are incised (as far laterally as possible) removal including the fat in the ischiorectal space, may be quickly accomplished.

There remains a large cavity surrounded only by the bladder in front and the bony wall of the pelvis. A large rubber square is placed into the cavity and this is packed with gauze to stop the oozing and to help support the new pelvic floor. The incision is then closed except for a distance of two inches, where the drain is situated. The gauze is partly removed on the second, third or fourth day and the cavity is irrigated daily with solutions of sodium chloride or boric acid or a 1 to 8000 solution of bichloride of mercury. After this the patient is put to bed and a blood transfusion of 500 cc. of blood is administered.

Postoperative treatment then is symptomatic. The colostomy is opened on the second, third or fourth day, depending on the degree of abdominal distension. The patient receives a full diet as soon as the colostomy is opened.

If there are no contraindications, the patient is encouraged to get out of bed on about the twelfth to fourteenth day after operation. This helps to make the new pelvic floor sag, thereby hastening the filling of the large cavity. Before the patient returns home, he is instructed regarding irrigation of the colostomy and other general care.

I believe that properly planned and executed, this operation offers the best hope of cure of cancer of the rectum. The operative mortality rate in 135 cases is 11 per cent.

The percentage of patients with five years’ immunity from carcinoma is 52; with three years’ immunity, 62 per cent; and 67 per cent of this group have been well for less than three years.

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TWO STAGE OPERATION FOR RECTAL CANCER

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Radical surgery of rectal cancer has now attained such a degree of technical perfection that it would seem that slight, if any, advance in operative technic can be looked for.

Contributing factors have been improvement in the preoperative survey and preparation of the patient, postoperative care, and above all the selection of the type of operation best suited to the individual case.

The operative maneuvers have become clearly defined and standardized into the following types:

(1) One stage abdominoperineal operation.
(2) Two stage abdominoperineal operation.
(3) Two stage perineal excision.
(4) Posterior resection.
(5) Perineal amputation.

This classification implies that the surgeon undertaking this type of surgery should be familiar with, and skilled in, the performance of each of these operations as indicated.

The one stage abdominoperineal operation, as perfected by Miles, with permanent terminal sigmoïdostomy and removal of the entire segment distal to the stoma, is the ideal from the standpoint of wide eradication of the disease and prevention of recurrence. Indeed, this wide excision is the only practical procedure when the rectosigmoid is involved, as it is in approximately 60 per cent of cases. Experience has shown, however, that the same radical removal can be accomplished with less risk by dividing the operation into two stages, namely, a preliminary colostomy to be followed in a fortnight or longer by the excision.

Pioneers in the development of the two stage operation are W. J. Mayo (1912) who did a loop colostomy, ligated the blood supply to the rectum and closed the ends of the pelvic colon sectioned distal to the colostomy, burying the aboral, devitalized segment beneath the closed peritoneum, to be removed extraperitoneally at the second stage. In 1915, Daniel Fiske Jones proposed a loop colostomy with central ligation of the sigmoid vessels, thus preserving the vascular arches from the left colic artery and blood supply to the distal segment; freeing the rectum on all sides and suture of the dissected pelvic peritoneum to the sigmoid above the point of central ligation of its vessels and above the tumor. The loop colostomy facilitates cleansing of the distal segment by irrigations before the second stage which is an extraperitoneal procedure. Inversion of the proximal end of the bowel at the second stage, however, leaves an undesirable blind pouch distal to the colostomy. In 1932, Jones reported his operability as 60 per cent, operative mortality, 20.7 per cent; operated patients alive at three years, 73 per cent; and at five years, fifty per cent, or 26.2 per cent of total cases seen.

Coffey, in 1914, published a procedure the chief object of which was to protect the peritoneum from infection. It accomplishes this aim very effectively. In the first, which is the major stage, the sigmoid is divided and an end colostomy is established, the distal vessels are severed, the distal pelvic colon and the rectum are dissected and the peritoneum closed in such manner that the lower portion of the peritoneum of the abdominal wound is united to the margins of the pelvic peritoneum dissected from the pelvic colon. The distal segment of colon is inverted through the rectum; in women, through the posterior vaginal fornix, beneath the closed peritoneum. Large cigarette drains, inserted to the bottom of the pelvis, emerge through the lower angle of the abdominal wound.

