

## MANAGEMENT OF CHRONIC PEPTIC ULCER\*

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In recent years, a large number of articles dealing with the subject of chronic peptic ulcer have appeared in the literature. Many writers have considered chiefly the problem of etiology, while others have advocated new and unusual forms of therapy. In an effort to sift the wheat from the chaff, we have found it necessary to direct our thoughts to the fundamental principles of the physiology of the gastrointestinal tract. It seems to us quite evident that major symptoms of this disease result from abnormal disturbances in motility and secretion. The effects of local inflammation within the stomach or at the site of the ulcer appear to be secondary factors. In this discussion the various conceptions of etiology will be discussed and the principles of treatment will be considered. First, however, some general observations will be made.

Chronic peptic ulcer does not occur in the lower animals; it distinctly appears to be a disease of civilized man. As a cause of chronic indigestion, it surpasses in frequency all other abnormal states with the exception of chronic disease of the gallbladder. However, during the period of man's greatest mental and nervous activity—between the ages of twenty-five and fifty—it has no close rival. Among those patients who come to us complaining of chronic recurring indigestion and in whom we are able to make the diagnosis of a gastric or duodenal ulcer, there appears to be a definite constitutional type. This apparent predisposition is not related to the physical appearance of the body, whether it be tall or short, thin or obese, but rather to the nervous makeup of the individual. The gastric or duodenal lesion is discovered in the asthenic or sthenic patient with nearly equal frequency, yet many clinicians would have us believe that the mere physical conformation of the body is of considerable significance. This has not been our experience because we have found that the energetic executive or professional man is the favored host, be he large or small, thin or fat. Like hyperthyroidism and diabetes, this disease attacks those individuals who take the responsibilities of life too seriously. Peptic or duodenal ulcers rarely affect the phlegmatic races, such as the Slavs, Chinese or full-blooded Negroes. Among the mulattoes who have an admixture of the white and black blood, ulcer occurs more frequently than in the pure blooded Negro. Recently, we were consulted by the President of a University for Negroes. This patient, while partially

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black, was suffering from a duodenal ulcer and he was a nervous but highly intelligent man.

Before the therapy of chronic peptic ulcer is discussed, it is quite necessary that the various known facts which serve to explain the clinical picture of this disease be understood. These theories can be grouped into three general headings, the neurogenic, vascular and acid erosion theories.

### I. NEUROGENIC THEORY

Rokitansky was probably the first physician to suggest that ulcerative lesions in the gastro-intestinal tract might have a neurogenic origin; on the other hand, Virchow regarded chronic peptic ulcer as a purely local process. Recently, the neurogenic conception has received strong support by the experimental and clinical observations of Dr. Harvey Cushing<sup>1</sup>. He observed that, in some instances, ulcers in the esophagus, stomach or small bowel have developed in patients who were afflicted with lesions of the interbrain, whether the central lesions were due to tumor growth or to inflammation. Even though these ulcers of probable neurogenic etiology have been acute in type and have failed to manifest all the characteristics of the chronic peptic ulcer, this may be due to the fact that the patients did not survive long enough for a characteristic chronic ulcer to develop. In his experimental work on animals, Cushing has presented much evidence to show that a parasympathetic center lies in the tuberal region of the diencephalon or mid-brain. He has conceived the idea that the prolonged stimulation of such centers may produce ulceration of the gastro-intestinal tract. Even though these observations are not entirely conclusive, our clinical experience permits us to apply this theory to the genesis of peptic ulcer in man. Such an hypothesis would explain why local ischemia could occur in the gastric or duodenal mucosa by arteriolar or smooth muscle spasm, the stimuli passing from the midbrain along the vagus nerves. It would explain how gastro-intestinal hypermotility and hypersecretion might occur from the effects of a prolonged period of fear, apprehension or anxiety, the results of the wear and tear of modern civilization. Great enthusiasm for this theory may not be fully warranted in the light of experimental work but, on the other hand, it meets the experience of clinical practice.

