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INTRODUCTION

The medical profession and the general public has shown a keen interest in cancer during the twentieth century. The study of malignant neoplasms from almost every conceivable angle has been fostered by public institutions, private institutions and individuals. The mortality statistics compiled by the United States Bureau of the Census has shown the death rate for cancer has been steadily increasing. These statistics show that one of every ten persons over forty years of age will die of cancer, and a good many persons under forty will also die of cancer. This startling fact alone is enough to create wide spread interest in malignant growths.

Knowing these facts and being further stimulated by working in the Proctology Clinic of the University of Nebraska's Medical College under the direction of Dr. R. R. Best of Omaha, Nebraska, I formed the desire to write upon the subject of Carcinoma of the Rectum and Rectosigmoid. I choose carcinoma of this specific region chiefly because of the high incidence of its occurance and because of the fine results modern surgery is attaining in combating the condition. I wish to stress the surgical treatment for three reasons: first,

because radical surgery in the early stages of carcinoma of the rectum has been getting quite astounding results; second, because of the wide variety of operations which can be applied; third, because the treatment by irradiation or radiotherapy has been quite fully discussed in a senior thesis of the University of Nebraska by Gordon Gunn in 1935. My reason for choosing the rectum and rectosigmoid is that approximately 80 percent of carcinoma of the lower bowel occur in these regions. The two regions are taken together because they approximate each other and often a lesion includes both regions. A discussion of either one entails the inclusion of the other as the etiology, pathology and treatment is similar whether the lesion is in the rectum or the rectosigmoid.

The history of carcinoma of the rectum has been written upon by a senior of the University of Nebraska in 1932 (11), therefore this paper will not include material from that viewpoint. Also, the treatment of carcinoma of the rectum has been discussed by Gordon Gunn in his thesis and I shall not include these subjects in this paper.

It is the purpose of this paper to attempt to give a resume of the latest literature upon the subject of "Carcinoma of the Rectum and Rectosigmoid" including

the incidence, etiology, pathology, symptoms, diagnosis, prognosis and surgical treatment. Only the most recent ideas and methods will be discussed in order to stress how this problem is being viewed at the present time.

INCIDENCE

Recent statistics compiled by the various governments of the world including American, British, German, and Austrian figures, according to Yeomans (18) and others, show carcinoma of the rectum and rectosigmoid comprise about four percent of all cancers of the body. Davis (20) demonstrated that carcinomata of the rectum and rectosigmoid are second in number only to carcinomata of the stomach in the gastro-intestinal tract and comprise approximately 80 percent of all intestinal cancers.

Edwards (21) in a series of 775 malignancies reports 542 of the patients were men and 233 were women. Rankin and Jones (22) found the proportion of men to women was 3 to 2. Lynch (23) in a series of 491 cases reported 281 were men and 210 were women.

Pennington (24) in reviewing 7,313 collected cases recorded the age incidence as follows:

Years	
Under 20	40
21-30	235
31-40	690
41-50	1,462
51-60	2,120
61-70	1,836
71 plus	930

Analyzing this the fact is clear that the preponderance of cases occur between the age of forty and sixty. It cannot be too strongly emphasized that carcinoma of the rectum can and does occur in young people under 20 years of age. Smith (25) reports a case in a boy of eleven years. Clark (26) collected from the literature including one of his own, fifty - two cases occuring in persons under twenty years of age, his incidence ran as follows:

YEARS	CASES
11	3
12	5
13	2
14	3
15	4
16	2
17	6

In a collection of 1,828 specimens of rectal cardinoma, Pennington (24) found

1,277	(70 percent)	in the ampulla
322	(7.5 percent)	in the rectosigmoid
229	(12.5 percent)	in the anal canal.

Yeomans (27) gives the site of occurence as

Anus and anal canal	(10 percent)
Rectum	(65 percent)
Rectosigmoid	(15 percent)
Sigmoid flexure	(10 percent)

Pennington (24) gives the site of the cancer as being about three times the number on the anterior rectal wall against the number on the posterior rectal wall, and ten times the number on the anterior wall against those on the lateral wall.

Summarizing the above statstics it is shown that carcinoma of the rectum and rectosigmoid comprise approximately 80 percent of cancers of the intestinal tract, being second only to cancer of the stomach in the number in the gastro-intestinal tract. It occurs more frequently in men than in women and most frequently between the ages of 40 to 60 although it can and does occur in chidren. The great majority (65 percent) occur in the rectum and also the great majority of these are on the posterior wall.

