Morbidity and Outcome of Pelvic Exenteration in Locally Advanced Pelvic Malignancies

Rajaraman Ramamurthy · Amudhan Duraipandian

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Abstract Pelvic exenteration is a technically demanding surgical procedure performed for locally advanced cancers in the pelvis. Aim of the present study was to analyze morbidity, failure pattern and survival after pelvic exenteration during a period of 15 years in a dedicated cancer centre in South India. Retrospective analysis of case records of 50 patients who underwent pelvic exenteration from 1996 to 2011 in the Department of Surgical Oncology, Government Royapettah Hospital Chennai. Forty-six patients were females and 4 were males with a mean age of 48.3 years (range 21–72). Twenty six patients had cervical cancer, 14 had rectal cancer, 3 had bladder cancer, 2 had endometrial cancer, 2 had vaginal cancer, 1 had uterine sarcoma, 1 had anal cancer and 1 had ovarian cancer. The postoperative morbidity was 50%. 7 patients (14%) developed recurrence of which 5 had local and 2 had distant recurrence. The estimated 5 year overall survival for all patients in our series was 53.5% and for the patients with Ca rectum and Ca cervix was 60.6% and 40.1% respectively. Adjacent organ invasion had a significant impact over survival. Pelvic exenteration provides a curative form of treatment for carefully selected locally advanced cancer in the pelvis and it can be done safely with acceptable complications in centers experienced in multivisceral resections.

Keywords Pelvic exenteration · Morbidity · Survival

Introduction

In an era of organ preservation, exenteration is still an important armamentarium in selected cases of advanced pelvic malignancies. This is possible because certain cancers arising from pelvic viscera have the propensity for remaining confined to pelvic organs for a long time before metastasizing beyond pelvis [1]. When first described by Brunschwig in 1948, the peri-operative mortality rate was 23% [2]. Improvements in preoperative evaluation, antibiotic usage, anesthesia, surgical expertise and post operative care have all contributed to improved outcome and steady reduction in both morbidity and mortality. The ultimate goal is to bestow the patient a reasonable quality of life in addition to providing the chance for a cure [3]. The purpose of this retrospective analysis is to share our experience with this procedure regarding complications and outcome.

Materials and Methods

Case records of 50 patients who underwent pelvic exenteration for recurrent cancers in the pelvis in our center during a period of 15 years between 1996 and 2011 were taken up for analysis. All patients were treated with curative intent, and followed up regularly. The preoperative evaluation consisted of clinical examination, routine blood and urine examination, chest radiography, US abdomen and pelvis, CECT abdomen and pelvis. Selected patients were additionally evaluated with examination under anesthesia (EUA). Histopathological documentation of the residual of cancer was done for all cases preoperatively. Patients and their

R. Ramamurthy · A. Duraipandian
Department of Surgical Oncology, Government Royapettah
Hospital & Kilpauk Medical College,
Chennai 600014, India

R. Ramamurthy (✉)
“RAMA SWATHI”, 11/25, 7th Main Road,
Raja Annamalaipuram,
Chennai 600028 Tamil Nadu, India
e-mail: rajaanu1@rediffmail.com

Table 1 Demographic profile of the patients

Diagnosis	N	Indication for exenteration			Type of exenteration				
		Residue	Recurrence	Primary	TPE	APE	PPE	MPPE	EPE
Cervix	26	8	18	-	10	16	-	-	-
Rectum	14	12	1	1	3	-	6	3	2
Others*	10	3	4	3	-	7	1	2	-
TOTAL	50	23	23	4	13	23	7	5	2

* Bladder = 3, Endometrial = 2, Vaginal = 2, Uterine sarcoma = 1, anus = 1, ovary = 1

relatives were explained about the procedure, counseled about the outcome and stoma care. Patients who were medically unfit, not willing for surgery, metastases outside pelvis and pelvic sidewall fixity were excluded.

In addition to the standard anterior (APE), posterior (PPE) and total pelvic exenterations (TPE) selected patients had modified posterior pelvic exenteration (MPPE) where bowel continuity was restored without stoma and extended pelvic exenteration (EPE) which included sacrectomy.

Diversion procedure was done in all patients except 5 who underwent MPPE. Urinary diversion was done with ileal conduit in our series for APE. In TPE, urinary and fecal diversions were done through two separate ostomies (colostomy and ileal conduit) in 3 patients and as double barrel colostomy in 10 patients. While using double barrel colostomy the distal end of the colon was rotated by 180° and the ureters were implanted into the distal segment. The opening for urinary diversion was placed above the fecal opening to avoid fecal contamination of the urinary tract. Omentum was routinely used to fill the denuded pelvic cavity after exenteration.

