

THE SURGICAL TREATMENT OF CHRONIC
MUCOMEMBRANOUS AND ULCERATIVE
COLITIS, WITH SPECIAL REFER-
ENCE TO TECHNIQUE.¹

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COLITIS of its different types is not uncommon; clinically, they are at some stages so much alike that a proper classification has not been made. The classification that I desire to assume (W. Hale White) may be summarized as follows:

1. *Chronic Primary Colitis*—by primary is meant an inflammation *not* secondary to an injury or extension from neighboring parts or secondary to some constitutional disease, such as Bright's disease. 2. *Chronic Primary Membranous Colitis*—mucous colitis. 3. *Ulcerative Colitis*—dysenteric or not. All of these have long been described in our text-books and are well known, although disputes have arisen regarding their bacteriology. We have of late years learned of other forms of colitis, clinically very similar to the above, differing only in degree and in that they are *secondary*, and all are amenable to betterment or cure through surgical treatment.

The first operation for the relief of chronic colitis was performed by Mr. Keith in 1894; the subject was a patient of Dr. Simpson's, and the case was published in the *Medical Press and Circular*, July 29, 1896.

The second case was of W. Hale White, of Guy's Hospital, operated by Mr. Golding Bird, and reported in the *Clinical Society's Transactions*, vol. xxix, 1895. Although these seem the earliest reported cases of rebellious colitis submitted to surgical treatment by right inguinal colotomy, yet I have been told that English surgeons in India were the first to per-

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form right inguinal colotomy for the purpose of giving rest to the colon, and that the patients they operated on were those suffering from the consequences of "Hill Diarrhoea" as well as from dysentery. Halsted, of Baltimore, was probably one of the first American surgeons to do the operation, the patient was one of Osler's. This author, in his "Practice of Medicine," 1902, says, regarding mucous and membranous colitis, "right inguinal colotomy has been performed with success in several cases of great obstinacy. The artificial anus should remain open for some time." To date, the operation has been done many times all over the world. It is rather queer to relate, however, that Boas, in his work on "Diseases of the Intestines," 1901, says, "Among the curiosities of treatment I may mention that the surgeons have attempted to cure membranous colitis by the establishment of an artificial anus. They claim to have had successful cases." In 1904, according to K. Vogel (*Münchener Med. Woch.*), Boas reports cures of ulcerative colitis by making an artificial anus in the cæcum and irrigating the colon in this way. I refer to these questions of operative treatment at this time in order to draw attention to the fact of the rather sceptical views of recognized clinicians as to the value of surgery in the treatment of rebellious colitis up to within a very recent period.

It is to John B. Deaver, of Philadelphia, that we must give the credit for directing the attention of the profession to the fact that some cases of mucomembranous colitis were caused by disease of the vermiform appendix. After reporting a typical case, he said ("Treatise on Appendicitis," 1896), "The removal of the diseased organ, which latter is probably the primary cause of these troubles, leading as it does to inadequate digestion in the large bowel, colitis, etc., or simply to malassimilation, auto-intoxication, and neurasthenia, is primarily only of utility in removing the constant danger to life by which these patients are threatened." Deaver then goes on to state that the benefits of operation are slow in their establishment. Following Deaver, George E. Shoemaker, of Philadelphia, published a paper in 1898 (*ANNALS OF SURGERY*,

1898), entitled "The Importance of Chronic Irritability of the Colon, with Mucous Stools as a Symptom of Appendicitis." This was an interesting communication and attracted wide attention. It has remained, however, for Sir William Macewen to give a scientific explanation of some of the uses of the appendix, and how an interference with its function may react upon the colon, causing inflammatory changes, mucous colitis, etc. Since Casper Bauhin discovered the ileocaecal valve in 1579, down to the present, little attention has been paid to it excepting some clinically important experiments, particularly those of Senn regarding its competence when fluids and gases were forced into the colon through the anus. Within the past two or three years, physiologists, among them T. R. Elliott and Keith, have made exhaustive studies and experiments regarding the innervation of the ileocaecal valve. It appears that "the junction of the large and small intestine is controlled by a muscular sphincter, not by a mechanical valve. Stimulation of the sympathetic nerves causes the sphincter to contract, though at the same time inhibiting the circular muscle in the wall of the ileum and colon adjoining the sphincter." Elliott, in discussing this subject, draws attention to the fact that in many animals, as, for example, the bear, hedgehog, and ferret, there is no ileocolic sphincter to enable a distinction between the small and large intestine. The human arrangement of an oblique entry of the ileum into the colon results in the formation of a valve, yet its fundamental control is by a muscular sphincter. As an example of this sphincter, in the London Hospital Museum may be found a pathological specimen of "an ulcerated colon" which exhibits a "simple evaginated sphincter without any differentiation of valves or circumferential ledges."