ETIOLOGY

Although the specific cause of cancer is as yet unknown, many theories have been advanced to explain the etiology. Delafield and Prudden (9) discuss Cohnheims' theory of embryonic cell rests, Ribbert's consideration that a disturbance of the balance between the epithelium and connective tissue resulted in cancer, Hansmann's theory that cancer is due to a loss in the ability of the cells to differentiate. Hereditary susceptibility and resistance to cancer has long been postulated. Irritation has been another source of thorough investigation as an etiological factor. Precancerous conditions have been strongly backed by many investigators of all cancers in general and especially of anal and rectal cancers specifically. The points most stress is placed upon are inflammatory processes of a chronic nature, scar tissue, and simple tumors.

Ewing (2) (who seems to base his statement largely on an expression from Kraske some years ago) has been widely quoted to the effect that a tissue predisposition appears definitely only in those cases arising on multiple polyposis, that there is no satisfactory evidence that cancer develops in tissue altered

hemorrhoids, fistulae, or cicatrices, and that in 38 percent of cancers of the pas perinealis reported by Zinner (3) to complain of hemorrhoids, the latter were uniformly the result rather than the cause of the malignancy. Pennington (4) rejected the entire irritation theory and believed hemorrhoids when present were a mere coincidence. Lockhart-Mummery (5) ardently supports the adenomata theory in the rectum, grants the occasional occurrence of cancer in fistulous tracts but doubts the etiological significance of other benign anal pathology.

Rosser (1) qualifies his views with the statement that if it is true that unsound tissues in the anal and rectal canal, resulting from long-continued existence of various forms of common anal pathology with infection and irritation, have the same provocative reaction in susceptible subjects as do similar tissues in other parts of the body, it becomes an unfortunate fact that the weight of written authority has up to this time discouraged the very logical resulting conclusion. He states that it cannot logically be contended that lesions in the anal canal influence the development of malignancy in the ampulla or at the rectosigmoid junction; here the double lesion is purely coincidence.

Nor is it his contention that anal cancer necessarily develops directly from the prior benign lesion; polyp formation may and no doubt does play a part in the origin of cancer of the upper portion of the anal canal, where glands are present and where adenocarcinoma may develop, but the inflammatory or irritative origin of adenomas is generally conceded and the possibility that the adenoma is secondary to an old anal lesion remains.

Rosser (1) in a series of 13 cases of cancer occurring in his own rectal work found 12 of these in which benign anal pathology was believed to have been present before the onset of malignancy and to have brought about a local tissue predisposition.

Thus in may be seen that etiology of carcinoma of the rectum and rectosigmoid is not proved anymore than etiology of carcinoma in any other part of the body. However, as Rankin (12) states not less than 140 cases have been recorded in which the association of polyps with carcinoma was fairly proved to be more than accidental. Proof is lacking that all carcinomas of the large intestine originate in polyps, but there is considerable evidence to support the belief that most of them arise in just such manner.

Then Rosser and others stress other rectal pathology such as hemorrhoids, etc.,may preceed carcinogenic tissue as a possible predisposing factor so carcinoma of the rectum cannot be said to be wholly unsolved concerning its etiology.

PATHOLOGY

It appears to be a fairly common belief that cancer is at first a local disease and remains localized for a considerable time. According to Miles (6) this may be true in certainsforms of squamous carcinomata but he is quite convinced that it does not hold good for the majority of the adeno carcinomata and especially for adenoid cancer of the rectum. In the latter it is a common experience for Miles to encounter widespread dissemination in the perirectal tissues and even in the abdominal cavity in clinically early examples of the disease, so that is seems probable that these carcinoma cells become detached from the primary growth almost synchronously with its inception and, finding their way by means of the lymph channels into the surrounding tissues, form more or less distant metastasis.

Miles (6), MacCallum (7), Yeomans (8), agree that adenocarcinoma is practically the only type of carcinoma occuring in the rectum and sigmoid. The epithelial elements are derived from the cylindrical cells of Lieberkuhn's follicles. Although there is only one type of carcinoma of the rectum, four distinct clinical varieties can be recognized, differing in physical

characteristics and in degree of malignancy. These are classified according to Miles (6) as: the papilliferous carcinoma; the common adenoid carcinoma; the colloid carcinoma; and the melanotic carcinoma.