We used a modified Bricker's method of non continent urinary diversion using ileal segment for patients who underwent APE, where the distal ends of divided ureters were dunked into the ileal conduit instead of mucosa to mucosa anastomosis as described originally by Bricker [4]. Patients were followed up monthly in the first year, 2 monthly in the second year, 3 monthly in the third year, 6 monthly for fourth and fifth years and yearly thereafter. Follow-up included clinical examination at each visit, yearly chest x-ray and CECT abdomen with pelvis and other investigations as indicated.

The postoperative complications, failure pattern and survival were analyzed. Survival analysis was done using Kaplan Meier curve with SPSS 17® (SPSS Inc, USA) for Windows Software. Results were compared with published data available in the literature.

Results

The mean age of the patients (46 females and 4 males) was 48.3 years (range 21–72). Twenty six patients had cervical

cancer, 14 had rectal cancer, 3 had bladder cancer, 2 had endometrial cancer, 2 had vaginal cancer, 1 had uterine sarcoma, 1 had anal cancer and 1 had ovarian cancer. Twenty-three patients underwent Anterior Pelvic Exenteration (APE), 13 Total Pelvic Exenteration (TPE), 7 Posterior Pelvic Exenteration (PPE), 5 Modified Posterior Pelvic Exenteration (MPPE) and 2 Extended Pelvic Exenteration (EPE). All patients underwent R0 resections, which were proved histopathologically. Some of the patients had previously received chemotherapy ($n=6$), radiotherapy ($n=25$) or chemo radiotherapy ($n=13$) as definitive or as part of multi-modality treatment. In 4 patients exenteration was done as a primary procedure (2 patients with bladder cancer, 1 patient with cancer vagina and 1 patient with cancer rectum who had adherence of uterus to rectum per operatively). The demographic profile of the patients is shown in Table 1.

On post operative histopathology, 14 patients showed adjacent organ invasion (cervix =9, rectum = 2, others = 3). Out of these 14 patients, 10 patients died and remaining 4 patients are on regular follow up. Of the 36 patients who had no adjacent organ invasion, 12 patients died, 7 patients lost to follow-up and the rest 17 patients are on regular follow-up. Nine patients had positive lymph nodes of which 3 patients died and 6 patients are on regular follow up.

The overall morbidity was 50% ($n=25$ patients, 34 events) and 30-day mortality was 0%. The postoperative complications ranged from minor wound infection to burst abdomen in the early postoperative period and bowel

Table 2 Complications following pelvic exenteration

Complications	No. of events
Wound Complications	
Wound Infection	14
Wound Dehiscence	8
Burst Abdomen	3
Fistulae	
Perineal Fecal Fistula	2
Fistula between Conduit and perineal wound	1
Uretero Vaginal Fistula	2
Urinary tract infections	2
Perineal Hernia	1
Intestinal Obstruction	1

Fig. 1 Perineal hernia following anterior pelvic exenteration

obstruction, fistula formation and urinary complications in the late period (Table 2). Re-operations were required for 3 patients who developed burst abdomen. One patient required laparotomy for intestinal obstruction, 26 months after TPE due to adhesion of small bowel to perineal wound. One patient developed fistulous communication between conduit and perineal wound following APE which was rectified by using transverse colon as a fresh conduit. One patient who underwent APE for bladder cancer developed perineal hernia (Fig. 1) and the same was repaired using mesh. Two patients with rectal cancer who underwent PPE developed ureterovaginal fistula, one was repaired using a Boari flap but the other patient lost to follow-up. The morbidity, mortality and recurrence rates of various series are shown in Table 3.

Seven (14%) patients had disease recurrence (5 local recurrence and 2 systemic). Of the 5 patients who developed local recurrence, 1 patient had cancer rectum, 1 had cancer ovary, remaining 3 had cancer cervix. The median disease

free interval in those patients who developed local recurrence was 15 months (8 to 34 months). The 2 patients who developed distant recurrence 9 months (pulmonary metastasis), 8 months (left supraclavicular node metastasis) post surgery were recurrent cancer cervix treated initially by radiotherapy. Of these 7 patients only one patient with cancer cervix and local recurrence is alive and in follow-up.

Twenty-two patients (44%) died during follow up (median survival = 12 months, range 2 to 62 months) and 7 patients were lost to follow up. Of the 7 patients who lost to follow up, 2 patients were on follow up for more than 5 years. The median follow up period for those patients who lost to follow-up was 36 months (range 11–76 months). The other 21 patients are in regular follow up till date.

The median survival observed for all patients in our series was 21 months (median survival was 18 months for cervix and 24 months for rectum). The number of patients with malignancy in other sites was too low to comment on their outcome.

The estimated 5 year overall survival (OS) using Kaplan-Meier analysis was 53.5% (Fig. 2). The estimated 5-year disease free survival (DFS) in our series is 51.1%. The estimated 5-year overall survival and estimated Disease-Free survival for patients with Ca Cervix in our series, was 40.1% and 33.1% respectively. For patients with Ca Rectum, the estimated overall survival (OS) at 5 years was found to be 60.6%. There was no difference between Disease-free survival (DFS) and Overall Survival (OS) at 5 years for rectum in this series.