Macewen, in a recent address delivered at the Charing Cross Hospital Medical School, narrates some very interesting observations and experiments that he was enabled to carry out in a case of a man whose caecum had been opened and exposed, the result of an explosion. Through this wound the surgeon could see the interior of the caecum, the ileocaecal orifice, and

the mouth of the appendix; his opportunities were very similar to those of Beaumont in the St. Martin case. To briefly summarize Macewen's observations, it was noted that when food was taken into the stomach the mucous secretion of the cæcum increased, and was much augmented just before chyme began to come through the ileocæcal orifice; at one observation quite a stream flowed from the appendix. The flow through the ileocæcal valve was not continuous; the chyme coming in small quantities at a time. The cæcal and appendix secretions were invariably alkaline, the chyme coming through the valve is acid. As Pawlow has shown that the "acid reflex" of the pylorus prevents too great a flow into the intestine, there being no alkaline reflex; thus Macewen reasons that an "alkaline reflex" in the cæcum controls the flow of the acid contents of the ileum through the ileocæcal valve, to the degree that normally the contents of the cæcum may remain neutral. Whenever this reflex was interfered with, the too rapid flow of acid chyme into the cæcum and out upon the skin caused great irritability of the latter, indicating how easily normal digestion in the cæcum could be interfered with and irritation developed. Mental shock and irritability were found to very materially lessen the secretions of the appendix and cæcum. Macewen says, "The nervous mechanism of the appendix is more in keeping with that of the small intestine than of the colon; it is supplied by the terminal branches of the same group of nerves as supply the small intestine, the superior mesenteric plexus of the sympathetic. Reflex action may be easily set agoing in the appendix by stimuli from the small intestine, and each part may react on the other. When it is recollected that the circular muscles of the cæcum are continuous with those of the appendix, and that the longitudinal cæcal bands end themselves on the appendix, it will be understood how easily the nervous apparatus of the appendix may irritate the larger movements of the cæcum by first inducing movements in the appendix, and how inhibition of these movements may cause cæcal disturbance. The same agency by control of the vascular supply will regu-

late the exudation from the appendix, and that in accordance with the impulse received from the small intestine."

Physiologists are beginning to recognize the necessarily important part that the appendix, cæcum, and ascending colon take in digestion. As early as 1813, Sir Everard Home noted that important digestion went on in the colon, but little notice has been taken of this subject. In fact, the fad of the day seems to be that the whole colon is simply a sewer canal. Acting on this theory, some surgeons have of late written in a rather depreciative way of its usefulness, and have advocated partial or complete excision rather than milder and more safe methods whenever these were possible. The glandular structure found in the appendix and colon prove beyond doubt the importance of these parts in digestion, and any abnormality of this function, whether as a cause or effect, will react. The micro-organisms always present in the appendix, cæcum, and colon, and assisting in the digestive process, may become pathogenic, and inflammatory changes result in the appendix itself or in the cæcum and colon. This interference may in the case of the appendix result in an inflammation mostly confined to that organ, an appendicitis, or else the abnormal secretion of the appendix, and perhaps cæcum also, may so interfere with the alkaline reflex of the ileocaecal sphincter that a too rapid escape of the acid chyme from this orifice into the cæcum and ascending colon will be followed by catarrhal inflammation of perhaps the entire colon. This is to me the only rational explanation of how a chronic appendicitis may bring about a mucous colitis.

Again, any abnormal position or angulation of the colon which would interfere with its digestive process may, and often does, result in some type of colitis. Downward displacements of the right kidney, dilatation of the cæcum or sigmoid resulting from adhesions or chronic constipation can and often do produce a mucous colitis, and in some rare cases ulcerative colitis and perforation.