The papilliferous carcinoma resembles an ordinary simple papilloma but at the base of the tumor, the epithelial elements proliferate irregularly and penetrate the muscularis mucosae. Such a growth extends rapidly upon the surface and soon involves the whole circumference of the bowel. Owing to the exuberance of the growth, the lumen of the bowel becomes obstructed long before infiltration of the muscular coat has progressed to any marked degree. Consequently these growths are not particularly malignant and seldom give rise to extra mural metastasis unless they have been in existance for a considerable time. When surface necrosis has occurred the retrorectal lymph glands may become enlarged from septic absorption, but rarely are they the seat of cancerous deposit. Hence the papilliferous carcinoma seldom recurs after removal, even by an operation of a most restricted type. As a rule, symptoms of obstruction, due to blocking of the lumen of the bowel by the exuberant growth, lead to early detection before extramural dissemination has had time to develop.

Delafield and Prudden (9), and MacCallum (7) agree

that the great majority of cancers of the rectum are of the adenoid carcinoma type. They are usually seen as sessile tumors involving the mucosa and submucosa. In the majority of cases the growth is flattened, the transverse diameter being greater than the longitudinal. The tumor increases in size in all directions and though at first freely movable upon the muscular coat soon infiltrates and becomes adherent to it. It is impossible to say how soon after the inception of the neoplasm deep infiltration takes place but probably it occurs within six months. As the growth increases in size, surface disintegration occurs and a definite ulcer, exhibiting the well known malignant characters, is formed. Even at this early stage the retrorectal lymph glands are usually invaded, thus showing that extra-mural dissemination of cancer cells takes place while the growth is still in a clinically early stage of development. As more of the circumference of the bowel becomes involved, the ulcer deepens and assumes a crateriform appearance with nodular, everted, and in-durated edges. When the ulcer has extended nearly all around the bowel, stenosis of the lumen is produced and then symptoms of impending obstruction make themselves manifest. The adenoid cancer gives rise to extramural metastasis which may be widespread while the growth is

yet in an early stage clinically, and therefore must always be considered as highly malignant. It will inevitably recur after a restricted operation.

The colloid or mucoid carcinoma is a soft gelatinous mass -- rapidly growing, a degenerated adenocarcinoma and is highly malignant.

The melanotic carcinoma fortunately is extremely rare because it is the most malignant of all rectal cancers. Miles (6) has met with only three examples of it among nearly twelve hundred cases of cancer of the rectum. The growth is found either in the anal canal or at the lower most part of the ampulla and generally upon the posterior wall. Microscopically, it differs little in general appearance from the ordinary adenoid cancer, but microscopically the presence of pigmentation in the epithelial and connective tissue elements reveals the true nature of the growth. The pigmentation, however, may be absent from portions of the growth so that unless serial sections of the tumor are made, the melanotic nature of the growth may escape detection. Rapid dissemination takes place giving rise to metastasis throughout the body. The growth invariably recurs after removal.

Knowledge of the spread of cancer of the rectum is of the highest importance to the surgeon -- this know-

ledge forms the basis for devising the various operations. An adeno-carcinomatous tumor of the rectum, when observed in an early stage, is confined to the mucous membrane and the submucous tissue. The tumor is sessile and is readily movable upon the subjacent muscular coat of the bowel. It gradually increases in size, and during the process of growth spreads in three distinct ways: by direct extension through continuity of tissue; through the venous system; and by means of the lymphatic system.

Spread by direct extension through the continuity of tissue takes place in two directions: (1) on the mucous surface of the bowel progressively from its entire margin, and (2) through the thickness of the bowel wall. The marginal increase is generally greater and more rapid in the transverse direction than in the longitudinal axis of the bowel. It is not uncommon to find that, whereas nearly the whole of the circumference of the ampulla has been invaded, the extent of the growth longitudinally is less than two inches. The growing edge undermines the more normal mucous membrane extending in the submucous tissue deep to the muscularis mucosae. Such surface extension is usually slow, thus, in the ampulla, for instance, it probably takes six months for the growth to travel round a quarter of the

circumference in an average case. It is difficult, however, to determine how long a growth may have existed, and to what extent the circumference of the bowel is usually involved before the earliest symptoms indicative of its presence manifest themselves, as there are so few data available.

