5-1-1934

Treatment of carcinoma of the rectum

Gordon A. Gunn
University of Nebraska Medical Center

This manuscript is historical in nature and may not reflect current medical research and practice. Search PubMed for current research.

Follow this and additional works at: https://digitalcommons.unmc.edu/mdtheses

Part of the Medical Education Commons

Recommended Citation
https://digitalcommons.unmc.edu/mdtheses/619

This Thesis is brought to you for free and open access by the Special Collections at DigitalCommons@UNMC. It has been accepted for inclusion in MD Theses by an authorized administrator of DigitalCommons@UNMC. For more information, please contact digitalcommons@unmc.edu.
SENIOR THESIS

University of Nebraska
College of medicine.

Gordon A Gunn
THE TREATMENT OF CARCINOMA
OF THE RECTUM

by

Gordon A Gunn
THE TREATMENT OF CARCINOMA OF THE RECTUM

I. Introduction
   A. Embryology
   B. Anatomy
   C. Physiology

II. Factors Concerning Carcinoma of the Rectum
   A. Etiology
   B. Incidence and age
   C. Symptoms
   D. Modes of Spread
   E. Grading

III. History of the Evolution of Treatment

IV. Treatment
   A. Irradiation
      1. Electro-surgery
   B. Medicinal
   C. Palliative
   D. Surgical
INTRODUCTION

Whether carcinoma of the rectum is becoming more prevalent or the clinician is becoming more skillful in the use of modern means of diagnosis is a matter of speculation, but certainly the disease is being recognized more frequently than ever before. Next to the stomach, the rectum is the most common site for malignant disease in the gastrointestinal tract. W. H. Mayo reported 551 cases of malignant diseases of the gastrointestinal tract seen at the Mayo Clinic in 1908 and 1909. Of these growths, 387 were in the stomach, 3 were in the small intestine, 69 were in the large intestine, and 92 were in the rectum. This high incidence in the rectum should impress the clinician and surgeon with their grave responsibility in acquiring a full knowledge of the characteristics of this disease in order that they may be led to make an earlier diagnosis and institute suitable treatment. In too many of these cases patients have been subjected to hemorrhage after onset of symptoms. This had occurred in 10 per cent of a group of 300 cases diagnosed at the Mayo Clinic. In the Massachusetts General Hospital, Jones reported that more than 75 per cent were found to have been treated in this manner. Moreover, one can no longer sidetrack responsibility with the assertion that surgical treatment in such cases is futile. Even in cases definitely beyond operability the surgeon frequently should perform palliative operations because of existing or impending obstruction, which if ignored means a miserable end for the patient.
EMBRYOLOGY: The rectum proper is derived from the cloaca, a highly differentiated caudal expansion of the hindgut (third embryonal week) from which also the genito-urinary system differentiates. The cloaca gives off the allantois, which represents the primitive urogenital sinus and at an early period differentiates into a dorsal vesico-urethral anlage, and a phallic portion, the anlage of the external genitalia and a great portion of the urethra; caudally the cloaca extends to form the postallantoic intestine, or primitive rectum. The communication which exists between the primitive genito-urinary system and the intestine eventually disappears with the downward growth of a saddle-like partition, the ultimate perineum, which normally completely separates them. The cloacal membrane is formed as the entodermal cloaca comes in contact ventrally with the ectoderm, and the downward growth of the mesodermal partition later fuses with this membrane to give rise to the anal plate.

The final stage in the completion of the development of the rectum consists of union of the postallantoic gut with the proctodeum (third embryonal month), and invagination of the epiblast at a point in the anal membrane where later the anus is formed. The intervening mesoblast is compressed and shunted or absorbed, so that eventually a septum is formed which consists of ectodermal epithelium of the proctodeum and the entodermal epithelium of the primitive rectum. Absorption of this septum makes the rectum and anus continuous.

Keith stated that both of the sphincter muscles are developed in connection with the proctodeum, and he fixed the upper limit of the epiblastic pitting at the level of
fold described by nall in the adult rectum which joins the upper ends of the columns of morgagni. it may be here noted that in carcinoma in this region, the inguinal nodes are liable to be involved as well as the perirectal ones since the proctodeum carries its lymphatic vessels with it.

anatomy: the rectum from its origin opposite the third sacral vertebra to its termination at the level of the apex of the prostate gland of the male, and at the upper level of the perineal body of the female, forms a general curve as it conforms to the hollow of the sacrum and coccyx. it measures 12.5 cm. to 15 cm. and its diameter increases from above downward. there are also lateral inflections, chief of which works externally to the site of the inferior valves of houston, or plica transversalis recti.

functionally and anatomically the rectum is readily divided by the plica transversalis recti into two parts. the upper portion is partially clothed by peritoneum on the anterior surface to form in the male the rectovesical pouch, which reaches within 7.5cm. of the anus, and in the female the rectouterine pouch, or the cul-de-sac of douglas. on each side, in both sexes, the peritoneum is deflected from the front of the rectum onto the posterior wall of the pelvis, thus forming the pararectal fossa. the lower extraperitoneal portion generally is considered the ampulla of the rectum. it is encased in a dense layer of extraperitoneal tissue, lies in a rectal channel, and is bound by a layer of pelvis fascia.

physiology: the physiology of the rectum is in accord with the work that has been started higher up in the intestines. the movement of material along the distal colon into the rectum is effected by strong peristaltic waves which originate in the
transverse colon. They are set up partly by local mechanical stimulation and partly by reflex influences, for which the apparent impulses arise in the stomach. The gastrocolic reflex is of decided importance in hastening on the colonic contents, and it is most evident after the first meal of the day. Its occurrence should be followed by going to stool, so that defecation may be performed without undue voluntary effort. This act is set going through distention of the rectum, and it involves relaxation of the internal and external anal sphincters along with contraction of the abdominal walls, while the diaphragm is pressed down on account of a forced expiratory movement while the glottis is closed. The external anal sphincter, being composed of skeletal muscle, is dependent for its tone on somatic nervous impulses and is under the control of the will. The internal sphincter is composed of involuntary muscle supplied by autonomic nerves.

It must be remembered that the fecal masses are held in the rectum, not only by the tone of the sphincters, but also by the folds of its mucosa and the angular relationship between it and the anal canal. As material collects in both it and the lower bowel, the tone of the musculature adapts itself to the volume of the contents, so that very considerable accumulation may occur. Although absorption of water is slight, it is nevertheless continuous, so that desiccation gradually occurs and defecation becomes more and more difficult. Impaction of feces may thus occur. Usually the rectum is empty until just before defecation.
ETIOLOGY: Surmises as to the etiologic factors involved in the production of cancer of the rectum are, perhaps, frequently unwise or illtimed; but unquestionably one is able to trace certain frequently found lesions in the rectum through the different stages of their changes into malignant metamorphosis. Particularly these changes may be seen in polyps, multiple or single, which are so frequently found in an otherwise normal bowel.

The intriguing theory that all cancer's of the rectum develop on polyps is one that hardly can be stated without some reservations. It is strongly suspected, however, that a great many of these malignant tumors do develop in just this manner. Although the initiating force, which stimulates hyperplasia of certain elements of the bowel into activity and by its advance becomes malignant is not known, the conclusion has been drawn that a great many cancers in the region are etiologically explainable in this manner. The obvious corollary is that polyps of any size in the rectum, discoverable by proctoscopic examination and removable in the same way, should be extirpated just as commonly as pre-cancerous lesions in any other part of the body.

Rectal lesions such as anal fissures, ulcerative proctitis, hemorrhage in stricture, have been reported often enough to make their consideration important in any consideration of the origin of rectal cancer.

Adenocarcinoma is the most common and frequently found cancerous lesion in the rectum. They arise from the secretory epithelium of the Lieberkuhn glands situated in the mucosa. The cells in a definite area undergo rapid multiplication and by breaking through the muscularis mucosa assume a neoplastic
Percentage incidence of cancer in anal canal, rectum, and sigmoid flexure.
character. The sessile nodule involves the mucosa and sub-
mucosa and at first is freely movable upon the muscularis, but
in a few months involves and adheres to the muscle. While the
tumor is growing in all directions its surface usually becomes
flattened and ulcerates early. As the tumor infiltrates around
the circumference of the bowel, the ulcer becomes deeper and
exhibits its definite characteristic, namely, a firm base with an
everted, nodular, indurated margin.

INCIDENCE AND AGE: Men are affected more commonly than women.
Edwards reported from St. Marks hospital 775 malignant cases
of the rectum; of these patients 542 were men and 233 were
women. In a group of 300 cases recently reviewed by Harkin
and Jones, the proportion of men to women was 3 to 2; in
Lynch's 491 cases 281 were men and 210 were women. Wehler, in
considering the cases in Kraske's Clinic, found the average age
to be 56 years, slightly higher in men than in women. In
Rankin, Bargen, Schie's group the average age was 57; and most of
the patients between 40 and 70 years of age.

SYMPTOMS: Unquestionably, the most frequently encountered
symptoms and signs of carcinoma of the rectum, none of which
is pathognomonic or distinctive are bleeding, irregularity of
stool, and pain, in the order named.

The duration of symptoms is usually less than one year.
Lynch found it to average eight months in 491 cases; at the
Mayo Clinic the average is eleven and seven-tenths months;
whereas in 1,234 cases appearing in the report prepared on
carcinoma of the rectum for the British Ministry of Health, the
average was thirteen and one-tenth months. Greenwood gave the
average length of life for patients with unoperated cancer of
the rectum as twenty six and seven-tenth months.
M O D E S O F S P R E A D :  a. By direct continuity of tissue.

