

TRANSVERSE COLON POUCH: AN ALTERNATIVE CONTINENT URINARY DIVERSION AFTER PELVIC IRRADIATION

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Objective Urinary diversion after pelvic irradiation is challenging. The use of irradiated bowel is mostly complicated and unsuccessful. Therefore, the use of an exclusively non-irradiated bowel segment, such as the transverse colon, is a good alternative in such a situation.

Patients and Methods Twenty-nine female patients who had received a high dose of irradiation underwent construction of a transverse colon reservoir as a primary form of urinary diversion. The indications were irreparable vesicovaginal fistula in 5, local recurrence of gynaecological tumors in 18 and invasive bladder carcinoma in 6

patients. They were followed up for a median of 5.6 (1-9) years.

Results No pouch-related complications were observed. Hydronephrosis improved in 9 of 15 renal units that had preoperatively been dilated. Incontinence occurred in 3 patients due to an inefficient stoma that was revised, and all were continent thereafter.

Conclusion The results suggest that the transverse colon reservoir in previously irradiated patients is safe and effective. It can, therefore, be recommended as the method of choice in this group of patients.

Key Words pelvic irradiation, transverse colon, continent urinary diversion

INTRODUCTION

Radiation therapy is a well-established adjuvant or definitive treatment modality for invasive bladder carcinoma or gynaecologic tumors with reasonable cure rates¹. However, urinary diversion may be indicated to manage the radiation-induced complications such as vesicovaginal or cloacal fistulae and bilateral ureteral stenosis since reconstructive surgery in the previously irradiated field is mostly difficult and unsuccessful. Another indication for urinary diversion is local tumor recurrence requiring anterior or total pelvic exenteration².

The field of radiation for pelvic malignancies includes the small intestine, the ascending and descending colon. Hence, the potential risk of failure is high if such segments are utilized for urinary diversion due to entero-enteric fistulae, ureterointestinal anastomotic stenosis and poor healing^{3,4}. Therefore, the transverse colon conduit as a non-irradiated bowel segment has been introduced for urinary diversion in such cases^{5,6}. The contemporary cutaneous continent reservoir can also be considered in previously irradiated patients with a favourable prognosis^{7,8}.

In the following we describe the surgical technique, the functional results and complications of a continent non-refluxing transverse colon reservoir in heavily irradiated patients.

PATIENTS AND METHODS

Between 1990 and 1998, twenty-nine female patients who had received a high dose of irradiation had a transverse colonic reservoir constructed as a primary form of urinary diversion. The mean patient age was 37.3 years (range 29-74). Five patients had a vesicovaginal fistula following irradiation for gynaecologic tumors, 18 patients with local tumor recurrence necessitated complete pelvic exenteration and 6 patients had received definitive radiotherapy for invasive bladder carcinoma. All patients received a total dose of 45-65 Gy in a four-field technique.

The patients were considered candidates for surgery after a thorough physical examination which included their ability to tolerate such major surgery and to perform clean intermittent self-catheterization (CISC). Preoperative laboratory profile, IVP and CT scan were man