While surface extension is slowly progressing, the more important deep infiltration of the muscular coat of the bowel is taking place. The infiltration probably begins at the center or oldest part of the tumor, but because of the fact that surface extension takes place unequally, it may happen that the most fixed and indurated portion is eccentric. The fact that the center of the growth is opposite an important structure, such as the prostate or base of the bladder does not imply that penetration of the bowel is occuring at that point, and that actual invasion of the structure has taken place, although the rectum may appear to be adherent to it.

Direct extension through the muscular coat of the bowel appears to be also a slow process. So soon as the bowel wall has been completely penetrated, the growth invades the perirectal fat through which it extends until it reaches the fasciapropria of the rectum. According to Miles (6) observations upon this point the

fascia is not usually invaded until the growth has existed long enough for more than three-quarters of the circumference of the ampulla to have been encompassed, thus indicating that the disease has existed for about eighteen months. It is only after penetration of the fascia that invasion of neighboring structures such as sacrum, uterus or vagina, the prostate, or bladder can take place; and it would appear that involvement of adjacent structures by direct extension does not occur for at least a year after the first appearance of objective symptoms. It will be seen, therefore, that the mode of spread through continuity of the tissue is a comparatively slow process, and that direct invasion of neighboring structures does not take place until the growth in the rectum has involved the greater part of the circumference of the bowel.

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

metastasis. Clinically the hepatic involvement may dominate the picture. Yeomans (8) gives a list of metastasis in the order of their frequency: liver, lungs, peritoneum, pancreas, bones, superarenal gland, kidney, ovary, intestine, mesentary, stomach, brain, thyroid, spleen, skin, heart, pericardium, bladder, uterus, breast, thoracic duct, muscles, scrotum and vagina.

Spread through the lymphatics 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 lymphatics 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 extra-mural lymphatics and anorectal glands may convey cancer cells upward, downward or laterally; or simultaneously in two and rarely in all three directions.

Arrest of cancer cells at any point during their transit through the lympatics results in the formation of metastatic deposits, either macroscopic or microscopic.

The most constant and consequently the most important direction of spread is upward. The structures in

this zone liable to permeation are the retrorectal glands, entire pelvic mesocolon, the paracolic glands, the glands at the bifurcation of the left common iliac artery, and the median lumbar or aortic glands. Occasionally even the group of glands around the celiac axis are involved. Clinical experience has unfortunately shown that in several instances metastasis has occurred to distant glands while the primary tumor is still in an early stage of development. Gordon Gunn (10) in his thesis covered the anatomy of the lymphatic system thoroughly so further detail would repeat his work. However, emphasis cannot be too strongly placed on this system as a means of spread of cancer of the rectum.

SYMPTOMS

Early recognition of symptoms of carcinoma of the rectum is one of the chief hope of permanent relief from the condition. Early diagnosis and early treatment are the only salvations we have at present and by stressing the symptomatology in order to bring about an early diagnosis the chances for recovery are bettered. Miles (6) emphatically stated that too often the patient comes to the doctor complaining of the results of a metastic lesion rather than the primary lesion - the former thus masking the latter. External growths manifest themselves promptly to the patient, but in internal cancers there is at first, as a rule, not umor or local change visible to the patient, and early symptoms are vague. This is particularly true of neoplasms of the large bowel. Concealment of symptoms is due in part to the large caliber of the affected bowel but mainly to the insidious nature of the disease which may produce only minor disturbances or remain almost symptomless for many months, eventually to force the patient to consult the physician for symptoms of marked ulceration or obstruction.

In the early stages carcinoma of the rectum according to Lahey (13) may present many symptoms such

as: constipation, constipation and pain, constipation and bleeding, diarrhea, diarrhea and pain, diarrhea and bleeding, bleeding and pain, bleeding and protrusion vaginal bleeding, hematuria, pain in the back, pain in the abdomen, pain in the anus, nausea and vomiting, dysuria, bullness in the rectum and swelling in the buttock.

In the second stage, when ulceration and secondary infection have developed, frequent foul discharges of mucus, blood and pus occur, constituting the so-called "cancer Diarrhea" which is spurious, for the patient, as a rule, is still really constipated. Finally, the symptoms of intestinal obstruction may supervene. Anemia, according to Coffey (14), along with emaciation and weakness are not characteristic of the first stage but an progressive in the second and third stages, but the anemia is usually of a lesser degree than when the proximal colon is the site of the tumor. He quotes Alvarez (15) et alii have recently shown that carcinomata of the proximal half of the colon tend to produce very severe grade of anemia. This tendency progressively diminishes with cancers in the transverse, descending and pelvic portions of the colon.

