

Pelvic exenteration

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PELVIC exenteration comprises the removal of female structures in the pelvis, together with the rectum and/or the bladder. Total pelvic exenteration consists of the removal of all pelvic organs—rectum, bladder, urethra, uterus, tubes, ovaries, and vagina. The operation is complicated by the fact that both urinary and fecal diversion must be accomplished. Partial exenteration is performed when the bladder is spared (posterior exenteration) or when the rectum is spared (anterior exenteration).

Pelvic exenteration is not only feasible, but is worthwhile treatment for carefully selected women who have advanced cancer that otherwise cannot be cured. Though the rate of postoperative complications is high, nevertheless, a large number of women have been cured and have been able to lead active and rewarding lives.

Pelvic exenteration is not being utilized to the optimal extent, for two closely related reasons. First, because of misconceptions on the part of physicians and patients in regard to the risk of operation and the potential for rehabilitation and physical performance after surgery, exenteration is considered only as a last resort, with the result that the optimal time for performing such surgery has long since passed. Secondly, even when physicians are convinced of the value of such surgery, persistent or recurrent disease is difficult to diagnose at a stage early enough to make possible successful excisional surgery. These conclusions are based on experience at the Cleveland Clinic since 1951. Forty-seven exenterations were performed for various advanced pelvic cancers: total exenteration 31 times, anterior exenteration 14 times, and posterior exenteration twice.

Selection of patients

Indications and contraindications to pelvic exenteration vary according to type and location of tumor, as well as to the extent of disease. The tumor for which this operation is most commonly done (*Table 1*) is a cervical carcinoma that has failed to respond to radiation therapy, or that is so extensive when first diagnosed that radiation treatment can offer only palliation.

Of the 47 women, 29 had carcinoma that persisted after irradiation

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Table 1.—*Indications for pelvic exenteration in 47 women*

| Pathologic diagnosis | Patients, number |
|--|------------------|
| Carcinoma, uterine cervix | 33 |
| Squamous-cell carcinoma | 32 |
| Adenocarcinoma | 1 |
| Carcinoma, vagina | 7 |
| Squamous-cell carcinoma | 6 |
| Adenocarcinoma | 1 |
| Radionecrosis (due to irradiation treatment for carcinoma of uterine cervix) | 2 |
| Carcinoma, colon | 2 |
| Carcinoma, urethra | 1 |
| Endometriosis, colon | 1 |
| Leiomyosarcoma | 1 |
| | — |
| Total | 47 |

therapy. Four others had had no prior treatment, and two others had extensive radionecrosis. Exenteration was performed in seven patients for carcinoma of the vagina. Other indications include carcinoma of the colon, urethral carcinoma, leiomyosarcoma recurrent in the vaginal apex, and endometriosis—a diagnosis that was made only after posterior exenteration had been completed. Extensive carcinoma affecting the vulva and anus, on occasion, may be successfully treated by an exenterative operation. Contraindications include primary carcinomas of the bladder, ovary, and the body of the uterus. Even though those tumors are clinically confined to the pelvis, the spread, by vascular channels, makes even extensive regional operations impractical for tumor control and cure. Pelvic exenteration should always be performed for cure—never for palliation. Despite careful preoperative evaluation of patients, often an explorative laparotomy must be performed, and even then, after excisional surgery has been performed and histologic study indicates complete removal of tumor, the patient still may succumb to metastatic disease.

The patient most suitable for exenterative surgery is the one who has a centrally recurrent or persistent tumor. The triad of unilateral edema of the leg, pain in the sciatic nerve distribution, and unilateral or bilateral ureteral obstruction, indicates lateral spread of the tumor, and eliminates further consideration of curative surgery. Any one of these findings is serious, but when they occur individually, explorative laparotomy may be necessary to determine successful operability. The so-called frozen pelvis is not evidence of inoperability, for this finding may be the result of extensive reaction to irradiation or to benign pelvic disease that existed before the development of the current malignant lesion.