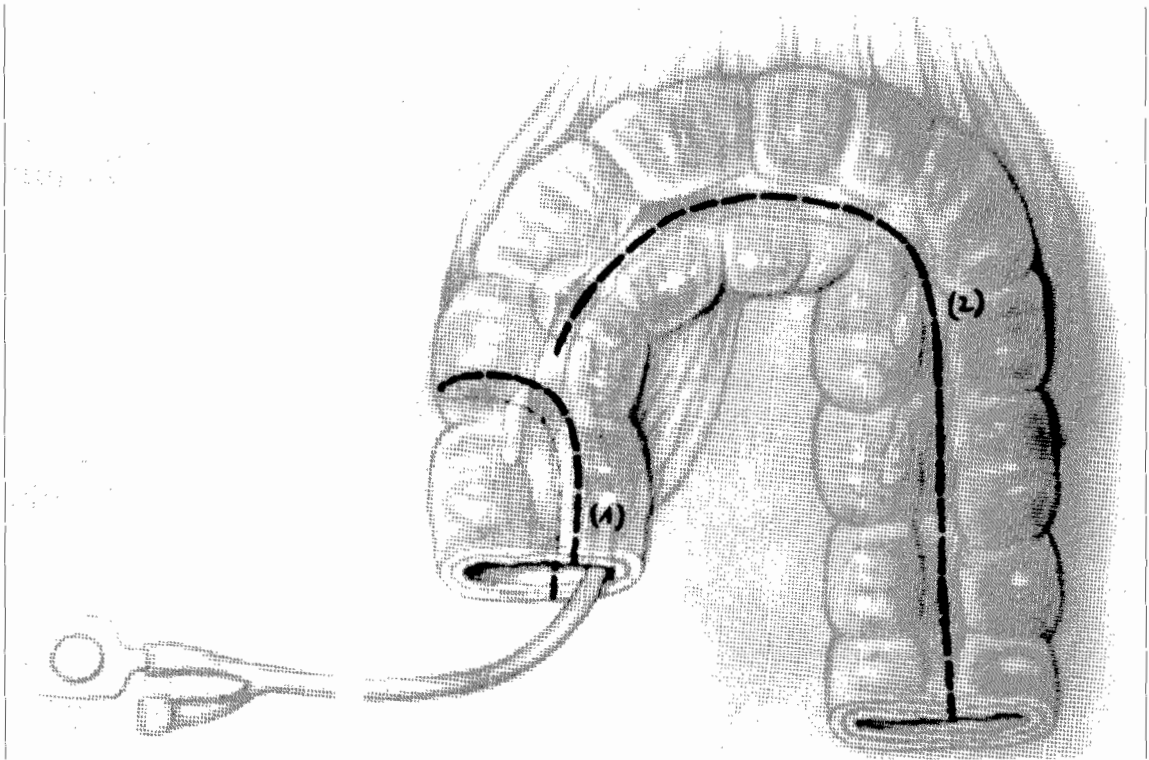


Fig. 1: About 15 – 20 cm colon are isolated for pouch construction. The oral end with the indwelling catheter is reserved for the creation of the efferent segment.