Babcock (16) states that weight loss is not

usually marked until the later stages are reached. Rahkin (17) further bears him out in this stating the average weight loss is eighteen pounds but some patients loss as high as sixty pounds late in the disease. Cachexia is also late. Pain varies usually with the height of the lesion following the broad flexible rule that the lower the lesion the more painful it is. The pain is usually not severe and may be only a sense of fullness in the pelvis, of pressure and obstruction in the rectum and often colic at stool. The onset is usually gradual, but may be abrupt with sudden hemorrhage or symptoms of obstruction.

DIAGNOSIS

The symptomatology of carcinoma of the rectum and rectosigmoid as discussed previously in this paper clearly is not sufficient to base a diagnosis upon. As Lahey (40) states they are helpful in as much as it should direct the surgeon to do a more thorough examination particularly of the rectum. Rosser(42) states that a carcinoma of the rectum and rectosigmoid can now be promptly and positively diagnosed. Thoroughness in the examination is the most important point.

Lahey (40) begins with the complete physical examination particularly noticing signs of metastasis such as jaundice, enlarged or nodular liver, areas of dulness in the chest (lung metastasis) etc. The abdomen must be carefully examined for any masses, spasticity, immobility of colon, etc. The colon is often more prominent than normal and may be very spastic. The inguinal glands should be carefully noted and if involved recurrence is prone to follow operation.

Daniels (34) makes it a rule to precede the rectal examination in women with a vaginal examination noting the position and state of the

uterus and its adnexia; the condition of the anterior rectal wall, and to reveal pathology in Douglas pouch.

Approximately 90 percent of rectal carcinoma can be palpated by the index finger according to Rosser (42). This can be greatly aided by making counter-pressure on the abdomen, by placing the patient under a general anesthesia, and by having the patient assume a squatting position.

All three of these methods tend to bring the field closer to the examining finger or in the case of anesthesia relaxes the perineal floor. Palpation determines the exact position of the tumor, its extent and physical character, and, above all, its degree of infiltration of the bowel wall and fixity to adjacent organs and structure.

Anterior fixation suggests implication of the prostate, seminal vesicles or bladder. Cystoscopy is indicated to disclose the condition of the bladder in cases of anterior involvement.

Clinically the growth may be protrubrant or polypoid, a craterlike excavated growth or an annular constricting growth. The growth should have the firm "cauliflower" characteristic imparted to the finger. This may be simulated of course by

inflammatory lesions and therefore examination must be continued.

Proctoscopic examination should be preceded by emptying the bowel (Yeomans (43) either by enema or a large dose of caster oil the day previous. The proctoscope enables the examiner to inspect the entire rectum and anal canal and in approximately 75 percent of cases the sigmoid colon to its apex, a total distance of 30 to 35 centimeters. The normal tube usually can and should be whenever possible be passed beyond a tumor and examining for normal mucosa above to determine the length of the process. Proctoscopy should not be omitted if a digital is done and vice versa.

X-rays of the rectum (Yeomans 43) are not only unncessary but may be misleading as the growth is frequently missed.

Biopsy according to Best (19) and Davis (20) should be made especially before operative procedures are started. Too often men who are very competent are misled by a benign inflammatory lesion and before a biopsy is performed operate only to find no malignancy. Both Davis (20) and Best (19) make it a rule to have a biopsy before operating no matter how sure they may be of their clinical diagnosis.

Heinz (41) in presenting the differential diagnosis between diverticulitis and carcinoma of rectosigmoid stresses the importance of biopsy as the diagnostic procedure of choice. X-rays are the next greatest aid in the diagnosis.

Inflammatory strictures are ulcerated and mimic neoplasms but are of a longer course, smooth funnel-shaped, annular constriction and frequently associated with exzema and condylomata of the anus. A history of syphilis or a positive Wassermann reaction combine to make the differential diagnosis.

Tuberculosis, adenomata, papilloma, thrombosed internal hemorrhoids may be confused with carcinoma. If any doubt is held in the surgeons mind a biopsy should be performed. Adenomata are usually single and pedunculated, may be multiple and the majority are senile. Papilloma are usually single, of the villous type - its feels velvety and soft, bleeds easily on contact and appears injected and wavy through the sigmoidoscope.