This is comparatively slow. It infiltrates over a slightly broader area in the deeper coats of the bowel wall than the mucosa.

b. Spread through the lymphatic system is the most important path of dissemination of cancer cells. This system consists of an intramural network which communicates through the fascia propria with the extramural lymph and the regional anorectal glands of Gerota, which are distributed over the surface of the rectum along the branches of the Superior Hemorrhoidal vessels. Efferents from the involved extramural lymph and anorectal glands may convey cancer cells up, down, or lateral; or simultaneously in two and rarely in all three directions.

c. Spread through the blood stream is the least frequent mode of dissemination and usually does not occur until the malignant process is well advanced. The venous radicals in the rectum are an integral part of the portal system. After invading the venous radicals the cancer cells may be set free in the blood stream and carried as tumor-cell emboli from a rectal cancer to the liver, the most common site of metastasis.

G R A D I N G : Of considerably more significance than the classification of cancer of the rectum on clinical grounds, or according to physical attributes of the invading growth, is a microscopic grading of the neoplasm on the basis of cell differentiation as has been described by Broders. In a study of 2,000 carcinomas, 1,628 of which were of the squamous-cell type, Broders classified them into four groups according to differentiation and mitosis. The more nearly the cell approaches the embryonic or undifferentiated type the more malignant the tumor, and the converse is true, in that the more nearly normal the
tumor cell, the lower the grade of malignancy. The grading is made on a basis of 1 to 4, and entirely independent of the clinical history. The number of mitotic figures and the number of cells with single large, deeply staining nucleoli (one-eyed cells) play an important part in the grading, and an increase in the mitotic figures, especially if they are irregular, tends to raise the grade to some extent. Broders states, "... ... a marked tendency to differentiate, that is, if about three-fourths of its structure is differentiated epithelium and one-fourth is undifferentiated, it is graded I; if the differentiated and undifferentiated epithelium are about equal it is graded II; if the undifferentiated is three-fourths and the differentiated epithelium one-fourth of the growth, it is graded III; if there is no tendency of the cells to differentiate, it is graded I'*4. Broder later revised this slightly as follows: "Instead of a grade I carcinoma in which about three-fourths of the cells are differentiated and one-fourth is undifferentiated, should be substituted a grade I carcinoma, in which differentiation or self-control ranged from almost 100% to 75%, and undifferentiated from almost 0 to 25%; a grade II, in which differentiated or self-control ranges from 75% to 50%, and undifferentiated from 25% to 50%; a grade III carcinoma in which differentiated or self-control ranges from 50% to 25% and undifferentiated from 50% to 75%; and a grade III in which the self-control ranges from 25% to practically nothing, and undifferentiated from 75% to practically 100%. 

---
HISTORY OF THE EVOLUTION OF TREATMENT OF CANCER OF THE RECTUM:

Certain definite results are desired in the treatment of cancer of the rectum, namely, permanent cure, a low operative mortality, and a controllable anus, or its best substitute. These results are modified by location, stage of progress and the age and condition of the patient.9

The gradual evolution of different techniques of excision of the rectum for cancer has developed during a century. It began in the pre-anesthetic and pre-antiseptic days.

Previous to 1870, operation for cancer of the rectum was but limited in extent, and only performed by the great surgeons of that time; in fact, it was almost wholly limited to palliation and lumbar colostomy. In view of this the results of these methods compared most favorably with radical operation.

Lisfranc, in 1826, performed the first successful excision of the rectum through the perineum and in 1833 published an account of his methods in the Memoires de l'Aademie Royale de Medecin, vol.2., page 296.

Inguinal colostomy has replaced the lumbar. During the next ten years to 1880, there was a marked advance in all surgery. Instead of there being but a few surgeons with initiative, a large number were making active scientific progress.10

During the years from 1880 to 1890 was developed the germ theory which revolutionized surgery and medicine. This period was one of anti-sepsis and drainage. Operations in all lines of surgery became more and more radical. The perineal methods were made more complete. In 1883, Volkman opened the sacral canal in an operation for cancer. Kraske, at that time his assistant, noticing that no harm resulted, was led to develop his sacral excision method of operation. He increased the
accessibility by removing the left lower portion of the sacrum together with the coccyx, and popularized the operation in a report of two cases before the Fourteenth Congress of German Surgeons in Berlin in 1885.

In 1890, Desquius suggested vaginal proctectomy. During the next decade McArthur, vantin, Price, and others practiced the method, and in 1900 J.B. Murphy in a report of five successful cases, outlined the technic.

In 1892, Maunsell deliberately opened the abdomen to mobilize the recto-sigmoid segment; by the aid of mattress sutures invaginated and drew the malignant growth through the anus, resected the area of cancer and sutured the bowel end-to-end.

In 1896, Quinn, Heverdin and Tuttle, performed and combined abdomino-perineal operation. Heverdin isolated the rectum first, while Quinn first opened the abdomen. An artificial anus was established, the sigmoid mobilized and superior hemorrhoidal artery tied to control hemorrhage. Then the rectum was dissected out from below, either through the perineal or the sacral route. These efforts created what is known as the "combined operation" for cancer of the rectum.

Kocher introduced a valuable point in the technic in closing the anus by suture to prevent infection, as the first step in the operation.

The difficulties which arose were from shock, which usually meant loss of blood; from peritonitis; and from the attempt to perform radical operations on inoperable cases, as the damage to the bone, loss of blood and open peritoneum were necessary by this method, before the operator knew fully the extent of the disease. The anus had usually been sacrificed;
now, where possible, attempts are being made to preserve this outlet.

The last decade has seen an advance in methods derived from an analysis of the mortality and failures in the past; and the gain has resulted in the present thoroughness of surgery and asepsis for anti-sepsis. The block removal of the rectum and glands where possible from below, and in a high location of the cancer, the combined abdominal and perineal method of removing rectal glands and the whole of the malignant tissue, is the new surgery for cancer of this region.
TREATMENT

IRRADIATION:

Treatment by radium or x-rays is usually designated as irradiation or radiotherapy. In recent years, x-ray machines have been built which produce 200,000 volts or more in the secondary; x-ray tubes have been devised capable of withstanding this high voltage, and the ionization methods of measuring the intensity of the x-ray has been developed.

One of the serious handicaps to the employment of large doses of x-rays is that a large portal of skin entry must be used to gain the benefit of secondary and scattered radiation. These large doses may be injurious to the normal tissues, the blood and blood-forming organs being especially susceptible.

Radium will act on cancer cells, as this has been established by a few facts gleaned in the past fifteen or twenty years. Carcinoma cells can be destroyed by rays, but it is also common knowledge that given a sufficient dose, practically all tissue cells can be killed by radiation. There is a minimum dose, however, which will just kill a cancer cell and will not, as a rule, kill an ordinary tissue cell. This is called the "minimum lethal dose," the" lethal dose", or the "cancer dose".

Theoretically, given a known quantity of rays, the lethal dose of the cells of a certain cancer, and the size and situation of the tumor to be treated, it is possible to destroy almost any cancer. Unfortunately, all of these three conditions are variable and are made up of variables. The size, density and depth of a tumor affect not only the quantity of rays penetrating the whole of a growth, but also the quality which cannot be thus adjusted when radiation is being applied from a distance. The actual insertion of a varying number
of suitably screened radium tubes into a tumor is the only method of insuring uniformity in the quality of the radiation applied. Some tumors are not suitable for the burying of tubes into their substance, and it is then seen how complicated the whole subject is, and how the question of the quality of the rays used, and the dosage, merge into a consideration of the size, density, nature and position of a tumor.

Radium is a metallic, chemical element, which was isolated by Mme. Curie in 1898. It disintegrates very slowly, losing only about one-half of its amount in 1,700 years. The atomic weight of radium is 226.4 and in the course of its continuous radio-active disintegration, it emits only an alpha-ray (helium) and is thus transformed into radium emanation, or radon, which is produced at a constant rate. The latter is an element which has the physiological properties of a heavy condensible gas with an atomic weight of 222.4. Weight for weight radium emanation is 100,000 times as active as radium element.

Radium emanation, in turn, goes through a series of rapid transformations into elementary solid bodies, named, RadiumA, Radium B, and Radium C. Only Radium Band C emit the beta and gamma-rays which are of value in therapy. Hence, the final therapeutic product is identical whether the source be radium salts or radium emanation. The great advantage of the latter is that it can be concentrated and manipulated like any other gas.

The soft alpha-rays are caustic; the beta-rays (soft and hard) are less caustic and more penetrating, while the hard gamma-ray, which is not caustic, penetrates the tissues deeper than any other known ray. For this reason suitable screens are used to eliminate the soft caustic rays, e.g., aluminum, brass, lead, gold and platinum. The gamma-rays of radium and
and high frequency x-rays of short wave-length appear to have an identical effect on the tissues, but radium has the superior merit of applicability in close contact with the pathological lesion.

The following table shows the stages of transformation of radium.

