this procedure for locally advanced primary rectal cancer. Their clinical characteristics, pathology, surgical morbidity, mortality, and complications were reviewed and recorded. The survival rates of the patients were analyzed.

Results. Thirteen patients had primary rectal cancer and received total pelvic exenteration. The mean age was 62.5±12.1. The surgical mortality rate was 15.4%, and the complication rate was 69.2%. Pathologically proved adjacent organ invasion was noted in 76.9%. Resection margins were free in all of the patients. Bowel continuity was possible in 38.5% of the patients. Preoperative radiation with or without chemotherapy was not associated with increased morbidity. The 5-year crude survival rate was 85.7% and the disease-free survival rate was 50%.

Conclusions. Total pelvic exenteration is an extensive surgical procedure with a high morbidity rate. However, the mortality rate is decreasing and it provides a reasonable survival benefit. Our result showed this procedure should be performed in selected patients to achieve curative surgery.

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Colon and rectum cancer is the third most common malignancy, and also the third leading cause of cancer death in Taiwan.[1] The treatment largely depends on adequate surgical resection of the malignant lesion, if feasible.[13,14] Standard radical hemicolectomy and proctectomy apply to tumors with limited invasion. However, rectal cancer with the invasion of adjacent structures has long been a challenge to colorectal surgeons. A number of patients received surgical exploration in a curative attempt and tumors were found to extend beyond the intestinal wall and adhere to adjacent tissues or organs. A significant percentage of these patients had no distant metastases.[14,15] They are said to have locally advanced diseases. Unlike other malignancies, colorectal cancer is not incurable in this circumstance. For optimal surgical treatment, total pelvic exenteration is sometimes necessary to remove the tumor with a clear resection margin.

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Pelvic exenteration is an ultra-radical surgery, which removes the rectosigmoid colon, internal genitalia, and bladder. The en bloc resection is followed by a reconstructive phase to restore the urinary and bowel system and repair the pelvic floor. This procedure was first performed in the 1940s at the Ellis Fischer Cancer Center. The initial result was reported to have high surgical mortality and morbidity.[2] Later, ileal conduit was used for the reconstruction of urinary diversion.[3,4] With the improvement in surgical technique and peri-operative care, the mortality rate has decreased to less than 10 per cent in recent publications.[14,16,17] However, the morbidity remains relatively high as compared with standard proctocolectomy procedures.

To study the surgical outcome and oncological result of total pelvic exenteration, we reviewed our patients who underwent pelvic exenteration for locally advanced rectal cancer from 1979 to 2001. We then compared the result of exenteration with that of the patients with advanced rectal cancer receiving less extensive procedures to evaluate if total pelvic exenteration was worthwhile.

Materials and Methods

We retrospectively reviewed the database of colorectal cancer from 1979 to 2001. There were thirteen patients having rectal cancer who received total pelvic exenteration in Veterans General Hospital-Taipei during the study period. The inclusion criteria were patients having primary rectal cancer and who received total pelvic exenteration in a curative attempt. Total pelvic exenteration was defined as radical resection of rectosigmoid colon, all internal genital organs, distal ureters, and whole bladder with the necessity of urinary diversion. There were eleven men and two women, with a mean age of 62.5 ± 12.1 years (range 31 to 76). All of them had adenocarcinoma of the rectum without distant metastases or discontiguous tumor nodules. The indication for pelvic exenteration was based on tumor invasion or suspected involvement of the trigone of the urinary bladder by preoperative studies or laparotomy findings. An ileal conduit was made for urinary diversion. Patients who received partial cystectomy or posterior exenteration were excluded. End colostomy was not a rule. We performed an ultra-low anterior resection and coloanal anastomosis if an adequate length of rectal stump was left after exenteration in recent years. Some patients received preoperative radiation with or without chemotherapy based on preoperative staging studies. There were six patients receiving preoperative radiotherapy. Four of them received concomitant 5-fluorouracil based chemotherapy. They all received at least 4000cGy of radiation and followed by curative resection four to six weeks later. Also, the patients with lower rectal cancer (location similar to the study group) with T4 stage but no distant metastases receiving surgical treatment less than pelvic exenteration in our hospital during the same period were also collected for comparison.

The medical records were reviewed. Morbidity, recurrence, survival, and oncological outcome were calculated. Categorical difference was checked by Fisher's exact test. The survival curves were calculated and plotted according to the Kaplan-Meier method, and compared with the log rank test. A p value of less than 0.05 was regarded as statistically significant.