PROGNOSIS

Woolf (28) in a discussion on prognosis of carcinoma of the rectum and recto-sigmoid clearly demonstrates that it is as yet an impossibility to get a concise and thorough review of the subject from this angle. The methods of treatment vary just enough and the technique of the surgeon varies just enough that the prognosis is not standardized. For instance Miles (29) reported the prognosis on three successive series of cases. The prognosis became better each time and Woolf (28) points out that this is probably due to the increase in the skill of the surgeon, his technique, care of the patient, etc. Woolf also states that a good many surgeons in reporting on prognosis have not checked thoroughly every case and when follow up letter of inquiry is not answered uses the case at a statistical average and thus the results vary. Also each series reported varies in the number of cases per series and comparison is made by statistical means which are not entirely desirable.

An example of statistical comparison given by Woolf (28) is a table, given complete, although its real import is to show the probable fate on the average of 1000 patients who receive no treatment compared to cases treated.

TABLE I.

YEAR	DURATION NATURAL (Greenwood)	DURATION NATURAL (Modified)	PERINEAL OPERATIONS 1890 onwards (467 cases)	SACRAL OPERATIONS (695 cases)	COMBINED OPERATIONS (229 cases)
0	1000	1315			
1.	760 (-14.4)	1000	1000	1000	1000
2.	434 (-16.6)	571	687	702	529
3.	213 (-13.8)	280	531	520	478
4.	114 (-10.7)	150	488	390	453
5.	54 (-7.6)	71	407	339	403
6.	30 (-5.8)	39	?	287	?

The natural duration of life without operation (column 2) has been estimated on the basis of 1000 patients instead of 760 (column 1) which was the number of patients whose fate was known. Without operation, therefore, of 1000 patients with cancer of the rectum only 71 would be alive at the end of his five years, 406 after perineal resection, 339 after sacral resection and 403 after combined operations.

This table shows that the mortality for perineal operations and for combined operations is almost the same over a five year period. This according to Woolf (28) is a point in favor of the perineal type of operation because of the lessened amounnt of shock shock to the patient because the trauma is less. However, the choice of operation as will later be demonstrated lies mostly in the height of the lesion, extent of the lesion, condition and age of the patient, etc. and not in these statistics which according to Woolf can be made to prove almost anything - even including the truth.

Statistics on mortality in various surgeons reports vary considerably. Woolf (29) in a series of 30 cases operated by the perineal method reports one death. Mummery (30) published the results of 200 operations. with 17 operative deaths, which is a percentage mortality of 8.5. Miles (31) notes 29 deaths in 116 operations by his combined operation in one stage, giving a mortality of 25 percent. Bargen and Leddy (32) report on a series of causes for poor prognosis and include a series of five year cures. Rankin (33) and Daniels (34) report series of five year cures along with Able (35),Jones (36),Lahey and Cattell (37), Coffey (38), Gabriel (39), by the combined abdominosperineal operation in both one and

two stages. Within all these series of cases mortality rates are decreasing but the complete analysis is yet to be made because of the variety of circumstances under which each series was compiled.

A series of statistics Woolf (28) obtained on the causes of post operative deaths as listed by the British Ministry of Health are as follows:

Immediate cause of death	Total No. of deaths due to this cause	Percentage of operative deaths	Males	Females
Sepsis	233	45.6	84	48
Shock & collapse	137	26.8	34	31
Penumonia & lung complications	50	9.8	18	11
Embolism	23	4.5	0	6
Disorders of the urinary system	9	1.8	5	0

This table has sepsis including: sepsis, septicemia, peritonitis, and pyemia. Disorders of the urinary system are common to both abdomino perineal and perineal types of operation.

In reviewing these reports one cannot help but be impressed by the rapid strides surgery is making in bettering the prognosis of carcinoma of the rectum

and rectosigmoid. The doctor can no longer give up in despair upon finding a malignant lesion in this area but now can act and act quickly to get radical treatment instituted early. It stands to reason that early recognition and treatment is doing a great deal toward improving the prognosis of the disease but nevertheless Rankin (33) states that the average time of recognition and diagnosis of the condition is over eight months.