At the second stage, ten days later, the distal segment and rectum are removed from below by wide dissection. Due to the considerable dissection and suturing required, the first stage is comparatively long while the second
stage is short. This operation, like that of Mayo, has the disadvantage of leaving, between stages, devitalized bowel with poor drainage in the freshly denuded pelvis. Dudley Smith modified Coffey's technic of the first stage by complete closure of the abdominal wound and inserting rubber dam drains through an incision lateral to the coccyx.

At the twenty-third annual Clinical Congress of the American College of Surgeons, Coffey reported that a total of 239 cases of carcinoma of the rectum and rectosigmoid had been admitted to his clinic. Radical removal was done in 31 cases of rectosigmoid growth, hospital mortality seven (22.5 per cent); and in 82 cases of carcinoma of the rectum by his "inversion technic" hospital mortality six (7.3 per cent). Fifty-one patients were traced, of whom 23 died before the end of five years. Of the 28 who survived over five years, 13 died, two only of recurrence; and 15 were alive without known recurrence from 5½ to 15 years after operation.

My own experience with Coffey's method in a single case was no infection of the peritoneal cavity, a stormy convalescence, but a very satisfactory result.

Mr. A. H., aged 52 years, had a large carcinoma beginning three and one-half inches above the anus on the anterior rectal wall and involving the rectosigmoid. The first stage was performed on June 8, 1925. Colostomy was established and the tumor bearing segment removed through the abdomen. Twelve days later the second stage perineal excision was carried out. Now, nearly nine years later, the patient is in excellent health. His colostomy functions well, his weight is the highest it has ever been and he follows his usual occupation without discomfort.

The next steps in the evolution of the two stage operation and the nearest approach to the one stage ideal procedure were advanced by Rankin and Lahey. Both procedures have the virtue of preserving the blood supply of the distal segment until the second stage excision.

Rankin, in 1929, advocated as the first stage an end colostomy, dropping back into the peritoneal cavity the closed distal end of the divided sigmoid, and preserving intact the blood supply of the distal segment. As a consequence, the second stage may be deferred as long as seems beneficial for the improvement of the patient's condition, rectal irrigations being given meanwhile. At the second stage the rectum is dissected from below, encased in a rubber glove, and the entire rectum and distal sigmoid removed through the abdomen. In 1934 he reports that in a series of 85 cases there were eight operative deaths, a mortality of 9.5 per cent. Of 300 cases of carcinoma of rectum and rectosigmoid operated upon in a total group having an operability of 50 to 60 per cent, 114 or 38 per cent, were alive and free from recurrence at the end of five years.

In 1930, Lahey modified the first stage of Rankin's method by fixing the distal segment of the divided sigmoid colon into the lower angle of the abdominal wound, thus affording an easy and efficient way of irrigating the distal segment. A practical difficulty may be experienced in obese subjects in bringing the distal end of the sigmoid to the skin surface and in retain-
CARCINOMA OF RECTUM

ing it there when the mesosigmoid is short. A minor disadvantage in the second stage is that the infective stoma must be closed just before opening the peritoneal cavity, dissection of the pelvic colon and rectum, and removal of the entire distal segment from below. Lahey (1934) reports that he and his associates have employed this method in 29 consecutive cases without an operative death.

The advantages of the two stage over the one stage abdominoperineal procedure are its greater safety and its applicability to cases in which the one stage operation would be too great a hazard. Between stages, function of the colon is established, a notable degree of rehabilitation of the patient is accomplished, nutrition improved and toxemia reduced. Moreover, irrigation of the distal loop cleanses it of feces, renders the ulcerated carcinoma comparatively free from infection and, as a consequence of the reduction of inflammation, the tumor bearing segment is frequently shrunken and so more easily and safely removed at the second stage.