To summarize the important features of the neurogenic theory, the following observations may be made:

1. High strung people are particularly susceptible to nervous indigestion and ulcer. The tendency to ulcer is in direct proportion to the duration and severity of the nervous strain. It is especially during the episodes of excessive worry that the ulcer first appears or a recurrence of the old ulcer takes place.

2. Ulcers tend to heal when the patient is put at mental and physical rest. A prolonged ocean trip or a month of rest at a resort, among pleasant surroundings and where simple diversions are available, may accomplish better and quicker results than medical care at home.

3. When the patient returns to his former environment and if the emotional strain is not lightened, the symptoms of ulcer tend to recur.

It is quite true that important agents other than excessive nervous strain lead to formation of an ulcer. These are included in the vascular and acid erosion theories. Some significance may also be attached to the influence of dietary indiscretions, the excessive use of tobacco and alcohol, the influence of allergy, and various disturbances in the endocrine glands. In most instances, it would appear that these factors, if present, affect and mediate through a disturbance in the vagal or, in some instances, the sympathetic control of the function of the gastrointestinal tract.

## II. VASCULAR THEORY

If the blood supply to any area of the gastric mucosa is diminished beyond the critical level, there will be a loss of vitality and finally ischemic necrosis takes place. Such an interference with an adequate circulation may be brought about by arteriolar or capillary spasm, by obstruction with sterile or infected emboli, by local endarteritis accompanied by thrombosis or by intramural hemorrhage. This devitalized area in the mucosa is then digested by the combined action of the acid gastric juice and pepsin. This concept is strengthened by the fact that microscopic examination of pathologic sections of chronic peptic ulcer fairly frequently show obliteration of the arterioles by endarteritis and thrombi or by emboli. Hauser<sup>2</sup> and Eggers<sup>3</sup> believe that localized hemorrhage causes death of the tissue at the site of an obstructed vascular supply and that ulceration of the mucosa soon follows. On the other hand, many observers attribute such changes to the secondary effects of ulceration and maintain that this reaction is not a primary agent. Be this as it may, there is considerable histologic evidence to show that the arterial blood supply to the ulcer-bearing areas of the stomach and duodenum are not very plentiful and that minor vascular accidents may seriously impair the nutrition of the tissue in these regions. Postmortem studies show that, in many instances of chronic ulcer, the nutritional disturbances begin well below the gastric and duodenal mucosa. Robinson<sup>4</sup> has found that, in the typical peptic ulcer, greater damage is manifested in the submucosa and muscularis and that, at the onset of the lesion, the least damage is seen at the mucosal surface. In other words, the vascular obstruction with secondary necrosis begins well below the mucous membrane. As a result, according to Morton<sup>5</sup>, the crater of the ulcer is often cone-shaped with the apex

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toward the mucosal surface and the base resting on or within the muscularis. Furthermore, many specimens show that the healing of the ulcer progresses more rapidly in the mucosa than in the submucosa. Conversely, if the ulcer were due to acid erosion and nothing else, the most extensive portion of the ulcer would be at the mucosal surface with the lesser damage in the bowel wall.

If these observations be correct, we have some evidence to show that the primary devitalization is due to an interference with the local vascular supply in the deeper layers in the wall of the stomach and duodenum. This concept would lead us to conclude that the acid-pepsin erosion is of secondary importance. Autodigestion would serve merely to remove the tissue which has been devitalized by local ischemia.

