

rapidly sunk to 15/200. In the third case of improved vision the right eye was entirely blind and the left eye could count fingers at three feet. After ten subconjunctival injections and one intravaginal injection in the left eye the vision of the left eye rose within a few hours from counting fingers to 15/70 and the field was perceptibly widened. This patient lived in Texas and returned home two weeks after the last injection. He reported that the improvement of vision lasted four months and then rapidly subsided, so that three weeks later it was reduced to perception of light.

CONCLUSIONS.

1. Posterior subconjunctival injections of sublimate may be given with but little pain if the sublimate injection is preceded by the injection of cocain.
2. The conjunctiva should be incised and carefully separated from the episcleral tissue, and the injection made far back toward the apex of the orbit.
3. The eye need not be bandaged after the injection, but cold applications should be made for half an hour.
4. This method of treatment of cases of atrophy of the optic nerve has, in my hands, proved of no more value than the usual routine treatment by mercury, potassium iodid and strychnia, and offers no encouragement for its continued use.

DISCUSSION.

DR. S. D. RISLEY, Philadelphia, said that the result of Dr. Bull's persistent experiments are negative and congratulated Dr. Bull on having the courage to announce such a result. He said that this is commendable and that he wished other experimenters had the courage to do the same in the case of similar results. Viewed from the standpoint of physiology and from what we know of the physiologic methods by which subconjunctival salt injections act, the result, Dr. Risley said, was an *a priori* conclusion. He is an advocate of subconjunctival salt injections; he has seen them do a great deal of good in diseases of the anterior segment of the globe and has many times seen the entire uveal tract clear up under the action of repeated, prudently made, subconjunctival salt injections. He said that by that he did not mean solution of mercury, but the so-called physiologic saline solution. He has never, however, seen any good effect from the deep injection of this or any other solution. He called attention to a point made by Dr. Bull, that in making these deeper injections we must go outside the capsule of Tenon and not into it. When we consider the peculiar anatomic arrangement of the optic nerve, how Nature by means of the dural sheath of the nerve, the curious complex arrangement between it and the pia sheath, the intricate arrangement of the blood vessels and the peculiar arrangement of the lymph spaces of the eye, we see how little is to be expected from deep injections. Dr. Risley does not know how salt injections do good. He does not believe, for example, that the law of osmosis and endosmosis has very much to do with it. He first supposed that that was the way in which it did good. He stated in a paper presented before this Section last year that it was simply the dilatation of the lymph spaces, with a fluid of proper specific gravity, thus permitting a freer current, as it were, and emptying the corneal lymph spaces, which were again filled by normal processes. He believes that all the good we can ever hope to accomplish from these salt injections must be by this method through the anterior lymph spaces of the eye, and that deeper injections are simply useless or harmful. He used them at first very extensively in his endeavor to cure that hopeless condition, detachment of the retina, but without results. How many of us, he asked, have not witnessed, day by day, this chamber of darkness gradually close around these patients with optic nerve disease while we sat sad and helpless, and who of us will not commend any procedure that brings a ray of hope? It is like casting one's fly into a quiet,

currentless and fishless pool, where, however skillfully done, there must be disappointment, but we must conclude to accept many clinical disappointments in our efforts.

DR. A. A. HUBBELL, Buffalo, stated that he had had some experience along this line, though not so systematically persisted in as by Dr. Bull. These lamentable cases, he said, deserve all the attention we can give and if there is the slightest hope held out by anyone we are all disposed to grasp it. Some years ago he began the use of the subconjunctival injections and among others he experimented with this disease. His experience, like that of Dr. Bull's, has been entirely negative. Dr. Hubbell rather expected such results from the fact that he believes that we must look further than the eye itself for the cause of the disease. He has not felt that it is necessary to adopt the surgical measures that Dr. Bull has done in giving the injections. Dr. Hubbell has endeavored to place the sublimate solution beneath the capsule of Tenon by grasping the episcleral tissues with the forceps and then passing the needle underneath the tissues held up. In that way he has succeeded in putting the solution well back. He thinks that these negative results are as valuable to the profession as results which are more favorable.

DR. GEORGE DE SCHWEINITZ, Philadelphia, said that our judgment of the value of any therapeutic measure is always greatly enhanced when we have a carefully diagnostic series of cases to deal with. He has had no experience in the treatment of these cases with this method and asked Dr. Bull whether he believes this method persisted in in the manner and according to the technic he has described is more efficient than the ordinary method of giving subconjunctival injections in other conditions. Dr. de Schweinitz has given many hundreds of subconjunctival injections with all suitable substances, and with most satisfactory results in various diseases of the uveal tract, the cornea and the sclera, but he is willing to follow Dr. Bull's technic if it is more efficient.

DR. CHARLES S. BULL, New York, in reply to Dr. de Schweinitz, said that if any effects are to result from this method of treatment on the condition of the optic nerve, the injections must be made, not anteriorly, but posteriorly. He had made a great many injections as he supposed posteriorly by simply grasping the conjunctiva and thrusting the needle through as far back as he could. Whether he is less skillful than others he does not know, but in every one of those cases he caused a great deal of pain to begin with, and the tendency of those injections was for the fluid injected to drift toward the anterior segment of the eye, in the circumcorneal spaces. When he first thought of opening the conjunctiva with scissors and separating it carefully as far back sometimes as the entrance of the optic nerve he found that the injection showed no tendency to come toward the anterior segment, but remained posteriorly where he wanted it. He has not found that these injections posteriorly had any more efficiency in producing favorable results on these conditions than those made in the anterior portion of the conjunctiva.

NEOPLASMS OF THE COLON.

REPORT OF SIXTEEN CASES.*

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OMAHA.

Neoplasms of the colon, when compared with abdominal growths in general, are not common, still they are of sufficient frequency that they can not be left out of consideration when the surgeon is confronted by tumors of moderate size in any region of the abdominal cavity. When we take into consideration the wide range of mobility possessed by the colon, we at once must recognize the fact that position or location can be no determining factor in the diagnosis. These growths may be fixed in a given locality, which may or may not be at the

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point of their origin and the normal locality of the organ bearing them. They may be very movable and occupy a position at a considerable distance from their initial stage by displacing the organ that harbors them. While these neoplasms are usually palpable, they may be concealed and can not be felt even after they have attained a considerable size and have brought about a complete intestinal occlusion.