Results

Thirteen patients received total pelvic exenteration for primary advanced adenocarcinoma of rectum during the study period. All had apotentially curative surgical resection and all resection margins were free of tumors. The characteristics of the patients are listed in Table 1. Two patients received diversion colostomy before definitive surgery due to obstruction. Six patients received preoperative radiation therapy, including four patients having concurrent chemoradiation therapy. Eight patients had the anus removed and needed end colostomy. Bowel continuity was reconstructed in the other 5 patients (38.5%). One of these five patients later received Hartmann's procedure because of anastomotic leakage and ureteroileostomy failure.

Table 1. Characteristics of Patients Who Received Total Pelvic Exenteration

Total case number	13
Male:Female	11:2
Age (years)	62.5 ± 12.1 (31-76)
Distance from anal verge (cm)	6.7 ± 3.2
Preoperative diversion	2
Preoperative radiation	6 (CCRT* 4)
Preservation of anus (n)	5
Pathology proved adjacent organ invasion (n)	10
T4 lesion (n)	11
Lymph node metastases	4

*Concurrent chemoradiation therapy

Table 2. Surgical Mortality and Morbidity

Complication	Case number
Mortality	2
Pelvic abscess/fluid	3
Anastomosis leakage/fistula	4
Ileal conduit problems	2
Pulmonary complication	1

There were two surgical mortalities (15.4%) in our series. Surgical complications were present in 9 patients (69.2%) and the complications are listed in Table 2. Preoperative radiation was not associated with more morbidity (p = 0.65, Fisher's exact test). Pelvic fluid accumulation was managed conservatively with drainage and antibiotics. Three patients with anastomosis leakage and one patient with fistula formation were all treated surgically by proximal diversionary colostomy and local repair. One of the leakage patients died of sepsis on postoperative day 37. In our data, anastomotic leakage was not related to preoperative chemoradiation therapy. Ileal conduit problems including ischemia and anastomosis leakage were repaired by abdominal approach. The pulmonary complication was a patient with adult respiratory distress syndrome and this was the cause of death.

Pathology studies revealed four Dukes' C patients (30.8%), including one N2 metastases, and all of them had a T4 lesion. The remaining nine patients (69.2%) were in Dukes' B stage and seven of them had a T4 lesion. Pathologically proved adjacent organs invasion was noted in ten patients (76.9%). Five had bladder involvement, three had prostate involvement, and two had both. One of the two female patients had tumor invasion of the uterus. Although three patients did not have pathologically proved adjacent organ invasion, all of them had dense adhesion to the base of the urinary bladder or prostate, and received preoperative radiotherapy.

The mean follow-up period was 52.8 months (median 48, range 4 to 158). We calculated the survival after exclusion of the two surgical mortality patients. Overall 5-year survival was 85.7%. Fig. 1 presents the crude survival. When considering the oncologic result after surgical treatment, the 5-year disease-free survival was 50%. Disease-free survival is shown in Fig. 2. We analyzed factors that might influence the recurrence of disease, including Dukes' stage, lymph node metastases, and pathologically proved adjacent organ invasion. There was a tendency of increased incidence of recurrence in patients with lymph nodes metastases. However, the difference was not statistically significant (p = 0.065). The presence of pathologically proved adjacent organ invasion was not associated with a worse outcome (p = 0.56 in survival and p = 0.58 in disease-free survival, log rank test).

Pelvic recurrence was noted in two patients, and distant metastases occurred in three patients. One patient received an abdominoperineal resection and had T2N0M0 stage (post radiotherapy stage). Pelvic recurrence was noted at 83 months postoperatively. He died at 85 months follow-up. The other received ultra low anterior resection and had T4N0M0 stage (bladder invasion). Pelvic recurrence was noted at 11 months postoperatively. After management with chemoradiotherapy, he was still alive without disease at the end of the study (75 months postoperatively). All of the patients having distant metastases initially received abdominoperineal resection. One patient with T4N1M0 stage developed bone metastases at 32 months and died 35 months postoperatively. Another patient with T4N0M0 stage had lung metastases at 39 months and survived after chemotherapy till 69 months follow-up. The other patient with T4N0M0

