

Major complications following exenteration in cases of pelvic malignancy: A 10-year experience

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Abstract

AIM: To analyze the major complications after exenteration of gynecological and rectal malignancies.

METHODS: Twenty-two patients with gynecological malignancy and 6 with rectal malignancy underwent pelvic exenteration (PE) between 1996 and 2005. PE was performed for primary malignancy in 71.4% of cases (vulvar cancer in 13, cancer rectal in 5, cervical cancer in 1 and Bartholin's gland cancer in 1 cases respectively and recurrent malignancy in 28.6% of cases (cervical cancer in 5, ovarian cancer in 1, uterine sarcoma in 1 and rectal cancer in 1 cases respectively). Posterior PE, total PE and anterior PE were most often performed.

RESULTS: Major complications in the operative field involving the urinary tract infection or the wound dehiscence occurred in 12 patients (42.9%). Early complications included massive bleeding from the sacral plexus, adult respiratory distress syndrome (ARDS), thrombophlebitis, acute renal failure, urinary bladder dysfunction, ureter damage, re-operation and pulmonary embolus. Urinary incontinence was observed in 2 women as a late complication. In 1 patient a nephrostomy was performed in 1 patient due to extensive hydronephrosis and 1 patient had complications connected with the gastrointestinal tract. The mortality rate was 7%, of which inter-operative mortality accounted for 3.5%. Major complications often occurred in advanced primary vulvar cancer affecting those with recurrent malignancies.

CONCLUSION: PE is more beneficial to patients with primary vulvar and rectal cancer than to those with recurrent cancer. Knowledge of the inherent complications and morbidity of PE is essential.

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INTRODUCTION

Total pelvic exenteration (TPE) has been used as a salvage therapy. Candidates are those who have failed radiation therapy or primary surgical or combined treatment of the recurrence in the central pelvis^[1-3]. Pelvic exenteration (PE) is also a method of treatment in cases of locally advanced primary pelvic tumors.

PE is carried out at the site of extensive pelvic tumor, and cervical, vulvar, vaginal, ovary, rectal cancer or bladder cancer which can not be removed by standard radical pelvic surgical techniques^[2, 4]. PE may result significant complications, its major complications can affect 62% of patients^[5-9]. The distribution of complications has changed over the years due to the advances in antibiotic therapy and improved supportive care including hyper-alimentation. At present the most threatening complications are those involving the gastrointestinal and urinary systems. Urinary fistulae and obstruction following PE are the frequent and life threatening complications, which increase the mortality and morbidity rates after PE of gynecological cancers^[10].

The present study was to review the literature and report our experience with the complications arising from PE as a radical surgery in the treatment of advanced pelvic malignancies.

MATERIALS AND METHODS

Twenty-two patients with gynecological malignancy and 6 with rectal cancer underwent PE in 1996 - 2005 at the Department of Gynecology, Medical University of Gdansk, Poland. Exenteration was performed because of vulvar cancer in 13 cases, rectal cancer in 6 cases, cervical cancer in 6 cases, ovarian cancer in 1 case, uterine sarcoma in 1 case and Bartholin's gland cancer in 1 case.

The clinical and pathological records were reviewed to determine the primary disease, previous treatment, type

of PE, postoperative morbidity and mortality as well as complications. The primary malignancies (71.4%) included advanced carcinoma of the vulva in 13 cases, rectal cancer in 5 cases, cervical cancer in 1 case, Bartholin's gland cancer in 1 case. The recurrent tumors (28.6%) included carcinoma of cervical cancer in 5 cases, ovarian cancer in 1 case, uterine sarcoma in 1 case, rectal cancer in 1 case.

Posterior pelvic exenteration (PPE), total pelvic exenteration (TPE) and anterior pelvic exenteration (APE) were most often performed.

All the vulvar and cervical cancers were squamous cell carcinoma (SCC). Surgery was performed by a team of gynecological surgeons or together with a team of urologists in cases requiring urinary diversion. All patients were operated under mixed anesthesia consisting of conduction anesthesia (spinal or epidural) and general anesthesia. Closure of the empty pelvic cavity was achieved by mobilization of omentum from the left side of the sigmoid colon or by reperitonization using the mobilized caecum. Re-operation was needed for early and late complications. Early complications were those arising within 30 days after surgery and late complications were those over 30 days after surgery.

RESULTS

The clinical characteristics of 28 patients who underwent pelvic exenteration are summarized in Table 1.

The mean age of the 28 patients at diagnosis was 53.3 years (range, 34-82 years).