While they usually begin as primary growths of the colon, they are not infrequently secondary and may have originated in the mesenterium or the appendix vermiformis of the uterus or its adnexa as will be seen from two cases detailed in this report. The primary growths may have developed so insidiously and pursued such a symptomless course as to be entirely unsuspected until by a hyperplastic-inflammatory process they cause adhesions to the colon, having formed a vascular pseudomembrane between it and the neoplasm, the colonic wall rapidly becomes involved, gradually creating a narrowing of its lumen, with the frequent occurrence of sudden torsions and angulations, and occasionally when carcinomatous ulcerations extend into the outer intestinal tunic, the production of perforation ushering in a fatal peritonitis.

We must confess that physical signs alone are not sufficient to warrant a diagnosis. The history is of first importance and particularly a knowledge regarding certain functions.

PATHOLOGY.

Neoplasms of the colon present several varieties and in a general way we may designate, from a pathologic standpoint, two groups, viz., benign and malignant. In the first group we naturally place such connective tissue tumors as intestinal fibroma, lipoma, myxoma, and polypoids which appear as small nodular growths or as pendulous polyps. The latter occasionally produce intestinal obstruction and sometimes invagination. Myoma and multiple cysts have been met with.

Sarcoma of the intestine is extremely rare. Occasionally the solitary follicles of Peyer's patches may be at the seat of lymphadenoma or lymphosarcomatous enlargement, especially associated with leukemia or pseudo-leukemia.

As an independent primary affection, round-celled sarcoma may spring from the submucosa and the deeper layers of the mucosa, sometimes extending to the mesentery. The mucosa and submucosa sometimes contains secondary sarcomatous nodules in considerable numbers and the peritoneal covering may be thickly infiltrated with miliary sarcoma points.

The malignant tumors of the intestine are chiefly of epithelial origin and under this caption must be counted not only carcinoma in all its varieties, but adenoma and inflammatory papilloma.

Chronic inflammations of the large intestine that result in inflammatory hyperplasia of the mucous membrane, sometimes terminate in papillomatous and polypoid formation of considerable extent.

While we can draw no sharp line between adenoma proper and inflammatory proliferations, the former, more strictly speaking, are tumors.

Adenomata may occur in the form of papillomatous cauliflower-like formations; or they may be found in the form of flat elevations of uneven surface and are prone to ulceration and hemorrhage.

Adenomata sometimes arise in the crypts of Lieberkühn in the duodenum of Müller's glands by an hyper-

plasia and in their makeup present typical glandular acini, a basement membrane containing cylindrical epithelium lining the tubules.

Adenomata are found sometimes in the colon, but more frequently in the rectum and rarely in the duodenum. Carcinoma is the tumor found most frequently in the intestine. It is observed most often in the colon and at the ileocecal juncture, at the flexures of the colon and least frequently in its descending portion. It is found sometimes in the duodenum, especially at the papilla of the common duct. More frequent than in all other parts of the intestine carcinoma is met with in the rectum.

Sutton collected 100 cases of carcinoma of the intestine. Of these 75 were located in the rectum, 23 in the colon and only 2 in the small intestine.

The collective reports of tables of autopsies published by Azeman, Maydl, Müller and Nothnagel, show an aggregate of 69,083 autopsies, of these 5,796 deaths were from carcinoma in general, about 84 per cent. Of the 5,796 deaths from carcinoma, 1,296 were in the intestinal canal, making 22.35 per cent. of all carcinomata. Thirty-five of these occurred in the duodenum and small intestine (2.7 per cent.); 35 were in the cecum (2.7 per cent.); 131 in different parts of the colon (10.11 per cent.); three in the vermiform appendix (23 per cent.); 83 in the sigmoid (6.405 per cent.); 262 in the rectum (20.25 per cent.) (Hemmeter). It will thus be seen that 19.422 per cent. of all intestinal cancer occur in the large intestine if we include the sigmoid, nearly 80 per cent. of these occurring in the rectum.

Carcinoma of the colon presents an irregularly formed mass, containing hard and soft areas, often ulcerated especially within the intestinal lumen, which bleeds easily and projects into the gut, reducing its diameter and interfering with the fecal passage, or when the growth is girdle-shaped and surrounds the gut, which is its most characteristic form, its lumen is narrowed, interfering with fecal circulation. As the intestinal constriction becomes greater the colon above the point of stricture becomes greatly distended by the accumulating gases and fecal masses. The bowel below the obstruction becomes thinner and its lumen contracted. The distension may become so great as to produce rupture.

Carcinomata of the colon are, chiefly, cylindrical epitheliomata of glandular cancers, being made up of atypical acini and tubules, epithelial cells in masses which have irregularly proliferated and infiltrated the neighboring tissues. Occasionally these neoplasms have been found a clear transition of adenoma into carcinoma (adenocarcinoma). Thus transformation is not uncommon in tumors of the bowel.

Cancer of the large intestine is usually of primary origin, but rarely is it secondary, and when so it has spread to the intestine by contiguity from the omentum, stomach, uterus, ovary, bladder, prostate glands, vermiform appendix and lymphatic glands, or cellular elements may be transferred from other distant organs wherein a primary carcinoma may be undergoing disintegration.

Carcinoma of the intestine and particularly of the colon, occurs chiefly between the ages of 40 and 60 years, although these growths are sometimes observed earlier. Nothnagel records a case of carcinoma of the cecum in a boy 12 years of age; Schönig two cases of rectal carcinoma in girls of 17 years of age; and Clar reported a case of medullary carcinoma in a boy three years old (Hemmeter). Maydl has shown by material of the

Allgemeines Krankenhaus, in Vienna, that one-sixth of all intestinal cancers occur between the ages of 30 and 40 years and one-seventh occur before the thirtieth year, consequently it is not safe to exclude cases from a diagnosis of intestinal cancer on account of age.

Adhesions between the neoplasm and all organs may give rise to great misplacement of viscera creating great operative difficulties. Sometimes many loops of intestine have become adherent to each other as well as to the neoplasm and all of these to the bladder, uterus, ovaries, and omentum, creating an entanglement that is impossible to disentangle. Adhesions may create fistulae between colon and intestine or bladder, occasionally perforations externally through the skin have been observed. A primary neoplasm may become so large as to occlude the intestine; in many instances such a growth may disintegrate, a portion of it slough away and the obstruction is relieved, to be followed by a constriction due to connective tissue formed in the place of the disintegrated portions. During a partial disintegration of such a growth, blood vessels become eroded and severe loss of blood may ensue. If the disintegration process extends to and through the peritoneum before agglutinative adhesions with adjacent parts have taken place, a fatal peritonitis follows.