As a further elaboration of the theory that a chronic peptic ulcer is produced by an interference with the local blood supply, several investigators have attempted to show that this is brought about by bacterial emboli. E. C. Rosenow<sup>6</sup> of the Mayo Clinic has been the principal exponent of this idea. His method has been to make cultures from infected teeth or tonsils of patients with ulcers. Such bacteria were grown on culture media of suitable oxygen tension. When suspensions of these bacteria were injected into the blood streams of laboratory animals, he has observed ulcers in the stomach or duodenum at postmortem examination. He has expressed this reaction as the "specific elective localization of bacteria." With the use of this same technic, some investigators have been able to verify these observations while others failed to corroborate his findings. From a clinical standpoint, we have no way of knowing whether we have prevented or cured peptic ulcers by the removal of foci of infection. After the ulcer has become established in a patient, the good results which may follow the removal of septic foci could very well be due to the accompanying dietary and medical management or to a natural remission of the disease. The late Lord Moynihan expressed the belief that, in some cases, a chronic peptic ulcer apparently heals after the removal of an infected appendix. We believe that we have observed this effect in an occasional case. On the other hand, the relief of digestive symptoms can be explained again by the effect of the general and detailed care of the patient.

### III. ACID EROSION THEORY

In the acute, painful stage of peptic ulcer, excessive quantities of hydrochloric acid are usually found in the stomach. A true gastric or duodenal ulcer does not develop in the presence of gastric achlorhydria. Both hydrochloric acid and pepsin are required to produce the ulcer. These are aphorisms which warrant little dispute. With few excep-

tions, authorities agree on these points—*no acid, no ulcer—plenty of acid, possible ulcer*. Many facts furnish support to this concept:

1. The pain of peptic ulcer is relieved by substances which neutralize or combine with hydrochloric acid. These consist of alkalies, proteins, mucin, and hydroxides of metals such as aluminum.

2. The pain is often controlled by a high fat diet which serves to inhibit the secretion of acid. Among these are the fats of meats and vegetables, cream and olive oil.

3. Peptic ulcer may develop in regions not ordinarily exposed to hydrochloric acid, such as in the mucosa of the terminal esophagus or in the jejunum after gastro-enterostomy. Likewise, at times a typical peptic ulcer may appear in a Meckel's diverticulum when aberrant gastric tissue is present in this structure. It would appear reasonable to venture the opinion that simple erosion can occur in those regions not accustomed to the presence of acid, without the need of any preliminary interference with the mucosal blood supply.

4. A peptic ulcer may heal when bathed by a high concentration of hydrochloric acid if the denuded area is protected from the erosive effect by some inert substance such as a large quantity of bismuth, aluminum hydroxide or mucin.

These points give considerable strength to the premise that acid and pepsin are necessary for the formation of an ulcer. However, under ordinary conditions, when the mucosa is in a healthy condition, the stomach and duodenum can maintain the integrity of the living mucous membranes. Autodigestion does not take place in normal tissue. For example, a glassful of beef blood can be swallowed and digested without difficulty. This acts as a food. On the other hand, any of our own blood that may be extravasated into the stomach by a bleeding ulcer or which may be swallowed during nose bleed or after a tonsillectomy will not be digested or utilized by the body. It is either vomited or passed by the bowel as a black, tarry, foul mixture. Vital tissues of the body are not destroyed by the normal enzymes.

The gastro-intestinal hypermotility and hypersecretion which occur in the ulcer state have important therapeutic significance. By roentgen studies one can demonstrate either hyperperistalsis in the stomach and small bowel or in many instances a definite pylorospasm. When the gastric contents are evacuated by means of an indwelling gastric tube, it can be shown that there is hypersecretion of a highly acid chyme. It is generally recognized that this irritable state in the muscles and glandular tissues of the digestive tract is due to autonomic imbalance, commonly termed vagotonia. The state of pylorospasm has been termed "pyloric achalasia" by Hurst<sup>7</sup>, the eminent English clinician. This

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condition of functional pyloric obstruction interferes with the normal regurgitation of alkaline duodenal fluid into the stomach. The gastric secretion remains highly acid. Healing of an ulcer is delayed unless means are taken to relax the pylorus. On the other hand, the alkaline "buffer" effect of the duodenal secretion may be lowered by associated biliary or pancreatic disease.