The estimated blood transfusion during operation ranged from 240 mL to 3580 mL with a mean of 1100 mL. The operating time ranged from 4 h to 11 h and 45 min with a mean of 6 h and 36 min. Patients stayed 8 - 66 d in hospital after operation with a mean of 27 d.

The overall complication rate after PE was 53.6% (15 of the 28 patients). Wound dehiscence (wd) occurred in 9 cases (32.1%), urinary infection in 3 cases (10.7%), urinary incontinence in 2 cases (7.1%), massive bleeding in 2 cases (7.1%). ARDS, thrombophlebitis, ureter damage, acute renal failure, pulmonary embolism, resuture, and urinary bladder dysfunction occurred in 1 case (3.6%).

The mortality rate was 7%, of which 3.5% was interoperative.

In our study, major complications often occurred in advanced primary vulvar cancer (mainly wound dehiscence), affecting those with recurrent malignancies.

Early complications

Massive bleeding occurred in 2 patients during operation. One patient with uterine sarcoma died of massive bleeding from sacral vessels during PPE although he received 1800 mL blood. The other patient had massive bleeding from the sacral plexus during PPE for vulvar cancer. An attempt was made for haemostasis. Disseminated intravascular clotting occurred and haemorrhage was massive and lasted for a long time. Because of the continuing bleeding and the poor general state of the patient, five large laparotomy sponges were left in the pelvis to cover the pelvic, iliac and sacral vessels under pressure. The emergency pelvic packing was successful and

the sponges were removed after 24 h. Twenty-eight days after the operation, the patient was transferred to the Department of Radiotherapy for supplementary treatment.

Gastrointestinal complications occurred after APE in 1 patient with cervical cancer. During the operation it was impossible to implant the ureter into the ileum by the Bricker method because of a lack of blood supply in the isolated intestinal loop, and uretero-cutaneostomy was performed.

The patient also suffered from acute renal failure as an early complication. Two days after APE the parameters of renal failure decreased gradually and a considerable worsening was found on day 8. Acute renal failure was confirmed. One patient with recurrent cervical cancer underwent APE and died of pulmonary embolism 2 wk after discharge from hospital. Another patient underwent TPE for recurrent cervical cancer and he received re-operation because of bleeding 2 h later. Haemorrhage was identified in the venus plexus surrounding the urethra but not fully achieved and one laparotomy sponge was applied under pressure for 48 h. After removal of the sponge no further bleeding was observed.

Late complications

Late complications occurred as urinary incontinence in 2 patients (7.1%) with vulvar cancer after PPE. A unilateral nephrostomy was performed in 1 patient with vulvar cancer due to extensive hydronephrosis and chronic renal failure one year after PPE.

A urinary fistula was diagnosed 6 mo after PPE for recurrent cervical cancer in 1 patient. During surgery to remove the fistula, a progression of disease was diagnosed and a cystectomy was performed to create an ileal conduit.

DISCUSSION

Primary radiation therapy or surgery in combination with radiotherapy has been the standard treatment for years in patients with advanced cancer. Although some changes have taken place in radiation techniques, the cure rate for advanced cancer still remains disappointing. Severe radiation complications may occur in these patients and PE should be performed for salvage therapy in combination with chemotherapy and radiotherapy as the first line treatment^[5].

TPE is often the only hope for women who have failed non-conservative therapy^[11, 12]. PE can provide a good chance of long-term survival in carefully selected patients but the role of palliative exenteration in patients with non-resectable disease is still controversial^[13]. PE is also the treatment of choice for the control of locally advanced recurrent gynecological malignancies unresponsive to therapy^[4].

We have performed PPE mainly for advanced vulvar cancer without the need to make an ileal conduit in patients who had no previous operation, radiotherapy or chemotherapy.

Physiological age and absence of co-morbidity appear to be more important when patients are selected for exenteration than chronological age. Careful pre-operative staging either by computed tomography scan

