Psychosomatic Medicine Monographs

MUCOUS COLITIS

A PSYCHOLOGICAL MEDICAL STUDY OF SIXTY CASES

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Published with the sponsorship of
COMMITTEE ON PROBLEMS OF NEUROTIC BEHAVIOR
DIVISION OF ANTHROPOLOGY AND PSYCHOLOGY
NATIONAL RESEACH COUNCIL, WASHINGTON, D. C.

WASHINGTON, 1939

EDITORIAL BOARD

FOREWORD

A TWENTY-ODD YEAR OLD hospital nurse of New England background and Protestant training received the amorous attentions of a physician who was an Italian and a Catholic. In response to a letter telling her parents of her engagement, she was told that if she did not immediately break it, she would be disinherited and could never return to her home. When she informed her parents that she planned to marry in spite of their protests, they doubled the calumny which they heaped upon her. Two months intervened before the wedding. Throughout this time she suffered from a mucous diarrhea.

On the day of the wedding, however, she received a letter from her mother, saying that she had been forgiven, and inviting her and her husband to feel free to come home at any time. Her symptoms immediately disappeared and never returned thereafter. Such histories form the basis of the present study.

Diarrhea as a symptom of nervousness has been recognized for centuries. It is only recently, however, that the reaction as a whole has been recognized and given the status of a syndrome. The shortest and most acceptable name seems to us to be "mucous colitis." No apology is made for the use of the word "colitis" to indicate "disorder of the colon." This is the original meaning of the word, and only in the last fifty years has the genitive "itis" been used to mean "inflammation of" with the implication that bacterial invasion is the cause.

THE AUTHORS

PSYCHOSOMATIC MEDICINE MONOGRAPH I

MUCOUS COLITIS

A PSYCHOLOGICAL AND MEDICAL STUDY OF SIXTY CASES

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I. HISTORICAL REVIEW

ALTHOUGH VARIOUS ALLUSIONS to mucous diarrhea had already been made, Da Costa (*1*) was the first of modern clinicians to emphasize its importance. He was familiar with the illness of the soldiers in the American Civil War among whom Woodward (*2*) had reported a high incidence of diarrhea. Da Costa had seen a great deal of nervous illness among the soldiers and made a thorough investigation of the "irritable heart" (*3*). In the paper on that subject he listed diarrhea as one of the principal "etiological factors" contributing to the causation of cardiac irritability. Unquestionably, some of the patients suffering from irritable hearts were debilitated by diarrhea. Others, quite probably, were suffering from two apparently unrelated manifestations of anxiety.

Da Costa described the syndrome of mucous colitis[1] with great accuracy and presented in detail the histories of seven patients. He commented upon the diarrhea with mucous casts, upon the high incidence of dyspepsia, upon the abdominal pain, and upon the relation of the symptoms to emotional tension. He examined the rectums of the patients with a speculum and noted that the mucosa was angry red and thickened, but showed no evidence of ulceration. He suggested that the low residue diet afforded the most effective form of treatment. His report contains also a scholarly review of classical references to the syndrome.

The subject of mucous colitis during the latter years of the 19th century was further studied by the dynamically minded clinicians of Europe. The earlier of these writers, Nothnagel (*4*), Marchand (*5*), and von Leube (*6*) emphasized the concept that the disease was really a secretory and motor neurosis of the intestine, while their immediate followers, Einhorn (*7*), Boas (*8*), Ebstein (*9*), and Schutz (*10*) disagreed to a certain extent with this simple concept. All the latter tended rather to emphasize the rôle of inflammatory processes in the colon. Von Noorden (*11*), in reviewing the evidence for these two beliefs, emphasized the fact that paroxysmal attacks of pain with mucous diarrhea were known to occur in frankly infectious enteritides, but he also pointed out that Rothmann (*12*) and Hemmeter (*13*) had demonstrated at the autopsy table histologically normal colons from patients who had suffered from severe "colica mucosa". Nothnagel, also, recognized that pain and mucus could occur in the presence or absence of specific lesions, and he sharply divided his neurotic cases from those which he considered infectious in nature. Westphalen (*14*) attempted to rationalize these views by formulating the concept that all excess mucous secretion was due to nervous influences, which, however, in the infectious enteritides, were secondary to inflammation. Von Noorden's concept was similar to that of the "secretory" school except that he felt the pain to be due to the peeling off of dried mucus from the bowel wall. He also emphasized the fact that almost all his patients with mucous diarrhea suffered from pre-existing constipation and he seemed to feel that the irritation from the hard movements might induce mucoid secretion.