SYMPTOMATOLOGY.

There is no disease of the intestine that in its early stages is usually so free from symptoms. It develops so slowly that its presence is unsuspected until more or less grave complications are manifest. Every practitioner can detail cases that have progressed to a point where a fatal termination was imminent from sudden bowel obstruction and yet no tumor was palpable because of its concealment under the left costal arch as in one of our cases. Others have been recorded and observed many times, where gradual emaciation, a cachexia and a gradually increasing constipation was the only warning. Again others with an unimpaired appetite and digestion, no loss in weight and the only manifestation the obstinate and aggravated bowel inactivity that gave cause for alarm.

The common early subjective indications are frequently recurring colic-like pains with circumscribed tenderness, unpleasant abdominal fullness due to accumulation of gas, with bowel inactivity alternated sometimes with diarrhea. These symptoms were present in nearly all of our cases. Particularly, the cramp-like pains that increased in severity and frequency until either a tumor could be palpated or bowel obstruction was complete. These colicky pains were more or less associated with abdominal fullness, tension and a point of tenderness.

The digestive functions were unimpaired, as one would expect in growths situated so low down in the intestinal tract, as the colon plays no important part in digestion or assimilation. These symptoms are not pathognomonic of malignancy nor do they indicate the presence of a tumor in any form. They seem to indicate that a more or less localized lesion exists which may be inflammatory or neoplastic. There is no justification for an absolute diagnosis of neoplasms of the colon, whether with or without the above symptoms, unless we can feel a tumor that seems to have no connection with other organs. The evidence becomes strong when gurgling of gas through the tumor is heard. The diagnosis becomes more certain when an obstinate and increasing constipation exists and it is usually quite certain when in the presence of a hard irregularly-shaped tender

tumor, a bowel obstruction exists. The author has found in several of his cases a strong confirming evidence to the use of the stethoscope, frequently on auscultation a gurgling of air through that portion of the intestine in which the growth was located, could be heard. Another valuable aid consisted in air being pumped into the rectum through a long tube. The little jets of air could be heard through the stethoscope up to the point of partial or complete obstruction but not beyond.

In several of the cases when the bowel had become partially obstructed, the fecal column was flattened, compressed, stringy and spirally molded, sometimes the stool was dry and globular. But these signs can not be considered of much importance because a constricted sphincter and might, in a measure, cause unusual forms of the feces. The stool, however, is often very offensive, owing to the disintegration of the neoplasm. The evacuations then may contain pus, mucous and blood in varying quantity, the hemorrhage being sometimes dangerously profuse. Care should, however, be exercised to ascertain if hemorrhoids in any form are existent. Occasionally particles of the growth are found in the evacuations, but usually escape detection. It is well, however, to examine the stools critically for such broken-off particles.

It is remarkable how long some of these cases can exist even after obstruction is complete. One of our cases was seen three weeks after the last evacuation. The colon is susceptible of great enlargement, sometimes being so large that on first inspection after opening the abdomen, one is uncertain whether or not he is dealing with the stomach. The enormously dilated colon can accommodate an immense quantity of firm stool, the fluids having been reabsorbed.

DIAGNOSIS.

It is very important that frequently repeated palpation of the abdomen in suspected intestinal neoplasms be done in various positions, sometimes under an anesthetic. Rectal and vaginal explorations are important because the neoplasm may of its own weight have sunk into the pelvis or have been drawn out of place by adhesions. It must be remembered that neoplasms of the colon, in their early development, are apt to be round or oval, smooth and not very large, not large enough to cause the abdominal wall to project. Later they become uneven and irregular in shape and sensitive. If located in the transverse colon a distinct aortic impulse is present. Growths of the ascending transverse and descending colon, if palpable at all, are usually freely movable and are located below the umbilical line. Owing to the varying amount of intestinal gas from day to day the tumor may be felt at one examination and elude detection in subsequent examinations, hence the necessity of frequent investigations. Percussion is not of much value. Fecal impactions not uncommon, may be so confusing as to make a diagnosis difficult and sometimes impossible.

The peristaltic wave is important; in some of our cases it was so distinct that the distended intestinal coils could be plainly seen and in two instances we obtained most excellent photographs. So frequently was this condition observed, that when present, it was regarded an important sign of probable bowel obstruction and taken together with several of the aforesaid symptoms was regarded as a reliable diagnostic factor.

CASE 1.—Primary. Endocarcinoma. Located in Sigmoid. Removed. Ends closed-lateral anastomosis. Needle and Thread. Recurrence in five months.

History.—Mrs. S. P., aged 42, had four children. Menses were always regular until last six months when they became more profuse but not excessive. No leucorrhea. She always enjoyed good health, bowels always regular until six months ago, when an occasional cathartic became necessary. Constipation increased so that repeated daily efforts with cathartics and enemata would after three to four days produce an evacuation and finally all efforts were unavailing.

Examination.—On admission uterus was only moderately movable, very tender and to it seemed to adhere a soft doughy mass whose outlines were difficult to fix in an upward direction. Its lower border seemed fairly well circumscribed. It seemed to fill the iliac fossa. There was much very severe abdominal pain. No discernible peristaltic wave but much gurgling of gas.

Operation.—The upper end of the sigmoid was found adherent to the uterus and that portion of the gut above the point of adhesion filled with a large mass of feces and gas. This proved to be the tumor that was palpable before the operation. The gut was separated but the adhesion surface was suspicious of malignancy. The gut above and below the point of constriction was clamped and the mass removed. The distal and proximal gut ends differed so greatly in diameter, owing to the distended central end, that an end-to-end anastomosis was deemed inadvisable, consequently both ends were closed by purse string suture, and a lateral approximation done with needle and thread. The growth proved to be an adenocarcinoma.

CASE 2.—Secondary. Papillomatous ovarian. Descending colon. Removed end-to-end. Czerny-Halstead Suture. Double suspension suture from recurrence. Free after one year. Lost from sight.