Careful preoperative evaluation is necessary. Physical health is a more important factor than is age. Cystoscopy and proctoscopy assist in determining the extent of disease. Intravenous pyelography should be performed, and occasionally retrograde studies are desirable. We have not employed lymphangiography extensively, because interpretation is variably reliable. Laparotomy is performed even though suspicious lymph node lesions are found, unless there is associated ureteral obstruction proximal to lymph nodes that are seemingly involved with tumor, and venous obstruction with lymphedema has occurred distally.

The scope of exenterative pelvic surgery is such that it is only practicable in large centers with all of the medical and surgical subspecialties represented. Optimal consultation with specialists, and cooperative efforts in solving medical problems are available. The best possible anesthesia and blood bank facilities are at hand. Constant-care and recovery areas provide personnel who are experienced in the management of the most complicated postsurgical problems. Most importantly, a house staff is constantly available for monitoring and for assisting in the management of the convalescent patient.

The single most valuable diagnostic procedure in determining operability consists of careful abdominal exploration by an experienced surgeon, who has readily available the services of a pathologist and facilities for making rapid frozen-section tissue diagnosis. Collateral exploration is most important. Particular attention must be paid to the areas of lymphatic drainage outside the pelvis, and to the liver. If there is evidence of extrapelvic extension of tumor, proved by biopsy, the operation should be immediately concluded.

After completion of upper abdominal exploration, a careful evaluation of the local extent of tumor should be made. There are four conditions that preclude further surgery. Fortunately, they usually can be detected before the surgeon is committed to performing exenteration. Multiple biopsies may be necessary to establish histologic presence or absence of these conditions. They are: (1) invasion of the side wall fascia by tumor; (2) invasion of the levator fascia by tumor; (3) extensive hypogastric, obturator, or iliac nodal metastases; or (4) entrapment of lateral pelvic blood vessels by tumor. Occasionally, metastatic cancer is found in an isolated group of lymph nodes when other lymph nodes in the area are normal. This is most uncommon, but when it occurs, surgery may be successful in effecting a cure.

Selection of operation

We have attempted to individualize operations in accordance with extent of disease, operative indications, and general condition of the patient. For uterine, vulvar, vaginal, and urethral cancers, total exentera-

tions generally are desirable. Posterior exenterations occasionally can be employed for rectal cancers. Only an occasional anterior exenteration is indicated—the major indication being carcinoma of the urethra—since carcinoma of the bladder is unsuited for exenteration.

For the first patients in the series, who had recurrent or persistent cervical cancer, an attempt was made to avoid total exenteration in favor of anterior exenteration. Rectal extension of a cervical carcinoma represents a paradoxical spread of the disease, making it theoretically possible to spare the rectum. However, when posterior exenteration is performed for radioresistant cervical cancer, devascularization and fistula formation so often develop that total exenteration is preferable for the treatment of this disease.

We have evolved a modification of the total operation, allowing for preservation of gastrointestinal continuity, with the result that only a urinary stoma is needed. This operation might also be classed as a modified anterior exenteration. The entire operation is performed through an abdominal incision. The vagina, bladder, and urethra are removed. The rectosigmoid and upper rectum are removed, but a short rectal stump and the anus are preserved. The entire left colon and splenic flexure are mobilized, and a low anterior colorectal anastomosis is performed. A temporary transverse colostomy is made, to facilitate healing of the anastomotic site deep in the pelvis. When healing is complete, the colostomy is closed. This operation is practical only when there is no tumor in the lower half of the vagina. It has been performed in 16 women (*Table 2*).

Various types of urinary diversions have been constructed (*Table 3*). The ileal conduit has been most frequently used. Ureterosigmoidostomy was performed early in the series as part of anterior exenteration. The one patient who has a 'wet' colostomy (ureterosigmoidostomy in an end colostomy) has survived for 15 years.