De Langenhagen (*15*) in 1903 reported a series of 1200 cases from

[1] See Foreword.

Plombières. He spoke of the association of mucous colitis with the "neuro-arthritic diathesis," an inaccurate but descriptive term for those physically and emotionally inadequate persons who frequent European watering places. Among the series of 1200, there were 50 cases who had severe intermittent attacks of colic and 112 who had, at one time or another passed intestinal sand, a gritty excrement, originally described by Matthieu but generally attributed to Dieulafoy (*16*). The entire 1200 were described as being neurotic. Neurasthenia, hypochondriasis and "hysteria" were the neuroses most frequently encountered. De Langenhagen emphasized the manifestations of lability of the autonomic nervous system and the frequency with which severe anxiety was encountered. He felt that the rôle of infection was unimportant.

Fleiner (*17*) differentiated between spastic and atonic constipation. The spastic type of which he wrote corresponded closely with Stierlin's (*18*) constipation of the "ascending type", in which the cecum was dilated and the sigmoid spastic. Likewise the work of Singer (*19*) on the "spastic colon" dealt with the same general group of patients. The first accurate sigmoidoscopic observations in the condition are generally attributed to Singer. Singer and Holzknecht (*20*) contributed to the radiological knowledge of the syndrome and also emphasized the fact that the sigmoid colon could often be palpated as a firm, hard mass in the left lower quadrant of the abdomen. Schwartz (*21*) described the spastic changes in the colon demonstrable by X-ray and also the "string sign" which is often attributed to later workers.

Hurst (*22*) belittled the concept of the "spastic colon". He introduced the word "dyschezia" to describe a form of constipation supposedly due to rectal retention. In the Massachusetts General Hospital series, the rectums of most of the patients were empty at the time of proctoscopy, a fact which throws some doubt on the frequency with which "dyschezia" and mucous colitis coexist. Hurst believed that "dyschezia", or rectal retention, was the only form of nervous constipation. He felt that the passage of hard, small scybala represented an overflow from the rectal retention and that the secretion of mucus and abdominal cramps resulted from its irritating presence. While his idea of the mechanism differed widely from that of other writers, it is interesting to note that, during the World War, Hurst (*23*) again called attention to the fact that mucous diarrhea and the "soldier's heart" often occurred in the same individuals. This observation, made by Da Costa forty-six years before, was also observed to be true by Sir Thomas Lewis (*24*).

After the World War, interest in the condition largely returned to this country. A hoard of brief clinical papers appeared in the literature, most of them making no contribution to the subject. With the rise in the development of clinical allergy, a number of attempts were made to explain the etiological basis of the disease as being due to food idiosyncrasy. Duke (*25*) presented 5 cases of unquestionable food allergy in which there were abdominal pains and symptoms in many ways suggestive of mucous colitis. Hollander (*26*) added 6 more in 1927. Meanwhile, other allergists were working on the causation of gastrointestinal symptoms. Among the leaders in this movement, were Vaughan (*27*) and Rowe (*28*). Whatever the merits of their work, it is certainly true that an overemphasis was placed upon the significance of gastrointestinal allergy during the third decade of this century. Largely through the influence of Cannon (*29*), who studied the physiological manifesta-

tions of fear and rage in animals (*30*), there also developed a broader and more intelligent interest in the concept of vegetative neuroses. Alverez' studies (*31*), on a gradient of irritability in the gastrointestinal tract, did much to explain many of the symptoms of gastric neuroses, and his homely psychiatric approach (*32*) went far to interest clinicians in the emotional aspect of gastrointestinal disorders. This tendency was manifested by numerous contributions and addresses by notable authorities on the rather vague subject of psychosomatic disorders.