History.—Mrs. M. M. A., age 44, has always been constipated since girlhood. Has taken all forms of cathartic and in large doses. Has had three children, menstruates regularly with little pain. Since four months she has had severe griping pains of more or less intensity sometimes requiring anodynes. She complained of frequent and annoying rumbling in her bowels, especially during attacks of pain. She has lost no flesh, appetite and digestion normal. It became more difficult to procure bowel evacuation until finally all efforts failed.

Examination.—On admission I find her in good condition. Abdomen moderately tympanitic, slightly tender over every portion except in left iliac fossa where pain is severe on pressure. Bimanual examination discloses an enlarged slightly tender uterus, in left parametrium a movable, tender, orange-sized mass. It is believed that there may be a bowel adhesion to this mass. Operation advised and accepted.

Operation.—Median incision. Mass in left side proved to be an ovarian papilloma to which is adherent the lower end of the descending colon, in fact, the colon seemed to be incorporated into the papillomatous mass. The growth is ligated at its base and separated from its uterine attachment. The gut is doubly clamped above and below the neoplasm and removed. The bowel is joined by an end-to-end anastomosis by a continuous Czerny suture and two rows of Halstead sutures. Nature of growth, secondary papilloma.

CASE 3.—Primary. Adenocarcinoma. Located in upper end descending colon. 1. Short circuit, Murphy button. 2. Growth removed, ileo-colostomy. End to side. Recurrence in twelve months. Death in eighteen months.

History.—Mr. L. S., age 60, mechanic, American, complains of much abdominal pain of a cramp-like character often vomits and has obstinate constipation. He states that his illness began four weeks ago with severe griping pain and more or less constant desire to move the bowels but he was usually unsuccessful. Purgatives sometimes produced evacuations but always associated with severe pain. These symptoms have become progressively worse until the date of our first examination.

Examination.—Temperature normal. Pulse, 120. Respiration, 40. General abdominal tenderness most severe near the left costal margin, but no tumor could be made out, chiefly on account of the tenderness. An operation was advised chiefly on account of the apparent bowel obstruction.

Operation.—Through a median incision extending above the navel a mass could be felt in the upper portion of the descending colon. It was hard and firm, moderately movable. The condition of the patient was so unfavorable that an immediate removal of the growth was deemed advisable; consequently a lateral anastomosis was established between the transverse and the descending colon with a large Murphy button. The button holding perfectly, the abdominal wound was closed. The patient recovered quickly from the anesthesia and in an hour passed a large amount of flatus, and on the second day with the aid of a small enema a large bowel movement occurred. The button passed on the twelfth day. The general strength returned rapidly so that on the twentieth day after the first operation a second one was done for the purpose of removing the neoplasm. Through a high incision in the left semilunar line the growth was exposed. It was first detached from its mesenteric attachments. Two long hemostatic clamps above and below the tumor were applied and the gut between the two clamps resected. The intestinal ends were inverted and closed. The anastomosis opening from the first operation seemed perfect. The abdomen was closed without drainage. Nature of growth adenocarcinoma.

CASE 4.—Primary. Adenocarcinoma (ileocolostomy). Located in ileocecum. 1. Artificial anus from ileum. 2. Lateral approx. Needle and thread. Well six months later, not heard from since.

History.—Mrs. T. R., aged 50, had good health until 18 months ago, when she experienced colicky abdominal pains, particularly in the right hypochondrium, sometimes associated with vomiting. Bowels fairly regular. No blood in the stools. Her weight gradually diminished. The abdominal pains became more frequent and more severe.

Examination.—Present state. Abdomen moderately distended. Manipulation caused visible peristaltic waves, especially in the right iliac fossa. In this region could be felt a fist-sized elastic tumor. Gas could be heard to pass through it, probably through the ileocecal valve. Bowel passages were obtained only by artificial aid.

The diagnosis was bowel obstruction in all probability due to a malignant neoplasm. The loss of flesh and cachexia associated with a palpable neoplasm seemed to warrant this conclusion. The pain and vomiting increased, the obstructive symptoms and the great prostration seemed to indicate an immediate interference. An operation was accordingly advised and promptly accepted.

Operation.—Chloroform. A section in the median line revealed a mass of distended intestines. Exploration was unsatisfactory. The neoplasm in the right iliac fossa could be felt but not accurately outlined. The patient appeared extremely exhausted, haste seemed imperative, consequently a loop of ileum was drawn out of the wound and carefully surrounded by gauze swabs, an incision into the ileum was made, permitting the escape of a large amount of flatus and fecal matter. The intestinal opening was closed and the loop of ileum was fastened to the abdominal wall for the purpose of making an artificial anus according to Maydl. The loop of ileum opened 36 hours later and a large amount of flatus and fecal matter was evacuated. The abdomen became flat in twenty-four hours. The general condition of the patient improved very rapidly and she gained in weight and strength rapidly. In two weeks the patient was up and about her home. Three weeks from the date of her operation a second operation was made to restore the continuity of the intestinal canal.

Second Operation.—Incision through the linea semilunaris revealed an orange-sized growth involving the ileocecal junction almost closing the ileocecal valve. The loop of ileum, which was attached to the abdominal wall, proved to be afferent iliac limb of the loop making the artificial anus. This loop together with the cecal tumor was removed, and the afferent limb of the artificial anus was closed. The closed end of the ileum was placed against the closed colon and a lateral anastomosis made with needle and thread. Further exploration of the abdominal cavity revealed no other pathology, consequently the abdomen was sutured. The opening that had been occupied by the artificial anus was then closed. Recovery was uneventful. Nature of growth of adenocarcinoma.

CASE 5.—*Primary. Adenocarcinoma. Located in ascending colon. Hepatic flexure. Excision, ends closed, lateral approx. Murphy button. Well two years later.*

History.—Mr. H. A., laborer, aged 38. There was vomiting of especial moment in the early history. The present illness began nearly two years ago with occasional griping pains in the abdomen. These were believed to be due to gastric disturbances. After an unusual exertion some six months ago, followed by an unusual amount of pain in the abdomen, he observed for the first time a lump in the right side. He had for a considerable period been very much constipated. There had been a gradual loss in weight and he became gradually pale and weak.

