

# REMOVAL OF THE RECTUM FOR CANCER:

STATISTICAL REPORT OF 120 CASES.

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It is my purpose to review in this paper 120 resections of the rectum for cancer which were done in St. Mary's Hospital, Rochester, Minnesota, between April 21, 1897, and December 31, 1909. Operations previous to this have been excluded because the data were insufficient from which to make the desired investigation.

The number of cases is not large but as the results have been obtained under nearly identical conditions and by various methods of operation, the material furnishes some information.

Total number of resections of the rectum for cancer in		
St. Mary's Hospital (C. H. and W. J. Mayo) from		
April 21, 1897, to December 31, 1909.....		120
Males .....		63
Females .....		57
Age of oldest patient .....		81
Age of youngest patient .....		27
Average age .....		52.12
Perineal route..	{ Perineal resection ..... 11 } { Quenu-Tuttle ..... 22 } { Harrison Cripps ..... 5 }	38
Posterior route.	{ Kraske: modified ..... 51 } { Resection continuity ..... 5 }	56
Abdominal combined	{ Combined ..... 20 } { Combined with permanent } { colostomy ..... 6 }	26
Total .....		120

*Operative Mortality.*—This includes all cases dying in the hospital following operation without regard to cause or length

\* Read before the American Surgical Association, May 5, 1910.

of time. Three deaths occurred from exhaustion more than four weeks after operation, one from pulmonary embolus, and one from apoplexy.

Total number .....	120	
Mortality (per cent. 16).....	20	
Total number during 1908-09 .....	44	
Mortality (per cent. 9).....	4	
Amount of bowel removed	{ Lower rectum .....	5
	{ Middle rectum .....	5
	{ Entire rectum .....	75
	{ Entire rectum and part of sigmoid .....	32
	{ Entire rectum, part of sigmoid, uterus, ovaries, tubes and part of vagina	1
	{ Rectum and prostate....	2
Total .....	120	

PATHOLOGIC REPORT.

Carcinoma .....	119
Sarcoma .....	1
Total .....	120

RESULT.

Operated upon more than 5 years ago.....	32
Present condition known .....	17
Alive and well { 2 abdominal (1 alive 9¾ years; 1 over 5 years) { 2 perineal (1 alive over 9 years; 1 over 7¾ years) }.	4
Operated upon more than 4 years ago.....	41
Present condition known .....	26
Alive and well (3 abdominal, 3 perineal, 2 posterior)	8
Operated upon more than three years ago.....	60
Present condition known .....	43
Alive and well (4 abdominal, 3 perineal, 6 posterior)..	13
Operated upon more than 2 years ago .....	82
Present condition known .....	63
Alive and well .....	26
Operated upon more than 1 year ago.....	102
Present condition known .....	82
Alive and well .....	36
Operated upon less than 1 year ago .....	18

I am indebted to Dr. E. C. Moore for his painstaking investigation in compiling the data as summarized above.

It is an unfortunate fact that in the majority of instances cancer of the rectum is not recognized in time to obtain a radical cure. When one considers that such tumors are, as a rule, within easy reach of the examining finger, and that they may readily be inspected with the proctoscope, it indicates a lamentable carelessness on the part of the medical profession and gives point to the saying that most errors in diagnosis are due to careless methods of examination rather than to lack of knowledge. We were also impressed with the fact that nearly ten per cent. of the cases subjected by us to resection had been recently operated upon for piles, or had been subjected to a futile dilation with bougies for supposed stricture.

Excluding the stomach, the rectum is the most frequent seat of cancer of the gastrointestinal tract. The relative proportions are shown in the following table.

TOTAL NUMBER OF CASES OF CARCINOMA OF THE GASTROINTESTINAL TRACT SEEN IN THE CLINIC AT ST. MARY'S HOSPITAL DURING THE YEARS 1908-09.

	Radical operation.	Palliative operation.	Exploratory operation.	Inoperable.	Total.
Stomach .....	78	45	74	191	387
Small intestine .....	..	2	1	....	3
Large intestine .....	40	15	8	6	69
Rectum .....	44	..	3	45	92
Total .....					551

The anatomical situation of the rectum is such that the technical difficulties of a radical operation are very great, and the means of approach, especially to the middle and upper portions, are indirect and difficult. The main arterial supply of the rectum is derived from the inferior mesenteric artery, which, after it crosses the left common iliac, becomes the superior rectal artery. At the upper border of the third sacral vertebra which marks the beginning of the true rectum, the

rectal artery divides into the right and left hemorrhoidals. The middle hemorrhoidal arteries arise separately or jointly with the vesical arteries from the anterior division of the internal iliac arteries, and are of much less importance. The inferior hemorrhoidal arteries are derived from the internal pudic and are of still less importance. The lymphatics follow the blood supply upward to the deep lumbar chain of glands. The lower inch and a quarter of the rectum is derived from the proctodæum and on this account the lymphatics in the inguinal region are liable to be infected in rectal carcinoma which involves the anus.