Bockus, Bank and Wilkinson (*33*) made a careful study of 50 patients with mucous colitis in which emotional problems were specifically studied. They described the syndrome almost exactly as has been done in this study, and found almost exactly the same incidence of signs and symptoms. They noted that most of the patients were not frankly "neurotic" although all of them were emotionally unstable. Hysteria was encountered in only 1 case. During exacerbations, the emotions were "near the surface"; that is, the patients were tense. A tendency toward depressive symptoms was noted in 23 cases, while a degree of introspection approaching hypochondriasis appeared in 22. Asthenia was a prominent feature in 16. The incidence of these tendencies compares reasonably closely with that found in the cases here presented.

Murray (*34*) reported the development of ulcerative colitis on an emotional basis. The first of the cases reported in his series was probably one of mucous colitis which developed in a situation almost identical with that of the nurse mentioned in the foreword. Sullivan (*35*) also studied the psychogenic basis for ulcerative colitis.

Even more specific than the work of Bockus, Bank and Wilkinson was that of Alexander (*36*) upon the unconscious motivation of gastrointestinal disorders. He employed the psychoanalytic technique and his results are discussed elsewhere.

Including the contribution of Bockus, Bank, and Wilkinson, there are at least 4 moderately careful clinical series of mucous colitis cases (*33*, *37*, *38*, *39*). Friendenwald, Feldman and Rosenthal (*37*) presented a complete review of the signs and symptoms, laboratory, X-ray and sigmoidoscopic findings in 500 cases. Their findings were essentially the same as those of Bockus, Bank, and Wilkinson, and agree closely with the incidences seen in the present study. Jordan (*38*) and Kiefer admitted patients in their series on the basis of less clear-cut criteria and one gains the impression that the term "irritable colon" in their clinic is used more broadly than mucous colitis in its current sense. The Mayo Clinic series (*39*) was not presented in comparable statistics.

A number of papers upon the roentgenological diagnosis of the condition have also appeared, among which those of Kantor (*40*) and Crane (*41*), which contributed the "string sign", are most widely quoted.

The concept of mucous colitis as a vegetative neurosis which may be precipitated by emotional tension can hardly be called a new one.

It is the purpose of this study to review a series of patients, studied from a medical as well as a psychiatric viewpoint, and to evaluate the evidence for and against this hypothesis.

II. CLINICAL SYNDROME

THE SYNDROME OF MUCOUS COLITIS consists essentially of gastrointestinal symptoms predominantly referable to the colon. In all the cases there is at some time constipation or diarrhea, accompanied by abdominal pain, and the passage of stools of small calibre. In the majority of instances the first symptom, usually coming on in the second or third decade, is constipation. Diarrhea, as a rule, is a later development. A certain number of patients have alternating constipation and diarrhea, and in many cases these short bouts of diarrhea are accompanied by the passage of long strings of mucus, or of mucous casts of the bowel, a process which is painful in the extreme.

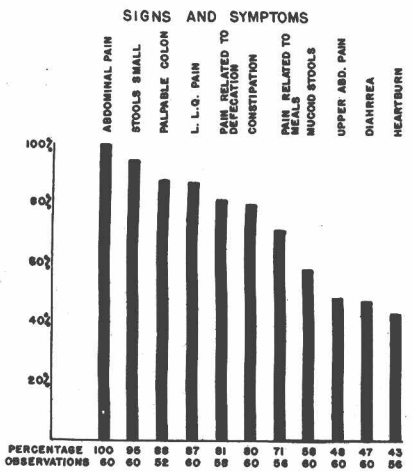

FIG. 1. Clinical findings in sixty cases of "mucous colitis"

Certain workers, Jordan (*38*), in particular, employ the expression "irritable colon" to refer to a wider range of symptoms than those outlined above. Jordan believes even this wider range of symptoms to be secondary to disturbances of the colon and one third of all the entries to her clinic are considered to be suffering from this syndrome. In her experience the commonest symptom of the "irritable colon" is upper abdominal distress, while frank lower abdominal symptoms are not always to be found.