Examination.—*Status Præsens.* Patient of medium height, well built, very pale. The abdomen symmetrical, shows a distinct fullness in the right flank. A distinct irregularly rounded mass can be palpated in the right hypochondriac and right lumbar regions, which can be moved upward and downward and laterally almost to the median line. The lower border is three fingers breadth below the transverse navel line. It appears to have no connections with the liver. The mass can be pushed almost into the renal fossa. It is only slightly tender. No tender points in any other part of the abdomen. Leucocyte count, 20,000, Hemoglobin, 45 per cent., red corpuscles, 4,000,000, urine clear, sp. gr. 1.020, alb., 0, sugar, 0. No renal elements microscopically. Temperature and pulse normal. The mobility, size and location of the tumor suggested a renal origin. The absence of all microscopic elements in the urine indicated an extra renal origin. A constantly increasing and stubborn constipation seemed to indicate an intestinal origin. The opinion is strengthened by the statement of the patient that he can feel a bubbling of gas toward and away from the tumor. He states that he can distinctly feel gas moving toward the mass where it seems to be arrested for a few seconds and then it passes beyond and away from it. The passage of gas can sometimes be felt with the palpating hand. The stethoscopic examination plainly indicated the passing of gas through the growth. Percussion gave a flat tympany.

Examination of stomach contents one hour after an Ewald's test breakfast, gave the following. Acid reaction, odor sour, distinct red color with phloro-glucin-ranillin solution. Inflation indicated normal position and size of the stomach; the growth was in no way affected. Tapping the abdominal walls with the finger tips started peristaltic waves which could be plainly seen passing across the upper part of the abdomen from left to right, at the same time bubbles of gas could be felt with the hand and heard through the stethoscope, passing through the tumor.

From the above findings it was believed that tumor of renal origin could be excluded. The test-meal investigation was negative as to stomach or pyloric involvement. There appeared to be no origin in the liver on account of tumor movements independent of the liver. Clearly we had to do with an intestinal neoplasm; its mobility, the passage of gas through it, the arrest of the peristaltic wave by it, together with the obstinate and increasing constipation indicated its presence. Its location suggested the hepatic flexure and transverse colon as its seat. An operation was advised and eagerly agreed to by the patient.

Operation.—Incision through right linea semilunaris reveals a mass involving one-half of the ascending and hepatic colonic flexure, which can be lifted into the wound. Mass is excised between clamps, two above and two below the growth. The ends of the colon are closed and a lateral approximation with a Murphy button is made. The abdomen is closed without drainage. Recovery uneventful. Nature of growth adenocarcinoma.

CASE 6.—*Secondary. Cicatricial mass. Located in descending colon from uterus and tube. Removed end-to-end suture. Double supporting loop. Lost sight of after two months.*

History.—Mrs. J. A. S., aged 42, American, has had three children, last one five years old. One year ago began having colicky pains at intervals. Bowels had always been regular, began to be irregular requiring an occasional cathartic until three months ago, constipation began to get progressively worse, requiring cathartics in increasing doses and frequency until within the week preceding admission large doses of

cathartics and enemata were only slightly successful. She had observed a profuse menstrual flow and occasional uterine hemorrhage in excretion.

Present State.—Apparently in good health, quite fleshy. Has lost no noticeable weight. Examination discloses an enlarged and tender uterus in normal position. Palpation produces slight uterine hemorrhage. In the left parametrium can be felt a moderately movable hen's-egg-sized swelling which was believed to originate in the left ovary or tube and probably had become adherent to the rectum causing the constipation.

Operation.—Abdominal section disclosed an enlarged uterus irregular, slightly nodular fundus. The descending colon was prolapsed and its lower end firmly adherent to the posterior and left side of the uterus, together with an old pyosalpinx. The sigmoid was crowded down into the cul-de-sac forming several reverse coils. The adherent coil was separated with the scissors and packed with gauze swabs and pushed aside. The uterus and adnexa were removed in toto. Then the adherent portion of the bowel, which was a cicatricial mass was excised and an end-to-end enterostomy was done using the double loop supporting ligature. Nature of constriction cicatricial.

CASE 7.—*Primary. Adenocarcinoma. Located in ileocecal region. Ileum planted into the side of colon. Murphy button. Lost sight of four months later.*

History.—Mrs. H. S., age 51, housewife. Her present illness began six months ago with constipation, which had increased so that her bowels moved only every three to five days and then only after repeated artificial aid, usually evacuating hard and lumpy feces. These periods of obstinate constipation have several times yielded to looseness, the stools being yellow and slimy, but containing no blood, nor did she complain of tenderness. Several weeks ago, she vomited a sour material, but no blood. She has lost much in weight. Exertion causes shortness of breath; recently her feet became swollen. Constipation was present but could be relieved.

Examination.—Although the patient appears somewhat pale, she is well nourished; normal temperature, slightly coated tongue. Abdomen somewhat distended. In the ileocecal region is a distinct elevation that is not affected by the respiratory movements nor by position. On palpation can be felt a goose-egg sized rounded nodular mass about midway between the anterior superior spinous process and the umbilicus. It can be felt immediately beneath the abdominal wall, not tender, very hard. It is freely movable and can easily be crowded under the navel. With a stethoscope occasional bubbles of gas can be heard to pass toward it, which are arrested for an instant and then pass on. A flat tympany can be elicited on light percussion. No peristaltic waves. The tumor could be pushed upward almost to the liver but not to it nor into the renal fossa, neither could it be made to descend into the pelvis. Test meal was negative as to stomach disease. Urinary analysis revealed no pathologic conditions.

The clinical evidence indicated an intestinal growth, probably ileocecal, but that was not certain.

Operation.—An incision through the linea semilunaris revealed a tumor involving the entire head and circumference of the cecum and the lower wall of the ileum. The mass was easily removed together with about three inches of the ascending colon and about two inches of the ileum. The open end of the colon was closed with a Czerny-Lembert suture. The end of the ileum was implanted into the inner side of and about one and one-half inches above the closed end of the ascending colon, by means of a Murphy button. Patient died on fourth day from perforation at site of anastomosis. The growth proved to be an adenocarcinoma.

CASE 8.—*Primary. Neoplasm located in lower end of descending colon. Relieved by short circuit with Murphy button. Died in three months.*

History.—Mr. W., age 58, about six months before admission, was struck on the left lower quadrant of the abdomen. He continued his work during the day but after retiring he had nausea and vomiting, and abdominal pain. The left iliac pain has continued since the accident, often worse at night

and sometimes aggravated by eating. He gradually lost in weight. Has had very frequent desire to evacuate the bowels, but is always unsuccessful without artificial aid.