The beautiful experiments of W. B. Cannon, of the Laboratory of Physiology, Harvard University (*American Jour-*

nal of Physiology, 1902), on the "Movements of the Intestines studied by Means of the Röntgen Rays," throw a bright light upon a hitherto little understood subject, viz., the mechanical process of digestion, and we can readily understand how, through the continuous interference with this mechanism, inflammation may result.

Briefly, for the purposes of this paper, I will avail myself of some of the observations of Cannon. If bismuth subnitrate 10 to 33 per cent. is mixed with the food, the movement of the intestinal contents, and thereby the movements of the intestinal walls, can be observed on the fluorescent screen.

Although it would be interesting to study the movements of the food through the *small intestine* as observed in the experiments of Cannon, it must suffice now to state that *antiperistalsis* was not observed, and strong evidence was obtained going to show that the statements of Grützner (*Deutsche med. Woch.*, 1894, xx, p. 897) and others as to the occurrence of this phenomenon was yet to be proved.

However, antiperistalsis was shown to be a constant factor in the digestive process in the large intestine. As the chyme enters the colon from the small bowel, it is carried by antiperistaltic waves into the cæcum, and all new food as it enters is likewise affected by these waves, and is, as Macewen has shown, mixed with the secretions of the glands of the appendix and cæcum. This chyme is not, as we have generally been taught, forced along slowly, but continuously towards the rectum. As the fluid in the cæcum travels upward it is forced backward by an antiperistaltic wave, and by a churning process becomes well mixed for the absorption of its more liquid and nourishing portions. As the contents of the large intestine move along they are met by other antiperistaltic waves. In fact, "the usual movement of the ascending and transverse colon and the cæcum is an antiperistalsis. This antiperistalsis gives a new significance to the ileocæcal valve," which by its competency prevents a back flow into the small bowel and admits of thorough mixing and absorption. As the

left portion of the transverse and descending colon are reached by their contents, peristalsis forces this onward, until by peristalsis and the pressure of the abdominal muscles evacuation occurs. One of the most interesting and, to me, important observations made by means of the X-rays was the disposition of nutrient enemata. We, at least I, have always thought that these were absorbed in the rectum and lower sigmoid, but careful observations with small and large enemata, thick and thin enemata, all of which contained bismuth, have proven that this is not the case. When small nutrient enemata are introduced, after lying in the descending colon, they are taken hold of by antiperistaltic waves, which carry them to the cæcum. The observer noted that "when large amounts are injected they stop for a moment in the region between the transverse and descending colon as if a constriction existed there. Then a considerable amount of the fluid passes the point and antiperistaltic waves carry it to the cæcum."

Absorption takes place as the waves pass, and the gradual increasing dimness of the bismuth shadows is observed, except in the descending colon; here they retain the original intensity. This proves that most absorption takes place, *i.e.*, of the liquid, above the descending colon. When the enemata were large and thin, about the consistence of cream, leakage occurred through the ileocaecal valve and the fluid passed into the small intestine. I have outlined the digestive process in the cæcum and colon in order, first, to direct attention to the manner of production of disturbances in the functions of the appendix and cæcum which may lead to a colitis; second, that we may readily comprehend how mechanical interference with both the peristalsis and antiperistalsis of the colon can result in some one of the forms of colitis. Edebohl's first insisted upon the relationship between displacement of the right kidney to catarrhal appendicitis; but I believe that the recent article by P. Aylare, in the December number, 1904, of the *Revue de Chirurgie*, is of value in the same direction. In it he points out from post-mortem studies how by a descent of the right kidney the hepatic flexure is pushed down, the ligament

of Toldt binding the lower pole of the kidney and the flexure of the colon strongly together. The result being a marked angle, and in some cases narrowing in the colon at the junction of the ascending and transverse portions. Interference with the digestive functions in the cæcum and ascending colon resulting.

A few days ago, during an operation, I had an opportunity to verify this finding; a mucous colitis had developed as a consequence of the condition. It was noted, also, that the long axis of the kidney was directed downward, inward, and forward when normally the direction is downward, outward, and backward. Adhesions had formed which would not admit, even after replacement of the kidney, of the natural restoration of the position of the colon.

