Urinary diversion in gynecologic oncologic surgery

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INTRODUCTION Today, the pelvic surgeon has at his disposal a variety of methods for urinary diversion, providing a successful solution for almost every clinical situation. The major points to be considered are whether the diversion should be to the bladder or supravesical, and whether it should be continent or continent.

In gynecologic oncology, the most common indication for surgical urinary diversion are anterior or total pelvic exenteration. Vesicovaginal fistulae, mostly due to radiation therapy, that cannot be repaired constitute another important indication for urinary diversion. In patients with unrecaptable recurrences, generally percutaneous nephrostomy is indicated.

The topic of this paper is surgical urinary diversion. Because the urinary bladder and the urethra are removed in the surgical treatment of gynecological cancers which have spread to the bladder, vesical forms of diversion will not be discussed. The method of diversion (continent or cutaneous) will depend on the patient's willingness to accept an appliance for urine collection, or to self-catheterize the stoma. The presence of colostomy, the previous treatment (chemotherapy and/or radiotherapy), and the life-expectancy of the patient are other factors in selecting the type of urinary diversion.

The major goals of urinary diversion are to preserve renal function and to provide a means for the disposal of urine that will least disturb the quality and duration of life. Characteristics of the ideal urinary diversion are unobstructed drainage of the urine from the kidney, continent storage of urine, separation of fecal and urinary streams, minimal reabsorption of urine and electrolytes, absence of reflux, maintenance of renal function, simplicity of technique and patient acceptance.

During the past decades, the experience with supravesical urinary diversion has made it clear that separation of the fecal and urinary streams is necessary with acceptance of using an isolated bowel loop for this purpose. The intestinal segment is not meant to act as a reservoir, but rather as a conduit for conveying the urine to the outside. In the following paragraphs, the main techniques of urinary diversion will be briefly discussed.

ILEAL CONDUIT The first report of clinical application of conduit diversion was made by Bricker (1). He used an isolated segment of ileum for the conduit. Soon after, ileal conduit was accepted enthusiastically by surgeons who performed pelvic exenterations. The use of the intestinal segment as an extension of the ureter to the skin provides greater flexibility, adequate length and blood supply resulting in an improved stoma location and fewer stomal complications. Ileal conduit has the disadvantage that the bowel segment invariably lies within the pelvic field of radiation, a situation that increases the risk of dehiscence of both the ureteral and the small bowel anastomoses. Preoperative evaluation of the renal function is mandatory. If one kidney is not functioning (less than 5% of total glomerular filtration) the ureter should be ligated. In previously irradiated patients, the ileum and ureters should be carefully evaluated intraoperatively for radiation damage. When it is suspected, the conduit should be created from the transverse colon, proximal ileum or jejunum. The basic principles of technique, common to all urinary conduits, include 1. wide ureterointestinal anastomoses to minimize the risk of stenosis, 2. the use an isoperistaltic intestinal segment not longer than necessary (15-20 cm), 3. a protruding stoma to optimize urine collection, 4. stabilization of the conduit to prevent displacement, and 5. an adequate size tunnel through the abdominal wall to prevent obstruction of the conduit. Preoperatively antibiotic and mechanical preparation of bowel is required, and the skin should be marked for the stoma. Surgical technique is reported in the major textbooks of gynecological surgery (2-3), and will not be described. Although the use of stenting the ureters is debated (7), we always use single-J stent passed through the stomas. Each stent is separately marked as right and left in order to monitor urine output from each kidney. The stents are left in place for 2 to 3 weeks.

Although urinary diversion by ileal conduit is technically not
the most difficult operation performed by the gynecologic oncologist, complications are frequent and the rate is strongly influenced by the general condition of the patient, prior radiation therapy and the extent of surgery performed in addition to the urinary diversion. Complications include urinary, vascular, and bowel complications. Urinary output from each kidney must be always monitored in order to detect low urinary output, which may depend on the physiologic response to surgical trauma and fluid management, and causes related to the urinary diversion. Conduit related causes include stent obstruction by clots or mucus, stent displacement and leakage from the uretero-ileal anastomoses. To exclude the former causes, irrigation of the stent should be performed. Persistent oliguria requires radiographic evaluation. Clinically diagnosed leakage of urine from the conduit occurs in about 5%-10% of patients (4-10). Stenting seems to be able to prevent leakage (11-13), but not in all patients. Symptoms of urinary leakage are 1. urine leaking from the perineum, from around the conduit stoma and from the intraperitoneal drain, 2. decreased urine output, 3. abdominal distention with fever and ileum. Diagnosis is usually made by CT scan with contrast and loopogram. Conservative management is the treatment of choice in nearly all patients because surgical intervention is associated with a mortality rate of 50%. The preferred method is to insert a stent anterograde via percutaneous nephrostomy, and to drain the associate intra- and abdominal urine collection. An indirect danger of urinary leakage from the conduit is the impaired healing of intestinal anastomosis, sometimes resulting in a leak from the intestine. The most frequent vascular complication is infarction of the conduit from arterial or venous thrombosis, which may involve the stoma, the segment traversing the abdominal wall, or the entire conduit. This complication is managed by laparotomy with resection of the infarcted portion. Several cases of hemorrhage resulting from a fistula between the right common iliac artery and the ureter have been reported. The usual history is that of intermittent gross haematuria. This is managed by artery embolization or surgical closure, followed by emergency cross femoral by-pass. As for any laparotomy, ileus may complicate postoperative course. Prolonged ileus may be an indication of urinary and intestinal leaking, and of an abscess due to intestinal leaking. Fever may complicate this intervention as with any other, but specifically may be related to pelvic abscess or pyelonephritis. The latter complication has been reported in up to 20% of these patients. Bowel preparation, antibiotic prophylaxis and good hydration help to reduce the postoperative risk of urinary infection.