Examination.—Abdomen distended and tender. Pain in left iliac region, where a firm mass can be palpated. Bowels can be moved only with enemata, bringing away flatus and considerable quantity of liquid feces but no blood or pus. Some free abdominal fluid can be made out. A peristaltic wave is visible. It is believed that we have to deal with a growth of the sigmoid.

Operation.—Through a median incision a large mass involving the sigmoid could be made out. The mass was firmly adhered to the posterior and lateral pelvic walls. A removal seemed out of the question. Consequently, the portion of the descending colon was brought down and fixed to the intestine at the recto-sigmoidal junction with a large Murphy button. The button seemingly did not hold the intestinal walls satisfactorily, probably on account of their thickness, therefore reinforcing sutures were employed. The abdominal cavity was closed without drainage. Recovery uneventful.

CASE 9.—*Primary. Adenocarcinoma. Located in lower end of descending colon. Removed end-to-end. Murphy button. Halstead suture, double row for support. Well after one year.*

History.—Mrs. B., age 35, small woman, 5 feet, 2 inches in height, weight 92 pounds. Abdomen moderately distended, somewhat tender. Peristaltic wave can be started by tapping the abdomen lightly with the finger's end. A tender and movable mass can be made out in the left side of abdomen near the left iliac crest. She complained of more or less colicky pains. Bowels greatly constipated, enemata appear to relieve the large bowel below the mass but not above it. An occasional gurgle of gas through the tumor can be felt, especially when the lower bowel has been emptied. No blood or pus in stools. Diagnosis, neoplasm of descending colon.

Operation.—Through median incision a goose-egg-sized mass was discovered at the ileosigmoidal junction. The mass could be lifted into the abdominal wound. The intestine was clamped with Murphy clamps above and below the growth and then removed, the open ends of the colon were joined by a large Murphy button. The gut walls were somewhat thick, so that the button held them imperfectly, consequently a row of double Halstead sutures were placed over the button making the union perfect. Recovery uneventful. Nature of growth adenocarcinoma.

CASE 10.—*Secondary. Carcinoma. Located in appendix, head of colon, and ileocecal valve. Removed. Lateral approximation by suture. Moynihan clamps. Well six months later, then lost sight of.*

History.—Mr. D. S. J., age 44, laborer, since seven months has had abdominal discomfort and occasional griping. Constipation at intervals, occasionally some diarrhea. Appetite variable. Five months ago he developed a tenderness in right iliac fossa and was thought to have appendicitis. Two months previous to admission a small mass could be palpated.

Examination.—On admission he appeared anemic, stated he had lost 30 pounds in weight. Abdomen moderately distended. A tumor, moderately movable, goose-egg-sized, slightly tender, could be felt in right iliac fossa. Gas could be heard and felt to pass through the mass. Peristaltic wave very distinct. No bowel movement for three days. Pulse and temperature normal. Diagnosis, cecal tumor.

Operation.—Incision right semilunar line. Tumor involves the appendix and had extended upward to head of colon and to ileocecal valve. The ileocecum, including the tumor, was removed. The end of the descending colon was closed by double-row continuous Lembert sutures. The ileum was treated in the same way. The two bowel ends were placed side by side and the bowel continuity was restored by a lateral enterostomy with sutures and with the aid of the Moynihan clamps. The closed bowel ends pointing in the same direction. The nature of the growth proved to be carcinoma.

CASE 11.—*Primary. Carcinoma. Located in ileocecum. Removed end of ileum implanted to side of colon. Murphy button. Died.*

History.—Mrs. A. L. D., age 49, was always in good health until she began to complain of pain in the right iliac fossa,

which persisted three or four months when she developed a swelling in the ileocecal region which was regarded to be an appendiceal abscess. Under an anesthetic an incision was made, a rather firm mass was encountered but no pus. A drainage tube was inserted and further operative efforts were abandoned. A month later she came under our observation and the following condition was noted:

Examination.—She was quite fleshy, although she stated that she had lost greatly in flesh. Temperature and pulse were normal. In the right iliac fossa was encountered a fist-sized mass firmly adherent to the abdominal wall and into this mass extended a wound about two inches long discharging a small amount of pus. There was much local tenderness and more or less abdominal, colicky pains, bloating and almost complete bowel obstruction. Immediate operation was urged and consented to.

Operation.—After the usual skin preparation, the wound itself was cauterized with carbolic acid and the cavity filled with iodoform gauze. An incision was made, encircling the wound in such a manner as to remove the walls forming the tract into the mass and finally entering the abdominal cavity. It now became clear that we had to deal with a growth of the cecum. The neoplasm was detached from its posterior attachments. The colon was severed well into healthy tissues and the ileum as well. The end of the colon was closed by Czerny-Lembert sutures and the ileum was implanted by means of a Murphy button into the side of the colon. The abdominal wound was closed without suture. The patient did well for a week when she developed a peritonitis ending in death. A post-mortem examination revealed a perforation at the ileocolonic junction. Nature of the growth proved to be adenocarcinoma.

CASE 12.—*Primary. Adenocarcinoma. Located in splenic flexure. Removed end-to-end. Murphy button. Lembert reinforcing. Died.*

History.—A. D. J., aged 40 years, mechanic, had always enjoyed good health until 1898. While serving with the U. S. troops in Cuba he began to complain of more or less colicky pain, diarrhea and tenesmus. The stools often contained considerable blood. He improved for short periods only to be followed by recurrences. After his return from Cuba he suffered alternately from bloody diarrhea and constipation until the latter condition became constant, amounting to a bowel obstruction when he was admitted.

Examination.—Appears emaciated, no bowel movement for five days. States that he has lost 40 pounds in weight. His abdomen is bloated and has a moderate amount of tenderness but no tumor can be felt nor any special point of tenderness. The peristaltic wave can be noted, especially when the abdomen is tapped with the end of the finger. Judging from the history it is believed that he had an ulceration of the bowel which has resulted in cicatricial contraction causing a stenosis, which seems to account for the bowel obstruction.