<table>
<thead>
<tr>
<th>Atomic weight</th>
<th>Period of transformation</th>
<th>Rays emitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radium</td>
<td>226.4</td>
<td>1760 years</td>
</tr>
<tr>
<td>Radium emanation (radon)</td>
<td>222.4</td>
<td>3.86 days</td>
</tr>
<tr>
<td>Radium A</td>
<td>218.4</td>
<td>3 minutes</td>
</tr>
<tr>
<td>Radium B</td>
<td>214.4</td>
<td>26 minutes</td>
</tr>
<tr>
<td>Radium C</td>
<td>210.4</td>
<td>19 minutes</td>
</tr>
<tr>
<td>Radium G</td>
<td>206.</td>
<td>No rays</td>
</tr>
</tbody>
</table>

Three methods are available for the application of radium in cancer of the rectum: a- intratumeral insertion, which is the implantation into the tumor of bare capillary tubes containing the emanation; b- intrarectal application, direct application of filtered emanation by applicators to the surface of the lesion; and c- external application, massive doses of filtered radium applied externally for deep radiation, either in packs containing tubes of emanation, or one to four grams of radium element, heavily screened in a thick, lead cylinder. This apparatus is suspended over the patient by a car, on a trolley or crane. The rays may thus be focused at any angle in the same way as those from an x-ray tube and the benefit of cross-firing obtained with out skin irritation. Due to the great cost of radium, the latter method is only available in institutions having large quantities of radium, where as the other methods are more generally applicable.
H.H. Janeway developed the method of interstitial implantation of capillary glass tubes containing radium emanation. The emanation is collected by the mercury pump into capillary glass tubes three to five millimeters long, each tube containing from 0.3 to 2.5 millicuries of radium emanation. Recently tubes of gold or platinum which filter out soft rays have been used to advantage. Before use the tubes are sterilized by boiling, or, simpler, immersed in an alcoholic solution of iodin, and inserted through a trocar needle into the growth. The emanation thus applied exerts a comparatively mild but continuous action on the tissues until the tube is exhausted. Radium emanation decays at the rate of approximately fifteen per cent per day. In about four days one-half of its energy has been used and the total period of active radiation is about two weeks.

The total value in cumulative action of one millicurie of radium emanation is approximately 132 millicurie hours, or the equivalent of one milligram of radium salt applied to the same area 132 hours.

Qualitatively, the action of the buried tubes is different and more efficient than surface application of radium emanation. The capillary tubes are inserted within the tumor at accurately determined distances and at a safe margin from the normal tissue. It is estimated that a tube of one millicurie strength is lethal to one cc. of cancer tissue.

It has been stated that one millicurie of radon can destroy all the cancer cells in a sphere of growth one cm. in diameter, and it might appear at first sight that a tumor eight cm. in diameter would require 512 millicuries, since its volume is 512 times that of the small sphere. As a matter of fact if the radon is uniformly distributed through out the sphere...
the total amount required to produce a lethal dose at its center is only 21.3 millicuries, while if double this amount namely, 42.6 millicuries is uniformly distributed throughout the sphere every particle of growth in this large volume will be destroyed.

Introduction of such large numbers of seeds and their accurate placing can only be accomplished conveniently by some special appliance, and an instrument has been devised by Souttar for this purpose. It consists of a fine cannula 15cm. in length with a revolving magazine at the at the proximal end which carries ten seeds. The introducer is held in the left hand and the magazine is rotated by the thumb, the seed being pushed down through the cannula and delivered into the tissues by means of a plunger held in the right hand. The magazine is detachable and a spare one is provided for an assistant to fill while the instrument is in use. The seeds are by this means introduced with great rapidity, with a high degree of accuracy, and with practically no trauma.

The rectum is a region peculiarly adapted to the use of radium seeds, whether the growth is in reach of the anus or can only be reached from the abdomen. In the former case the growth itself and the whole of the pelvic tissues around it can easily be infiltrated with seeds from two punctures in the perineum, one on either side of the midline. With the patient in the lithotomy position the needle of the introducer is inserted to one side of the tip of the coccyx and fifteen seeds (platinum) of two millicuries each are introduced in long columns so as to be deposited as uniformly as possible on that side, and the procedure is then repeated on the opposite side. In this way, with a posterior growth, a substantial barrier of
seeds can be constructed in the hollow of the sacrum behind
the rectum in order to irradiate both the base of the growth
and the rectal glands. The infiltration of a growth on the
anterior wall is a little more difficult because of its
greater inability to be reached. If the growth is situated
on a higher level it must be exposed by laparotomy and the
seeds introduced across the peritoneal cavity. The introduc-
tion of the seeds is perfectly simple, and as asepsis can be
strictly observed, it is not accompanied by any special risk;
but as in this region the growth has usually encircled the bowel
and produced obstruction, a permanent colostomy is almost ess-
ential.

The whole system of ray treatment is exceedingly compli-
cated. The difficulties of a dosage are modified by nearly
all the usual things which may take place in a tumor from its
nature or position etc. The possibility of actually stimula-
ting an outlying portion of a growth which has been duly par-
tially radiated must always be borne in mind; although it is
not as a rule a difficult problem in practice, because fortu-
nately the range of dosage producing stimulation is an exceed-
ingly small one.

"What is needed is a large number of physical measurements
of the different parts of the human body and of pathological
growth, and a full and complete investigation of the nature
of the lethal dose for cancer cells. When these have been
made, an approximate idea may be obtained of the method of
treating tumors in different situations, although even then
it seems that a number of imponderable biological problems,
such as, the resistance of the organisms as a whole and the
resistance of tissues locally to cancer growths, remain to be
solved."
Bowing and Anderson have found that Roentgen Rays influence primary cancer of the rectum only slightly, and the results, even with a voltage of 200,000 or more, are disappointing. On the other hand, the rays inhibit or destroy metastatic nodules. Lymphatic involvements are more susceptible to the rays, and thus their use lessens the liability to metastases. The optimum voltage seems to be 180,000.

Henri Hartmann, of Paris, says he has never had a cure with radium treatment of cancer of the rectum. He also says that intra-rectal applications have not given the least result. On the contrary, in some cases, he noticed a slight improvement with radium puncture through the external wall of the rectum. After preliminary colostomy, the rectum was exposed by the posterior route and excision of the coccyx. Needles, screened by 0.5 mm. of platinum, were implanted into the rectum and the retro-rectal cellular tissue along the lymph vessels. In some cases a real improvement was noticed, but had no cure. His results were the same after deep radio-therapy and after telecurie-therapy.

After making a report on 555 cases of rectal cancer, Hartmann sums up by saying that surgical extirpation is the best treatment. In order to get the best results, the laity and the physicians must be educated, and the patients should not be treated for months without local examination.

In the treatment of cancer of the rectum at the General Hospital, Birmingham, a considerable quantity of radium has been available and the treatment has been carried out by a team consisting of surgeon, radiologist and pathologist.

In many of the cases colostomy was performed to secure freedom from irritation by the fecal current, thus eliminating...
a factor which has been long regarded as potent in increasing the rapidity of the growths' extension.

In some cases the coccyx was also removed to secure freedom of access to the growth, to ensure accurate application of the radium salt. It may be added that all the cases treated were in an advanced state of the disease and inoperable. Twenty-six cases were treated. In nineteen of these a preliminary colostomy was performed and in five the coccyx was removed to allow the best access to the growths mainly posterior in position. Peri-rectal suppuration is apt to occur, despite great care to prevent infection, and in two cases a permanent fistula followed. Small doses over a prolonged period are preferable to large doses over a shorter period, as the latter produce much irritation and discharge. As to the constitutional changes induced, there is little alteration in the blood. Mild pyrexia usually occurs. Secondary hemorrhages may happen, and one patient died of this and associated pelvic peritonitis; but such results may probably be avoided by less intense methods of treatment.

Of the twenty-six cases treated, in two the growth has disappeared; in five others improvement has resulted. In all these patients the nature of the growth was verified by the microscope.

Lockhart-Mummery (London), succeeded in collecting a total of 73 cases treated by the insertion of radium needles or seeds in cancer of the rectum. Of these 73, 40 are dead, 16 show no signs of improvement, 12 are improved and 5 show no signs of recurrence in 18 months. So far, it may be seen, that the treatment of cancer of the rectum by radium cannot be considered as satisfactory; as no case that can really be claimed as a cure has as yet been brought forward.
Wm. S. Stone, New York City, says that cancer of the rectum as being treated with radium has proved a more difficult problem than at first was led to believe. The extreme sensitiveness of the normal mucosa makes it difficult to give a sufficient dosage, and in an annular growth a permanent stricture is practically impossible to prevent. Life in such instances may be prolonged, but it is usually at the expense of suffering. In any serious effort to cure this lesion by irradiation a preliminary colostomy is necessary. Annular lesions to be suitable to radium treatment, must be practically of the same early type in which the operation is indicated. In lesions limited to part of the circumference of the rectal wall, surface irradiation combined with the implantation of radium in the growth and followed subsequently by excision, has produced better results than could be obtained by the operation alone.

The effects of irradiation are apparently an inhibition of the proliferation of the cancer cells; their later degeneration and destruction; and round cell infiltration, resulting in the formation of fibrous tissue. This formation of sclerotic tissue, shutting in and depriving cancer cells of nutrition by cutting off their blood supply, is a major, if not the major effect of irradiation.

Apart from the possibilities of cure, radium has its value in improving both the local and the general condition of an inoperable case, so that in some instances operation with prospect of a cure becomes possible. In cases of local recurrence it is an asset of great value, especially if the recurrence is treated early. It gives hope to those who are beyond surgical help, and in moderate doses has a remarkable tonic effect on the general health.

Gordon, Watson, say, "If radium treatment of rectal cancer
can be raised to the same level as that of tongue, larynx, and breast, and if it can supplant radical surgery, it must be able to secure the disease without a permanent colostomy and to leave a rectum which can function. This ideal, though possible in certain instances, is a long way off."

It is generally recognized that the present methods of radical surgery for cancer of the rectum in its early stages cure a high percentage of cases, but they involve the stigma of colostomy.

If a growth is adequately barricaded with radium and shows little evidence of retrogression after two months, it is probably useless to repeat irradiation. On the other hand, if the growth responds to radium and readily retrogresses, though it fails to disappear completely, further irradiation is indicated on the ground that the dose has been insufficient in respect of amount, time, or distribution.

The continued frequency of incidence of cancer of the rectum and the constantly extending fight against it by a variety of methods, make it an evident duty to obtain some clarity as to the results of these methods, in order that we may be able to offer the admittedly best and most reliable treatment for the use of those suffering from cancer.

The following table shows some of the results taken from various sources, of Radio-therapy of cancer of the rectum.

