Benign Stricture of the Intestine Due to Irradiation of Carcinoma of the Cervix Uteri:

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Four hundred and twenty-two patients with carcinoma of the cervix have received irradiation at the Cleveland Clinic. This total number includes six cases (1.4 per cent) of benign stricture of the intestine which might easily have been confused with metastatic carcinoma. Subsequent to the irradiation no evidence of carcinoma was found, and, judging by present standards, none of these patients received excessive irradiation. It seems probable that the incidence of this lesion is found to be greater elsewhere as well as in this institution than the literature would indicate.

The present study directs attention to this benign lesion as a clinical entity, and offers suggestions for its prevention. It appears logical that this complication may be prevented without altering the principles of the well-proved, present efficacious radiation therapy of cervical cancer. Although there are many reports in the literature which deal with the manifestations of acute injury of the intestine following irradiation, no reports were found wherein the patients recovered from the acute symptoms and at a later time symptoms developed which were referable to benign stricture of the intestine. This condition may represent a later stage of the inflammatory process than has hitherto been observed. Of the six cases reported, five of the benign strictures occurred in the sigmoid colon and one in a loop of the lower part of the small intestine.

A patient who complains of unusual abdominal symptoms, particularly if they simulate those of intestinal obstruction, several months or even years following radiation therapy, may have a stricture of the intestine due to irradiation, and such a patient may be restored to normal health by a resection of the lesion. Before the disability is attributed to metastasis, a re-examination should eliminate the possibility of the presence of this curable condition. At least roentgen examinations of the sigmoid and colon should be made, and a careful roentgen study of the small intestine may be advisable, provided the obstruction is not complete. It is advisable to explore the abdomen, particularly in cases in which there is evidence of intestinal obstruction, and in which there is no evidence of the presence of carcinoma remaining in the pelvis.

The lesion may show any stage of chronic inflammation at the time of examination, but an annular fibrosis which results in a narrowed lumen was the predominant finding in the cases observed. If ulceration is present, it may involve only the mucosa, or it may

extend through all the layers of the intestine into the adjacent mesenteric fat. No evidence of acute perforation into the peritoneal cavity was found in this series of cases.

In making a diagnosis of the lesion, the history relative to bowel function is of first importance, and minute inquiry should be made concerning the condition of the patient immediately following operation. When a stricture caused by irradiation is forming, although diarrhea is often the predominant symptom, unusual constipation supervenes sooner or later, which is accompanied by other symptoms of varying degrees of intestinal obstruction. If the patient is seen during the ulcerating stage of the disease, intestinal hemorrhage may be the chief complaint.

In the cases in which lesions of the sigmoid were present, the sigmoidoscopic examination did not reveal the lesion, because of the unusual fixation of the involved area, or because of an unusually redundant sigmoid colon which was distal to the lesion. The roentgen examination of the colon was the most important single means of revealing the presence of the lesion in the sigmoid colon. Modifications of the usual roentgen procedures were used.

The dosage of radium administered to these patients varied from 2,440 millicurie hours to the equivalent of 4,240 millicurie hours. One patient received only radium irradiation. Tubes of radon containing 1.5 mm. of brass filter enclosed in 2 mm. of rubber were used in all cases. In addition, in one case, radium needles were inserted into the carcinomatous tissue. Roentgen therapy was administered through four portals—the suprapubic, the right iliopubic, the left iliopubic and the postsacral regions, each portal in succession receiving 50 per cent of a skin unit dose at a time, and the entire course of treatment in each instance being given in from five to seven days. The skin unit dose was 800 roentgens and the estimated 10 cm. depth dose was 30 to 40 per cent, a potential of 200 kilovolts being used, 5 to 8 milliamperes with filtration varying from 0.5 to 1.0 mm. copper and 1 mm. of aluminum and varying sized portals at 50 cm. focal skin distance, depending on the thickness of the abdominal wall. The total calculated roentgen dose about the cervix was approximately 800 roentgens.

In considering the etiology of the lesion it is pointed out that if a segment of intestine is to be affected by the radium irradiation, it must lie very close to the treated area, and must remain more or less constantly in that position during the time the radium is in place. The factors used in the roentgen therapy produce a hemogeneous irradiation to the entire contents of the pelvis. No one segment of intestine should receive more roentgen irradiation than any other

segment. If it is kept in mind that only one of these patients received only radium therapy, it is logical to assume that in the patients who received both types of irradiation, roentgen therapy aggravated a condition already started by the radium therapy.

Certain measures which are suggested for the prevention of benign stricture of the intestine following irradiation are the following:

1. If the patient is placed in a moderate Trendelenburg position during the time of the radium irradiation, the danger of dislodgement of the radium is minimized, and the lesion may be prevented unless the vulnerable, redundant segment of intestine is fixed in position at the time of the irradiation.

2. Continued peristaltic activity of the intestine during the time of irradiation might also be a means of changing the position of redundant loops of intestine. The administration of pitressin after the usual preparation by a thorough emptying of the intestine is suggested as a means of producing this desired effect.

3. The keeping of the tip of a flexible colon tube in the sigmoid colon during the time of radium application might be helpful in preventing an accumulation of gas, which might predispose to the development of a benign stricture in this area.