TABLE I

INCIDENCE OF VARIOUS CLINICAL FINDINGS IN FOUR SERIES OF CASES

FREQUENCY OF SPECIFIC SYMPTOMS

	Friedenwald, Feldman and Rosenthal	This Study	Jordan	Bockus, Bank and Wilkinson
Dyspepsia or Upper Abdominal Pain	64%	48%	59%	58%
Abdominal Pain	93%	100%	87%–90%	70%
Diarrhea	19%	43%	9%	44%
Constipation	72%	80%	80%	80%
Males	16%	27%	23%	36%
Females	84%	73%	77%	64%
Food Allergy	1%	3.3%	—	—
Coincident Peptic Ulcer	8%	6.7%	—	4%
Spasm by X-ray	51%	18.0%	27%	43%
Asthenic Physique	64%	33.0%	—	56%
Sigmoidoscopic Changes	89%	89.0%	—	92%

In contrast to this liberal use of the irritable colon concept, many clinicians use the expression, "mucous colitis", to refer only to those cases in which there is frank diarrhea with the passage of large amounts of mucus. They often limit the use of the term to those now relatively rare cases in which there are severe attacks of abdominal colic followed by the expulsion of membranous casts of the bowel. This type of syn-

drome was apparently much more common in the first decade of this century than it is now.

In this study the concept of the irritable colon has been used more conservatively than it is by Jordan; that is, to refer only to cases in which good evidence is available that the symptoms were in fact due, at least in part, to a disorder of the colon. On the other hand, it has been used to include a wider range of symptoms than those recognized by most clinicians. The only symptom which has been taken as a *sine qua non* of the diagnosis has been pain.

In our series the original complaints and diagnoses varied considerably, but in 67 per cent the main trouble was immediately recognized. The commonest misdiagnosis was "gall bladder disease", with peptic ulcer, genito-urinary infections, and appendicitis not far behind (*see Table II*).

TABLE II

INITIAL DIAGNOSES IN SIXTY CASES OF MUCOUS COLITIS. IN SOME INSTANCES THE INITIAL DIAGNOSES WERE INCORRECT, IN OTHERS THEY BECAME SECONDARY DIAGNOSES

Initial Diagnoses

	Cases	Percent
Colitis	22	37
Psychoneurosis	18	30
Gall Bladder Disease	3	5
Peptic Ulcer	2	3·3
Appendicitis	2	3·3
Irritable Heart	2	3·3
Addison's Disease	2	3·3
Carcinoma of Stomach	2	3·3
Pelvic Inflammation	1	1·7
Pregnancy	1	1·7
Myxedema	1	1·7
Diaphragmatic Hernia	1	1·7
Asthma	1	1·7
Angina Pectoris	1	1·7
Allergy	1	1·7

The majority of the cases entered the hospital in the middle decades of life; the average age, coming under observation, being 35. Most patients had suffered from their symptoms for a period of several years before the correct diagnosis was made, the average age of onset being 25. The age of onset of symptoms and of hospital admission (with correct diagnosis) is recorded in Fig. 2.

All the patients in our series suffered from abdominal pain at some time or other. In addition, all of them had constipation or diarrhea at some time, stools of small calibre, with certain other characteristic changes and in most instances a palpable and tender sigmoid. Friedenwald, Feldman and Rosenthal summarized the symptoms and signs found in their series and their summaries roughly coincide with ours. In Table I the tabulations from four sources are shown in parallel columns. These data affirm the fact that Friedenwald, Feldman and Rosenthal were dealing with the same group of patients which have been studied in this series. For a detailed review of the symptomatology of the syndrome, their paper is the best reference available.