<table>
<thead>
<tr>
<th>Source</th>
<th>Patients</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick 1917</td>
<td>161 nearly all advanced cases.</td>
<td>14 patients clinically free from disease from 4 mo. to 4 yrs. Palliation from 1 to 3 years in several cases.</td>
</tr>
<tr>
<td>1921</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kelly and Ward Dec. 1911-Jan. 1922</td>
<td>200 (12 operable) 35% recurrent</td>
<td>13 of the 22 &quot;cured&quot; patients were well at 5 to 10 years after irradiation. % of total cases cured (1-10 yrs.)</td>
</tr>
</tbody>
</table>
Table cont'd.

<table>
<thead>
<tr>
<th>Source</th>
<th>Patients</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schreiner St. Insti. for the Study of Malig. Disease, Buffalo, N.Y. 1914-1925</td>
<td>168 (153 were advanced) adeno-ca. of rectum.</td>
<td>Clinically well 10 (7 cases 6mo. to 2 yrs 5mo; 3 cases 3 yrs.) Palliation or improved 18 cases.</td>
</tr>
<tr>
<td>Mayo Clinic. 1919-1924</td>
<td>44</td>
<td>Radium alone or combined with x-rays. Rectum later resected for cancer, in all preceded by permanent colostomy. 35 cases. Cases traced:- 33; of these 15 dead; 10 living 3 yrs. After first irradiation 6 were better 2 and 3 yrs, and 2 under 1 year.</td>
</tr>
</tbody>
</table>

Stone says, "the use of irradiation has made greater refinement in diagnosis necessary. In fact, cancer therapy has become an institutional problem requiring more clinical experience and knowledge of surgical pathology to use physical agents, than does the operation."

There can be no doubt that in radium we have a weapon of extraordinary power for the treatment of cancer, but we are still far from knowing all its possibilities or from being able to direct its energies to the best advantages.

The cure of cancer would be vastly simplified by early diagnosis and early treatment. The cure of cancer is waiting— if only the general practitioner will teach the public the value of asking early.
Electrodesiccation: This is produced by a monopolar current of the Oudin type of relatively high voltage, low amperage, and high frequency of oscillation, 1,250,000 per second. After the treatment by dessication, the cells appear shrunken and shrivelled and nuclei close together, the whole presenting a mummified appearance. The blood vessels are thrombosed and round-cell infiltration occurs in adjacent zones. Dessication is of no practical value in the treatment of rectal cancer.

Electrocoagulation: This is produced by a bipolar current of the d'Arsonval type of low voltage, high amperage and damped oscillation of 1,250,000 frequency per second. The heat, generated by this current in the tissues, coagulates both the cancer and stroma cells into a structureless, homogeneous mass. The heat penetrates beyond the area of total destruction, devitalizing cancer cells, with out permanent injury to the normal tissues. The liability to recurrence and metastases is thus diminished.

Technic of Electrocoagulation: It is quite simple but experience acquired by practice is essential to judge the extent of coagulation and of slough later. Sheet rubber insulates the patients' back from the operating table. The indifferent electrode is a heavy copper wire mesh, eight by eight inches, suitably covered and moistened, and placed under the patients hips. The active electrode is an ordinary cambric needle in an insulated handle. For coagulation of a tumor in a cavity, as the rectum, use is made of long knitting needles insulated with rubber, except the distal cm.

The strength and quality of the current are tested on
metal or in a piece of raw beef before applying the needle. The current is controlled by hand or a foot switch. The needle is inserted into the tissue to the desired depth and the current turned on until a white zone or bubble appears around the needle. It is then withdrawn and reinserted at another point. If too long an application is made, the tissues are carbonized, which is considered poor technic.

**Cutting Current:** The cutting current is produced by passing an oscillating current from a transformer and condenser thru two De Forest (radio) tubes arranged in parallel. The cutting current is of lower voltage (500), lower amperage (5 milli-amperes) and higher frequency (1,500,000) than for currents used for dessication and coagulation. The oscillations are "undamped", that is, the waves haul an equal amplitude; whereas in dessication and coagulation they are "damped", i.e., of unequal wave-length.

The cutting is not actually done by a knife but by a steel needle fixed at the end of an insulated holder. Very slight contact of the needle with the tissues causes them to fall apart by "molecular disintegration" of the tissue cells. The cut surface presents a very superficial carbonization. Beneath this the tissues show slight dessication and coagulation effects. 0.1 millimeter in thickness, a result of the slight heat developed. The tissue change does not prevent primary union but is sufficient to seal the lymphatics and the capillaries. This reduces operative trauma and may limit somewhat the possible dissemination of cancer cells.

Electrocoagulation and cutting current are the two electro-thermic methods of value in the treatment of cancer of the rectum. Efficient machines are now obtainable which combine
in one apparatus the currents for coagulation and for cutting. By simply turning a switch the operator can instantly change from one current to the other at will.
The attitude of the medical profession to cancer is rather peculiar; it is, perhaps, the only disease, as differentiated from malformation or injury, which has been handed over to the surgeon without reserve. This may be explained by the fact that physicians say medical treatment is ineffective—and will be so until the cause is known; when some vaccine or serum therapy may become possible. Why not do as has been done with say tuberculosis for example—do not treat the disease, but treat the patient instead.

This research was commenced in 1925, shortly after the revival, or rehabilitation, of the lead treatment of cancer was brought about at Liverpool. Lead is an old remedy for cancer. As there had been signs of promise from Selenium in cancer, it was considered that the union of lead and selenium might give better results than lead alone. A colloidal lead selenide was made and, after careful testing on animals, used for man. The first few cases tried proved to be unusually susceptible to this treatment.

In order to make the test very difficult, cases were accepted for treatment which were far advanced and completely inoperable.

The preparation used is available to all, being a 0.4% solution of lead selenide, manufactured by British Drug Houses, Limited. It has been labeled D 4s and no one has been allowed to pay any fee for treatment.

The colloid is of low toxicity when made in the proper manner; a rabbit will tolerate 4 c.c. per kilo. It is not possible to state the lethal dose for an adult human, but as much as 33 c.c. has been given in one dose without adverse effects.

-26-
The colloid is given intravenously at weekly intervals. The size of the later injection depends upon the amount of focal and general reaction, for this appears to be proportionate to the amount of action on the neoplasm. A definite, appreciable reaction is desired, it should last for about 24 hours and comes on from 6-48 hours after the injection. When the reaction has passed there is usually a feeling of well-being with increase of appetite and diminution of pain; some patients describe it as a tonic action. The size of the injection is increased by one or two ccm. in sensitive neoplasms and two to four ccm. in non-sensitive neoplasms, until the maximum dose is found which is followed by a satisfactory clinical and hematological reaction; that dose is then maintained.

This treatment increases the lymphocytes, plasma cells and eosinophil leucocytes of the blood. Any electro-negative colloid, of which D 4s is one, will tend to increase the activity of the macrophages. Hyperplasia of fibrous tissue is a result of use of this colloid, and has been found to kill patients from stenosis of the intestine or ureter.

In addition to the colloid, lead selenide, each patient being thus treated medicinally receives 3 gm. of calcium chloride per day as an albuminate. The plasma of cancer patients shows a poverty of calcium. The poverty of calcium is proportional to the rapidity of growth of the cancer; the more virulent and advanced the growth the less is the calcium content of cancer and plasma. Calcium chloride would correct the alkalotic shift, which is present in cancerous patients, and thereby increase the diminished calcium, while at the same time it would leave a depot of calcium for absorption.
Besides the above mentioned drugs, fat-soluble vitamins are given in the hope of increasing the assimilation of calcium. Parathyroid extract is also prescribed which increases the calcium of the plasma and tissues. A daily dose of liver extract corresponding to four ounces of liver is given to combat any anemia, which is especially present in later stages. Thyroid extract, which is a true tonic has its place in the treatment of cancer. A small dose is given daily.

In conclusion, let the whole method be used, as it is not possible to say how much the interaction of the various medicaments conduces to the results. That is, give the patient: (a) Lead Selenide to increase local and general defense mechanisms; (b) Calcium Chloride to increase ionized calcium by acidosis, to correct alkalosis, and to furnish a depot for calcium assimilation; (c) fat-soluble vitamins in large doses especially vitamin D, to increase calcium absorption and to combat any infective element; (d) small doses of thyroid extract as a tonic and anti-infective agent; (e) liver extract to combat anemia.
**PALLIATIVE TREATMENT:**

This treatment is indicated in all radically inoperable cases of cancer of the rectum; also in certain operative cases which by reason of age, constitutional or other diseases are unfit for the radical procedure.

**General Measures:** Hygienic surroundings, fresh air and mild exercise contribute to the patients well being and cheerful words and manner inspire confidence and hope in the cancer patient.

**Diet:** When digestion is good, proper food is a most important factor in maintaining the resistance of the patient. Forced feeding with easily digested foods of high caloric value and small residue is indicated, for example, creamed soups, creamed vegetables, chicken, mutton, beef, sweet breads, liver, gelatin, cereal, puddings and concentrated foods; as against the normal 2,500 calories, the cancer patient should receive 3,500 calories.