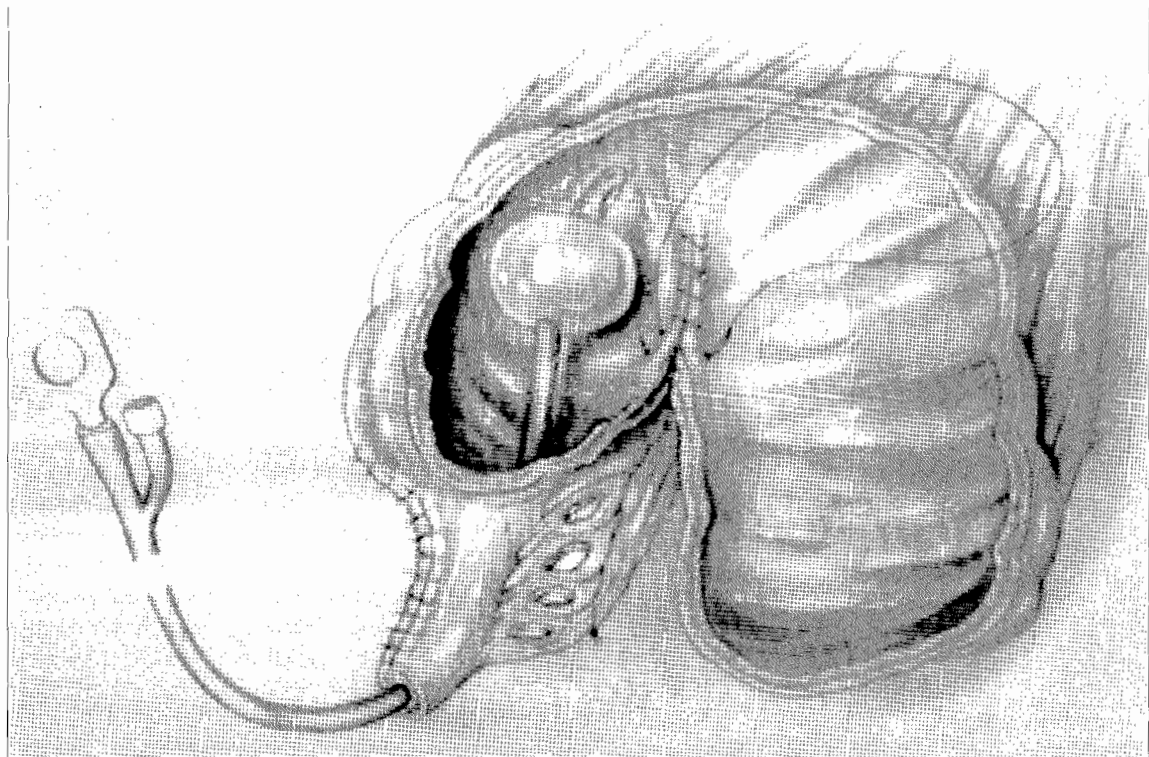


Fig. 2: Detubularization of the colon and creation of the pouch plate. The aboral end is tapered over an 18 Fr. catheter and mesenteric windows are created.

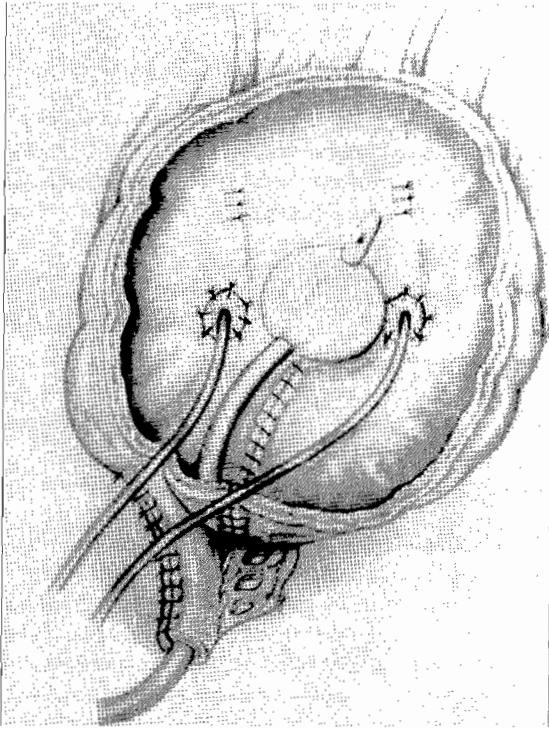


Fig. 3: Implantation of the ureters through submucous tunnels

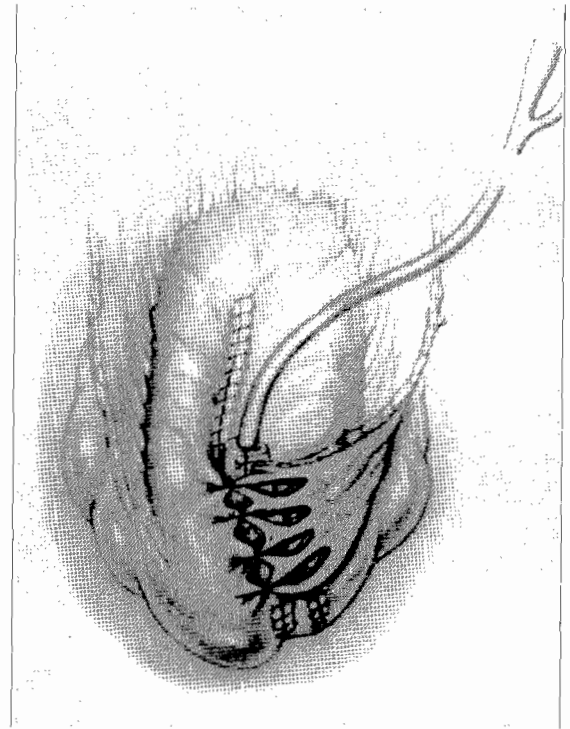


Fig. 4: Subserous embedding of the efferent segment by sutures placed through the mesenteric windows

datory. Serum creatinine was less than 1.5 mg/dl in all patients. Hydronephrotic changes were diagnosed in 15 of 58 renal units. A contrast enema was performed to exclude colonic diverticula, polyps or stenosis, to assess the anatomy of the colon and to judge whether the ascending or descending portion was more suitable for pouch construction. The patients received a two-day bowel preparation using a low-residue diet, cathartics, bowel irrigation and antibiotics.