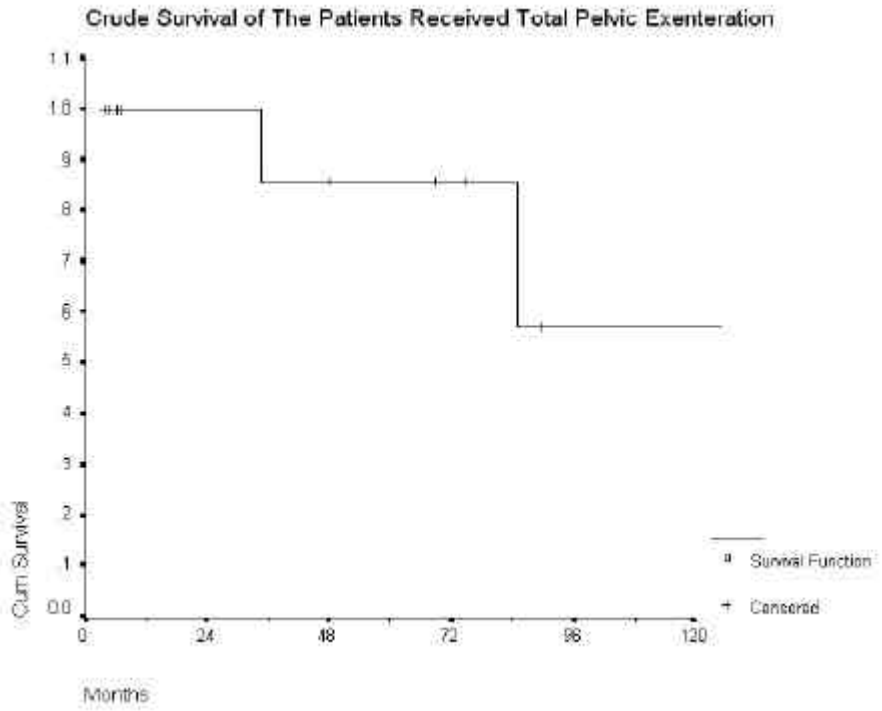

Fig. 1. Crude survival of the patients who received total pelvic exenteration. Five-year survival rate was 85.7%.

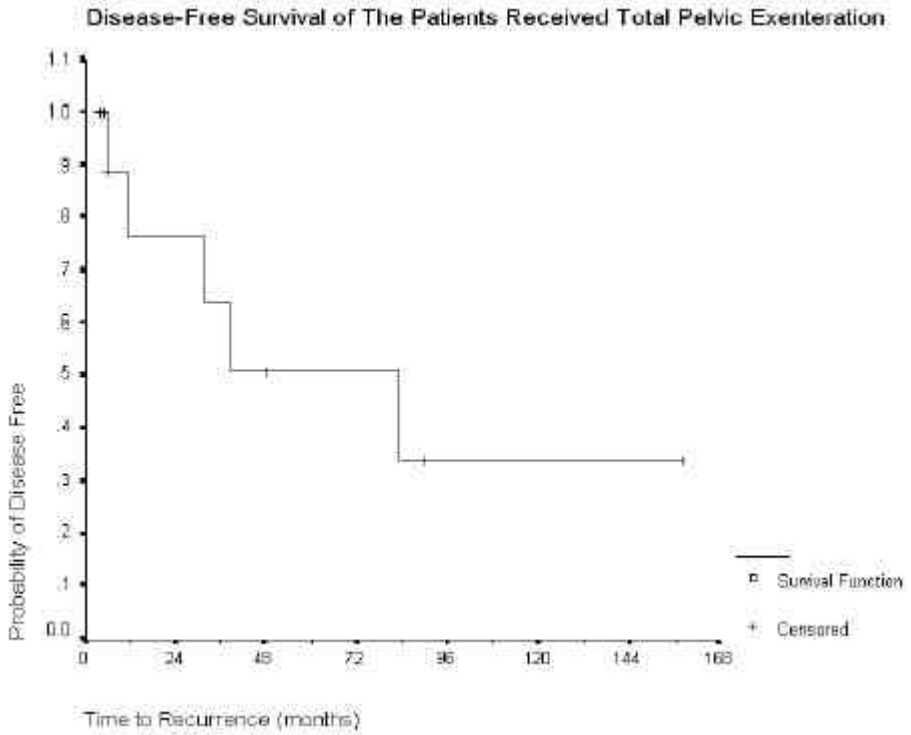

Fig. 2. Disease-free survival of the patients who received total pelvic exenteration. Five-year disease-free survival rate was 50%.