The following is a specimen diet for one day as prescribed by the New York City Cancer Institute:

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Amount</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 A. M.</td>
<td>Stewed prunes</td>
<td>150 gm.</td>
<td>393.6</td>
</tr>
<tr>
<td></td>
<td>Oatmeal</td>
<td>100 gm.</td>
<td>407.8</td>
</tr>
<tr>
<td></td>
<td>Cream</td>
<td>100 gm.</td>
<td>200.8</td>
</tr>
<tr>
<td></td>
<td>Toast</td>
<td>40 gm.</td>
<td>104.2</td>
</tr>
<tr>
<td></td>
<td>Coffee</td>
<td>1 cup</td>
<td>117.4</td>
</tr>
<tr>
<td>9:00 A. M.</td>
<td>Junket, eggnog</td>
<td>½ cup</td>
<td>147.1</td>
</tr>
<tr>
<td>12 Noon</td>
<td>Cream of pea soup</td>
<td>100 gm.</td>
<td>208.0</td>
</tr>
<tr>
<td></td>
<td>Roast minced chicken</td>
<td>100 gm.</td>
<td>142.8</td>
</tr>
<tr>
<td></td>
<td>Butter</td>
<td>15 gm.</td>
<td>117.4</td>
</tr>
</tbody>
</table>
12 Noon cont.  
Lima beans  
Lettuce  
Tomatoes  
Potatoes  
Spanish cream  
Amount  
100 gm.  
40 gm.  
100 gm.  
100 gm.  
1 serving  
Calories  
79.1  
9.5  
24.1  
96.9  
304.

4:30 P.M.  
Creamed egg on toast  
butter  
lettuce  
cream cheese  
oats  
peaches  
cream  
1 egg  
15 gm.  
40 gm.  
50 gm.  
50 gm.  
100 gm.  
100 gm.  
Calories  
179.2  
117.4  
9.5  
215.4  
160.9  
60.  
200.8

8:00 P.M.  
Same as 9:00 A.M.  
147.

\[ \text{Total Calories: } 3,442.8 \]

Care of the Bowels:
Sufficient evacuation may be easily produced by drinking plenty of water and one-half ounce doses of liquid petrolatum night and morning. The salines are the best if the growth has become obstructive. Enemas may have to be used of soapsuds, glycerin and oxgale, for stasis above a growth.

Irrigations are unnecessary if the bowels are regular and little or no discharge present. They are indicated in cases with a tendency to hard, lumpy stools, and in those having diarrhea with much discharge of mucus, pus and blood. Potassium permanganate, 1:10,000 and lysol, 1:200 is the best for this.
or excessive bleeding, 5% solution of aqueous extract of krameria is very efficient.

DRUGS:
for anemia and asthenia, a tonic is indicated; Elixir of 1. Q.S. serves well. In advanced cases spiritus rumen in \( \frac{1}{2} \) to ounce doses before meals stimulates the appetite and promotes euphoria.

Insomnia, not due to pain is combated by bromides, and coal-tar derivatives—veronal, trional and medinal. For mild or moderate pain, begin with the mildest sedative; pyramidon 5 gr., asperin 10 gr. with or with out \( \frac{1}{2} \) gr. doses of codein by mouth. For severe pain there is no substitute for morphin given hypodermically in doses of 4 to 7 minnims at as frequent intervals as will keep the patient comfortable.

At the New York City Cancer institute there are 240 beds, which are kept for this palliative treatment alone. Every one of the patients have been kept very comfortable at all times. Every now and then one or two of the patients would leave only to return again in a day or two as their comfort was so much more complete under supervised care and routine treatment.

PALLIATIVE SURGERY:
there are two measures which are most frequently taken in the surgical field to insure comfort to any patient who for some reason cannot undergo the radical operation. These are:

1. Colostomy: The main aim is to prevent any of the contents of the bowel above passing beyond the opening in the colon into the bowel below.

A 1 1/2 inch skin incision is made 1 1/2 inches from the anterior superior spine at right angles to a line drawn from this bony point to the umbilicus.

The fascia of the external oblique muscle is divided along
the length of the wound. The edges of the wound are retracted and the fibers of the internal oblique and transversalis muscles are separated. The transversalis fascia is held up with forceps, and notched with a scalpel. The peritoneal edges are held up with forceps, and the opening made and enlarged.

The colon is now brought out of the wound. The peritoneal edges are attached to the skin by a few fine catgut sutures and at either extremity two long sutures are passed through the skin and peritoneum from one side to the other. These shut off the subcutaneous and muscular planes of tissue and prevent contact between them and the colon.

Two forceps are applied to the long axis of the exposed colon, about 1 1/2 inches apart, and the bowel is packed round with gauze between it and the skin incision.

The bowel is opened in the transverse axis not more than two cm. in length. A Paul's glass tube of medium size is now inserted into the bowel through the small opening. A stout silk ligature is passed around the tube outside the bowel and tied. The operation is now complete.

When Colostomy is required permanently, it is better to divide the bowel straight across and to tie a glass tube in each end.

2. Curettage: When frequent hemorrhages from an inoperable growth in the rectum are exhausting the patient, curettage of the fungating portion is an old treatment. Curettage is applicable only to growths situated on the posterior or lateral wall of the rectum. If the tumor is on the anterior wall, there is danger of opening the bladder or urethra in men, and in women of perforating into the peritoneal cavity. The operation is not safe for growths high up in the rectum.

Technic: The bowel must be empty and washed out with an
antiseptic solution just before curettage. Sacral anesthesia, preceded ½ hour by a hypodermic of morphin, gr.½ and atropin gr.1-150 is most satisfactory. With a large blunt curet the fungating mass above the surface of the bowel is rapidly scraped away. Hot irrigations and gauze packing check the rather free bleeding. After a few minutes wait, the gauze is removed and radon implantations may be inserted into the base of the tumor. A rubber tube is then inserted into the rectum and strips of vasaline gauze packed firmly around it. After two days the packing is removed and the bowel irrigated twice daily with 1:10,000 potassium permanganate solution. In ten days to a fortnight a flat granulating ulcer covers the site of the growth. Curettage may be repeated when bleeding recurs, which is usually in three or four months.
SURGICAL TREATMENT:

 Usually surgeons consider surgery the treatment of selection in most cases of operable cancer of the rectum. Surgeons are appreciative of the poor prognosis attending operations on highly malignant lesions and therefore recommend irradiation as the procedure of choice.

Operability: This controversial appellation implies conditions favorable and unfavorable to the removal of carcinomatous growths, conditions which in borderline cases must be measured and evaluated by the judgement, experience, and courage of the surgeon. The enormous influence of the personal equation in estimated operability is attested by the wide variation in the percentage of operability of the following surgeons: Miles, 29.3%, Bergman, 80%, Witzel, 25%, Boas, 19%, and Czerny, 71%. Similarly there is a marked difference in the mean operability for various countries: England, 38% in 1,312 cases; U.S. 61% in 1,118 cases, and Germany, 48% in 2,000 cases.

The standard of operability has gradually improved with the refinement of surgical technic and the development of greater skill by individual surgeons. Operability has been determined by such modifying influences as age, sex, obesity, general health, duration of the lesion with its attendant signs and symptoms, and various local conditions associated with the neoplasm, such as size, situation and mobility, the relative malignancy and the presence or absence of metastasis, both lymphatic and visceral.

It seems vastly unreasonable to eliminate arbitrarily patients as inoperable merely because they are elderly, or because their less robust organs are potentially the sites of post-operative complications. Such decisions would deprive a large percentage of those suffering from cancer of the rectum.
of the hope of cure. Although a certain number of such patients will fail to survive operation, still a larger percentage not only survive the operation but return to an improved state of health.

Sex plays a definite influence on the operability of cancer of the rectum. The following figures, from the report on cancer of the rectum to the British Ministry of Health, clearly indicates that the mean operability is higher for women than for men.

Woelfler reported the operability for men to be 43%, and for women, 53%. Peutz reported the operability for men to be 42% and for women 84%. Kocher reported the operability for men to be 66.3% and for women 70%, and Chalier and Mandor reported the operability for men to be 53.5% and for women 68.4%.

This rather marked advantage of women over men is probably due to the greater extent of the female pelvis and its increased resistance to infections of 233 patients with cancer of the rectum reported by Neuman, as having died of peritonitis, 84 were men and 48 women. Further more, the close relationship of the anterior wall of the rectum to the prostate gland and seminal vesicles results in frequent involvement of these structures in growths situated on the anterior wall.

Fixation considerably influences operability. Advanced growths which have attending complications due to fixation, immobility and perforation of the wall of the bowel demand shrewd judgement in the decision, not only of whether they are amenable to radical resection but whether palliative operation is indicated. Fixation is thought to be the result of inflammatory reactions more oftend than from a malignant extension, and that it should not be regarded too serious a deterrent to subsequent removal, particularly if this may be accomplished in two stages.
The grading shows that most cancers fall into the intermediate grade, grade 2. It has been felt that malignant lesions of the colon or rectum, graded 1, 2, and low 3 are more satisfactorily treated by operation and if they are graded high 3 and 4 they are satisfactorily treated by radium unless there is some particular reason for reversing this sequence. Hankin and Broders have shown that the grade of the malignancy has a direct bearing on the percentage of metastasis and absence of metastasis since the percentage of cases with metastasis increase in proportion to the grade, and the percentage of cases without metastasis in inverse proportion to it.

It is difficult to make a dogmatic choice of an operation for cancer of the rectum. It is not probable that any one procedure will ever be applicable to all types of cancer of the rectum and rectosigmoid, for the reasons that such patients present themselves at such varying stages of the disease; and consequently in different physical states, both as regards metastasis and local extension of the growth and because the lymphatic drainage from different divisions of the terminal bowel is by widely different channels. Therefore any surgeon operating on cancer of the rectum should have at his command a number of procedures and then make the selection that seems wisest in the individual case, for example: colostomy and perineal excision, abdomino-perineal resection in one stage, and abdomino-perineal resection in two stages; local operations such as the Harrison-Cripps operation, and palliative operations such as, colostomy, and local cauterization. The employment of one operation to the exclusion of all others decidedly narrows the scope of usefulness which surgery offers to these sufferers, and unquestionably vitally influences immediate mortality.
the functional results and ultimate survival.

Several factors influence the selection of the type of operation: (a) the situation and extent of the growth and its freedom from metastasis; (b) the age and general state of health of the patient; (c) the patient’s anatomic type and sex; and (d) the mature judgement of the surgeon based on clinical experience.