While it cannot be said that too much attention has been paid to the lymphatics in carcinoma of the rectum, it can be truthfully asserted that too little attention has been given to the local extent of the disease. In our experience inoperable conditions, as a rule, have been due to hopeless local extension rather than to lymphatic metastasis. I could go further and say that I have seen more cases in which embolic carcinoma of the liver has been the contraindication to excision of a locally removable disease than has irremovable glandular metastasis.

Hartwell collected records of 50 patients operated upon by seventeen New York surgeons and found that local return was the rule in all the cases which were not cured. It is evident that more extensive and perfect methods are needed of removing actually involved structures; and it is just here that the greatest difficulty is encountered, especially in the male. The bladder, prostate, urethra and seminal vesicles seriously limit the extent to which dissection can be carried, which accounts for the higher mortality and smaller percentage of cures in the male as contrasted with the female.

Of the 120 cases, 63 were males with 11 deaths, and 57 females with 9 deaths. Of the 60 cases operated upon more than three years ago, there were 29 males and 31 females. Of the 13 alive and well, five were males and eight females.

Sepsis was the cause of the highest percentage of operative mortality. The rectum contains the most virulent organisms

at all times. As pointed out by Hochenegg, the feces in the fluid state are not only filled with bacteria, but are mechanically difficult to control and he therefore advises clearing out the intestinal tract at least 48 hours before operation, allowing the intervening time to enable the intestines to become quiet. For the same reason Kammerer and others, advise a preliminary and usually a permanent colostomy in order that the lower fragment may be cleansed and freed from fecal contamination before the radical operation, which is made one or two weeks later.

A great many surgeons practice closure of the anus with circular sutures and take every precaution to prevent leakage during operation. Peck has made a valuable contribution to the technic in advising temporary closure of the proximal bowel after operation. The closed end of the stump is fastened into the anal space and left closed for 48 hours or more until union takes place. In some of our cases union was primary, two patients leaving the hospital three weeks after extensive resection with completely healed wounds and with moderate muscular control.

If catharsis had not been used for at least 48 hours before operation it was surprising how long complete obstruction could be maintained without great discomfort to a patient who had been kept on a diet of albumen water, broths, etc. In one case, a woman, we were able to maintain complete closure for seven days, and complete closure for three, four and five days was not uncommon following operation.

The question of interference with function after resection is very important and it is a serious drawback to the majority of methods in use. For carcinoma above the middle rectum, Blake prefers a permanent colostomy. His reasons for this are based upon sound principles and have the merit of enabling the most radical treatment of the local disease. Weir, Maunsell, Tuttle and others prefer to follow some modification of the Quenu method, which, in the high cases at least, does not require a sacrifice of the group of muscles which give control, and even if this control is not perfect it is much more satis-

factory than a permanent colostomy. It frequently happens that the muscular control is inefficient and unsatisfactory, and especially as contrasted with the sacral anus, a permanent colostomy is preferable. We have always made a careful statement of facts and conditions to the patients, obtaining their consent to whatever might appear necessary at the time of operation, and after the removal of the growth we have made the best disposition possible for function.

The 120 cases have been divided into three groups which have been classified according to the means of approach into— (1) perineal operations; (2) posterior operations of the Kraske type; (3) abdominal operations of the combined type. Up to the present time we have not chosen any one operation to which we unhesitatingly give preference in all cases. In making a choice of operations we are influenced in individual cases by the situation of the tumor, age and general health of the patient, and especially as to whether there is a great quantity of adipose tissue. The abdominal method in the very obese, especially males, is attended by a considerable mortality, much higher than with the employment of either the perineal or the posterior route.

*Perineal Operation.*—In doing the perineal operation we have found the exaggerated lithotomy position the most useful. Cancers which lie in the muscular canal of Symington, *i.e.*, lower one and one-fourth inches of the rectum, are most satisfactorily dealt with by the Harrison Cripps operation. The distinguished originator of the method has reported a large number of cases in which it has been employed in operating upon cancers of the rectum in various situations, and has shown good results. In our experience, which has been limited to five cases within the last three years, the functional result was extraordinarily good, considering that the entire muscular apparatus was removed in all of them. The essential idea as regards the operation is the removal of the rectum to a point well above the seat of the disease including the muscles, fat and surrounding tissue, making no attempt to draw the end of the bowel down. If the peritoneum is

opened during the operation, it is closed at once. Sometime in the third week dilation with bougies is commenced and kept up for a few weeks. The sigmoid trap is fortunately not disturbed and the long cicatricial canal which is formed gives something approaching control.