In most instances, each of these operations at the Cleveland Clinic Hospital were performed by three teams of specialty surgeons (gynecologist, colorectal surgeon, and urologist). The responsible specialist for each

Table 2.—*Pelvic exenteration in 33 patients: management of the colon*

| Procedure | Patients, number |
|-------------------------------------|------------------|
| Low anterior colorectal anastomosis | 16 |
| End colostomy | 15 |
| "Pull-through" resection | 2 |
| Total | 33 |

Table 3.—*Pelvic exenteration in 45 patients: types of urinary diversion*

| Procedure | Patients, number |
|---|------------------|
| Ileal conduit | 31 |
| Ureterosigmoidostomy (anterior exenteration) | 10 |
| Cutaneous ureterostomy | 2 |
| Gilchrist pouch | 1 |
| 'Wet' colostomy (ureterosigmoidostomy to end colostomy) | 1 |
| Total | 45 |

team has varied, but there has been general overall continuity, as the gynecologic team usually has been responsible for coordinating the care of the patient, for making the preoperative evaluation, for judging the operability, and for performing the exenteration. The proctologic team performs the appropriate gastrointestinal repair, while the urologic team completes the necessary urinary diversion.

The use of separate surgical teams is practical and efficient in our hospital, each specialist performing the part of the surgical operation with which he is most familiar and has the greatest experience. Technical compromises occasioned by surgeon's fatigue are avoided—a situation different from that in which the entire operation is performed by a team in one specialty. With the three teams cooperating, postoperative complications are quickly recognized and resolved.

One of the most important contributors to the overall team effort in postoperative care and rehabilitation of the patient is the enterostomal therapist. Dr. Rupert B. Turnbull, Jr., of the Department of Colon and Rectal Surgery, early recognized the need for instructing the patient in the personal management of the intestinal stoma. He enlisted the aid of Mrs. Norma N. Gill (who herself had undergone ileostomy), who for many years now has instructed patients in colostomy and ileostomy management and has trained others who have become recognized enterostomal therapists. The orientation and instruction of patients is instituted early in hospital convalescence and continues throughout the hospital stay. Assistance is also given to rehabilitated patients who may be having problems with appliances or other aspects of the management of stomas many years after surgery.

Complications

Exenteration is often performed in debilitated patients, many of whom have had extensive irradiation. Local tissues may be potentially or actually infected. Operations are prolonged by gastrointestinal and urinary

anastomoses. Thus, complications not only are varied, but are frequent and complex. One patient alone may have multiple complications. The 79 postoperative complications that occurred in the series of 47 patients are listed in *Table 4*.

Table 4.—*Pelvic exenteration in 47 patients; postoperative complications*

| Site and type of complication | Number |
|----------------------------------|--------|
| Gastrointestinal | |
| Small-bowel obstruction | 13 |
| Fistulas | 12 |
| Rectovaginal | 5 |
| Enterovaginal | 4 |
| Enterocutaneous | 3 |
| Staphylococcal enteritis | 5 |
| Ileus, severe, paralytic | 4 |
| Peptic ulcer | 2 |
| Bleeding | 1 |
| Perforated | 1 |
| Large-bowel obstruction | 1 |
| Total | 37 |
| Urinary Tract | |
| Pyelonephritis | 8 |
| Ureteroileal dehiscence | 4 |
| Acidosis, severe | 4 |
| Acute renal failure | 3 |
| Renal calculus | 1 |
| Ureteral obstruction with uremia | 1 |
| Total | 21 |
| Miscellaneous | |
| Wound | 10 |
| Superficial dehiscence | 6 |
| Incisional hernia | 3 |
| Gas gangrene | 1 |
| Pelvic abscess | 5 |
| Vaginal hernia | 1 |
| Vascular thrombosis | 2 |
| Ileofemoral | 1 |
| Deep leg vein | 1 |
| Edema, leg(s), severe | 2 |
| Cardiac arrest | 1 |
| Total | 21 |