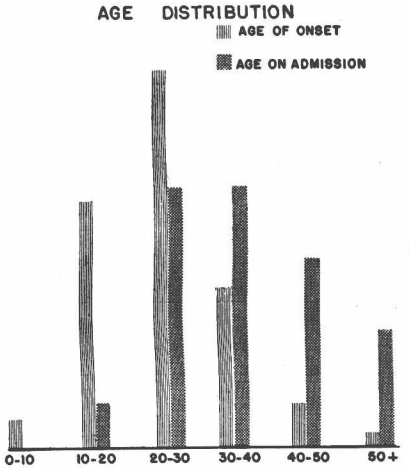

FIG. 2. Age distribution at onset of symptoms and at time of diagnosis. Note that the greatest number of cases develop symptoms in the second and third decades of life.

In most instances where diarrhea was a prominent complaint, the diagnosis was arrived at promptly, the more serious types of etiology for diarrhea having being ruled out by appropriate diagnostic tests. Where abdominal pain or constipation was the presenting symptom, however, the final diagnosis was often overlooked for a long time, and made ultimately only after the situation had been aggravated by the therapeutic use of cathartics.

When diarrhea was the presenting bowel symptom, the patient most often complained of the passage of many soft stools of small calibre. They varied in consistency from watery, to mushy, often contained mucus, very rarely blood. When constipation was the presenting complaint, the symptoms were somewhat more varied. The type of constipation differed from that of simple anal retention (dyschezia) in that the patient would sit at stool with no urge to defecate, and if any movement occurred it would be extremely small. In dyschezia, the patient complains of large, hard, painful dejections. Even in constipated patients with the mucous colitis syndrome, movements might be hard or soft. If hard, they were commonly composed of small, hard, dark scybala or "rabbit pellets". Occasionally these scybala, formed by excessive resorption of water in the colon, collected in the rectum and coalesced so as to produce a painful dejection, but generally they were passed singly. Often they bore a coating of clear mucous distinctly greater than the normal. If the movements were soft, they were also small in calibre, lighter in color, and stringy in appearance—generally described by the patient as "the size of a pencil". The history of these characteristic stools should set one on one's guard against the diagnosis of atonic constipation or of simple rectal retention.

The type of abdominal pain was of great help in leading to the diagnosis. Although upper abdominal symptoms such as heartburn, belching, sour eructations, post-prandial epigastric fullness, nausea, lack of appetite, furring of the tongue, and dry mouth were often complained of, in almost every instance there was some pain below the umbilicus. Jones (*42*) has shown that pain due to stimulation within the colon is usually referred to an area well below the navel. From most parts of the colon he showed it to be referred to the midline, but from certain regions which are fixed to the peritoneum, the pain is found to one side or the other. The pain in the lower abdomen in our patients often extended entirely across its width, but in many instances was more acute in the right or left lower quadrants. In most cases, the pain was described as "cramp like", although often it was referred to as a sense of pressure or a feeling of gas; less frequently, patients complained of a raw aching feeling in which they recognized grinding sensations. In almost every instance the pain was aggravated by certain stimuli which might be expected to have an action upon the muscular walls of the colon. Eighty-one per cent had aggravation of pain in association with bowel movements. A large number also had increased severity of pain after taking cathartics or enemata. Seventy-one per cent had exacerbations of discomfort after the ingestion of food, and usually about ½ hour to 1 hour thereafter. This period corresponds roughly with the time generally required for establishment of activity of the gastro-colic reflex. Almost all the patients found they were unable to eat cabbage or other foods high in cellulose residue, and nearly all the sufferers in the less neurotic group noticed an immediate aggravation following episodes of emo-

tional tension. Excessive exercise, exhaustion, and respiratory infections were also found to be excitatory influences.