Other theories of the genesis of peptic ulcer will not be discussed here. Studies in the fields of allergy and endocrinology are as yet too incomplete for the findings to be utilized in any therapeutic program. Clinicians are interested only in the practical application of all facts and theories which may be used as guides to rational treatment. Furthermore, not only the immediate relief of the ulcer symptoms must be considered, but the *prevention of the cyclic recurrence of this disease* is of importance also. After a careful survey of the known facts and theories and in the light of our own experience with chronic peptic ulcer, we are quite convinced that the nervous factor is of primary importance and that all other influences are secondary to the autonomic imbalance. Our patient is a civilized being, he is beset by the responsibilities of his work and his home. Modern competitive business affects people in all walks of life. Hyperemotional states and nervous fatigue are a common misfortune. These excessive stimuli disturb the normal physiology of the stomach. The reactions are somatic. Day after day there is pylorospasm, gastro-intestinal hypermotility, gastric hypersecretion, and also probably spasm in the peripheral arterioles and capillaries, both on the body surface and within the viscera. We have no simple explanation of these phenomena—they are civilized man's reactions to his environment.

### TREATMENT

The treatment of peptic ulcer requires a definite plan of education. Like the care of such diseases as diabetes, tuberculosis, syphilis or chronic heart disease, the full and intelligent cooperation of the patient must be gained if treatment is to be successful. The patient must not throw the whole burden of his disease on the physician's shoulders but he must work intelligently *with* his medical advisor.

### HABITS OF LIVING

At the best, we are never sure that a peptic ulcer is permanently healed. Relaxation in therapeutic vigilance will result in an exacerbation of the disease in most instances.

Our first and most important point in management is the modification in the patient's habits of living. He must secure tranquillity of mind and body as far as social and business conditions will permit. Nine hours of sleep at night, a midday rest of one-half hour, simple recreation

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during leisure hours and, above all, a philosophical point of view are all vital and essential factors in therapy. A period of change away from the home environment is most valuable. In many instances, this cannot be managed, especially if the sufferer is a factory or office worker. However, his treatment can be individualized so that at least for a portion of the day he can secure an escape from reality. A short walk, moderate work in the garden, music, a hobby such as stamp collecting or carpentry can furnish a suitable avocation which will give a release from nervous tension. This treatment alone will not infrequently produce a remission of symptoms. A good fishing and hunting trip with companions who are not too convivial or, if circumstances permit, an ocean voyage will often hasten the subsidence of symptoms of ulcer.

### DIETETIC MANAGEMENT

The proper use of diet in the treatment of peptic ulcer has been the subject of controversy for many years. Some clinicians have continued to employ the Sippy diet, others the Lenhartz regimen. Likewise, diets outlined by Smithies, Coleman and Leube have been used with success. Such diets are rarely suitable to home treatment, because hospital care or the supervision of one trained in dietetics is required. In our experience, except in cases with gross hemorrhage from the ulcer, the patients do as well on a smooth diet as any other. With such food, there is little danger of any disturbing effect on the ulcer and, in addition, the diet is well balanced. The patient can eat tender meat, pureé of vegetables, day old bread, soft eggs, cereals, cooked fruits, milk and cream, simple pudding, and gelatin. As a rule, it is necessary to prohibit the use of tomatoes and fresh fruit until the acute symptoms of ulcer subside. The chief disadvantage of the Sippy and similar diets lies in the fact that they are deficient in iron and may be deficient in the essential, vital elements of food.

If the ulcer bleeds profusely, a preliminary starvation period of 24 hours may be followed by special diets. In several hundred cases, we have successfully used a smooth diet complemented by extra milk and cream midway between meals and at bedtime. Under this form of treatment the patients have been ambulatory and have been able to carry on their daily occupations with comfort, thus eliminating the customary period of two to four weeks in bed.