SURGICAL TREATMENT

According to Gabriel (39) cancer of the rectum is one of the most hopeful of malignant tumors if treated by radical surgery, and one of the fascinations of the surgery of this region is the variety of operations which can be applied. This also constitutes a difficulty, for the operator has the responsibility of selecting the operation which he believes will be the most suited to the particular case. In the light of our present knowledge it can be asserted that the operation of choice should be the most radical one that can be performed with reasonable safety to the patient; the patients general condition, the extent of the growth, and its height above the anus, being the points which particularly need to be considered.

The first consideration is the preparation of the patient for operation. According to Yeomans (44) about one week is required to prepare a patient for the operation of radical excision. Rest conserves the patient's strength. Forced feeding with a nitrogenous diet, meat, concentrated broths, and refined cereals, together with drinking of

water freely, is best calculated to increase the patient's strength. Oral hygiene should be carefully attended to. An empty bowel is essential at the time of operation. Small doses of saline every morning for a few days and a dose of caster oil forty-eight hours before operation are usually effective. Irrigation of the bowel once or twice daily with permanganate solution 1:10,000, or 25 percent hydrogen peroxide (peroxid one part, water three parts) diminishes local infection. Intestinal antiseptics as salol, 20 or 30 grains daily, are indicated. These measures will go far to overcome the toxic state present in many of these patients. Some patients appear quite robust and healthy and do not required prolonged preparation. Advantage is taken of this period to make a complete study of the blood, including the blood chemistry and Wassermann test, and a test of kidney functions. If indicated, a transfusion of blood should be given the day before the operation.

Rankin (45) agrees that irrigations of the bowel with hot saline and a purgative should be given. He uses senna. A high calorie, low residue diet he also agrees on. In cases of persisting obstruction surgical decompression by cacostomy is indicated.

During the period of decompression, rehabilitation measures which increases the safety factors are instituted. Preoperative administration of an intraperitoneal vaccine of mixed, streptococci and colo bacilli has, be believes, proved its value as one of the steps in the sequence of events aimed at preparing an individual to withstand a potential peritoneal infection following contamination.

The choice of anesthesia is a most important consideration in dealing with cancer of the rectum and rectosigmoid, whether the operation be accomplished in one or two stages, is the question of anesthesia. Rankin (45) uses gas-oxygen and ether for the exploration and establishment of whatever decompression measure seems advisable, and for the second stage he uses trans-sacral block anesthesia for the perineal procedure and gas oxygen and ether or ethylene anesthesia for the completion of the abdominal stage of the maneuver. Spinal anesthesia, which Rankin used routinely for over a period of years, has been abandoned.

In doing an abdomino-perineal operation the operators vary in choice of abdominal incision. Rankin (45) favors the low mid-line one because of the less liklihoo of herneation. Best (46) says

there are two essentials demanded first, a correctly placed incision, ample enough to carry out thorough exploration, both palpatory and visual, and to permit any necessary intra-abdominal procedure; second the carrying out of a properly placed colostomy, either loop or end type, and either temporary or permanent. It seems to be the consensus of opinion that a median or paramedian incision offers the operator the better opportunities. He prefers the paramedian incision because he believes it is fairly well established that muscle to muscle and fascia to fascia approximation gives better support to the wound and where a colostomy is implicated, complete surrounding of the limb to limb of colon by muscle tissue provides a better functioning colonic operture. As a matter of fact, probably all abdominal work could be done with two incisions, namely, the right and left para-median incisions.

Choosing the proper operation for an individual operation depends on his judgment of the operators experience. There are several standard operations, each with its variations of technique. The major types are: the posterior or Kraske's operation, perineal operation, complete posterior excision

with colostomy, and abdomino-perineal excision.

The posterior resection popularized by Kraske is employed for complete removal of cancers of the middle or upper third of the rectum, but not when the growth involves the rectosigmoidal area. Woolf (28) thinks this has no advantage over the perineal method of excision. The Kraske operation was divised to leave a sacral or low anus by removing a piece of sacrum and bringing the bowel above the growth to the sacral region, that part of the rectum below the growth being removed. Woolf thinks the excision is not safely extensive enough to circumvent recurrence nor is a sacral anus anything but a misery to the patient on account of the lack of control and the difficulty of applying an apparatus to such a part. Woolf is supported in his dislike of this type of operation by Rankin, Yeomans, Miles and other eminent authorities--nevertheless this type of operation is used in central Europe today to some extent.