Physical Status

No crude correlation with anthropological types of Kretschmer (*43*) could be determined. Forty-three per cent of the cases belonged to the leptosomic group, 32 per cent to the pyknic group, while the remaining 25 per cent were of indeterminate build. There were, however, certain stigmata of dysfunction of the autonomic nervous system and other physical findings which occurred with regularity and were apparently of importance.

A *general* nervous excitability was indicated by the appearance of tension, restlessness, and in a large percentage of cases of grossly hyperactive tendon reflexes.

A *specific* incoordination of the autonomic nervous system was indicated by dilation of the pupils (5 mm. or wider) in a small number of the cases, flushing of the skin, particularly of the face and neck, coldness of the extremities, marked sweating, particularly of the palmer surface of the hands, and a definitely exaggerated "red" response to stroking of the skin (*see Fig. 3*). The red response was usually not accompanied by actual wheal formation. In addition, the descending colon was generally palpable as a firm, tender, tubular structure. Some of the patients had recognized it themselves and referred to it aptly as a "rubber hose". The only other physical findings of importance were lability of the pulse rate and irregular sighing respirations, both of which were frequently observed. The evidence for vascular instability is reviewed elsewhere in discussion of the Schneider and Turner tests of physical efficiency (p. 80).

Value of Special Diagnostic Procedures

The conventional routine laboratory procedures yielded no help in the diagnosis of mucous colitis. Blood studies showed no evidence of anemia or

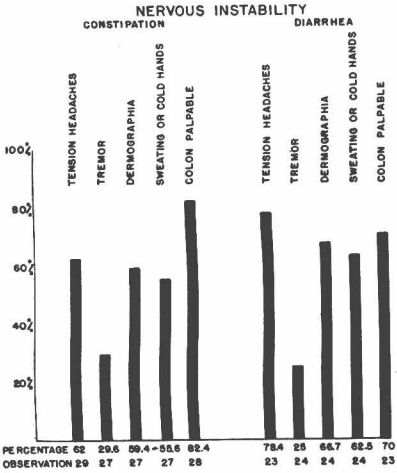

Fig. 3. Stigmata of nervous instability. There is no appreciable difference between the patients with constipation and those with diarrhea.

leukocytosis, the differential blood count was within the normal range, and even eosinophilia was absent. An increase in eosinophiles might have been expected in view of the close parallelism between the underlying pathology and that of bronchial asthma. The urine examinations also showed no deviations from the normal.

Stool examinations were important only from the point of view of shape, consistency, color, and the presence or absence of mucus. These features are discussed elsewhere in relation to symptomatology. Gross or occult blood occurred only in cases where there were local lesions in the anal canal. Many of the stools were examined for para-

sites, ova, and cultured for dysentery organisms without success. In Fig. 4 are recorded the significant characteristics of the stools in the different syndromes of mucous colitis.

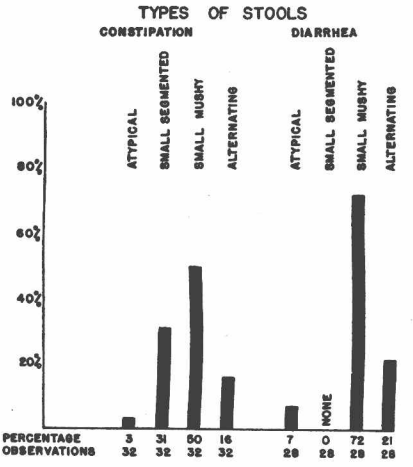

FIG. 4. Shape and consistency of stools. Note that in the presence of diarrhea small mushy stools are almost invariably present. In constipated subjects small, hard, segmented stools and mushy stools occur with almost equal frequency.

