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Indications and long-term clinical outcomes in 282 patients with pelvic exenteration for advanced or recurrent cervical cancer

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ABSTRACT

Objective. The aim of this study was to summarize the clinical experience at our clinic with pelvic exenteration as a treatment for cervical cancer with special regard to the indications and outcomes of specific patient groups.

Methods. Medical records of 282 women who underwent pelvic exenteration to treat cervical cancer were analyzed.

Results. In total, 70 patients (25%) underwent primary exenteration, and 212 (75%) underwent secondary exenteration. Exenteration was anterior for 14 (5%) patients, posterior for 6 (2%) and total for 262 (93%). The overall survival (OS) of the 282 patients was 41% at 5 years and 37% at 10 years. The disease-free survival at 5 years was 61%. For 133 patients for whom pelvic exenteration was a curative procedure, the OS was 64% at 5 years and 57% at 10 years. For cases of pelvic exenteration as a palliative intervention, the OS was 19% at 5 years and 18% at 10 years. No difference was seen in the OS at 5 years between patients who received primary and secondary operations. No significant difference in the OS was found regardless of whether the patients had positive pelvic lymph nodes, whereas in cases of paraaortic lymph node metastasis, the OS was significantly lower. Out of all of the procedures, 139 (49%) involved no perioperative or postoperative complications. One major complication was reported for 72 (26%) patients, two complications occurred for 42 patients (15%) and more than three complications were noted for 29 (10%) patients.

Conclusion. Pelvic exenteration is an effective technique with a high percentage of long-term survivors. To the best of our knowledge, our study involves the largest published number of patients treated with pelvic exenteration for a single gynecological cancer and shows that previous contraindications for pelvic exenteration, such as lymph node metastasis (especially when confined to the pelvic lymph nodes), older age or palliative intent, should be reconsidered.

Introduction

In 1948, Brunschwig was the first surgeon to publish preliminary experience with pelvic exenterations [1]. The original procedure included the en bloc resection of the internal and external reproductive organs, the bladder with urethra, the pelvic ureter, the rectum and the sigmoid colon, including the anus and perineum. The ureters were then implanted into the colon upstream of the colostomy site. This combined stoma was responsible for major drawbacks such as urinary tract infections and hyperchloremic acidosis.

New techniques for resection and pelvic reconstruction have been developed over the past few decades, considerably decreasing the frequency of complications and perioperative mortality.

In 1956, Bricker presented a new method based on his description of the ileal conduit. With this technique, renal complications such as pyelonephritis and hyperchloremic acidosis have decreased. However, the maintenance of this "wet" stoma negatively affected quality of life [2,3].

The reconstruction of pelvic floor defects after extensive surgical resection of genital malignancies presents multiple challenges. The pelvic dead space predisposes the patients to problems with ileus, hematomas and abscesses. The reconstruction of pelvic floor defects with omental flaps, bowel anastomoses and the creation of neovaginas have decreased the complication rate after pelvic exenteration. Today, a complete reconstruction includes the creation of a neovagina, in our clinic created from bowel segments, primary reanastomosis of the rectosigmoid colon and the creation of a continent neobladder, when possible. In this way, high quality of life is achieved by all patients, even those with advanced tumors that penetrate the urinary bladder, the rectum or both.

Recently, primary pelvic exenterations have gained acceptance, and their purpose has switched from solely palliation to a potential cure.

Nevertheless, pelvic exenteration is still regarded as mutilation, with social exclusion and potentially poor chances of survival.

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The aim of this retrospective analysis of pelvic exenterations was to summarize over 30 years of clinical experience with a total of 450 pelvic exenterations, with special attention to the survival and morbidity in a cohort of 282 patients with primary advanced or recurrent cervical cancers. This report represents, to the best of our knowledge, the largest study of patients with pelvic exenteration for a single gynecological cancer.

Patients and methods

The medical records for 450 patients who underwent pelvic exenteration because of primary advanced or recurrent gynecologic cancer were analyzed. Of these, 282 patients had cervical cancer. Exenteration was indicated as a primary case where tumors exceeded 5 cm in diameter or where tumor-induced fistulas occurred between the bladder and/or rectum and the vagina. In a secondary case, the indications were tumor recurrences after irradiation or after surgery, meeting the criteria for primary exenteration. The exenteration was considered curative when clear margins were pathologically assured and no distant metastases were found either intraabdominally or in the preoperative computerized tomography (CT) scan. An exenteration was declared palliative in the presence of distant metastasis, positive peritoneal lavage or perforation into the pouch of Douglas, as well as in cases when complete tumor removal was not possible. This was the case when a tumor, intraoperatively judged as resectable, showed microscopic positive margins. The clinical data of these patients are shown in Table 1.

All patients had preoperative chest and abdominal computerized tomography CT scans, as well as examinations under general anesthesia, to evaluate operability and to histologically verify the tumor. Moreover, each examination included a cystoscopy and rectoscopy. In cases of hydroureter, including bilateral hydroureters, a split renal function study was performed. A nephrectomy was performed during exenteration if there was no kidney function on one side.