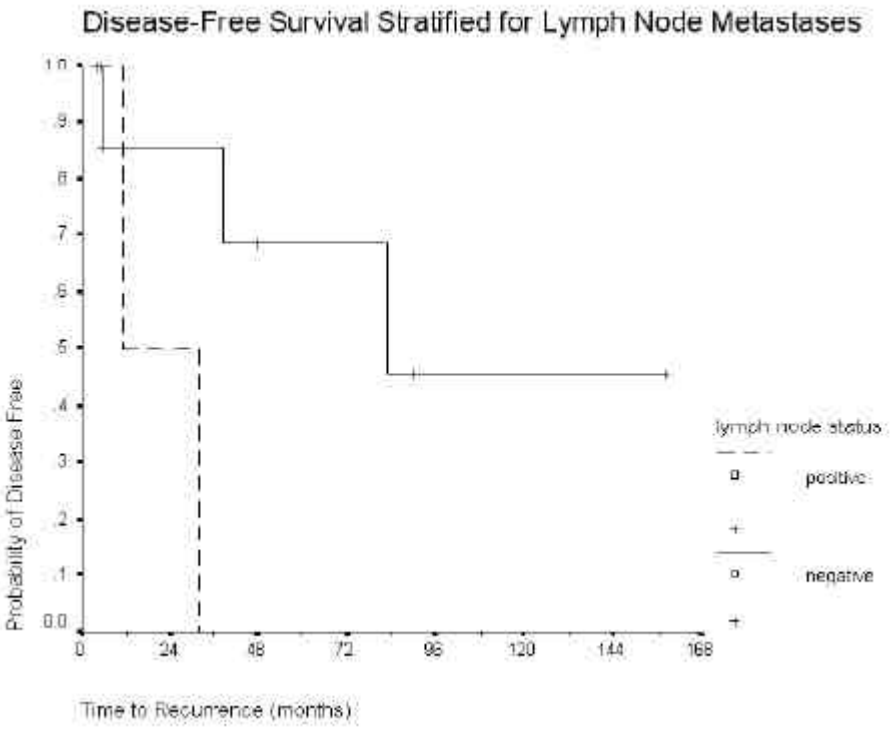

Fig. 3. Disease-free survival of the patients according to the presence of lymph node metastases. The solid line indicates no lymph node metastases. The dotted line indicates positive lymph node metastases.

stage developed liver metastases at six months and follow-up was lost one month later. The local recurrence rate was 18.2%. The treatment failure rate was 45.5%. Median time to failure was 32 months after the operation. If we categorized these patients according to Dukes' stage, disease-recurrence rate for Dukes' B was 33.3%, but 50% for Dukes' C patients.

Three patients had no pathologically proved adjacent organs involvement. One died at 85 months due to local recurrence. The other two were alive at the end of study without evidence of disease but the follow-up period was relatively short (48 and 4 months respectively).

For evaluation of the feasibility of total pelvic exenteration in our hospital, we calculated the survival of patients receiving resections less extensive than total pelvic exenteration for T4 lower rectal cancer (less than 10 cm from anal verge) during the study period. Patients with distant metastases were excluded. We selected these special groups of patients because of the similar location and comparable severity of local invasion of the tumor. The patient groups and characteristics are listed in Table 3. The 5-year

Table 3. Characteristics of T4 Low Rectal Cancers

	Curative Resection	Palliative Resection	*p*
Total case number	91	24	-
Age (range)	62.312.8 (23-88)	61.713.8 (31-79	0.834
Male:Female	60:31*	18:6*	0.469
Distance from anal verge (cm)	63, median 7	62, median 7	0.937
Multivisceral resection	33%	20.8%	0.323
Lymph nodes metastases	62.6%	58.3	0.284
5-year survival	40%	16%	0.0007**

* Case number; ** Significant difference.