Surgical technique

A midline approach is used to facilitate the completion of cystectomy or pelvic exenteration. After the pelvic procedure is finished, the small and large bowels are carefully mobilized and the ureters are dissected to a level at which arterial capillary bleeding and spontaneous peristalsis are evident. The greater omentum is dissected from the anterior wall of the transverse colon. Complete mobilization of the right or left colic flexure is performed to gain adequate colonic length. The gastrocolic ligament is then transected to detach the colon from the greater curvature of the stomach.

Between 15 and 20 cm of the transverse colon and either the hepatic or splenic flexure are isolated and resected between stay sutures after identification of the middle colic artery and its arcades by transillumination (Fig.1).

The continuity of the bowel is re-established using one layer interrupted seromuscular 4-0 polyglactin sutures. The isolated colonic segment is then irrigated copiously with saline solution.

The colon is detubularized antimesenterically leaving 5 cm of the oral end intact for creation of the efferent segment. This segment is tapered over an 18 Fr. catheter and then reconfigured into a pseudoappendix using 3-0 polyglycolic running sutures (Fig.2). An easy catheter gliding is necessary since a shrinkage rate of approximately 25% is expected. From the rest of the detubularized colon, a pouch plate is created using a running 4-0 monofilament polyglycol suture. An antireflux Goodwin submucous tunnel is performed for ureteral implantation on both sides of the suture line (Fig.3). The dilated ureters are implanted through an extramural serous-lined tunnel⁹.

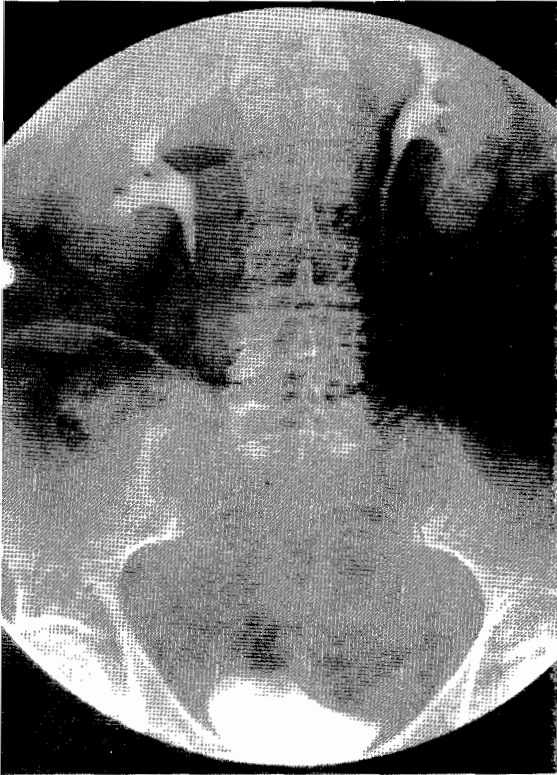


Fig. 5A: Preoperative IVP showing normal renal units

The pouch is closed and the efferent segment embedded in the anterior suture line of the pouch wall.

Mesenteric windows are created in the tapered colon which is then placed in the suture line, and the seromuscular layers of the anterior wall are sutured together using single 3-0 prolene sutures through the mesenteric windows (Fig.4). The efferent segment is anastomosed to the umbilical tunnel at the level of the rectus fascia using 3-0 polyglactin and the pouch is then fixed to the abdominal wall. The omentum is used to cover the pouch and bowel. Along with a 10 Fr. pouchostomy, the ureteral stents are led out through the pouch and abdominal walls at separate sites.