Table 1 Clinical characteristics of patients

Patient number	Age (yr)	Year of operation	Days in hospital after surgery	Histology	Method	Blood transfusion (mL)	Operating time (min)	Complications
1	59	1996	48	vulvar - scc	PPE	240	240	wd
2	48	1996	14	vulvar - scc	PPE	800	315	-
3	62	1998	35	vulvar - scc	PPE	600	330	urinary infection, wd
4	77	1998	28	vulvar - scc	PPE	900	360	-
5	37	1998	15	rectal-adenoca	PPE	600	255	-
6	50	1999	23	ovarian-adenoca	PPE	1200	405	-
7	65	2000	54	vulvar - scc	PPE	1500	380	urinary infection, wd
8	34	2000	49	vulvar - scc	TPE	1200	330	ARDS, wd
9	52	2000	16	vulvar - scc	PPE	300	360	urinary incontinence
10	44	2000	-	uterine sarcoma	PPE	1800	275	massive bleeding- died during operation
11	43	2002	28	vulvar - scc	PPE	1560	350	-
12	64	2002	28	vulvar - scc	PPE	900	420	-
13	63	2002	42	vulvar - scc	TPE	1420	450	thrombophlebitis, wd
14	53	2002	25	Bartholin's gland -scc	PPE	1100	360	urinary infection, wd
15	44	2002	41	vulvar - scc	PPE	1500	450	ureter damage, wd
16	64	2002	14	rectal-adenoca	PPE	300	315	-
17	62	2002	16	cervical - scc	PPE	500	360	-
18	57	2003	28	vulvar - scc	PPE	3580	420	massive bleeding
19	34	2003	24	cervical - scc	APE	1285	480	acute renal failure
20	34	2003	8	rectal-adenoca	PPE	280	380	-
21	74	2004	66	vulvar - scc	PPE	500	330	wd, urinary incontinence
22	82	2004	16	rectal-adenoca	PPE	950	330	-
23	53	2004	10	cervical scc	APE	1200	410	pulmonary embolism-death
24	48	2005	15	rectal-adenoca	PPE	900	435	-
25	43	2005	14	cervical-adenoca	TPE	1500	660	wd, bleeding-reoperation
26	56	2005	29	rectal-adenoca	PPE	1200	705	urinary bladder disfunction
27	51	2005	26	cervical scc	PPE	1200	560	urinary fistula
28	38	2005	10	cervical scc	TPE	1800	430	-
Mean	53.3	-	26.7	-	-	1100	396	-

Wd = wound dehiscence; ARDS = adult respiratory distress syndrome; SCC = squamous cell carcinoma

or by magnetic resonance imaging can usually identify patients with distant metastases, extrapelvic nodal disease, or disease involving the pelvic sidewall (which generally precludes surgery). Recent application of intraoperative radiotherapy or postoperative high-dose brachytherapy in patients with advanced pelvic disease involving pelvic sidewall, may expand the standard indications for exenteration. However, this procedure with or without radiotherapy, should be the resection of all tumors since the site of palliative exenteration is controversial^[14].

A successful operation can free patients from the potential discomfort caused by aggressive tumor. To a certain extent it can also reduce the pain in the pelvic

area^[6, 13].

The most serious and common complications after exenteration are acute enteric complications (which can exceed 20%), enteric obstruction, fistulization, pelvic infection, sepsis, wound infection, pyelonephritis. Acute renal failure is a rare complication after pelvic exenteration^[7-9,15-18].

Inguinal lymphadenectomy combined with PE increases the total incidence of complications in patients with vulvar carcinoma. Necrosis of the skin over inguinal and symphysis pubis areas is the most common complication which is present in 75% of cases^[18].

The long operating time and huge blood loss associ-

ated with exenteration increase the risk of wound infection which may adversely affect anastomosis site healing. Concomitant transfusion requirements and the entry of contaminated viscera- vagina, urethra, rectum are inherent to the operation. Most patients who undergo the procedure have advanced cancer and have received high-dose radiotherapy to the operative field. This compromises healing ability and makes the procedure even more risky^[4].

Experience shows that irradiation produces relative ischemia of the exposed area with diminished cellular vitality, thereby impairing the healing process^[19]. The dose of previous radiation therapy (especially higher than 4000cGy) is the most important risk factor for major surgical complications. The incidence of postoperative urinary or gastrointestinal complications is significantly higher in previously irradiated gynaecological patients^[4,7,10,20]. Averette *et al*^[15] reported an operative mortality of 40% is associated with surgical correction of fistula and 93% of these patients have received previous radiation therapy. The fistulized loop of bowel is attached to the pelvic floor at reoperation. In our study, fistulization after PE was found only in 1 patient with recurrent cervical cancer. This low incidence can be attributed to the majority of patients presenting primary tumors, who did not undergo primary radiation but reperitonisation at closure of the pelvic cavity to prevent small bowel prolapse. Rodriguez-Bias *et al*^[21] showed that 67% of patients who did not receive prior radiation therapy and 26% of patients who did not receive prior irradiation develop postoperative complications. Other authors have implicated prior radiation therapy as a risk factor for increased morbidity after PE^[15,22].