### MEDICINAL THERAPY

It is seldom that any unusual or complicated form of medicinal therapy is required. Despite some opinions to the contrary, belladonna or atropine are the most satisfactory antispasmodics. In all cases, unless there is an idiosyncrasy to the drug, we give 12 to 15 drops of

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tincture of belladonna before meals and at bedtime, four times a day. In a few instances, we have used sodium nitrate in doses of 1 grain. As a rule, the pylorospasm and gastro-intestinal hypermotility are definitely abated by the use of belladonna. The dose of this drug is easy to control.

We are employing alkalies in smaller and less frequent doses. A satisfactory prescription is one containing 2 parts of calcium carbonate and one part each of bismuth subnitrate and the heavy oxide of magnesia. At first, when the ulcer is very painful, this powder can be given in doses of one-half teaspoonful before meals, midway between meals, and at bedtime. Within a week, it is given only four times a day and soon two or three doses are sufficient in 24 hours. A few of my colleagues use colloidal aluminum hydroxide. This is given with the same frequency, two teaspoonfuls being taken at each dose, unless the patient does not tolerate alkalies well. Except in cases of severe nephritis, the alkaline powder is quite satisfactory. To my knowledge, we have not observed alkalosis when the dose of the powder was regulated in the manner described above.

The use of mucin is of distinct benefit. However, instead of prescribing the sticky, unpleasant commercial mucin, it is more satisfactory for the patient to produce and swallow that of his own manufacture. He is encouraged to chew gum with gusto. This procedure has the added advantage of affording some pleasure and of giving him something to do. It also acts as a substitute for candy and tobacco.

At times, in highly nervous patients, a bromide quiets the cerebral activity. During the first week of treatment, a prescription consisting of tincture of hyocyamus, 4 drachms, sodium bromide, 6 drachms, and simple elixir to make 4 ounces will not irritate the stomach if taken three times a day. Often it is palatable to take this mixture with the alkaline powder. As to the use of hypodermic preparations containing histidine, we are in accord with those authorities who believe that any apparent beneficial effects are largely psychological. At the present time, there are no short cuts in the treatment of chronic peptic ulcer.

## GENERAL MEASURES

From the standpoint of general health, the patients must constantly be urged to live rationally and temperately. Adequate rest at night, a period of relaxation at midday, fresh air, sunshine, and moderate exercise all play an important part in the recovery. Definite foci of infection should be eliminated at the proper time. Disease in the pelvis or appendix may require surgical care. Simple hypochromic anemia will respond to adequate iron therapy but it is best not to give iron by mouth

until the painful stage of ulcer has passed. Such general measures serve to hasten healing and to prevent recurrence of the lesion.

The *ambulatory method of treatment of peptic ulcer* is employed in the majority of uncomplicated cases for the following reasons:

1. If the patient of limited financial resources is kept on the job, he has less anxiety about the welfare of his family. He cannot be expected to secure mental and physical relaxation if his limited savings are rapidly being exhausted.
2. His general strength will be preserved by keeping him on an adequate diet from the very beginning of his treatment.
3. He will be spared that difficult period of adjustment to normal living which often occurs after he has spent a few weeks in bed or in the hospital.
4. He will better realize that, while his disease is not of a critical nature, he must cooperate to the fullest extent by doing his share toward recovery. He is not being treated by nurses but by the advice of his physician.
5. The final and best reason is that this type of treatment, when intelligently carried out, works very well.

Under what circumstances, then, should the patient be sent to the hospital?

1. When he has suffered from one or more severe hemorrhages.
2. When roentgen examination shows that a penetrating ulcer or pyloric obstruction has not improved after due trial with ambulatory care.
3. When the physical condition is such that he must be put to bed and when the home care, under these circumstances, is inadequate.
4. When the home environment is uncongenial and when it interferes with proper mental and physical relaxation. Under such circumstances, if his funds are adequate, he will do better in a hospital or sanatorium.
5. If his pain is so severe that there is grave doubt as to the diagnosis or if there is the likelihood of perforation and peritonitis.