Other specific complications are ureteral-intestinal stenosis, which may develop slowly and progressively, leading to a progressive silent hydronephrosis in about 10% of patients (4, 8, 12). The problem may be remedied by insertion of ureteral stent or, in more severe cases, by percutaneous nephrostomy. Repeated urinary infection may occur in 5-10% of patients. Both these complications may lead to the loss of kidney function. Specific late complications occurring in about 10-15% of patients are stomal stenosis and parastomal hernia.

SIGMOID CONDUIT The chief advantage of sigmoid colon conduit is avoiding a small bowel anastomosis with its potential for fistulization. Other advantages include fewer stomal complications and the suitability of the colon for a non-refluxing ureteral anastomosis. Disadvantages are: 1. it is not applicable in patients with diverticulitis, 2. an increased risk for carcinoma within the conduit, 3. reduce the possibility of a low rectal anastomosis, 4. the sigma lies in the field of pelvic radiation, thus may show radiation changes. For these reasons, the sigmoid colon conduit is rarely carried out.

TRANSVERSE COLON CONDUIT The transverse colon is normally outside of the pelvic irradiation field, thus the use of the transverse colon conduit appeared to ideally suit for patients undergoing pelvic exenteration after irradiation for gynecological cancer. Other advantages are the large diameter which reduces the likelihood of stenosis, its mobility which allows stomal placement in any abdominal quadrant, and its reduced probability to be the site of intrinsic disease (e.g., diverticula) as compared to the sigmoid colon. Furthermore, in this procedure, the ureters can be transacted well above the field of pelvic irradiation.

The most natural location for the stoma of the transverse conduit is the left upper abdominal quadrant. In this case, the conduit is isoperistaltic. The stoma can be located in the right upper and right lower quadrants as an antiperistaltic conduit. Presumably, an antiperistaltic segment of colon would increase the intraluminal pressure. However, no unusual complications have been reported with the antiperistaltic colon conduits.

The literature data on transverse colon conduits is limited (5, 11, 14-15), and we do not know whether its complication rates differ from those of other conduit procedures. However, there is no reason to believe that they would differ significantly, particularly in patients who received radiation therapy.

CUTANEOUS URETEROSTOMY This procedure has been abandoned because of the technical problems in producing a single stoma, the risk of stomal necrosis, and the common development of long-term stomal retraction and stenosis.

ILEOCOEAL NEOBLADDER WITH MULTIPLE TRANSVERSE TAENIATOMIES Although the use of intestinal segments for conveying the urine outside has improved, survival and the quality of life of patients undergoing pelvic exenteration, and the need for a permanent urine collector is a major disadvantage particularly during anterior exenteration. To overcome this drawback, several techniques of continent neobladder have been proposed, as reported in other papers on this topic. The basic idea is to create a continent, low pressure reservoir.
This is most commonly done by using a detubalized bowel segment in order to decrease intraluminal pressure and to avoid ureteral reflux. However, detubalization makes the surgical procedure more difficult, and increases the cost and the risk of complications as compared to the extirpative counterpart which is per se a difficult and time-consuming procedure (16). Recently, it has been reported that a continent, low pressure caecal neobladder can be created with multiple taeniamyotomies (16).

The distal 5-6 cm long segment of the terminal ileum and about 10 cm of the caecum are used to create the reservoir. The segment is isolated with great care in preserving the ileocolic artery. The ureters are anastomosed to the terminal ileum, and the ileo-caecal valve prevents antireflux. Multiple (5 to 8) transverse sections of the taeniae are performed to successfully relax the caecal wall. The original technique was modified by using the appendix as conduit between the caecum and the anterior abdominal wall. The lumen of the appendix is narrowed by invaginating sutures, and the appendix is sutured to the umbilicus. An ileo-caecal anastomosis complete the intervention. This reservoir has a maximum capacity of 300-400 millilitres, which increases with time (17). Ureteral reflux has been reported to occur in about 10% of patients (17). Self-catheterization of the stoma is required. Continence of the neobladder was achieved in 3 out of 4 patients (9). Although more data is needed to validate this technique, its simplicity and the reduced operating time led us to believe that this is a useful technique.

REFERENCES