The two stage perineal excision for tumors of the rectum proper justly merits the popularity accorded it, especially by British surgeons. At the first stage the abdomen is explored and a loop colostomy established. About two weeks later, during which the distal segment has been irrigated and the general condition of the patient improved, the distal segment is removed through the perineum at a safe distance above the tumor, and the proximal end inverted by a double row of sutures.

Miles abandoned this procedure after recurrences in 94.4 per cent of the patients in which he had used it. Nevertheless, Gabriel’s statistics of 370 cases of posterior resection by the surgical staff at St. Mark’s Hospital are impressive. Of 189 cases operated upon (1910–1926), 55 or 36.4 per cent survived five years without recurrence. Of 91 cases operated upon (1910–1921), 20 were cured on a ten year basis, i.e., 30 per cent. In both series the “untraced” and those “dead from other causes” are excluded in estimating the results.

The chief advantages of the two stage perineal excision are its safety in poor risks, in anemic and weak individuals, in very obese subjects and in patients having cardiorenal complications, conditions which bar the more hazardous one stage procedure. Where applicable, the two stage posterior resection is the safest operation in the hands of the average surgeon.

Posterior resection implies dissection of the lower pelvic colon and rectum through the abdomen; posterior removal of the coccyx, possibly with a portion of the lower sacrum, delivery of the tumor bearing segment of bowel through the wound, its division above and below the growth and circular suture of the ends. As an alternative, the upper segment is drawn through the previously denuded anal canal after the method of Hochenegg. Posterior resection involves an exacting and difficult technic and is employed by very few surgeons. Its complications are infection and later stricture or fistula at the site of the circular enterorrhaphy. Recurrences are frequent.
Perineal resection (amputation) of the rectum without colostomy should be reserved for neoplastic involvement of the anal canal and lower rectum in which the finger, introduced per anum, reaches the upper margin of the growth. If the roentgen ray shows a freely movable sigmoid colon of average length, as much as six to eight inches of bowel can be brought down and amputated, and a new anal outlet established at the normal site. This is an excellent operation in obese patients and in the aged, and in females especially its accomplishment is technically easy.

My personal experience with perineal resection has been quite extensive and in general very satisfactory both as to immediate and late results, including control of the feces. Several patients have lived in comfort and without recurrence over five years, one more than ten years after operation.

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GOLD RADON SEEDS IN RECTAL CANCER

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Selection of the most appropriate treatment for a given case of rectal cancer may be an easy or difficult problem. There are many variable factors to be considered at the time the disease is recognized. Analysis of these factors varies widely. They may suggest a hopeless condition or possibility of a clinical cure. Experience has proven that best results are obtained when each case of rectal cancer is considered a separate problem and treated in accordance with clinical and pathologic factors.

Treatment of cancer is a surgical problem. Different methods of surgical technic are advantageous. Radium and roentgen ray should be considered additional surgical equipment. In our clinic we employ the one and two stage abdominal perineal operations; the perineal extirpation usually preceded by a colostomy and radiation therapy. Radiation therapy is used alone, as a palliative measure, and in selected cases to promote clinical cures. The physical agents are also at times combined with colostomy and radical surgical removal.

Implantation of gold filtered radon seeds into the tumor mass constitutes one form of interstitial irradiation. The method may be used separately, as the only form of radiation therapy, but usually it is combined with preliminary external irradiation. Radon seeds are a means of delivering sub-lethal and lethal dosages of radon to malignant cells. The field of irradiation is largely limited to the tumor mass, there being only a moderate effect upon the rectal mucosa and surrounding tissues, provided seeds are not inserted beyond malignant areas. By varying the number and strength of seeds, large, as well as small, tumors may be influenced.

Gold radon seeds consist of radon encapsuled in a small gold tube. The seeds are four to five Mm. long, 0.75 Mm. in diameter with a three-tenths thickness of gold. The glass filter of the radon seed was replaced by gold in