

Management of radiation injuries to the bowel associated with treatment of uterine carcinoma by radiotherapy: preliminary communication¹

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Introduction and methods

Between January 1974 and April 1977, 200 patients at The Middlesex Hospital received intracavitary radiation using the Cathetron as part of their curative treatment for carcinoma of the cervix or endometrium. The Cathetron is a treatment device which allows miniature, highly radioactive cobalt sources to be inserted into the uterine cavity and vagina under remote control, with greater precision and safety to the operator than was the case with radium (O'Connell *et al.* 1967). Treatment times are reduced to a few minutes, compared with several days using radium.

Patients with carcinoma of the cervix received high-dose external radiotherapy to the whole pelvis (5280 rad tumour dose in 23 fractions over 38 days using 8 MeV X-rays), supplemented by intracavitary Cathetron treatment which deliver 2200 rad to point A in three fractions, one week apart. Patients with operable endometrial carcinoma received intracavitary Cathetron treatment (4000 rad to point X in 4 fractions over 4 weeks) prior to extended hysterectomy. (Points A and X are anatomical points defined for dose prescription purposes. Point A lies 2 cm lateral to the uterine canal, 2 cm above the external cervical os and corresponds to the intersection of the ureter and uterine artery. Point X lies 2 cm lateral to the uterine canal, 2 cm below the uterine fundus and is situated in the myometrium.) A minority of patients unfit for operation received additional external radiotherapy to the pelvis.

In this preliminary report, the 200 patients have been reviewed for serious bowel complications, defined as those requiring surgery or prolonged inpatient medical treatment. Patients with recurrence of their uterine carcinoma have been excluded. Since half the patients received external beam radiotherapy in addition to the Cathetron, an opportunity was provided to compare the relative contributions of external radiation and the Cathetron in causing bowel damage.

Results

Thirteen of the 200 patients were lost to follow up, and the remaining 187 were almost equally divided between cases of carcinoma of the cervix (96) and endometrium (91).

There were 12 patients with serious complications, and all had received external radiotherapy in addition to the Cathetron treatment (Table 1). The complications divided equally into cases of mainly rectosigmoid and mainly small bowel damage, although some patients had damage at both sites.

Details of the 6 patients with rectosigmoid complications are shown in Table 2. Patients 1 and 2 had their strictures by-passed by a loop colostomy. Patient 3 presented a diagnostic problem with a narrow stricture producing symptoms so early after treatment that diagnostic laparotomy was carried out to exclude carcinoma; the radiation stricture found was not resected and a colocutaneous fistula resulting from mobilization of the stricture eventually closed. Patient 4 has required multiple blood transfusions for rectosigmoid bleeding and is being considered for surgery. Patient 5 had an anastomotic leak following sigmoid colectomy and died from peritonitis following a second operation to exteriorize the bowel. The sixth

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patient presented with increasing abdominal pain for many months, and laparotomy was carried out when the pain suddenly increased, revealing a faecal peritonitis due to necrosis of the sigmoid wall; a Hartmann's operation was followed by further surgery to drain pus and remove necrotic tissue, but she died from peritonitis.

The 6 small bowel complications (Table 3) also comprised 5 patients with strictures seen on barium studies or at operation and all in the ileum, and one patient with radionecrosis of bowel. Patients 1 and 2 have been admitted for observation and investigation and are still the cause of some concern with continuing pain and weight loss. Patient 3 presented with small bowel obstruction and right hemicolectomy was carried out for a terminal ileal stricture; rectosigmoid damage was noted at operation but not resected and following surgery she

Table 1. Patients with serious bowel complications following radiotherapy

	Carcinoma of:			Bowel complications	
	Cervix	Endo-metrium	Total		
Cathetron alone	20	74	94	0	0%
Cathetron + external radiotherapy	76	17	93	12	13%
Total	96	91	187	12	6.4%

Table 2. Patients with rectosigmoid complications

Patient	Age (years)	Carcinoma site	Onset of symptoms following radiotherapy (months)	Complication	Surgery	Outcome
1	36	Cervix	16	Stenosis	Colostomy	Well
2	60	Cervix	10	Stenosis	Colostomy	Well
3	61	Cervix	3	Stenosis	Laparotomy	Fistula
4	60	Endometrium	10	Stenosis	—	Bleeding
5	71	Cervix	6	Stenosis	Sigmoid colectomy + further surgery	Died
6	53	Cervix	6	Necrosis	Hartmann's procedure + further surgery	Died