The perineal excision is advocated by Yeomans (47) and Lockhart-Mummmary (48). It consists of an abdominal exploration. The loop of sigmoid is brought out in the left hypochondrium or left out

of the exploratory incision. It is later cut across leaving a double barreled permanent colostomy. In ten days the rectum with the growth is removed from below by dissection. This operation does not traumatize quite as much tissue as the combined operation and according to Woolf (28) does not have many more recurrances than the combined operation of Miles.

Lahey and Cattel (37) have an operation in which the rectum is removed through the vagina at a second stage procedure. Lahey also operates by merely separating the two openings of the sigmoid after it is cut across, the one communicating with the rectum being left at the lower end of the exploratory incision. This is closed at a second operation by a purse-string suture, thrown into the abdomen and removed subsequently as in the Miles operation. It is intended to relieve obstruction and wash the bowel below before removing the affected part. Babcock (52) has an operation by which the vessels are dissected out in the sigmoid mesentary and those to the upper rectum preserved. He mobilizes the rectum both from above and below and then by a method of his own anastomosis the loosened upper rectum to the anal canal, excising the portion between.

The perineoabdominal operation is popular with many authorities in this country such as Rankin (33) (45), (51), Abel (35), Jones (36), Gabriel (39). In this operation the abdomen is opened, explored, the sigmoid mobilized and cut across. The proximal end is brought out as a permanent colostomy, the lower closed and depressed below the peritoneal floor. Then the patient is rolled over so that the rectum and lower part of the sigmoid are removed. So described it is a one stage procedure devised by Miles. Woolf (28) and Rankin (45) think this is the ideal operation. It removes the greater area of infection and is good for a lesser reason, namely, that there is only a one barreled colostomy to take care of an no blind pocket remains, nor can there be a liklihood of a perineal sinus remaining from breaking down of the inverted stump left after a perineal resection. Such an operation must be performed, if the growth is too high for a perineal resection and too low for exteriorization of the sigmoid loop and removal through the abdomen. The dangers are coincident with adhesions present, a mesentary loaded with fat or an adepose patient. Rankin (45) divides the signoid, uses the upper end as a colostomy and

closes the lower end. The latter is thrown back into the abdomen and removed with the rectum at a later date making a two stage operation out of Miles one stage operation. Gabriel (39) has a perineo-abdominal method or modification, in which the double barreled colostomy is made and then the rectum later is dissected from below, pushed up into the abdominal cavity and removed by opening the exploratory incision again or making a new one.

It can easily be seen that these variations do not fundamentally alter the benefits of the two standard operations which are namely: the perineal method of Mummery, and the abdomino-perineal method of Miles.

Rankin (45) advises that postoperatively it is not advisable to give fluids by mouth for a period of forty-eight to sixty hours. Narcotics are supplied for comfort and to quiet peristaltic movements. It has been his custom to begin giving fluids by mouth when the individual begins to pass gas through the colostomy, and until this time to insure hydration by the administration of 3000 to 4000 c.c. of fluids by hypodermoclysis and venoclysis. Routinely after resection, a single blood transfusion of 500 c.c. of blood is given and repeated during the convalescence if it seems essential. Rankin is very much

in favor of this.

The posterior packing is removed at the end of sixty to seventy-two hours and warm saline irrigations are instituted. Sitz baths are begun on the tenth day. At the end of two to three weeks the wounds are usually fairly well healed, and complications are treated symptomatically, as they arise. Especially should one be one the watch for the development of parotitis which seems to be an unusually frequent complication following operations on the large bowel and rectum; it occurs nearly seventeen times as often as in general surgical cases. Its early recognition and immediate treatment by radium packs prevents suppuration in the large majority of instances and avoids incision of the gland.

The attitude of the individual toward the care of the colostomy is important. All complicated apparatus has long since been abandoned and reliance is now placed upon a simple elastic belt much like an abdominal supporter. This belt has placed in it, over the colostomy site, a removable rubber mat about six inches square. The colostomy should be irrigated and tended to once or twice a day if

necessary, and dietary regieme instituted to see that the stools are formed. The escape of gas is unavoidable but so long as the stools are formed there is little unpleasantness if the colostomy is properly attended to.

In conclusion I think that it can be safely said that modern surgery has gone a long way in perfecting treatment of carcinoma of the rectum and rectosigmoid. Improved technique in care of the patient both pre and postoperatively and improved methods of anesthesia are greatly lessening post-operative mortality. There is a great future in view as methods and technique improve still further and they are sure to do this as shown in the improvement in only the last twenty years.

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