All surgical procedures were performed at the Department of Gynecologic Oncology of the University Hospital of Erlangen and the Department of Gynecology of the General Hospital Neumarkt.

Anterior exenteration was defined as the removal of the reproductive tract and the bladder with the pelvic ureters and the urethra. Posterior exenteration was defined as the removal of the reproductive tract with the rectosigmoid colon. Total exenteration included the removal of the reproductive tract, bladder with the pelvic ureters and urethra and rectosigmoid colon.

Usually, the urinary tract was reconstructed via the formation of a continent ileocecal bladder (241/282). If possible, the appendix was used as an alternative for the urethra. Otherwise, the last 10 cm of the ileum was used to create a neourethra.

Initially, the neourethra was diverted into the right lower abdomen; afterward, the diversion was performed via the umbilicus. These steps made the continent stoma almost invisible. The stoma can be emptied with a non-sterile female catheter in a simple manner. In 30 cases, the urinary diversion was performed via an ileal conduit and, in 5 cases, with uretero-ureterostomy. Six patients had a posterior exenteration while preserving the urinary bladder.

For 249 patients, colonic neovaginas were simultaneously generated. Together with the omental flap (formed in 234 of 282 cases) and the reanastomosed bowel, the neovagina helped to fill the empty pelvic region. Filling the empty space reduced small bowel-associated morbidity and mortality. The neovagina was formed out of the caudal 10 cm of the remaining bowel. This 10 cm had the same blood supply and was first dissected before being rotated 180° and fixed with a prolene mesh to the os sacrum to prevent prolapse (180° colonic neovagina).

Restoration of bowel continuity was achieved with colorectal or coloanal anastomosis (275/282). In 91 cases, mostly because of prior radiation or extremely deep localization of the anastomosis, a temporary protective stoma was built for 6 weeks.

Pelvic or paraaortic lymphadenectomy (248/282) was performed according to oncological guidelines. Additional interventions, such as vulvectomy (16 cases) and amputation of the rectum (27 cases), were also performed as necessary. All operations were carried out by seven gynecologic surgeons. In cases of surgical bypass grafts (8/282), a vascular surgeon was consulted.

In 187 cases of the total 212 secondary exenterations, the disease-free range between the primary treatment and the exenteration was known (1 to 357 months, with a median of 18 months). For 40 patients who had undergone prior surgical procedures, the lymph node status was positive, but 57 women showed no involvement of the pelvic lymph nodes. For 29 cases, no medical records concerning lymph nodes were available.

The survival analysis was performed using Kaplan–Meier curves including Greenwood 95% confidence bands. Survival curves were compared using the log-rank test. Fisher's exact test was used to examine the significance of the association between two variables in a 2×2 contingency table.

Table 1
Clinical data of the patients who underwent curative or palliative exenterations.

Characteristics		Curative		Palliative	
		133/282	47%	149/282	53%
Pretreatment	Primary	27/133	20%	43/149	29%
	Secondary	106/133	80%	106/149	71%
Recurrence type	After operation	27/106	25%	29/106	27%
	After irradiation	27/106	25%	28/106	26%
	After both	52/106	49%	49/106	49%
Exenteration type	Anterior	11/133	8%	3/149	2%
	Posterior	3/133	2%	3/149	2%
	Total	119/133	90%	143/149	96%
Nodal status	Negative	91/133	68%	54/149	36%
	Pelvic positive	30/133	23%	29/149	20%
	Paraaortic positive	4/133	3%	12/149	8%
	Both positive	8/133	6%	54/149	36%
Age	22–44 years	42/133	32%	53/149	36%
	45–54 years	39/133	29%	56/149	38%
	55–79 years	52/133	39%	40/149	27%
Lymphatic vessel invasion	Positive	57/133	43%	95/149	64%

Results

In total, 282 patients underwent pelvic exenteration for primary advanced or recurrent cervical cancer. Of these, 70 patients (25%) received primary exenteration, and 212 (75%) received secondary exenteration. Exenteration was performed as a potential cure in 133 patients (47%), and in 149 women (53%), the aim was palliative. The procedures included anterior exenterations (14/282), posterior exenterations (6/282) and total exenterations (262/282).

The patients who received a secondary exenteration previously had an operation (56 cases), an operation and irradiation (101 cases) or only irradiation (55 cases).

The median age of the women was 50 years (range, 23–79). The mean follow-up time after exenteration was 45 months, with a median of 17 months.

Complete removal of the tumor was achieved in 182 patients (65%), and 99 patients (35%) had R1 resections. For one patient the records showed no data. R1 resection was defined as detection of the tumor or lymphatic vessel invasion at the specimen margins, tumor cells found in the abdominal lavage or a tumor that penetrated the Douglas space. Additionally, 41 patients (15%) had intraabdominal or distant metastasis. Complete resection was possible in 46 (66%) out of the 70 cases that involved primary exenteration and in 136 cases (64%) of secondary exenteration.

The overall survival was 41.0% at 5 years and 37% at 10 years (Fig. 1). The disease-free survival at 5 years was 61%. For the 133