Operation.—On opening the abdomen the greatly distended bowels crowded into the wound. On prolonged exploration a tumor was found under the left costal arch which existed in the splenic flexure of the colon. It was globular, about the size of a goose-egg and only moderately movable. The incision was prolonged upward and after much difficulty the gut above and below the growth was doubly clamped and it was removed. The colonic ends were joined with a large Murphy button. The gut, however, was too thick for the button so a re-enforcing Lembert suture was made to insure accurate coaptation. Abdomen closed without drainage. Case progressed satisfactorily for four days when a peritonitis developed and death ensued on the sixth day. Autopsy disclosed a perforation in line of suture. The growth proved to be an adenocarcinoma.

CASE 13.—*Primary. Adenocarcinoma. Located in descending colon. Removed end-to-end. Murphy button. Lembert reinforcing suture. Well after one year.*

History.—Mrs. T. B. A., age 48, passed menopause two years previously and always enjoyed good health until one year ago, when she began to have occasional colicky pains, especially in the left side of the abdomen. It became more difficult to obtain bowel evacuations. Two months ago a movable tumor was detected in the left side which was supposed to be a floating kidney. On admission the following was noted:

Examination.—A movable, somewhat tender, fist-sized tumor was noted but could not be pushed into the renal fossa. On auscultation bubbles of air could be heard to pass through it. Air inflation per rectum could be heard at site of tumor but not beyond. No abdominal distension nor peristaltic wave could be noted. Obstruction was not complete. The diagnosis of neoplasm of the colon was made.

Operation.—Incision through left linea semilunaris. A fist-sized mass located in the colonic walls, was easily lifted out. After double clamping above and below the tumor it was excised together with about six inches of descending colon. End-to-end anastomosis with a Murphy button was made, with some difficulty the thick colonic walls were approximated within the grasp of the button. A re-enforcing Lembert suture closed the operation. The wound was closed after a gauze drain had been placed near enterorrhaphy line. Recovery uneventful. Nature of growth proved to be adenocarcinoma.

CASE 14.—Primary. Adenocarcinoma. Located in splenic flexure. Removed, end-to-end suture. Czerny-Lembert. Double loop supporting ligature. Well after one year.

History.—Mrs. W. S. S., aged 38, for many years had suffered from uterine disease. She was always more or less constipated, which increased so that during the last three to four months it has been difficult to obtain bowel evacuations. For one month a sensitive mass has been known to exist to the left of the umbilicus, moderately movable. She has had occasional bloody stools, but these were attributed to hemorrhoids. More or less indefinite abdominal pains.

Examination.—Has lost 20 pounds. Appears anemic. More or less indigestion. Moderate distension. A hen's-egg-sized mass can be felt in the left side, movable so that it can easily be pushed up to left costal arch and almost into the left iliac fossa. No peristaltic wave, no gurgling of gas through the mass, but rectal insufflation of air indicated on auscultation that the air is arrested at the growth. Diagnosis, neoplasm of the descending colon.

Operation.—Incision through left linea semilunaris. Mass easily lifted out of the abdomen and found to involve the splenic flexure of the colon. The mass is excised in the usual way. An end-to-end anastomosis is made by the aid of the double loop suspension ligature, and the intestinal ends are joined by the continuous Czerny-Lembert sutures. The abdomen is closed without drainage. Recovery uneventful. The neoplasm was an adenocarcinoma.

CASE 15.—Primary. Adenocarcinoma. Located in transverse and hepatic flexure. Closed ends. Lateral Approximation. Murphy button. Died four months later from a fall producing basilar fracture. No return of growth.

History.—M. McL., aged 65, always enjoyed good health until a year ago when she began to lose flesh, and became somewhat constipated so that she was obliged frequently to resort to cathartics. About three months before her admission she observed a movable lump in the umbilical region. Otherwise she declared herself to be in perfect health.

Examination.—On admission she appeared moderately anemic. She appeared as if she might have lost flesh from the flabby condition of her skin. She enjoyed a fairly good appetite. No digestive disturbances. Her bowels moved only by artificial aid and then with difficulty. Occasionally she had had blood in her stools. A fist sized, very movable and painless mass existed beneath the umbilicus. It was believed to be intestinal, but whether large or small intestine, could not be made out. There was no peristaltic wave. Auscultation disclosed nothing, rectal air inflation negative. Never had had colicky pains.

Operation.—Median incision above the umbilicus disclosed a mass involving the entire transverse and hepatic flexure of the colon. The mesenterium appeared free, consequently after a ligation, with catgut, of all attachments, the colon was divided well into healthy structures to either side of the neoplasm. The ends of the colon were closed by a purse string and continuous Lembert sutures. The closed ends were then placed side by side and a lateral anastomosis made by a large Murphy button. Abdomen closed without drainage. Recovery was uneventful. The neoplasm proved to be an adenocarcinoma.

CASE 16.—Primary. Myo-fibrous polypus. Located in hepatic flexure. End-to-end. Connell-Cushing suture. Double loop suspension. Well after three years.

History.—Miss A. V., aged 25 years, since one year had had very many bloody stools, associated with much abdominal colic-like pains. At times she was greatly constipated, at other times there were frequent bowel evacuations of muco-hemorrhagic character. She lost no flesh, her appetite and digestive functions seemed normal.

Examination.—No evidences of the source of the hemorrhage could be found in either the rectum or sigmoid. An indistinct and tender mass was found beneath the umbilicus. No peristaltic wave was discernible, probably on account of the firm and well developed abdominal muscles. Auscultation established nothing. The alternating constipation and bloody diarrhea together with tender mass led to a probable diagnosis of intestinal neoplasm, and an exploratory operation was advised.

Operation.—Incision in median line below the umbilicus disclosed a mass attached to the hepatic flexure of the colon and was drawn down nearly to the right iliac fossa. The omentum had become quite extensively adherent to it, and at first it appeared to be inoperable. However, the omental attachments were gradually severed and the mass could be brought into the wound. On close examination it appeared as if the mass was chiefly in the lumen of the colon. It was the size of a hen's egg and appeared to be attached only to the mesenteric border. The growth together with about five inches of colon was removed. The ends of the colon were united by a Connell-Cushing suture aided by the double suspension loop. Recovery was uneventful. Well after two years. The neoplasm proved to be a myofibroma springing from the mesenteric side of the colon.