Surgeons who perform the sacral operation may be divided into two main schools, irrespective of the manner in which they deal with the sacrum; those who practice resection of the rectum, and those who practice amputation. The term resection of the rectum ordinarily denotes division of the bowel above and below the growth in subsequent repair of the intervening space by circular sutures of the divided ends, or by invagination of the upper segment then the lower end and approximation of the edge of the bowel to the margin of the anus.

The term amputation implies division of the bowel above the growth and removal of the lower portion of the rectum and anal canal including the muscles of the sphincter. The artificial anus may be established in the perineal, coccygeal or sacral position.

The question of continence is a matter of considerable significance in judging the relative merits of the various methods for consummating the sacral operation. In 398 cases of amputation of the rectum only 12.1% of the patients were classified as completely continent, 54.3% were partially continent, and 33.5% were incontinent. On the other hand, reports of 625 cases of resection indicated that 63.7% of the patients were continent. Mander’s statistics are of value because of their completeness. He found that in 19.3% of the cases in which circular suture was done the patients were
discharged continent, whereas after the elapse of time 49.4% became fully continent.

Colostomy and perineal excision established preliminary to the major procedure has had its greatest popularity in England and America. In this country and in England, there are surgeons, who condemn perineal excision for any lesion situated higher than the anal canal, and at the other extreme is strong advocacy for its use in every case of cancer of the rectum.

**PERINEAL OPERATION:** (amputation of the rectum)

The skin over the perineum and sacral region is prepared the night before the operation by shaving and antiseptics and protected by sterile gauze. An enema of 25% peroxide of hydrogen is given two hours before the operation and a hypo of ½ gr. of morphin and 1-150 gr. of atropin is administered ½ hour before time set for the operation.

As to the position of the patient, the lithotomy position with a slight Trendelenburg elevation of the table is the best. If the patient be a male, a stiff catheter is tied in the urethra to guard against its injury during the operation. This is unnecessary in women, but the vagina is swabbed with 5% picric acid solution.

**Excision of the rectum with preservation of sphincters:**

The rectum is sponged dry, swabbed with tincture of iodin and then lightly packed with gauze in order to identify its walls during the dissection. A circular incision is made at the mucocutaneous junction of the anal canal; a cuff of mucosa is dissected up ½ inch and closed with a heavy silk ligature to prevent fecal contamination of the wound. The long ends of the ligature serve for traction. The cuff below the ligature
is carbolized and gloves are changed. The external sphincter is freed from the bowel by blunt dissection and incised posteriorly entirely outside the rectum and left in the lateral flaps.

The posterior incision is extended back in the midline to the base of the coccyx, and deepened into the ischiorectal fossa. A pair of long, heavy scissors curved on the flat is passed between the rectum and levator ani muscle and withdrawn with the blades open. Then two fingers are introduced through this opening into the retrorectal space, bluntly cleaning the anterior surface of coccyx and sacrum, crowding the tissues of the mesorectum forward toward the rectum. After severing the insertions of the glutei muscles at the sides of the coccyx, the bone is disarticulated. The finger is then hooked above the levator ani and its fascia and these structures, on each side are divided a short distance from the rectum. A long strip of full width gauze, folded to four inches, is packed tightly in the posterior space to staunch oozing of blood.

Blunt curved retractors are now placed to hold the anal sphincters and anterior margin of the wound forward; the rectum is drawn backward and dissected free anterior to the level of the severed levator ani. In women there is a plane of cleavage through which the rectum can be readily separated from the vagina by blunt dissection; in men, separation from the urethra prostate, seminal vesicles and bladder is frequently difficult and requires extreme care to avoid injury of these organs. Sometimes separation can be accomplished easier by introducing the finger into the wound and separating the anterior rectal wall from above downward, severing the analublar raphe upon the finger.

The lower portion of the rectum is now free on all sides.
Above it is still fixed by the lateral ligament, peritoneum and the vessels of the mesorectum. The packing is removed and while making moderate traction on the rectum, its mesentery is readily peeled from the sacrum, as far as the peritoneal cul-de-sac in front. Any firm fibrous bands encountered should not be torn through but caught in forceps and cut. The lateral ligaments are then identified by touch, doubly clamped on each side to control bleeding from the middle hemorrhoidal arteries and cut between the clamps. The gut can now be drawn down, exposing the peritoneal pouch. If the upper margin of the tumor protrudes two inches or more beyond the surface of the wound, dissection of the rectum may end at this point. If, however, as is usually the case, the growth approaches the area of the peritoneal pouch, the peritoneum can be peeled from the rectum for a short distance. Usually it is better to change gloves and instruments and divide the peritoneum close to the rectum back to the mesorectum. The latter is divided close to the sacrum to avoid injury of the inferior mesenteric artery. In this manner about eight inches of the bowel can be removed.

When the length of freed bowel above the tumor is sufficient to reach the anus without tension, the peritoneum is closed by attaching it to the anterior and lateral walls of the rectum with interrupted sutures of fine chromic cat gut. Any clamped vessels are now tied and the clamps removed. The levator is sutured to the sides of the bowel. A few interrupted sutures through the muscular coat of the bowel and the tissues above the sphincter close the anterior dead space. The sphincter (if it has been cut out) is sutured and the skin closed with silk worm gut. Then three Stewart sutures of the same material are passed transversely on a large curved needle just back of the protruding bowel.
These sutures are very important in restoring pelvic support. The needle is first passed deeply about one inch from the margin of the wound and brought out at a corresponding point on the opposite side, then in its return picks up the skin only of both sides in the same plane ¼ inch from the wound margin, and is tied snugly over a small rubber tube to avoid excess tension on the skin.

The bowel is now amputated ¼ inch outside the anus, the mucosa being caught in T-forceps as the incision is made. When the incision reaches the mesentery this is caught and tied, otherwise retracting vessels will bleed. As the bowel is divided some bleeding should occur. Absence of bleeding shows inadequate blood supply and the probability of the bowel sloughing. Careful note is also made that the line of amputation is well above the tumor. The mucosa is sutured to the skin with interrupted stitches and a tube inserted in the bowel, its lower end projecting three inches outside the external dressing, to convey discharges and gas away from the wound.

A large drainage tube is inserted into the cavity posterior to the rectum, and gauze packed lightly about it. Fluffed gauze covering the wound is held securely in place by strips of adhesive applied transversely across the buttocks, while the patients legs are extruded. Over this a large pad of gauze is placed and held in position by a broad binder.

Amputation of rectum with sacrifice of the Sphincters.

When operating upon a cancer of lower one inch of the rectum, the anal canal, sphincters and a wide margin of adjacent tissue must be removed, en bloc, together with the tumor bearing portion of the rectum. A "shield" incision has been found very practical.

An incision of three to four inches is carried transversely.
across the perineum. From each of its ends, curvilinear incisions meet at the tip of the coccyx. This incision insures wide removal of skin, superficial fascia, and lymphatics. The dissection is carried out as in the previous operation, but usually a shorter length of rectum requires removal. After the gut descends a sufficient distance, the pelvic floor is restored by sutures, bowel amputated, and rectal mucosa is sutured to the skin.

Drainage tubes are inserted and dressings applied in the manner already described.

The two-stage Abdomino-operation for Cancer of the Rectum.

The first stage consists of colostomy and this has already been described earlier in this paper.

The second stage of the operation is carried out after four to six weeks, and is as radical as is possible; the segment of bowel, the nodes and node-bearing tissues below the colomic stoma are removed. The rectum is mobilized from behind in this stage, freeing it up to the peritoneal fold, then encasing it in a rubber glove, and dropping it back into the hollow of the sacrum and closing the wound. (This is all performed under sacral anesthesia.) Following this the patient is turned on his back, the median line incision opened again, the ureters are identified on both sides, the inferior mesenteric vessels are ligated, the pelvis peritoneum is incised, and the entire segment of bowel is lifted out through the abdomen. A new diaphragm is made of peritoneum; if the patient is a female, the broad ligament and uterus may be satisfactorily utilized in the preparation. The wound is closed and drainage is provided posteriorly by removal of some sutures and putting in a small pack to control whatever oozing is present.
Babcock has modified the conventional abdomino-perineal operation in four ways without in the least compromising its radical features.

1) A colostomy is eliminated, and an immediate perineal anus is produced without clamping, excision, or suturing the bowel within the abdomen. To avoid infection the bowel is not opened until all the wounds are closed and the perineal dressings are in place. A rectal tube is tied in the new anus at the close of the operation.

2) No pelvic diaphragm is formed. Babcock has the impression that patients have a better post-operative prognosis without it. In 30 cases of procto-sigmoidectomy with an open pelvis, meteorism, as a rule, has been very slight.

3) The diseased bowel is brought through the pelvic floor but traction is made only through the healthy intestine by a band of soft gauze two inches wide tied about the sigmoid well above the level of the cancer. The ends of the gauze are packed against the pelvic floor, where they may easily be located and withdrawn thru a perineal incision after closure of the abdomen.

4) A perineal colostomy or anus is immediately formed. With an adequate opening the bowel may empty completely and the period between defecations is lengthened with intervals of from 12 to 24 hours—providing a properly formed perineal opening is made, even though no sphincter is retained. Finally, the perineal colostomy is valuable for follow-up examinations, to determine local recurrences. Hankin has twice recognized recurrent nodules by digital examination of the perineal anus at a time when excision was feasible.

The advantages are as follows:
(a) The rapidity and simplicity of the operation make it possible the most radical abdomino-perineal resection in one stage without excessive shock. (b) The surgeon can perform the operation without delay and without a preliminary colostomy in certain types of cancer without obstruction but without peritoneal contamination. (c) The common sources of peritoneal infection during operation are eliminated. (d) Rapid closure of the pelvic cavity is possible, and by the tenth to the fourteenth day a satisfactory and adequate perineal colostomy is formed.

