

# Radiation-induced gastrointestinal fistulae

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## Summary

Seventy patients with radiation enteritis presented to a single surgical unit between 1958 and 1984. Of these 10 (14%) had 14 radiation-induced fistulae. The median latent period between radiotherapy and presentation of the fistula was 20 months. The fistulae were often multiple and/or associated with other radiation-induced lesions, patients presenting with fistulae being significantly more likely to have synchronous lesions compared with those who presented with strictures ( $P = 0.005$ ). These patients are often unfit for major surgery. Wide resection and anastomosis, or exclusion operations are the surgical procedures of choice.

## Introduction

Abdominal or pelvic radiotherapy, given usually for malignant disease, affects the gut in a variety of ways. During the radiotherapy there are nearly always transient symptoms, such as nausea, vomiting, abdominal pain or diarrhoea. These acute disturbances usually resolve spontaneously on stopping radiotherapy (1). A smaller number of patients will go on to develop symptoms due to chronic radiation enteritis. About 5% of patients who have had abdomino-pelvic radiotherapy will eventually present surgically with haemorrhage, stricture, fistula or perforation (2,3).

Though radiation-induced fistulae are not common they pose several problems of management. First, fistula formation seems to represent a particularly severe form of radiation enteritis. Synchronous lesions, such as fistulae into other organs or other gastrointestinal lesions, are common (4). Also the prognosis of patients presenting initially with fistulae, in terms of their developing new radiation-induced lesions later, is poor (5). Second, conservative treatment, which may result in healing of at least 60% of most gastrointestinal fistulae (6), is unlikely to be successful in those induced by radiation.

This paper describes the clinical presentation of patients with radiation-induced intestinal fistulae in a single surgical unit and highlights the problems associated with their management.

## Clinical details

Between 1958 and 1984, 70 patients with sequelae of radiation-enteritis presented to the Department of Surgery at the Hammersmith Hospital (5,7-9). Of these, 10 patients (14%) presented with a total of 14 gastrointestinal fistulae. This excludes enterocutaneous fistulae resulting from ana-

stomotic leakage. The ten patients (Table I) comprise eight women and two men who had received their radiotherapy for cancer of the cervix (4), endometrium (2), ovary (2) or bladder (2). The median age at receiving radiotherapy was 50.5 years and the latent period to manifestation of the fistula was 20 months.

## THE NATURE OF THE FISTULAE

Table I illustrates the organs involved in the 14 fistulae. In five patients the fistulae were multiple. These included one patient with a synchronous vesicovaginal fistula and one patient in whom the small bowel and caecum had perforated into a chronic abscess cavity which communicated with the bladder. Three patients had multiple, independent fistulae affecting the gut. In seven of the 14 fistulae a distal stricture was present and one other patient had a rectovaginal fistula and a terminal ileal stricture. Thus, of ten cases where the fistula presented as the first manifestation of radiation-enteritis, multiple lesions or complex disease was present in eight. By contrast multiple problems occurred in only 15 of 55 cases when a stricture was the first manifestation of radiation-enteritis ( $P = 0.005$ , Fisher's Exact Test). In two cases, gut which had already been bypassed went on to fistulate.

## CLINICAL MANAGEMENT

One patient was unfit for surgical intervention and died soon after presentation in renal failure. Operations were performed on the remainder as described in Table I. Resection with immediate anastomosis was associated with a high anastomotic leakage rate. No leaks occurred when we modified our surgical technique to use, for at least one end of the anastomosis, gut taken from outside the original radiation field. After ileal resection, ileo-ileal anastomosis was avoided, it being assumed that the whole ileum had been irradiated. The distal ileum was closed (or resected with the right colon) and the proximal ileum anastomosed to unirradiated transverse colon. After rectosigmoid resection a similar principle was employed, the left colon being removed and unirradiated splenic flexure being used to anastomose to the distal rectum (9).

## Discussion

The type of fistula encountered in irradiated bowel is determined by the position of the original lesion requiring radiotherapy. Thus, most fistulae are rectovaginal or colovesical following the treatment of genitourinary malignancy.