Table 5.—*Causes of death of four patients after pelvic exenteration*

| Case no. | Cause of death | Days after operation |
|----------|--|----------------------|
| 1 | Cardiac arrest (unexplained) | 4 |
| 2 | Ileal conduit dehiscence | 11 |
| 3 | Gram-negative septicemia after wound infection and peritonitis | 69 |
| 4 | Bowel obstruction, sepsis | 129 |

Results

Of the 47 patients, 19 (40.4 percent) remain alive. Nineteen patients died of cancer, 9 within one year and the other 10 in from one to five years. Only three patients each operated upon for cervical carcinoma died without evidence of recurrent cancer—1 year, 13 months, and 6 years postoperatively. Two of those patients succumbed to late postoperative complications of pyelonephritis and small-bowel obstruction, and one from a perforated peptic ulcer. Two other patients, each with primary carcinoma of the vagina, died at five months (pulmonary embolus) and at 10 months (enterovaginal fistula) postoperatively. No autopsy was performed.

Of thirty-five women who underwent exenteration more than five years ago, 13 (31.7 percent) have survived five years. Twenty-seven of the 35 patients had a diagnosis of carcinoma of the uterine cervix, and 10 (37 percent) of them survived five years.

There have been four postoperative hospital deaths in the series of 47 operations (8.5 percent) (*Table 5*). The ileal conduit dehiscence occurred because of devascularization of the ileum, secondary to remote irradiation. A reanastomosis of the ureter to the ileum also failed to heal. The patient died of bowel obstruction and sepsis 129 days postoperatively, after the development of every conceivable postoperative complication. Postmortem examinations were performed on three of the deceased patients, and in no case was residual tumor found. No autopsy was performed on the fourth patient who died, but angioinvasion, and perineural and lymphatic invasion by tumor had been identified by microscopic examination of the operative specimen.

Discussion

We have concluded that exenteration is safe, since the postoperative hospital mortality was calculated to be 8.5 percent among the 47 patients. Persistent or recurrent cancer is the major cause of death in the late postoperative period. The high death rate from cancer is due in part to the natural history of the disease. By the time we recognize persistent or re-

current cancer, microscopic spread may have occurred beyond the point where even the most radical surgery could remove it. Types of tumor vary considerably. Some tumors spread laterally or out of the pelvis in early stages, whereas others may remain localized for many months or years. Of the women who died of persistent cancer, a number were found to have angioinvasion, and lymphatic and perineural invasion of tumor in the operative specimen. This cannot be recognized at the time of operation, and no patient with this finding survived longer than two years.

Despite these considerations, it is possible that we can improve the cure rate associated with exenteration. Vigorous efforts are needed to assess the effectiveness of primary treatment that has been given for carcinomas of the lower generative tract, so that persistent tumor may be detected at an early enough stage to allow for successful radical surgical treatment. Simple pelvic examination and Papanicolaou tests are not sufficient. We can all recognize the implications of swollen legs, sciatic pain, and an increased blood urea content, but when these exist it is too late for secondary surgical procedures to be curative. Since advancing tumor can be confused with postirradiation fibrosis, examination under anesthesia, together with needle and punch biopsies can be most helpful. Exploratory laparotomy should be performed when progressive disease is suspected. Waiting for overt evidence of persistent disease may result in a totally inoperable condition when the diagnosis is finally made.

Many vaginal or urethral cancers can best be treated primarily by surgery. The proximity of the vagina to the urethra, the bladder, and the rectum, results in serious complications after irradiation to these organs, with the result that there is a tendency to undertreat those lesions with irradiation.

Summary

Experience with a series of 47 pelvic exenterations has been reviewed and analyzed. Thirty-five patients underwent operations five or more years ago, and 13 (37.1 percent) are still alive. Primary postoperative and hospital mortality was 8.5 per cent. Only one of the 22 deaths occurring in the first five years was due to causes other than cancer.

We believe that pelvic exenteration is safe, and that more vigorous efforts should be made to distinguish potential subjects for these operations.