Irradiation injury to the colon

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EDITORIAL SYNOPSIS Two patients with irradiation injury to the colon are reported to illustrate the problem of diagnosis. There may be a long interval between irradiation and the onset of symptoms. Obstruction is common and is due to nerve and muscle damage impeding bowel motility.

The treatment of cancer by irradiation always results in some damage to normal tissues, and damage to the bowel in the course of irradiation to the abdomen has been recognized for many years. Most reports, however, are of injury to the small intestine or rectum. This paper concerns two cases in which the colon alone was injured.

CASE REPORTS

CASE 1 This patient was a 45-year-old man. In March 1962 a left nephrectomy was performed for a papillary adenocarcinoma of the kidney. One month later a course

of Cobalt 60 was given in two parallel opposed fields (15 cm. $\times$ 15 cm.), which included the kidney bed and regional lymphatics. A dose of 300 r was given daily alternating between the anterior and posterior portal. A total dose of 5,500 r was delivered over 29 days.

The patient remained at work until May 1963 (month 12 from the time of irradiation) when he experienced an episode of severe epigastric pain and nausea. This settled down without treatment but one month later he was admitted to hospital following a week of obstinate constipation, lower abdominal pain, and distension. This too resolved over the following seven days, although a barium enema showed a stricture of the descending colon (Fig. 1).

FIG. 1. Results of a barium enema showing a stricture of the descending colon.

FIG. 2. Inflamed and thickened area in the descending colon found at operation.

An exploratory laparotomy was performed in July 1963 (month 14) and revealed a chylous ascites together with a paracolic abscess surrounding that portion of the colon corresponding to the stricture on the radiograph. The abscess was drained through a stab incision and the patient made an uneventful recovery. He returned to work but was chronically disabled by nausea and intermittent abdominal pain.

In February 1964 (month 21) he had a further attack of large bowel obstruction and re-operation was decided on. He was prepared for surgery with intravenous fluids and insoluble sulphonamides.

At operation a pint of chylous ascites was removed. The localized area of the descending colon was thickened and indurated as before but was more extensively inflamed (Fig. 2). A strikingly similar lesion was found on the left side of the transverse colon. The bowel between the two lesions was apparently normal. There were several hard white lymph nodes adjacent to the lesion in the transverse colon. One of these was immediately removed for frozen section examination, but this revealed no abnormality. The involved portion of the colon was resected and mid-transverse colon anastomosed end-to-end to proximal sigmoid colon.

The patient made an uneventful recovery and was discharged two weeks later. He remains well.

CASE 2 This patient was a 47-year-old woman who had a squamous cell carcinoma of the cervix diagnosed in February 1956. This was treated by radium (one application to give 4,000r to point A) followed one month later by Wertheim's hysterectomy and lymph adenectomy. Histological examination showed residual carcinoma following the radium but no glandular involvement.

The patient remained well until February 1957 (month 12) when she complained of pain in the right hip region. Rectal, vaginal, and abdominal examination revealed no abnormality at this stage but six weeks later a mass was palpable in the right side of the pelvis. In April 1957 (month 15) the patient received a course of Telecobalt irradiation given by the 360° rotation technique, the tumour volume being a sphere 12 cm. in diameter. A tumour dose of 6,800 rads (80%) was given. The pelvic mass had decreased in size by August 1957 (month 18) and was not palpable by December 1957 (month 22).

She remained in good health until January 1958 (month 23) when she complained of pain in the rectum together with slimy diarrhoea and blood passed by rectum. A hard perirectal mass was palpable on rectal examination. Her symptoms subsided with a course of prednisone and olive oil enemas.

One month later, however, she was admitted to hospital with a three-day history of pain in the left iliac fossa. She had not had her bowels open for five days and had been vomiting on the day of admission. On examination she was grossly distended with generalized abdominal tenderness. A plain radiograph of the abdomen showed a typical picture of a large bowel obstruction.

A caecostomy was performed under local anaesthesia because of the patient's poor general condition; she died two days later.

FIG. 3. Resected colon containing radionecrotic ulcer in operation specimen (case 1).

PATHOLOGY

Both specimens showed extensive ulceration and narrowing of the lumen. In case 1 (Fig. 3) there were three ulcers: one was an irregular ulcer 5 cm. in diameter in the transverse colon which almost encircled the bowel, and in the descending colon there were two ulcers 2 cm. in diameter (Fig 4). The slough in their bases was bright yellow and could not be dislodged without damaging the bowel.

The specimen for case 2 had numerous ulcers varying in size from 2 mm. to 1 cm. in diameter in the narrowed sigmoid colon. The proximal large bowel was greatly dilated.