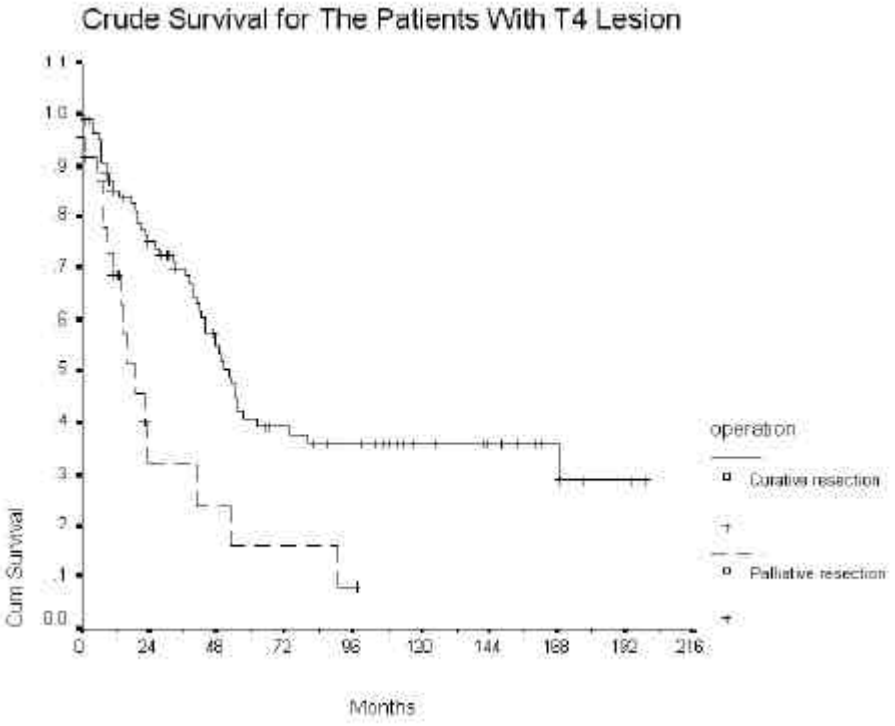

Fig. 4. Sur vival curve of the pa tients with T4 rec tal can cer. The solid line is pa tients who re ceived cu ra tive re sec tions. The dot ted line is pa tients who re ceived pal lia tive re sec tions.

sur vival was 40% in the cu ra tive re sec tion group and 16% in the pal lia tive group. The sur vival curves are shown in Fig. 4. The re cur rence rate for the cu ra tive resection group was 41.76%. Palliative resection group had 58.3% pos i tive re gional lymph nodes metastasis.

Discussions

As re ported in some lit er a ture, tu mor size or contig u ous in va sion to ad ja cent or gans is not an ad verse prog nos tic fac tor if the re sec tion mar gins were free.[9-11] With the ad vent of adjuvant ex ter nal bean ra di a tion and che mo ther apy, the man age ment of rec tal can cer now requires multidisciplinary team work. Ran domized tri als showed better re sults could be achieved with pre- or post-operative ra di a tion or chemoradiotherpay.[7,8,18-20] In re cent prac tice, we have also uti lized ra dio ther apy for better con trol of lower rec tal can cer. Ra di a tion was not as so ci ated with more com pli cations in our se ries.

The study group has lim ited pa tient num bers because we in cluded only the pa tients hav ing to tal pelvic exenteration and ex cluded pa tients with out the necessity of urinary diversion, even though multi-visceral re sec tion or pos te rior exenteration (in women) was per formed. This was a sig nif i cant num ber of pa tients. The rea son was that sur gi cal com plex ity, mor bid ity, and the life qual ity of the patients re ceiv ing to tal pel vic exenteration were very dif fer ent from the other groups of pa tients.[21,22] It should be per formed with very care ful se lec tion of the pa tients. To tal pel vic exenteration has mark edly more sur gi cal com pli ca tions and mor tal ity be cause of the ex ces sive blood loss, tis sue de struc tion, longer op er a tive time, and re con struc tion phase.[13,23] The me dian op er a tive time was six hours and mean blood loss was 3800ml in the re port. How ever, the sur gi cal mor tal ity has de creased mark edly with the ad vance of ex pe ri ence and post op er a tive care.[16] Recent data from Law et al. showed a 5-year sur vival

rate of 64% for pri mary rec tal can cer fol low ing pel-vic exenteration.[22] The lat est re port from Chen et al. in 2001 showed an over all 5-year sur vival rate of 49% with low mor bid ity (37%).[17]