The most important single diagnostic procedure is that of sigmoidoscopy. In Friedenwald, Feldman, and Rosenthal's series, recognizable sigmoidoscopic changes were noted in 89 per cent of the cases. This figure is in agreement with our observations, in which 89 per cent showed changes similar to those which they described. According to their work there are three stages of the development of the characteristic sigmoidoscopic picture.

Stage 1 consists in a dilation of the smaller veins, slight generalized injection, the appearance of fresh glairy mucus and greater or lesser degrees of spasm (so called, shad roe appearance).

Stage 2 represents a longer duration of the process. The generalized injection is more marked, so that the veins lose their identity in the surrounding field; the mucus is drier and more tenuous.

Stage 3 is still more severe. In it the tenuous mucus peels off the mucosa with difficulty, leaving small granular indentations in its wake. A certain amount of spasm may be present in any of the three stages.

Although it was not attempted in our study to make a clear cut differentiation into three stages, in general our observations were in accord with those of Friedenwald, Feldman and Rosenthal. In Fig. 5 the incidence of the characteristics described by them is recorded. The cases of short duration in which constipation was the predominating symptom showed only slight abnormalities. Cases with more severe constipation or with symptoms of longer duration usually showed more distinct changes, consisting generally of dilation of the superficial veins and venules, the presence of a mild degree of injection, some glairy secretion of mucus, and an abnormally great irritability with a tendency to spasm. All cases with diarrhea showed alterations of at least this degree of severity; the most marked changes appeared in persons with prolonged constant diarrhea, or in those with acute bouts of severe colic followed by the expulsion of mucous casts. This last group showed the most marked alterations. They were similar to those described in stages 2 and 3 of Friedenwald, Feldman and Rosenthal's schema. The generalized injection, puckering, and wrinkling of the mucosa tended to mask the dilation of the veins. The mucus was dry, tenuous, and adherent, at times stripping with difficulty. Spasm as a rule was more marked than in the early constipated cases, but it was not present in all of them. In several instances when spasm was present, it was relieved following the local application of a 0.1-0.5 per

cent solution of atropine in the rectum, but this phenomenon was only observed in 6 of the 12 cases on which it was tried. On the other hand, drugs which stimulate the parasympathetic nervous system, such as Acetyl-B-methyl choline chloride, pilocarpine, and physostigmine, when applied locally, were almost without effect on the sigmoidoscopic picture. This is in striking contrast to their effect upon the normal rectosigmoid, which is discussed in a subsequent chapter.

The sigmoidoscopic picture of mucous colitis is not specific. It can occur in the normal rectum and sigmoid following repeated irritant enemata, and it may be seen in patients recovering from acute infectious enteritis. It may also be seen in those with localized inflammatory lesions such as diverticulitis, proximal types of infectious colitis, regional ileitis, etc. The observed signs are really only those of chronic irritation, which may be and, in many instances, is mediated through the parasympathetic division of the autonomic nervous system. These non-specific changes are of great value in making the diagnosis when they are considered in the light of other diagnostic criteria. They indicate that a sufficient focus of irritation to produce the symptoms is present and, by the absence of ulceration, polyp formation, etc., they help to eliminate the diagnosis of more serious types of disease.

The roentgenological examination, on the other hand, is of almost no value from a diagnostic point of view. In our series, only 18 per cent of the cases showed suggestive changes by the routine barium enema technique. Even in the carefully controlled series of Friedenwald, Feldman and Rosenthal, only 51 per cent of the cases showed spasm at the time of examination, and spasm was the sign most frequently encountered (*see Table I*). Whatever its failings from a diagnostic point of view, the X-ray examination has great academic interest from the point of view of abnormal physiology. This is true because the X-ray is capable of demonstrating

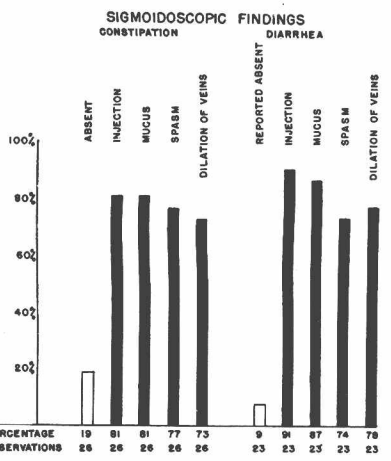

FIG. 5. Sigmoidoscopic findings. Entirely negative observations occurred more frequently among the constipated subjects. The two negative observations in patients with diarrhea were routine hospital observations.

the motility of the colon better than any other one method, and the early studies of different types of constipation were based upon roentgenological differentiation.