The microscopic picture in both cases showed areas with complete and partial loss of mucosa. The most striking feature was the hyalinization of the submucosa which had numerous bizarre fibroblasts and abnormal collagen. Wood, Ralston, and Kurrle (1963) considered vascular damage to be a definite contributing factor in irradiation damage in their cases. However, in these cases there were no changes in the intimal cells nor any reduction in the size of the lumen in the arteries. The mucosa of the splenic flexure between the two damaged areas in

FIG. 4. Radionecrotic ulcers in transverse and descending colon in operation specimen.

case 1 was quite normal, further proof against a vascular basis in producing the bowel pathology.

DISCUSSION

These patients illustrate the problem of diagnosis in irradiation injury. In each case the symptoms could have been produced either by recurrent malignancy, a new primary malignancy, or irradiation damage. Since the prognosis is so vastly different in each condition it is essential to make every effort to differentiate them. In this regard a thorough inspection of the surface of the patient's body can be most valuable. Epilation and pigmentation in the skin may confirm or refute that the field of irradiation which was recorded in the case notes was in fact as recorded. In case 1 the lesion in the descending colon was considered to be outside the field of irradiation but closer examination showed the effects of irradiation on the surface overlying the bowel.

A long interval between irradiation and occurrence of symptoms should not preclude a diagnosis

of irradiation damage. Colcock and Hume (1959) recorded seven cases of irradiation injury to the colon at the Lahey Clinic in which this interval varied from two weeks to three years, while Abrahamson (1960) reported a case of radiation ileitis in which symptoms occurred 19 years after treatment.

X-ray studies with opaque media are of assistance in localizing the lesion but are by no means diagnostic. The lesion in the descending colon (Fig. 1) in case 1 appeared to occupy only a short segment of bowel and had an abrupt transition to bowel of normal calibre not unlike a carcinoma. In retrospect, however, the second lesion in the transverse colon could be seen, although this was not so marked. Careful examination of films for multiple sites may therefore be of assistance in making a correct diagnosis.

Even at operation the diagnosis is not always obvious. Both a primary malignancy of the colon and a segment of irradiation injury can be indurated and fixed to surrounding structures. The points of difference between these two are set down in Table I.

TABLE I

POINTS OF DIFFERENCE AT OPERATION BETWEEN MALIGNANCY AND IRRADIATION INJURY	
Primary Malignancy	Irradiation Injury
1 Usually single	1 May be multiple
2 Short segment of colon involved	2 Usually longer segment of colon involved
3 Diameter of colon unchanged or larger at site of lesion	3 Diameter of colon reduced at site of lesion
4 Colon normal in colour	4 Colon injected and inflamed
5 Central lymph nodes may be involved	5 Peripheral lymph nodes white and indurated
6 Hepatic metastases may be present	6 No metastases

Intestinal obstruction is the commonest complication in damage to the small bowel, but there is less information regarding the presentation of cases with damage to the colon. Three of the seven cases from the Lahey Clinic had sigmoiditis, while the remaining four presented with a stricture. Both the cases under discussion presented ultimately with obstruction due to a stricture. The mechanism of the obstruction is undoubtedly that of interference with peristalsis due to nerve and muscle damage rather than to mechanical narrowing. Although there was considerable cicatrization in the region of the ulcers in the descending colon, the lumen was by no means occluded. The damage to muscle and nerve flexures was seen in the bed of the ulcer.

Fixation of the bowel appears to be an important factor in damage to the small intestine. All of the nine patients reported by Graham and Villalba

(1963) had either a previous laparotomy or pelvic sepsis which accounted for the injured loop being trapped close to the source of irradiation. It is surprising then that the colon with its comparative immobility is not damaged more frequently.

Most authors agree that patients with irradiation damage presenting as colitis should be managed by medical means in the first instance. Those who do not respond, or progress to a large bowel obstruction, however, together with those presenting with obstruction due to stricture, should be treated surgically. In cases with a stricture the obstruction may be incomplete and the patient's colon can be prepared sufficiently well to make a one-stage resection safe and desirable.

SUMMARY

Two cases of irradiation injury to the colon are discussed, and both presented ultimately with large

bowel obstruction. Examination of the patient's skin for the effects of irradiation is suggested to compare with the site of the suspected injury, and barium enema may reveal other unexpected and less obvious lesions in the colon.

The points of difference at operation between a primary malignancy and irradiation injury to the colon are noted. Vascular damage did not appear to be in any way responsible for the bowel pathology in these two cases.

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