In reviewing the foregoing cases, sixteen in number, we find that the majority, in fact, all but one case must be classed as malignant. Eleven were adenocarcinoma. One was papilloma, another myofibroma. One appeared to be cicatricial, secondary to a neoplasm of the uterus. In one the exact diagnosis could not be made with certainty on account of its inoperable character, but in all probability it was carcinoma. The greater number of these cases were well advanced, in fact several of them were advanced to a point where the wisdom of an extirpation might be questioned. When we consider the early dissemination of all growths of the epithelial type into neighboring glands and sometimes to more distant regions, the operator, who has dealt with numerous growths involving other parts of the body, pauses and weighs the chances for and against the possibility of prolonged relief and possible cure. Up to the present time the permanent cures have been few. The operative mortality, while not as good as from other neoplasms of the abdominal cavity, has, with a gradually improving technic improved, and I am convinced that with an accumulation of diagnostic aids that will enable us to recognize intestinal neoplasms in their incipency, the fatalities eventually will be no greater than for other abdominal operations. Of the series here reported, we have a mortality of three cases, but the recurrences have been numerous. In fact, we are at this writing unable to state if any of them will remain free from recurrence. It is impossible to follow the history for more than a short time. Many of our cases who may have suffered from recurrence undoubtedly have fallen into the hands of other surgeons, consequently it is impossible to draw any conclusions as to permanency of cure from the few cases here recorded and for that matter, from any number.

The surgery of neoplasms of the large intestines is very much in the same state as the surgery of malignant new growths of the stomach. If operative inter-

ference is deferred until the clinical signs are positive, i. e., when bowel obstruction is complete and a tumor can be felt, then metastatic deposits have become so extensive that we can scarcely hope to eradicate all the pathologic structures. It is true we still can very often remove the principal growth, restore the continuity of the bowel lumen and achieve an operative recovery, but in the light of the present status of bowel surgery, we must expect an all too great recurrence percentage. Surgeons have dreaded to enter the abdomen when the clinical signs were doubtful. So did they, not so very long ago, where the bile tracts of the appendix were involved, chiefly because they had not become familiar with definite and well defined diagnostic signs and on the other hand on account of the uncertain technic in dealing with these organs. The same holds true of neoplastic intestinal obstruction. Sometimes the signs are absolute and yet it is with dread that most surgeons attack these cases. An intestinal neoplasm usually involves a resection.

The principles involved in such a procedure are well defined, but the details of such an operation are countless. No two operators accomplishing the same result employ the same methods. I am sure that this unsettled operative condition is responsible for much procrastination. It will be seen from the cases here detailed that a variety of methods of bowel union were used. Without going into a discussion of the respective merits of the various methods, it may be briefly stated that from the experience gained from our cases of neoplasms of the large intestine as well as bowel obstruction due to inflammatory and mechanical causes, two principal procedures for the restoration to the continuity of the bowel have commended themselves as easy and rapid of accomplishment, viz.: First, in cases where the resected ends were not entirely free from inflammatory conditions, a closure of both ends of the bowel with purse string and Lembert sutures, after the removal of the neoplasm, and a lateral approximation near the ends and the establishment of an anastomosis with suture aided by the Moynihan clamps; and, second, after the removal of the neoplasm and the bowel was otherwise sound, an end-to-end union with a Connell and Cushing suture aided by the double loop suspension ligature were found most practical and easy of application. The merits of these methods will be the subject of another communication at another time and place.

THE SURGICAL CONCEPTION OF SIGMOID PATHOLOGY.*

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In the evolution of intraperitoneal surgery, our progress has invariably been from a resultant or terminal pathology to the antecedent or original pathology; from the well-advanced and easily discovered lesions to the earlier and more obscure departures from normal. Gradually, step by step, as our knowledge has widened by experience and study, we have learned that large pelvic abscesses have small beginnings in an infected tube or endometrium; that cancer of the gall bladder or stone in the ducts means a previous infection of the parts; that malignant disease of the rectum, stomach or uterus is usually preceded by benign localized inflammatory or

necrotic lesions, and we have learned to take into thoughtful account the physiologic and anatomic peculiarities of these different regions in connection with their etiologic bearing on pathologic conditions, and, lastly, as better results followed timely surgery, we have won the confidence and co-operation of our colleagues, the internists, without which many victims of intraperitoneal pathology must still have suffered or died, with their malady unrecognized, untreated or mistreated. So it has been in other parts of the abdomen, and so we have reason to hope it will be in sigmoid disease.

MORTALITY.

So long as our surgical endeavors are limited to advanced malignant disease and acute obstruction from volvulus, we can not reasonably hope to reduce the present high mortality that attends sigmoid operations. So soon as we learn to recognize, trace and interpret the successive morbid processes, that unchecked lead up to dangerous terminal pathology, we may confidently expect to realize the full benefits of timely and preventive surgery here as in other parts of the body.

In spite of the absence or scarcity of statistical operating-room and postmortem evidence, there are good reasons for believing that the sigmoid must often be the site of important pathologic processes deserving surgical consideration, of which only the small proportion that terminate in cancer or complete obstruction of the bowels are usually recognized.

ANATOMIC CONDITIONS.

No one familiar with the surgical anatomy of the sigmoid can fail to be impressed with the existence of conditions that must render this part of the alimentary canal especially susceptible to disease and accident. It is a constricted irregularly tortuous portion of the large intestine, firmly attached at either extremity by a comparatively short mesentery, the middle portion freely movable, being connected by a long mesosigmoid, and would seem to present every opportunity for the occurrence of twists and angulations (Fig. 3).

A sagging descending colon, with its loose attachment, favors angulation at the upper extremity of the sigmoid, while angulation of the lower extremity can easily occur when the middle portion falls over the more closely attached distal end of the sigmoid. Under the head of volvulus, only those distortions are described as are seen more or less imperfectly in operations, but experimentally various other twists and angulations may be produced in a way to obstruct the bowels partially or completely.¹

It is highly probable that partial obstructions of the large intestine, malignant and benign, occur at this point much oftener than is generally believed; for unless the obstructive symptoms are urgent these cases rarely come under the observation of the surgeon and in most instances escape recognition. In the light furnished by experiments on the cadaver and recent clinical observations, I feel sure that I have in the past treated the vast majority of these cases symptomatically with no conception of the real causes of the symptoms, and doubtless others have often made the same error.

In no part of the gastrointestinal canal are the anatomic conditions so favorable for the development of

1. Volvulus is permitted by a long mesocolon, but the direct cause must be either trauma, or more frequently mechanical obstruction at the distal end, sufficient to distend and displace the middle portion of the sigmoid.

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-seventh Annual Session, June, 1906.