When these conditions exist, he can be sent to the hospital as a resistant case. While he is in the hospital, he can be given hourly feedings. Gastric intubation for the administration of aluminum hydroxide by continuous drip can be carried out under supervision. Of greatest

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importance is the fact that he can be examined by a consulting surgeon who will be ready to open the abdomen should the ulcer perforate or symptoms of obstruction at the pylorus become acute.

### TREATMENT OF AN ACUTELY BLEEDING ULCER

The patient should be put to bed at once. If there is vomiting of blood or melena, morphine sulphate, 1/6 grain, with atropine sulphate, 1/100 grain, should be given by hypodermic injection. He should be starved until bleeding has ceased for from 24 to 48 hours. An empty stomach is less likely to bleed. If bleeding will not cease, blood clots can be evacuated from the stomach by the careful use of a gastric tube. The lavage fluid may consist of four to six ounces of ice cold water and this lavage should be repeated until the water returns free of blood. If this is insufficient, the washing fluid may consist of 1:1000 solution of ferric chloride followed by the instillation of one drachm of 1:1000 solution epinephrine.

Blood transfusions are indicated if the hemoglobin falls to 40 or 50 per cent. Fluid is given by the intravenous route or by Murphy drip using 5 per cent glucose in physiological sodium chloride solution. A surgeon should always see the patient in consultation for, if these measures fail, operation will be required. Occasionally, in spite of all care and even though repeated transfusions have been used, the ulcer will continue to bleed and the patient will finally die. Hence, these cases constitute emergency problems and should be watched with great care and attention.

### INDICATIONS FOR SURGICAL INTERVENTION

The indications for surgical intervention in peptic ulcer are quite definite:

1. In cases of intractable ulcer.
2. In those cases of gastric ulcer in which biweekly follow-up roentgen studies fail to show regression of the deformity. All gastric ulcers are under suspicion of cancer until they show definite evidence of healing.
3. Pyloric obstruction which resists medical therapy.
4. Persistent or recurring massive gastric hemorrhage.
5. Acute or chronic perforating ulcers.

The following outline gives a general summary of the medical management of simple ulcers.

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<i>Rest in Bed</i>	<i>Modification of Living Habits</i>		<i>Ambulatory treatment</i>
Diet	1. Dietary	Regularity	Diet
Lenhartz		Calmness	Smooth diet
Sippy		Vitamins	Extra cream
Smithies	2. Work	Tension at work	
Coleman		Dissatisfaction	
Leube		Worry	
Others	3. Social and Habits	Loss of sleep	
		Alcohol	
		Tobacco	
		Sex	
	4. Relaxation	Vacations	
		Midday rest	
		Hobbies	
	Medication		
	Olive oil		
	Alkalies		
	Atropine		
	Bromides		
	Mucin		
	Nitrites		
	Non-specific proteins		
	Removal of foci of infection		

## CONCLUSIONS

We know of no criteria by which one can be certain that a patient is entirely cured of peptic ulcer. If his symptoms have abated and the roentgen evidence points to a normal contour and motility in the stomach and duodenum, we feel justified in regarding the disease as arrested. If the disease recurs, as it often does, it is due to the fact that the etiological factors have escaped therapeutic control. This is brought about, we believe, by nervous factors that mediate through the autonomic nervous system. Unless the patient has been able to modify his living habits so that nervous strain is at a minimum, any form of therapy will fail. By means of a simple diet, antispasmodics, moderate usage of alkalies or colloidal aluminum hydroxide, and, above all, by the establishment of mental and physical quietude, we can, in the main, obtain results that are satisfactory. In most instances, ambulatory treatment is preferable to complete bed rest in the hospital or home. It is only when these measures fail to produce remissions which are lasting or when complications develop which are not amenable to medical care that surgical intervention is necessary.

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