Our data show clearly that patients who present with

TABLE 1 *Clinical details of patients with radiation-induced fistulae*

Age	Sex	Primary diagnosis	Type of fistula	Latent period	Synchronous radiation lesion(s)	Management	Comment
40	F	Carcinoma cervix	Caecum/terminal ileum to abscess cavity to skin	10 years	Bladder to abscess cavity fistula	Resection and anastomosis	Died. Sepsis
51	F	Carcinoma cervix	Colo-vesical	8/12	Distal stricture	Resection and anastomosis	Anastomotic leak. 4 years later—further fistula—same site (Distal stricture)
39	F	Carcinoma cervix	Recto-vaginal	6/12	Terminal ileal stricture	Resection and anastomosis (of each lesion)	Satisfactory
56	F	Carcinoma cervix	Recto-vaginal (following Hartmann's procedure for rectal stricture)	2 years	Distal stricture Vesico-vaginal fistula	Conservative	Died. Renal failure
48	F	Carcinoma ovary	Ileo-vesical Colo-vesical	22/12	Distal stricture Distal stricture	Resection and anastomosis. Colostomy	Died. Anastomotic leak
50	F	Carcinoma ovary	Ileo-colic Recto-uterine	14/12	Distal stricture	Resection and anastomosis. Colostomy	Died. Anastomotic leak
62	F	Carcinoma endometrium	Ileo-vaginal	44/12		Resection and anastomosis	Re-fistulated 5/12 later. Resected. Died of sepsis
61	F	Carcinoma endometrium	Ileo-ileal	42/12	Distal stricture	Resection and anastomosis	Died. Anastomotic leak
65	M	Carcinoma bladder	Recto-urethral (post-cystectomy)	18/12		Colostomy	Satisfactory
50	M	Carcinoma bladder	Colo-vesical Ileo-colic	10/12	Distal stricture	Colostomy. Resection and anastomosis	Died. Anastomotic leak

radiation-induced fistulae are likely to have other lesions present at the same time. They are significantly more likely to do so than those patients who present, for example, with radiation-induced strictures. Cooke and DeMoor (4) also found that, of 28 patients presenting with radiation-induced rectovaginal fistulae, there were other associated fistulae in six.

Before embarking upon any definitive surgical procedure for these patients, it is clearly important to exclude any synchronous lesion. A careful history should be taken for urinary symptoms or symptoms suggestive of a subacute bowel obstruction. Appropriate investigations should be performed if there is any suggestion of associated disease. In this way the operative procedure(s) can be carefully planned in advance. The patient's fitness is also likely to be a decisive factor in the choice of operation. Malnutrition may complicate high small bowel fistula and ascending urinary tract infection or renal failure may be associated with entero-urinary fistulae. One of the patients in this series died of renal failure from a combined vesicovaginal and rectovaginal fistula before any surgical intervention could be contemplated.

Whatever the ultimate choice of operation for colonic fistulae, most agree that a proximal defunctioning colostomy is an important preliminary step. This may prove to be a satisfactory definitive measure if the patient is unfit for further surgical procedures. The one patient in this series who had simple colostomy alone, being unfit for a major resection, is coping well 5 years later. If a colostomy is performed as part of a planned procedure, it should be sited in the right transverse colon so that the splenic flexure may be brought down later to complete one end of a restorative anastomosis. Although Goligher (10) suggests that a delay of up to 1 year may be necessary between colostomy and further operation in order to allow resolution of inflammat-

ion, this is probably not necessary provided that the diseased rectum is excised.

Local repair of fistulae alone is likely to fail since irradiated tissue heals so poorly. However, in the case of rectovaginal fistulae, the interposition of non-irradiated tissue between the vagina and the rectum, for example muscle or omentum (11), may be sufficient to allow satisfactory healing. Sphincter-preserving procedures following excision of the diseased rectum and restorative anastomosis using, for example, the pull-through technique originally described by Parks (12) may be useful in some cases. In this operation, mucosa is stripped from the lower rectum and the mobilised descending colon is pulled through the muscular tube to be anastomosed to the anal region, the fistula being left *in situ*. Clearly if this operation is to be performed, it is important to exclude any distal stricture but there is no guarantee that the remaining muscular tube of the rectum will not be the site of a later radiation stricture. Using this technique, Cooke and DeMoor (4) have achieved satisfactory results in terms of cure of the fistula and maintenance of continence in a series of 28 patients with rectovaginal fistulae.

In the case of fistulae involving small bowel, resection of the diseased bowel may not be possible if, for example, it is matted down into a frozen pelvis and a bypass procedure may be necessary. In a small number of patients Piver and Lele (13) found that bypass and isolation of a small bowel fistula was associated with less postoperative morbidity and mortality than a simple bypass alone.

Our results seem to indicate that the presence of radiation-induced fistulae indicates widespread radiation damage. Not only are fistulae likely to be associated with synchronous lesions, but on clinical follow-up of these patients we have found that those patients who initially present with either fistulae or perforations are at particular risk of going on to develop new metachronous radiation-induced problems (5).