Fleiner was the first to introduce the concept of atonic versus spastic constipation. This work stimulated many further investigations which have led to much confusion of the nomenclature. The spastic constipation of Fleiner is presumably the form which was encountered in this series. Subsequently Stierlin introduced the concept of "constipation of the ascending type." He described X-ray changes in the colon in which the rectosigmoid was grossly narrowed and spastic, while the cecum was distended by retained fecal matter. This is precisely the situation which obtained clinically, on the basis of sig-

moidoscopic examination and abdominal palpation, in our series. The type which Stierlin described is apparently related to the spastic constipation of Fleiner and is one of the forms which constitute the mucous colitis syndrome.

Singer and Holzknecht were among the first to describe such spastic changes in mucous colitis. Schwartz in 1914 emphasized the presence of spasm of the descending colon, and observed patients in whom very rapid spasm and relaxation of the entire descending colon could be easily observed. Schatski, in studying one of the cases in this series under experimental conditions, was able to confirm this sudden constriction and relaxation of the descending bowel. In his case slight pressure over the left abdomen would produce spasm of the descending colon and relaxation of the transverse colon. Conversely, a similar stimulus applied in the epigastrium would produce spasm of the transverse colon and relaxation of the descending colon. This interplay was repeated an indefinite number of times. Other workers made observations which largely confirmed those of the early German workers. In 1927, Kantor described with some accuracy the changes observed in the colon in mucous colitis and emphasized the importance of the administration of barium by mouth. This technique enabled him to study the rate of passage of the barium column from the cecum to the rectum. He observed that whereas in the normal person the head of the barium column was usually at the hepatic flexure in 9 hours, it might, in patients with mucous colitis, be at the region of the splenic flexure or even in the rectum by this time. He also noted, as was subsequently confirmed by Jordan, that the filling time by barium enema was decreased. Kantor emphasized the importance of deep haustral markings in the spastic areas, reduction in calibre in the transverse and descending colons, the rapid passage of barium, and in some instances, the appearance of residual "strings" left after the passage of the barium column. These strings, supposedly composed of barium and mucus, cast rather striking shadows when they were present. Crane was the first to emphasize the specificity of this sign which occurs in only a small percentage of cases. Schwartz had recognized and described it 15 years earlier. With the advent of the mucosal relief method which was introduced by Forssell (*44*), careful study of the mucosa of the rectosigmoid became possible. Knothe (*45*), working in Berg's (*46*) clinic, made observations which showed the mucosa to be finely wrinkled and to show a preponderance of vertical folds. The observations of many German and American (*47*) workers are essentially in agreement as to the X-ray signs which are often seen in these patients. The disagreement lies in the inability by *routine* methods to reveal them in every case, and in their lack of specificity. From the theoretical angle they are of interest in throwing light upon the physiological mechanism which is operative.

The X-ray observations most often encountered in mucous colitis are: 1) Rapid filling of the colon by enema or rapid downward passage of barium taken by mouth, 2) Spasm and irritability of the descending colon, 3) Increase in the depth of haustrations in the spastic areas, 4) The presence of strings of barium in the transverse or descending colons after the passage of barium, and 5) Increase in the number of mucosal folds, with a tendency toward an increase in the number of vertical folds, when studied by the relief method. When observed by *routine* technique these changes are easily missed, and hard to evaluate; hence, the usual X-ray examination may be considered to