Ac cord ing to an Amer i can na tional sta tis tics, the five year sur vival rate was 69% for stage II and 51% for stage III rec tal can cer.[5] For lo cally ad vanced or lymph node pos i tive rec tal can cer, the five year sur-vival rate was re ported to be 56.9%.[6] In our study, the pa tient with lo cally ad vanced dis ease had com pa ra ble survival following total pelvic exenteration. The crude five-year sur vival rate was 85.7%, while the dis-ease free five-year sur vival was 50%. A se nior ed i tor ques tioned the dif fer ence be tween the crude survival and dis ease-free sur vival rates. The fol low ing is our ex pla na tion. In our study, 45.5 per cent of the pa tients re ceiv ing to tal pel vic exenteration had treat ment fail-ure (lo cal re cur rence or dis tal metastases). Among the fail ure group, 40 per cent oc curred in two years and 80 per cent oc curred in 5 years. In the pa tients with lo cal recurrence, survival was over five years following therapeutic chemoradiation. In the patients having metastases, 33.3 per cent of them sur vived more than 5 years. This might be be cause that the metastases oc-curred three years af ter the de fin i tive sur gery. The sam ple size in our study was rel a tively small. In ad di-tion, 60 per cent of the pa tients with lo cal re cur rence or metastases sur vived more than five years ac cord ing to our re cord. The above de scrip tions could ex plain why there was such a dif fer ence be tween the crude and dis-ease-free sur vival.

The com par i son group of pa tients hav ing T4 rec-tal can cer re ceiv ing cu ra tive less ex ten sive re sec tion showed a slightly worse out come as com pared with the study group. This par a dox i cal re sult may be at trib-uted to less lymph node involvement in the exenteration group (30.8% vs. 62.6%). Pa tients with T4 le sions but re ceiv ing pal lia tive re sec tion had the worst out come. It was re ported that tu mor-positive re-sec tion mar gin had an ad verse ef fect on out come.[24,25] Dur ing the op er a tion, the sur geons of ten found ad he-sion be tween the tu mor and nearby struc tures. It was re ported that as many as 50% of these ad he sion were ma lig nant in na ture.[12,14] There fore, dis sec tion through the ad he sions vi o lated the prin ci ple of sur gi cal on col-ogy. Sur geons should dis sect the re sec tion mar gins from the grossly nor mal parts.

Too con ser va tive re sec tions oc cur due to var i ous reasons. These include limitation of the surgeons' skill, the gen eral con di tion of the pa tients, and very of ten, re jec tion of uri nary di ver sion by the pa tients or sur geon him self, es pe cially when there is sus pi cious tu mor in va sion to the base of the uri nary blad der or pos te rior sur face of pros tate.

Dou ble di ver sions (fe cal and uri nary) are not al-ways nec es sary af ter to tal pel vic exenteration. With the im prove ment in the sphincter-saving tech nique, pa tients re ceiv ing to tal pel vic exenteration may only have a urinary diversion or even no diversion.[25-28] Sometimes the tumor only invades to the prostate gland, but with out in volve ment of the uri nary blad der base. In this sit u a tion, re con struc tion of uri nary flow through a bladder-urethrostomy[29,30] may still be achieved.

The sur gi cal mor bid ity of to tal pel vic exenteration was re ported to be 26% to 60%.[16,22,31] With im prov ing sur gi cal tech niques and pa tient care, the mor tal ity and mor bid ity of to tal pel vic exenteration is de creas ing.[32] Eisenberg et al. re ported no sur gi cal mor tal ity since 1988 for to tal pel vic exenteration.[15] The anastomotic leak age rate was rel a tively high (four in five) in our study. In the pa tients re ceiv ing anal-preserving sur-gery, anastomotic leak age oc curred in three pa tients and one pa tient had rectovaginal fis tula. For such an extensive sur gi cal pro ce dure, a pro tec tive co los tomy is highly sug gested when coloanal anas to mo sis is per-formed.

Be cause the sur gi cal com pli ca tion rate is still rel a-tively high in our study and most of the re ported se ries, we do not con sider to tal pel vic exenteration as a pal lia-tive procedure. Only a potentially curable disease should be treated with the to tal pel vic exenteraion. Pa-tient se lec tion, mu tual un der stand ing be tween the doc-tor and pa tient, and fam ily sup port are very im por tant. The pa tient should also un der stand the pos si ble ben e-fits and risks fol low ing the pro ce dure.

Conclusions

To tal pel vic exenteration is a treat ment of choice for lo cally ad vanced rec tal can cer in se lected pa tients. The mor tal ity rate is de creas ing and it has an ac cept able mor bid ity rate. Pro tec tive co los tomy is rec om mended when anal-preserving pel vic exenterative sur gery is per formed. In com bi na tion with the ra dio ther apy and che mo ther apy, this ul tra-radical sur gi cal pro ce dure may pro vide a greater sur vival rate with out in creased com pli ca tions in se lected pa tients.

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