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## Hamilton Bailey 1894-1941

There must be few students of surgery who have not heard of Hamilton Bailey. Not only was he a prolific writer but also as an experienced surgeon and teacher he wrote with authority.

His earliest books were *Demonstrations of Physical Signs in Clinical Surgery* (1927) and two volumes of *Emergency Surgery* (1930 and 1931). His new format with clear illustrations, photographs and succinct writing became popular. At one time "Ham" Bailey was named the Edgar Wallace of Medical Literature and the *Short Practice of Surgery* (Bailey and Love) became known as the student's bible.

At the wish of his father, Dr Henry J Bailey, a general practitioner in Brighton, he enrolled at the London Hospital in 1912. As a second year student while serving as a dresser in the British Red Cross in Belgium, he was arrested and nearly shot as a German spy. Bailey related this in the *London Hospital Gazette* (1914). By the intervention of the U.S. Embassy, he was repatriated to serve later as a Surgeon Lieutenant in the Royal Navy till 1919 having had active service at the Battle of Jutland.

In 1924, shortly after his assistantship at the 'London', his left index finger was amputated following a severe infection before the advent of sulpha-drugs. This daunting experience for an ambitious man was overcome by the

dextrous use of a special needle holder. Undeterred, he continued his career in provincial hospitals. Throughout, he amassed a collection of clinical notes and illustrations supported by his avid reading of the literature for his future use. His 'Emergency Surgery', based on his personal experience, was directed to the 'comparatively isolated surgeon' at home or overseas.

A post in a teaching hospital eluded him but in 1932 he found his niche at the Royal Northern Hospital. This striking, well-dressed, tall (6'4"), alert figure was a shy person and a man of few words which could be mistaken for brusqueness. He had a quiet sense of humour and was a good raconteur. He had a charitable disposition, being disinterested in money. His unflagging energy found him working on his publications even after a strenuous day of hospital work. At his home in Totteridge, aided by an efficient secretarial team armed with up-to-date gadgets, he enjoyed writing undisturbed. He would not relax for even on a rare weekend away 'he had two rounds of golf and had resected a length of intestine'.

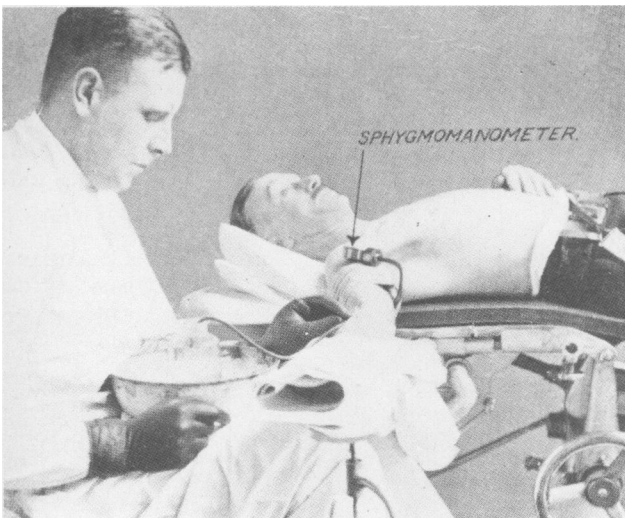
His forte was emergency surgery and being a rapid operator he attracted many 'poor risk' patients. His many surgical contributions included all aspects of intravenous therapy including blood and even auto-transfusions, a timed routine for combating cardiac arrest, a stand-by set for pulmonary embolectomy, parotidectomy, the transverse abdominal incision—to name a few. Of his many other hospitals, he enjoyed working at St Vincent Clinic where he found the peaceful tranquility of a dedicated staff.

In 1943, the tragic accidental death of his young son cast a cloud over his work. This had a latent effect on him mentally. From 1948 to 1952 he laid aside the scalpel, but on his recovery he took up the pen and gradually resumed the revision of his books, namely 'Pye's Surgical Handicraft', the House Surgeon's vade mecum, and the 'Short Practice'.

After several moves in 1961, he and his ever devoted wife Veta went to live Spain near Malaga where he died ironically after surgery for malignant bowel disease.

As a memorial to this international figure, a Hamilton Bailey Trust was established whereby the royalties of her husband's books were allocated to medical libraries abroad and also by scholarships for young overseas surgeons seeking further education in this country—a worthy legacy.

VALENTINE SWAIN FRCS



Hamilton Bailey collecting the blood from a donor