For cancers above the levator ani muscle, but within easy reach of the examining finger, the perineal operation of the Quenu-Tuttle type has given us the best satisfaction. Patients who were in wretched physical condition from ulceration and hemorrhage have, as a rule, made good recovery after this method and often a very fair degree of muscular control has been obtained. In the female this operation may be applied to high tumors, as the uterus and vagina protect the bladder, ureters, etc. In the male, tumors which lie in the middle and upper part of the rectum are so closely associated with the bladder, prostate, seminal vesicles and ureters that the posterior route enables the dissection to proceed under better inspection than with the perineal method.

The Quenu-Tuttle operation is particularly applicable to those tumors which lie in the middle rectum above the levator ani muscle. The anus is closed with a purse-string suture and an incision made through the muscle plane which begins at the anus, cutting through the external sphincter and extending to the coccyx, which is removed if more room is needed. With the fingers the entire hollow of the sacrum is swept free from glands and fat and a gauze pack introduced temporarily. The levator ani and associated muscles are now cut free from the rectum, and the rectum itself freed from its anterior muscular association and drawn backward. The dissection is deepened through the perineum anteriorly until the peritoneum is reached and opened. In the male, during this anterior dissection, a sound should be kept in the urethra to prevent injury. A gauze pack is now placed in the peritoneal cavity and the rectum well freed anteriorly and posteriorly until it hangs by a lateral band on each side, much as the uterus is held by the broad ligaments. Heavy crushing clamps are now placed upon each side grasping these lateral attachments

close to the pelvis wall. The rectum is cut free and drawn down and by making its lateral peritoneal reflections taut and dividing them, it is not usually difficult to draw out the entire rectum and part of the sigmoid with all of the glands and fat attached. The lateral clamps are removed, the bleeding vessels ligated and the peritoneal cavity closed anteriorly by a few catgut sutures, and after tying the proximal sigmoid the rectum is cut away, the stump sterilized with the actual cautery and drawn down into the muscular space. The sigmoid should be sufficiently free from tension to allow it to take the natural curve of the sacrum, as recommended by Hartmann, and the closed stump allowed to project at least one inch beyond the anal margin. The stump is rather loosely attached to the muscles which are not completely closed posteriorly.

*Posterior Operation.*—In the posterior operation we have practically given up removing any part of the sacrum. If the coccyx is removed, an incision along the side of the sacrum gives nearly as good exposure and much more rapid healing of the wound following operation. We have found it most satisfactory to place the patient on the table face downward in the Trendelenburg position. In this posture, hemorrhage is much diminished because of the pelvic elevation and when the peritoneal cavity is opened the pelvis is automatically freed of intestines and a splendid view of the operative field afforded. As mentioned already, we seldom do this operation except in the male. Kammerer makes a preliminary permanent iliac colostomy, and ten to fourteen days later he dissects the rectum by the posterior route closing the proximal end of the bowel completely by suture. As contrasted with the sacral anus this gives the better functional result.

*Combined Abdominal Operation.*—This is undoubtedly the operation of choice in the large majority of cases of cancer in the upper part of the rectum, and also in selected cases of low rectal cancers. This operation has the great advantage of enabling proper examination of the upper limits of the growth and for lymphatic metastasis, and especially to note whether the liver is free from disease. However, in

the very fleshy subject, especially the male, it is an operation attended with considerable mortality. Undoubtedly as increased experience and improved technic make the operation easier and safer, it will become the method of choice. At the present time, however, with the greater number of patients reaching us at a stage of the disease when cure is doubtful under any treatment, the perineal and posterior routes being safer, have a field of usefulness. It will be noted in our statistics, that the perineal and posterior routes have furnished as high percentage of three, four, and five year cures with a lower mortality than the combined abdominal route. It is more than ten years since we first began to use the combined abdominal method. In twenty of our cases the operation was completed by drawing the stump of the sigmoid down into the anal space. In six cases a permanent colostomy was done. I believe our mortality would have been smaller and the functional results just as good had we made permanent colostomy oftener.

Hartmann has recently called attention to the work of Sudec and Archibald, showing the anastomotic loop between the sigmoid arteries and the superior rectal. Hartmann demonstrated by dissections that this vascular anastomosis lies just below the promontory of the sacrum. He emphasizes the fact that division of the inferior mesenteric artery just above the promontory insures vascularization of the sigmoid so that it may be safely drawn down into the anal space, whereas division of the artery below the point of anastomosis endangers the circulation.

The abdominal route certainly permits better glandular dissection, but the perineal and posterior routes must, in any case, be used for the removal of the actually diseased structures. The abdominal operation is simply one step in the more thorough eradication of the local disease which must be reached from below or behind, and is not a substitute for them.