Lane (*Lancet*, November, 1904) has recently directed attention to the stagnation in the colon resulting from angulation following adhesions, and the cure of the disturbed colonic function by surgical methods. In order to cope successfully with the different kinds of colitis, we must in so far as possible be able to differentiate the cases and apply the surgical procedure to fit the cause. This is rather new surgery, but has a field of usefulness. Any form of colitis which had resisted careful medical treatment must be studied with a view of determining the cause and the reasons for the persistence of the cause. We may for surgical convenience recognize three kinds of colitis. First, the inflammatory due to the effect of some specific organism, an inflammatory disease commencing in, and mostly confined to, the colon. Second, an inflammatory condition secondary to an inflammation or derangement of function of the vermiform appendix. Third, an inflammation induced by mechanical interference with the peristaltic, and more especially the antiperistaltic, waves of the colon.

The surgical treatment of colitis, if carried out in recognition of these causes, will be successful. And to be successful, the type of operation must be selected with a view to meeting the pathology. It will not do nowadays to confine ourselves

in all cases to a right inguinal colotomy. This may have done for the class of cases for which it was first selected, but even in this class, which I will designate the bacteriological, the artificial valvular fistula operation suggested by Gibson, of New York, has many advantages. Not the last being the annoyance of a large open fistula and the inevitable loss of weight and strength which always follows the free external discharge of chyme as it comes direct from the ileocaecal orifice. In my experience with the appendicular forms of colitis, there are two varieties, first, and most common, the *explosive form*, which is recognized in its commencement, *i.e.*, the first few hours, by intense general abdominal pain with tenderness over the appendix. In from six to twenty-four hours dysenteric symptoms develop which may last some days, and then gradually subside or persist with moderate symptoms for several weeks. These attacks recur. The other form is of the kind described by Deaver and mentioned in the first part of my paper.

In the first kind the removal of the appendix is all that is required, as has been so in three of my cases. In the neurasthenic type of Deaver not only should the appendix be removed, but the Gibson caecal fistula ought to be established; the long-continued interference with caecal and colonic digestion by the abnormally functioning appendix has brought about changes in the mucosa of the colon that can only be cured by the rest and local treatment afforded through this fistula. If these simple means will not bring about a cessation of the discharges and the impaired health which always accompanies them, then something further must be done. The colon must, in greater or less part, be excluded from the process of intestinal digestion and the function established gradually by the small intestine and the remaining portion of the colon. Operations for exclusion have undergone a remarkable evolution.

Formerly, we had the old operation of Maisonneuve, which is all sufficient in the treatment of many cases of mucous colitis. But this anastomosis opening may close as in one of

my cases; just as the same thing happens after a gastro-jejunostomy when the pylorus is freely patent. Taking advantage of the experimental work of Dr. N. Senn ("Intestinal Surgery," 1888), surgeons divided the ileum close to the ileo-cæcal valve, sutured the distal end, and implanted the upper end into the sigmoid flexure or upper rectum. This usually gives practically complete rest to the colon and the colitis is cured. In some cases, however, by the process of antiperistalsis or retroperistalsis, the intestinal flow is directed backward until it reaches the cæcum and irritation develops.

Although this has not happened in three cases in which I have carried out the technique, perhaps not in two of them because I did the Gibson operation at the same time, yet it has happened, and Monprofit has shown us how to prevent the occurrence. He does what he is pleased to call "Exclusion with Drainage into the Intestine." There seems to be a rather indefinite idea of what "intestinal exclusion" really means. Elsewhere (*Medical Herald*, June, 1904) I have discussed the subject.

As M. H. Hartman (Paris) says, "the term exclusion of the intestine ought to be reserved to operations in which the continuity of the intestines is interrupted by one or two sections. The exclusion or sequestration of the intestine can be either *unilateral* or *bilateral*, and is known as the operation of Saltzer."

In *exclusion unilateral* the intestine is divided above the portion which we wish to exclude, the superior end is anastomosed or implanted into a portion of the bowel below the portion which we wish to exclude. The divided end of the section excluded is either closed or perhaps fistulized to the skin.

In *exclusion bilateral*, two divisions of the intestine are made, one above, the other below, the part excluded; the divided ends peripheral and central are anastomosed. The divided ends of the excluded portion can be closed or fistulized to the skin; or, better, they can be closed and a valvular fistula made at some suitable point in the section. In cancer,

entero-anastomosis suffices to bring about a cessation of accidents. In cases where it is indicated, exclusion is inferior to operations which definitely and immediately suppress the lesion (resection of the intestine, liberation and suture of the fistula, etc.).