Postoperatively, the pouch is irrigated with 50 ml saline four times a day to avoid obstruction with mucous. The ureteral stents are removed after 2 weeks. The patients begin CISC every 2 hours during the day and 4 hourly at night. Once it is confirmed that the patient has mastered CISC, the pouchostomy is removed, and over the next 4-6 weeks the patient is instructed to increase the catheterization interval to 4 hours.

The patients were routinely followed-up at 3-month intervals in the first year, 6-month intervals in the second and annually thereafter. Evaluation included a complete physical examination, serum chemistry, chest X-ray and ultrasound. Pouchography was done 3 months after surgery and then annually. A computer tomography scan was mandatory every year to exclude local recurrence or metastatic deposits.

Urodynamic evaluation of the pouch was done one year after surgery. The patients were followed-up for a median of 5.6 (1-9) years.

RESULTS

There was no operative mortality nor early complications related to the pouch procedure such as bowel or urinary anastomotic leak. The ureteral stents were removed in a timely fashion. The hospital stay ranged from 2-3 weeks according to the patients' ability to perform CISC. Of the 29 patients, 3 died of metastatic disease at 13, 22 and 51 months after surgery.

Metabolic acidosis defined as a base excess of less than 4 mmol/L was encountered in 12 patients. However, they had a good renal function and none required therapy. Eight patients had persistent asymptomatic bacteriuria, although no urinary tract infection was diagnosed. Postoperative IVP revealed improvement in 9 of the 15 renal units that had previously been dilated (Fig.5). There was no evidence of leakage or reflux in any of the cases (Fig.6). Ureteral stenosis was evident in three renal units, 2 were corrected with re-implantation and 1 necessitated nephrectomy due to the deteriorated kidney function.

Urodynamic studies showed an average pouch capacity of 450 ml (350-600) and absent or less than 35 cm H₂O contractions. The patients achieved daytime continence with a median time between catheterization of 4.5 hours and a median pouch capacity of 500 ml. Pouch-related complications occurred in 7 patients. Three were incontinent due to an inefficient outlet. The efferent segment was revised using a tapered colonic segment incorporated into the pouch wall in 2 and an ileal nipple valve in one, and all were continent thereafter. Difficult catheterization due to stoma stenosis occurred in 4 patients. Three were treated by endoscopic incision and one underwent Y-V plasty.

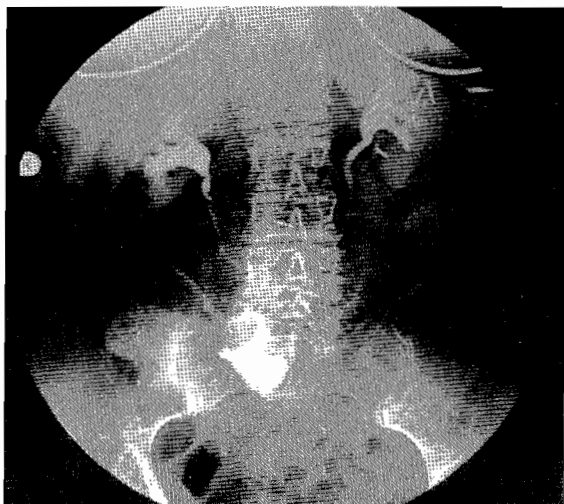


Fig. 5B: Postoperative IVP showing perfect renal units

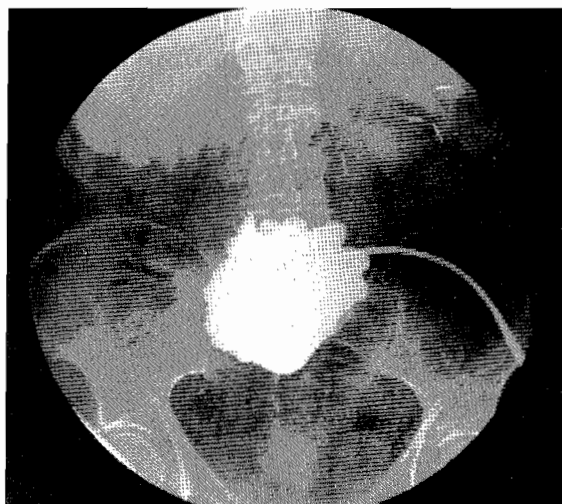


Fig. 6: Postoperative pouchogram showing good pouch capacity, no reflux or extravasation