Rankin is firm in his belief that the choice of treatment for cancer of the rectum at the present time is radical extirpation in all cases in which the growth is movable or has not metastasized to other viscera, especially the liver. According to Rankin, radium is too uncertain at the present time to warrant its practice as a routine in operable cases. Tumors, having a low grade malignancy are distinctly more favorable for surgical extirpation.

Gordon-Watson says, it is a tempting proposition to remove an early rectal growth with the aid of radium, to leave an intact rectum with normal function, and to avoid a colostomy. We can attack the tongue in this way and be confident of a cure in a large percentage of the cases, but we cannot control or stop lymphatic spread without the aid of surgery.

Lockhart-Mummery have a total of 223 patients who survived operation, and of these 130 were operated on over five years ago. There were 57 cures, 57 recurrences, 8 died from other causes during the five years, and 8 were untraced.

The word "cure" is merely a conventional phrase and has been used in cases of five years survival.
The following is a table showing results and subsequent history of 117 private cases compiled by Lockhart-Mummery.

**Key to table**

- **A** = very favorable.
- **B** = medium cases.
- **C** = border line cases.
- **H** = death from operation.
- **R** = recovery from operation.

<table>
<thead>
<tr>
<th>Case</th>
<th>Year of operation</th>
<th>Sex</th>
<th>Age</th>
<th>Type of case</th>
<th>Result</th>
<th>Length of survival and remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1905</td>
<td>m</td>
<td>37</td>
<td>C R</td>
<td></td>
<td>22yrs. in 1923 a new growth occurred in upper part of rectum; second growth excised.</td>
</tr>
<tr>
<td>2.</td>
<td>1912</td>
<td>m</td>
<td>60</td>
<td>A R</td>
<td></td>
<td>16 years.</td>
</tr>
<tr>
<td>3.</td>
<td>1913</td>
<td>f</td>
<td>68</td>
<td>A R</td>
<td></td>
<td>8yrs. 4yrs. after had duct ca. of breast, removed; died 1921 of apoplexy.</td>
</tr>
<tr>
<td>4.</td>
<td>1915</td>
<td>M</td>
<td>60</td>
<td>D R</td>
<td></td>
<td>7yrs. died of heart disease.</td>
</tr>
<tr>
<td>5.</td>
<td>1915</td>
<td>m</td>
<td>62</td>
<td>C R</td>
<td></td>
<td>5yrs. died of cerebral disease.</td>
</tr>
<tr>
<td>6.</td>
<td>1916</td>
<td>m</td>
<td>52</td>
<td>A R</td>
<td></td>
<td>2yrs. died of recurrence.</td>
</tr>
<tr>
<td>7.</td>
<td>1916</td>
<td>f</td>
<td>75</td>
<td>A R</td>
<td></td>
<td>6mo. died of pleurisy.</td>
</tr>
<tr>
<td>8.</td>
<td>1916</td>
<td>m</td>
<td>63</td>
<td>C R</td>
<td></td>
<td>2yrs. recurrence in liver.</td>
</tr>
<tr>
<td>9.</td>
<td>1916</td>
<td>m</td>
<td>52</td>
<td>D R</td>
<td></td>
<td>9mo. died of recurrence.</td>
</tr>
<tr>
<td>10.</td>
<td>1916</td>
<td>m</td>
<td>43</td>
<td>A R</td>
<td></td>
<td>11yrs.</td>
</tr>
<tr>
<td>11.</td>
<td>1917</td>
<td>m</td>
<td>66</td>
<td>D R</td>
<td></td>
<td>9yrs. untraced since Aug. 1926</td>
</tr>
<tr>
<td>12.</td>
<td>1917</td>
<td>m</td>
<td>67</td>
<td>B R</td>
<td></td>
<td>2yrs. died of pneumonia.</td>
</tr>
<tr>
<td>13.</td>
<td>1917</td>
<td>m</td>
<td>52</td>
<td>B R</td>
<td></td>
<td>2yrs. recurrence.</td>
</tr>
<tr>
<td>14.</td>
<td>1917</td>
<td>f</td>
<td>63</td>
<td>B R</td>
<td></td>
<td>2½yrs. recurrence in pelvis.</td>
</tr>
<tr>
<td>15.</td>
<td>1917</td>
<td>M</td>
<td>68</td>
<td>B R</td>
<td></td>
<td>6mo. probably recurrence.</td>
</tr>
<tr>
<td>16.</td>
<td>1917</td>
<td>M</td>
<td>68</td>
<td>A R</td>
<td></td>
<td>Alive 5 years.</td>
</tr>
<tr>
<td>17.</td>
<td>1917</td>
<td>M</td>
<td>57</td>
<td>A R</td>
<td></td>
<td>11 years.</td>
</tr>
<tr>
<td>18.</td>
<td>1917</td>
<td>m</td>
<td>53</td>
<td>A R</td>
<td></td>
<td>7yrs. died of a 2nd primary growth in the colon. 10½ years.</td>
</tr>
<tr>
<td>19.</td>
<td>1917</td>
<td>m</td>
<td>57</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>1918</td>
<td>m</td>
<td>55</td>
<td>B R</td>
<td></td>
<td>10 years.</td>
</tr>
<tr>
<td>21.</td>
<td>1918</td>
<td>f</td>
<td>45</td>
<td>C R</td>
<td></td>
<td>6yrs. recurrence in vagina.</td>
</tr>
<tr>
<td>22.</td>
<td>1918</td>
<td>f</td>
<td>62</td>
<td>A R</td>
<td></td>
<td>2yrs. &quot; &quot; &quot; &quot;</td>
</tr>
<tr>
<td>23.</td>
<td>1918</td>
<td>f</td>
<td>58</td>
<td>B R</td>
<td></td>
<td>3yrs. &quot; &quot; &quot; &quot;</td>
</tr>
<tr>
<td>Case</td>
<td>Year</td>
<td>Initials</td>
<td>Years</td>
<td>Cause of Death</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>----------</td>
<td>-------</td>
<td>----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>1918</td>
<td>M.50</td>
<td>BR</td>
<td>4yrs. recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>1918</td>
<td>F.50</td>
<td>BR</td>
<td>3yrs. recurrence in colon.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>1918</td>
<td>F.36</td>
<td>BR</td>
<td>1yrs. recurrence in vagina.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>1918</td>
<td>F.70</td>
<td>BR</td>
<td>1yrs. died from coma.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>1918</td>
<td>F.56</td>
<td>AR</td>
<td>9½yrs. had Grave's disease for 20 years.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>1919</td>
<td>F.44</td>
<td>BR</td>
<td>2yrs. recurrence in lumbar glands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>1919</td>
<td>M.56</td>
<td>BR</td>
<td>9yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>1919</td>
<td>M.72</td>
<td>BR</td>
<td>8½yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>1919</td>
<td>M.51</td>
<td>BR</td>
<td>6½yrs. died of recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>1919</td>
<td>M.64</td>
<td>BR</td>
<td>6yrs died of recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>1919</td>
<td>M.54</td>
<td>BR</td>
<td>8½yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>1920</td>
<td>F.54</td>
<td>CR</td>
<td>4yrs, died of recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>1920</td>
<td>F.52</td>
<td>BR</td>
<td>8yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>1920</td>
<td>F.48</td>
<td>AR</td>
<td>1yr. recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>1920</td>
<td>F.60</td>
<td>BR</td>
<td>8yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>1920</td>
<td>F.43</td>
<td>AR</td>
<td>8yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>1920</td>
<td>M.51</td>
<td>CR</td>
<td>1yr. recurrence in lumbar spine.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41.</td>
<td>1920</td>
<td>F.63</td>
<td>BR</td>
<td>4yrs. recurrence in liver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.</td>
<td>1921</td>
<td>M.72</td>
<td>AR</td>
<td>5yrs. died other causes 6 yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43.</td>
<td>1921</td>
<td>M.61</td>
<td>BR</td>
<td>7yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44.</td>
<td>1921</td>
<td>F.54</td>
<td>BR</td>
<td>2yrs. recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45.</td>
<td>1921</td>
<td>M.61</td>
<td>AR</td>
<td>7yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46.</td>
<td>1921</td>
<td>M.52</td>
<td>AR</td>
<td>6yrs. died of recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47.</td>
<td>1921</td>
<td>F.53</td>
<td>CR</td>
<td>5yrs. &quot;n&quot; &quot; &quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48.</td>
<td>1921</td>
<td>M.62</td>
<td>AR</td>
<td>2yrs. recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49.</td>
<td>1921</td>
<td>M.69</td>
<td>AR</td>
<td>4yrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50.</td>
<td>1921</td>
<td>M.60</td>
<td>AR</td>
<td>4yrs. died of recurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51.</td>
<td>1921</td>
<td>F.58</td>
<td>AR</td>
<td>3yrs. &quot; &quot; &quot; &quot; &quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52.</td>
<td>1922</td>
<td>M.61</td>
<td>CR</td>
<td>Few mo. later local recurrence died after x-ray burns.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>53.</td>