The type of urinary diversion is also significantly related to the development of complications. A modified Indiana pouch and transverse colon for the reservoir are reported to have a lower incidence of complications than the sigmoid colon or Kock pouch^[10,12,23,24]. Compared to cutaneous ureterostomy and ileal conduit, a continent reservoir provides a better quality of life and a low incidence of pyelonephritis and chronic renal failure. However, the early complication of wound infection is higher^[4].

Urinary fistulae and obstruction following pelvic exenteration are the frequent and life threatening complications, which increase the mortality and morbidity rates of large resections performed during PE for gynecological cancers. Major early urinary complications are significantly increased in patients who have received previous pelvic radiotherapy or have had an intestinal conduit for urinary diversion. Late complications are associated with urinary diversion, including stenosis, chronic or recurrent pyelonephritis, prolapsed stoma, incontinent or obstructed reservoir and calculi in the reservoir^[10].

Patients after PE are at high risk of developing cardiac complications, ARDS and pulmonary emboli^[25,26]. Contrary to other authors we have performed PPE mainly in advanced vulvar cancer without the need to make an ileal conduit in patients did not receive radiotherapy or chemotherapy. The majority of these patients had recurrence after prior surgery and radiotherapy. After exenteration, the 5-year survival was 40-60% in patients with gynecological cancer and 25-40% in patients with colorectal cancer^[14]. We present a review of complications and their

percentages as cited in literature^[3,5,7-9,15-18]

Early postoperative complications

Intestinal obstruction rate was 5.3-21.1%, skin flap necrosis (in vulvar cancer) 75%, hemorrhage 1-16.6%, intestinal fistula 5-16.3%, enterocutaneous fistula 4-23.8%, urinary fistula 1-15.7%, pyelonephritis / pyelonephrosis 3.8-21.6%, wound infection 2-14%, peritonitis 4%, pelvic abscess 2.6-17.9%, stoma separation 5.8%, ureteral obstruction or necrosis 1-5%, uremia (without obstruction) 5.7%, stoma stenosis 2%, prolonged ileus 15%, postoperative psychosis/depression 1.9-5%, pelvic cellulitis 7.4%, stomal hernia 10.5%, colostomy necrosis 2.4-5.2%, loop necrosis 3.7%, iliac artery thrombosis 0.4-1.1%, arterial thrombosis 2.4%, hydronephrosis 15.4%, hyperchloremic acidosis 7.4%, thrombophlebitis 2-8.3%, pulmonary embolus 2-4.3%, neurogenic bladder 8.3%, urinary incontinence 5.3%, cerebrovascular incident 2.2%, shock 3.3%, calculi 2%, myocardial infarction 2.2%, heart failure 0.9%, perineal evisceration 2- 6%, metabolic disorders 21%, pneumonia 1%.

Late postoperative complications

Intestinal obstruction rate was 4.4-15.4%, small bowel ileus 10%, hydronephrosis 1.4-21.6%, enteroperineal fistula 1-5%, pyelonephritis 2-10.5%, colostomy necrosis 5%, perineal abscess 1-3.4%, perineal hernia 1.9-3.3%, renal calculus 0.9-6.2%, stomal hernia 3.7-5%, stomal stricture 1-5.5%, uretero-ileal stricture 1-9.2%, recurrent infection 27.2%, small bowel fistula 5.5-8%, wound dehiscence 9.8%, urinary incontinence 8.3%, chronic lymphoedema 16.6%, perineal evisceration 4%, metabolic disorders 8%, urinary fistula 3%.

Robertes *et al*^[9] reported that 29% of patients after PE need re-operation. Re-operation after PE is extremely difficult and often leads to further morbidity if not mortality in such a situation. Re-operation for small bowel fistula and obstruction has 40% and 50% operative mortality, respectively. In our study, only 1 out of 28 patients (3.6%) had indications for re-operation.

PE is a high-morbidity procedure and its major complications correlate with preoperative pelvic radiotherapy and previous pelvic surgery. However sufficient postoperative nutrition (hyper-alimentation), antibiotics and antithrombotic therapy, use of tissue less affected by radiation (such as transverse colon, jejunum) and the creation of a continent reservoir can decrease the incidence of complications and improve the quality of life after this radical procedure^[4].

Although significant advances have been made in radiotherapy and chemotherapy, PE still remains an important part of the armamentarium of pelvic surgery and is the primary and occasionally the only treatment for the control of advanced malignancies.

In conclusion, PE should be considered as the treatment of choice for the control of locally advanced primary and recurrent pelvic malignancies unresponsive to therapy. An understanding of post-exenteration morbidity and complications is necessary. We are continuing to revise and update the procedures to minimize complications and increase survival.

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