Doyen and Monprofit say that if both ends of a section of the bowel be occluded, the procedure can chiefly be considered in the light of a physiological study of the secretions of the excluded bowel, but clinical experience proves that in a certain number of cases, although no fistula of the excluded section be made, nature by a process of obliteration, because of lack of function, so takes care of the excluded portion that atrophy and obliteration follow without detriment. When fistulization is employed, the fistula sometimes persists for an indefinite period. The mortality after complete exclusion without drainage, *i.e.*, the suturing together of both ends of the excluded section, or the separate suturing of each end, is greater than when the excluded part is fistulized.

According to Mikulicz, Herman, Saltzer, and others (*Handbuch der Praktischen Chirurgie*, Band iii) who have made experiments on animals, and Boracz, Von Eiselsberg, Narath, and others who have studied the subject in the human being, a section of the healthy intestine can be excluded with both ends closed without drainage and the procedure be followed by little danger. When, however, the excluded section is diseased, the secretion is increased, especially in ulcerated conditions, while the absorptive powers are diminished, this can lead to over-distention and rupture. In the sound intestine secretion and absorption are about equal, and the mucous membrane finally becomes atrophied. Therefore, unless a fistula is already in existence, Mikulicz and Kausch insist that when exclusion is made, the excluded section must be fistulized with the skin; in such conditions I would suggest the artificial valvular fistula after the method of Gibson. However, in order to overcome consequences, imminent or remote, regarding the accumulation of secretions or the persistence of fistulization in the excluded section, a surgical procedure is available.

Monprofit (*Chirurgie du Gros Intestine*) has very recently brought forward an ideal technique which he designates "exclusion with drainage into the intestine" in contradistinction to exclusion with skin fistulization. It is applicable to all possible cases, and it may be used in affections of the large intestine, the jejunum, the ileum, or even of the duodenum. It is the application of the gastro-enterostomy by double implantation, "en Y," as it is called.

In order to make the method clear, let us take a case of obstruction of the bowels due to a tumor of the ascending colon. If the ileum be divided near the cæcum, but sufficiently far away, about 20 centimetres suffice, so that the cut ends can be implanted, the lower into the sigmoid flexure of the colon, the upper into either the transverse or descending colon, the intestinal current is re-established, and the diseased excluded ascending colon is drained into the sigmoid flexure.

The theoretical objection that fluids from the excluded part of the colon would not drain through the ileocæcal valve into the stump of the ileum on into the sigmoid flexure does not hold in practice.

The pathology in the colon brings about changes in the valve which result in incompetency. Monprofit discusses the advisability of shutting off the valve by dividing the ileum close to the cæcum, suturing the valve end and then implanting the other end into the cæcum or colon near the original ileocolonic juncture. In practice, this seems unnecessary, especially at the primary operation, and calls for too much time in addition to that required for the absolutely essential procedures. Obstructions in the colon other than those very low down in the sigmoid flexure can all be treated by intestinal exclusion with drainage, likewise obstructions of the small intestine. In suitable cases, that part of the bowel obstructed can be excised, either primarily or as a secondary operation. In a case of my own, this method of exclusion with drainage into the intestine has been followed by the happiest results.

It would seem an improvement over this method of Monprofit's, if, instead of dividing the lower ileum, it be approxi-

inated to the sigmoid and two anastomosis openings made; between these openings the ileum should be occluded by a purse-string suture, and both limbs fastened to the sigmoid so as to close any opening that might permit of a loop of intestine becoming strangulated. My personal experience in the surgical treatment of mucous membranous and ulcerative colitis is limited to eight cases, exclusive of mild catarrhs of the cæcum and appendix due to displacement of the right kidney. Four have had the Gihson operation, and two of these had in addition the ileum divided. The lower segment occluded and the upper implanted into the sigmoid. One of my operations was that after the technique of Maisonneuve. In another an ulcer of the sigmoid was excised. In one case the urgency of operation was determined by an intussusception of the lower ileum, probably resulting from the antiperistalsis in the colon.

I have had one death due entirely to too long delay and to too much zeal upon my part to correct some serious pelvic complications. The eight cases referred to were operated in the Clarkson Hospital, Omaha.