<td>1922</td>
<td>M.47</td>
<td>BR</td>
<td>3yrs. recurrence.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| No. | Year | Age | Sex | Status | Cause of Death/
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>54.</td>
<td>1922</td>
<td>46</td>
<td>A</td>
<td>R</td>
<td>6yrs.</td>
</tr>
<tr>
<td>55.</td>
<td>1922</td>
<td>39</td>
<td>C</td>
<td>R</td>
<td>2yrs. recurrence.</td>
</tr>
<tr>
<td>56.</td>
<td>1922</td>
<td>63</td>
<td>C</td>
<td>D</td>
<td>Sepsis</td>
</tr>
<tr>
<td>57.</td>
<td>1922</td>
<td>38</td>
<td>A</td>
<td>R</td>
<td>3yrs. died recurrence liver.</td>
</tr>
<tr>
<td>58.</td>
<td>1922</td>
<td>46</td>
<td>A</td>
<td>R</td>
<td>6yrs.</td>
</tr>
<tr>
<td>59.</td>
<td>1922</td>
<td>47</td>
<td>B</td>
<td>R</td>
<td>3yrs. recurrence.</td>
</tr>
<tr>
<td>60.</td>
<td>1922</td>
<td>75</td>
<td>C</td>
<td>D</td>
<td>Heart failure 3 wks. after operation.</td>
</tr>
<tr>
<td>61.</td>
<td>1922</td>
<td>56</td>
<td>B</td>
<td>R</td>
<td>5½yrs.</td>
</tr>
<tr>
<td>62.</td>
<td>1923</td>
<td>45</td>
<td>B</td>
<td>R</td>
<td>2yrs. recurrence.</td>
</tr>
<tr>
<td>63.</td>
<td>1923</td>
<td>64</td>
<td>A</td>
<td>R</td>
<td>5½yrs.</td>
</tr>
<tr>
<td>64.</td>
<td>1923</td>
<td>54</td>
<td>B</td>
<td>D</td>
<td>Heart failure.</td>
</tr>
<tr>
<td>65.</td>
<td>1923</td>
<td>64</td>
<td>A</td>
<td>R</td>
<td>4yrs. died strangulated hernia.</td>
</tr>
<tr>
<td>66.</td>
<td>1923</td>
<td>63</td>
<td>A</td>
<td>R</td>
<td>5yrs.</td>
</tr>
<tr>
<td>67.</td>
<td>1923</td>
<td>59</td>
<td>A</td>
<td>R</td>
<td>1yr. recurrence.</td>
</tr>
<tr>
<td>68.</td>
<td>1923</td>
<td>60</td>
<td>A</td>
<td>R</td>
<td>3yrs.</td>
</tr>
<tr>
<td>69.</td>
<td>1923</td>
<td>70</td>
<td>B</td>
<td>R</td>
<td>3yrs. untraced since.</td>
</tr>
<tr>
<td>70.</td>
<td>1923</td>
<td>68</td>
<td>C</td>
<td>R</td>
<td>1yr. recurrence.</td>
</tr>
<tr>
<td>71.</td>
<td>1923</td>
<td>63</td>
<td>B</td>
<td>R</td>
<td>4½yrs.</td>
</tr>
<tr>
<td>72.</td>
<td>1923</td>
<td>69</td>
<td>B</td>
<td>R</td>
<td>1yr. recurrence in liver</td>
</tr>
<tr>
<td>73.</td>
<td>1923</td>
<td>60</td>
<td>A</td>
<td>R</td>
<td>4½yrs.</td>
</tr>
<tr>
<td>74.</td>
<td>1923</td>
<td>60</td>
<td>A</td>
<td>R</td>
<td>4½yrs.</td>
</tr>
<tr>
<td>75.</td>
<td>1923</td>
<td>56</td>
<td>A</td>
<td>R</td>
<td>untraced.</td>
</tr>
<tr>
<td>76.</td>
<td>1923</td>
<td>56</td>
<td>B</td>
<td>R</td>
<td>4½yrs.</td>
</tr>
<tr>
<td>77.</td>
<td>1923</td>
<td>58</td>
<td>B</td>
<td>R</td>
<td>4½yrs.</td>
</tr>
<tr>
<td>78.</td>
<td>1924</td>
<td>73</td>
<td>B</td>
<td>R</td>
<td>&quot;</td>
</tr>
<tr>
<td>79.</td>
<td>1924</td>
<td>62</td>
<td>B</td>
<td>R</td>
<td>Lyr. recurrence.</td>
</tr>
<tr>
<td>80.</td>
<td>1924</td>
<td>65</td>
<td>B</td>
<td>R</td>
<td>4yrs.</td>
</tr>
<tr>
<td>81.</td>
<td>1924</td>
<td>59</td>
<td>B</td>
<td>R</td>
<td>&quot;</td>
</tr>
<tr>
<td>82.</td>
<td>1924</td>
<td>71</td>
<td>B</td>
<td>R</td>
<td>2yrs. died cerebral thrombosis</td>
</tr>
<tr>
<td>83.</td>
<td>1924</td>
<td>64</td>
<td>B</td>
<td>R</td>
<td>2yrs. recurrence.</td>
</tr>
<tr>
<td>84.</td>
<td>1924</td>
<td>59</td>
<td>B</td>
<td>R</td>
<td>4yrs.</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Age</td>
<td>Sex</td>
<td>Location</td>
<td>Details</td>
</tr>
<tr>
<td>---</td>
<td>------</td>
<td>-----</td>
<td>-----</td>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>85.</td>
<td>1924</td>
<td>M.64</td>
<td>B R</td>
<td>Australia</td>
<td>Gone to Australia, believe well.</td>
</tr>
<tr>
<td>86.</td>
<td>1924</td>
<td>M.67</td>
<td>B R</td>
<td></td>
<td>4½yrs.</td>
</tr>
<tr>
<td>87.</td>
<td>1924</td>
<td>F.61</td>
<td>A R</td>
<td></td>
<td>3½yrs.</td>
</tr>
<tr>
<td>88.</td>
<td>1924</td>
<td>F.56</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>89.</td>
<td>1924</td>
<td>M.56</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90.</td>
<td>1925</td>
<td>M.62</td>
<td>A R</td>
<td></td>
<td>3yrs.</td>
</tr>
<tr>
<td>91.</td>
<td>1925</td>
<td>F.58</td>
<td>B R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>92.</td>
<td>1925</td>
<td>M.55</td>
<td>A R</td>
<td></td>
<td>2yrs. died of recurrence.</td>
</tr>
<tr>
<td>93.</td>
<td>1925</td>
<td>M.58</td>
<td>A R</td>
<td></td>
<td>3yrs. 2nd in liver.</td>
</tr>
<tr>
<td>94.</td>
<td>1925</td>
<td>F.52</td>
<td>A R</td>
<td></td>
<td>3yrs.</td>
</tr>
<tr>
<td>95.</td>
<td>1925</td>
<td>M.73</td>
<td>A R</td>
<td></td>
<td>1yr. died of recurrence.</td>
</tr>
<tr>
<td>96.</td>
<td>1925</td>
<td>F.75</td>
<td>B R</td>
<td></td>
<td>2yrs. died recurrence in abd.</td>
</tr>
<tr>
<td>97.</td>
<td>1925</td>
<td>M.65</td>
<td>C R</td>
<td></td>
<td>1yr. recurrence.</td>
</tr>
<tr>
<td>98.</td>
<td>1925</td>
<td>F.71</td>
<td>C R</td>
<td></td>
<td>9mo. recurrence in brain, died.</td>
</tr>
<tr>
<td>99.</td>
<td>1925</td>
<td>F.58</td>
<td>C R</td>
<td></td>
<td>Alive to date.</td>
</tr>
<tr>
<td>100.</td>
<td>1926</td>
<td>M.72</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>101.</td>
<td>1926</td>
<td>M.69</td>
<td>B R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>102.</td>
<td>1926</td>
<td>M.55</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>103.</td>
<td>1926</td>
<td>M.69</td>
<td>B R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>104.</td>
<td>1926</td>
<td>M.56</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>105.</td>
<td>1927</td>
<td>F.44</td>
<td>B R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>106.</td>
<td>1927</td>
<td>M.67</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>107.</td>
<td>1927</td>
<td>M.45</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>108.</td>
<td>1927</td>
<td>M.59</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>109.</td>
<td>1927</td>
<td>F.67</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110.</td>
<td>1927</td>
<td>F.64</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>111.</td>
<td>1928</td>
<td>F.70</td>
<td>B D</td>
<td></td>
<td>Bronchitis and heart failure.</td>
</tr>
<tr>
<td>112.</td>
<td>1928</td>
<td>M.45</td>
<td>A R</td>
<td></td>
<td>Alive to date.</td>
</tr>
<tr>
<td>113.</td>
<td>1928</td>
<td>F.62</td>
<td>B R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>114.</td>
<td>1928</td>
<td>F.71</td>
<td>B R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>115.</td>
<td>1928</td>
<td>F.71</td>
<td>A R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
116. 1928 M.71 B R Died from ascending pyelitis several weeks after operation.

117. 1928 M.60 C R Alive to date.

When a patient with cancer in any part of the alimentary tract applies for treatment, he should be given the benefit of the most radical measures possible for its eradication, whether or not these measures involve the loss of certain physical function. A radical operation on the rectum is only possible by sacrificing the sphincteric apparatus contrived by nature.

The greatest forward step in the treatment of cancer of the rectum has been the acceptance of permanent colostomy as a preliminary step in radical excision.

Operability has such a wide range that whatever may be considered as operative case by one surgeon may be considered inoperable by another. Hankin believes that in all cases in which there is no metastasis to the liver and in which the growths are not fixed to adjacent tissues or other viscosa, in the absence of extremely grave and debilitating co-existing conditions, patients should be subjected to extirpation, even with the possibility of a relatively high mortality rate.

If early diagnosis was the rule instead of the exception, the surgical results of radical cure would stand comparison with those of cancer in any other region of the body.
BIBLIOGRAPHY

2. Ditto. p.511
3. Ditto. p.62
4. Ditto. p.22
5. MacLeod, Physiology and Biochemistry in Modern Medicine.
24. Yeomans, Frank, C. Proctology, 616.35, 14. 1929
27. Wallis, Sir Fred. blb:35 W.16 1912.