On univariate analysis using log rank test, adjacent organ invasion significantly affected estimated 5 year overall survival for all patients (35.7% vs. 61.2% $P=0.018$) when compared with those without invasion. Persistent or recurrent disease after RT, type of exenteration, nodal involvement within pelvis did not influence the survival to a statistically significant level.

Table 3 Morbidity and mortality of pelvic exenteration: selected series

Series	Duration of study years	N	Diagnosis	Recurrence	Morbidity	Mortality
Lopez et al. [5]	50	232	Mixed	38%	45%	14%
Goldberg et al. [6]	40	154	Mixed	67%	47%	14%
Chen HS et al. [7]	9.5	50	Rectum	-	37%	2%
Poletto et al. [8]	21	96	Mixed	23.95%	15.6%	19.8%
Pandey et al. [9]	20	48	Mixed	29%	62.5%	10.42%
Nguyen et al. [10]	11	76	Mixed	-	28%	0%
Wydra et al. [11]	10	28	Mixed	-	42.9%	7%
Bannura et al. [12]	14	30	Rectum	33%	50%	0%
Maggioni et al. [13]	10	106	Gynec	44.3%	66%	0%
Present series (2011)	15	50	Mixed	14%	50%	0%

Table 4 Survival after pelvic exenteration: selected series

Series	N	Diagnosis	5 year OS	5 year DFS	Median follow-up (months)
Chen HS et al. [7]	50	Rectum	49%	-	-
Poletto et al. [8]	96	Cervix = 18 Colorectal, anal = 46 Others = 32	41.9%	40.5%	13.8 (1 day- 188 months)
Pandey et al. [9]	48	Cervix = 15 Rectum = 29 Others = 4	Cervix = 77.6% Rectum = 54.2%	Cervix = 73.1% Rectum = 33%	-
Bannura et al. [12]	30	Rectum	30%	-	32 (4–120 months)
Goldberg et al. [14]	103	Cervix = 95 Colorectal = 5 Others = 3	47%	41%	-
Ishiguro et al. [15]	93	Rectum	52%	46%	40 (1–305 months)
Present Series (2011)	50	Cervix = 26 Rectum = 14 Others = 10	53.5%	51.1%	21(1–174 months)

Discussion

Brunschwig initially thought pelvic exenteration as a palliative procedure for locally advanced pelvic malignancies but the focus of the operation shifted towards cure. More than 50% 5 year survival was noted following exenteration in many recent series [3, 9, 15]. Goldberg et al. [6] in their study concluded that indications for palliative exenteration should be exceptional and individualized, and that, in general, the procedure should not be undertaken. Nguyen et al. [10] demonstrated no survival benefit after pelvic exenteration done as a palliative procedure. In our series all patients were treated with curative intent.

In our series we encountered only one conduit related problem where the patient developed fistulous communication between conduit and perineal wound that needed a redo surgery. Berek et al. [3] made the transition from the incontinent to the continent urinary diversion without an increase in morbidity in their institution. But continent urinary

diversion was not done in our series. Aguirre et al. [16] reported the repair of perineal hernia in 9 patients (9/303) following pelvic exenterations. In our series one patient (1/50) underwent repair of perineal hernia with mesh.

The complications of pelvic exenteration can be troublesome due to the residual defect resulting in a high incidence of postoperative small intestinal obstruction and fistula formation. Goldberg et al. [14] experienced a high rate of enteric (11/103) and ureteral anastomotic fistulas (14/103) while using mesh or other foreign material for pelvic floor reconstruction but no such complication with the rectus myocutaneous graft. In a study by Goldberg et al. [6], obliteration of the denuded pelvic cavity did not result in reduction of complications to a statistically significant level. We routinely use omentum to fill the pelvic cavity. Five patients had fistulous complication in our series (Table 2).

All patients in our series underwent R0 resections. Fourteen patients (28%) had adjacent organ involvement other

Fig. 2 Survival curve-all patients

than the index organ. Recurrence rates after exenteration vary between 24% and 67% in various series and are usually locoregional [5, 6, 8, 9, 12, 13, 17]. In our series; the recurrence rate was 14% ($n=7/50$, rectum = 1, cervix = 5, ovary = 1). The pattern of failure was loco regional in 5 patients and systemic in 2 patients.

In our study only adjacent organ invasion significantly affected survival. Persistent or recurrent disease after RT, type of exenteration, nodal involvement within pelvis did not influence the survival to a statistically significant level. In a study by Berek et al. [3], no statistically significant correlation was found between the type of exenteration and overall survival. Lymph node involvement significantly affected survival after pelvic exenteration in some studies [9, 13].

Conclusion

The 5 year survival seen in our series is on par with international series. This analysis shows that role of exenteration is invaluable and can be done safely with acceptable complication rates and is the only curative hope in selected patients with locally advanced pelvic malignancies.

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