DISCUSSION

Since the use of irradiated bowel for urinary diversion is associated with a high complication rate¹⁰⁻¹², the use of the transverse colon being away from the irradiation field has become the method of choice in such a situation^{5,13}. Several authors have confirmed the excellent outcome and low complication rate associated with the transverse colon conduit as a supravescical diversion in patients treated with pelvic irradiation¹⁴⁻¹⁶.

Early experience with continent cutaneous diversion in patients who had undergone adjuvant or definitive radiotherapy was disappointing due to the associated high operative morbidity and mortality^{17,18}. The technique of a continent urinary diversion using the transverse colon was first described in 1990⁷. A year after, Bihrie et al. reported a transverse colon pouch using a strip of the greater curvature of the stomach as a stoma⁸.

The results of our series compare favourably with other reports of continent cutaneous diversion^{19,20}. No deaths or major complications were encountered. Only 4 patients were unable to use CISC, 3 of them were treated endoscopically. Although the described efferent segment achieved excellent continence results, three patients required its refashioning by using a new colonic tube in two and an ileal nipple valve in one. However, other techniques are also available. A tapered

small bowel segment can be embedded in the pouch wall according to the way described above. A full thickness colonic tube can also be used^{21,22}. The Monti technique remains a good alternative that enables us to use a short bowel segment²³.

The antirefluxive ureteral implantation was successful in all but 3 renal units as the ureters were resected up to a high level where vascularization is better and subsequent stenosis could be avoided. This was confirmed by earlier observations of Spera and associates²⁴.

The patients with mild metabolic acidosis required no therapy as they had good renal function and improved considerably by six months after surgery. However, prophylactic alkalinization is advised in such a situation.

Urodynamic studies showed a low pressure reservoir with a median capacity of 450 ml and a catheterization interval of 4-5 hours, a finding which emphasizes the superiority and easy handling of the transverse colon pouch.

In conclusion, the transverse colon reservoir ensures the use of non-irradiated bowel and ureters for a primary urinary diversion. It has a low rate of stomal complications, easy maneuverability, feasibility of antireflux ureteral implantation and allows for the preservation of the ileocaecal valve, limiting the adverse effects related to increased stool frequency. We recommend the use of the transverse

colon reservoir as a versatile alternative form of primary continent antirefluxive urinary diversion in irradiated patients.

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RESUME

La Poche Colique Transverse : Une Alternative à la Dérivation Urinaire Continente après Irradiation Pelvienne

Objectif La dérivation urinaire après irradiation pelvienne est pleine de défis. L'utilisation d'un colon irradié est souvent compliquée et sans succès. Ainsi, l'utilisation d'un segment colique non irradié comme le colon transverse est une bonne alternative dans pareille situation. **Patients et Méthodes**

Vingt-neuf patientes ayant reçu une forte dose d'irradiation ont bénéficié d'un réservoir colique transverse comme dérivation urinaire de première intention. Les indications étaient une fistule vésico-vaginale incurable dans 5 cas, une récurrence locale d'une tumeur gynécologique dans 18 cas et un carcinome vésical invasif chez 6 patientes. La durée moyenne de suivi était de 5,6 ans avec des extrêmes de 1 et 9 ans. **Résultats** Aucune complication liée à la poche n'a été observée. Une hydronéphrose s'est améliorée dans 9 des 15 unités rénales qui étaient dilatées en pré-opératoire. Une incontinence survint chez 3 patientes à cause d'un stoma inefficace. Toutes sont devenues continentales après révision de la poche. **Conclusion** Ces résultats suggèrent que le réservoir colique est sûr et efficace chez les patients qui ont été irradiés. Ainsi, il peut être recommandé comme méthode de choix chez ce type de patients.

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