Table 3. Patients with small bowel complications

Patient	Age (years)	Carcinoma site	Onset of symptoms after deep X-ray (months)	Complication	Surgery	Outcome
1	67	Cervix	2	Malabsorption	—	Pain, weight loss
2	36	Cervix	2	Malabsorption	—	Pain, weight loss
3	50	Endometrium	11	Stenosis	Right hemicolectomy	Fistula healed
4	46	Endometrium	4	Stenosis	Ileo-ileal anastomosis + further surgery	Died
5	39	Cervix	5	Stenosis	—	Intravenous feeding
6	66	Cervix	4	Necrosis	Ileo-ileal anastomosis + further surgery	Died

developed a small anastomotic leak which healed in 10 days on intravenous feeding; she still has intermittent bleeding from the rectosigmoid lesion. Patient 4 had an ileo-ileal anastomosis following resection of a stricture and died from an anastomotic leak; she also had significant rectosigmoid changes. Patient 5 had such extensive small bowel strictures shown on barium studies that surgery was not considered feasible, but her symptoms of pain, distension and diarrhoea have now largely settled on intravenous feeding. The last patient developed an acute abdomen following several months of pain; necrosis of the ileum had caused a localized peritonitis, but following resection she died of peritonitis due to a leak from her ileo-ileal anastomosis.

Thus 4 of the 12 patients have died from intra-abdominal complications, including the 2 patients with necrosis of the bowel wall. Eight patients have required surgery and 3 are now well, but 5 still have symptoms. None has presented with serious rectal or bladder complications.

Discussion

The evidence at present available suggests that the cure rates of the Cathetron are at least as good as those obtained with radium (Joslin *et al.* 1972, Snelling *et al.* 1979). The follow-up period in this study is short and further complications are still to be expected, although more than 90% occur within two years of treatment (Wellwood & Jackson 1973). In this series of 200 patients, approximately half received intracavitary Cathetron treatment alone and none of these suffered any bowel injury. Only patients receiving high dose external radiotherapy to the pelvis in addition to the intracavitary treatment appeared to be vulnerable.

Although the present complication rate is considered an acceptable price for the cure rates obtained, changes in management may reduce these complications. Proposed changes in surgical management are: first, to avoid ileo-ileal anastomosis for lower ileal strictures and instead to carry out a right hemicolectomy with anastomosis to relatively undamaged colon near the hepatic flexure; secondly, to assess carefully any rectosigmoid lesion when an ileal stricture is resected, as back pressure from an unrecognized rectosigmoid lesion may contribute to a proximal leak (Palmer & Bush 1976); thirdly, to use low anterior resection for an uncomplicated sigmoid radiation stricture, as the accuracy of the Cathetron would appear to effectively spare the low rectum and high success rates have been reported by this approach (Palmer & Bush 1976); finally, to operate earlier rather than later in cases of continuing pain associated with radiation strictures, in order to avoid the lethal complication of radionecrosis, which usually has prodromal symptoms (Jackson 1976).

It is advisable to reduce the dose of external radiotherapy in vulnerable patients, e.g. those over 70 years of age, with advanced disease, diabetes, hypertension, small physique or obesity (Maruyama *et al.* 1974). Of the 12 patients discussed here, one was over 70 years of age, 2 had T3 tumours of the cervix, 2 were insulin-requiring diabetics and one suffered from hypertension.

Other measures, such as treating the patient prone or with head-down tilt, have been claimed to reduce the radiation damage to the small intestine (Green *et al.* 1975).

References

- Green N, Iba G & Smith W R (1975) *Cancer* 35, 1633–1640
- Jackson B T (1976) *Proceedings of the Royal Society of Medicine* 69, 683–686
- Joslin C A F, Smith C W & Mallik A (1972) *British Journal of Radiology* 45, 257–270
- Maruyama Y, Van Nagell J R, Utley J, Vider M L & Parker J C (1974) *Radiology* 112, 699–703
- O'Connell D, Joslin C A F, Howard N, Ramsey N W & Liversage W E (1967) *British Journal of Radiology* 40, 882–887
- Palmer J A & Bush R S (1976) *Surgery* 80, 458–464
- Snelling M D, Yarnold J R & Lambert H E (1979) *Clinical Radiology* (in press)
- Wellwood J M & Jackson B T (1973) *British Journal of Surgery* 60, 814–818