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## CAUSES AND TREATMENT OF CHRONIC HYPERACIDITY, HEARTBURN AND SOUR REGURGITATION.

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THERE are very few affections in the domain of internal medicine, the conception of which is so much influenced by the *à priori* view of the physician, as are some of the affections of the gastro-intestinal tract. One needs only to mention the significance and importance attached by some physicians to ptosis of the abdominal organs, the views as to the importance of constipation as a cause of local and general disorders, and the vague conception of biliousness, nervous dyspepsia, intestinal indigestion, and auto-intoxication. It is much the same as regards hyperacidity, although this is one of the most familiar gastric disorders, and one that the physician is daily called upon to treat. Only a few years ago, gastralgia played a prominent rôle in painful gastric affections; it was assumed to be due to some form of gastric spasm induced by hyperacidity. Recently, however, a tendency has developed, especially among surgeons, to go to the other extreme, and deny the existence of hyperacidity as an independent functional disorder, and to regard it merely as a symptom of some lesion within the gastro-intestinal tract. And even among those who consider chronic hyperacidity as a clinical entity, we find a great deal of vagueness as to its etiology, symptomatology, pathogenesis, and treatment.

Many physicians class any functional gastric disorder as hyperacidity when it gives rise to heartburn and sour regurgitations. And even such authors as Luthje and Albu consider the condition hyperacidity in the presence of these symptoms, though the gastric acidity may be only normal, or even subnormal. In the latter case, however, they use the term "latent hyperacidity."

Now these views, which associate heartburn with hyperacidity, are, to my mind, erroneous and at variance with clinical facts. Comparing the findings in the gastric contents with the subjective symptoms of the patient, it is found that sour regurgitations and heartburn are very rarely symptoms of hyperacidity. Sour regurgitation occurs only when there is an associated hypersecretion, while heartburn is found in connection with normal, sub- and even anacidity, and is, therefore, when continuous and persistent, a separate gastric disorder differing from hyperacidity in its etiology, symptomatology and treatment.

Chronic hyperacidity as a functional disorder and independent of any organic affection is, according to my observation, found only in the psychoneurotics, in whom it constitutes a fairly common affection. It occurs more often in young adults and in the middle-aged than in the elderly, and is more common in women than in men. The symptoms of hyperacidity appear from half an hour to two hours after meals, and vary greatly in different patients, and frequently even in the same patient at different times. In the majority of cases there is a sense of uneasiness, fullness or distress in the gastric or in the umbilical region, belching of gas, dryness of the tongue, and a disagreeable taste in the mouth. Some patients complain of pain in the region of the stomach or across the abdomen, of a sense of weight underneath the sternum, as if some foreign body had lodged in the esophagus, and a disagreeable pressure in the back, between the shoulder-blades. In some instances the pain and the distress are in the lower part of the abdomen, which is greatly distended, with tenderness over both iliac fossae, belching of gas and passing of flatus,—a condition which is quite often diagnosed as intestinal indigestion, and, by some of the older physicians, as flatulent dyspepsia. Constipation is usually present, but in some cases there are normal daily evacuations, and in others even diarrhea. The appetite varies, sometimes greatly impaired, at other times very good, depending more upon the general than upon the local condition of the stomach. The same is true of the weight and the general health, although losses of fifteen to twenty pounds in weight are by no means rare.

Pains are not frequent, and are rather dull in character when present, but in some cases they are quite severe, shooting from the gastric region through the back, and are relieved by food, as in gastric ulcer. In a case of hyperacidity in a psychoneurotic woman, about 55 years of age, the pains were on a few occasions so severe as to originate the suspicion of either ulcer or gallstones; but she has since then developed diabetes, and the pains, as well as the other gastric symptoms, have disappeared, not having returned in about seven years.

There is in addition a train of nervous symp-

toms, such as headache, backache, dizziness, pressure on the back of the head, disturbed sleep, and in women, an "all-gone feeling," palpitation of the heart, and various paresthesias. These nervous symptoms are in some patients quite prominent, while in others they are masked by the local symptoms, and elicited only by close questioning.

*Sour Regurgitation or Acid Eructation.* This occurs only when there is an associated hypersecretion, which, contrary to the general opinion, is found quite often in normal and subacidities. This, however, refers only to the so-called digestive hypersecretion, as my experience in gastrosuccorhea continua is limited; but in one case of the latter affection that came under my observation a hypoacidity was found in the gastric contents after a breakfast test.

*Heartburn.* This is, when continuous and persistent, a distinct separate gastric neurosis, as it is rarely found in hyperacidity, and is, on the other hand, quite common in some forms of dyspepsia with normal, sub- and even anacidity. In the case of a psychasthenic woman, in whom heartburn was the dominant symptom, the examination of the stomach contents showed an absence of free hydrochloric acid and only a low total acidity. As an experiment, she was given 15 drops of acid mur. dil. after meals, with the result that her heartburn became much worse. This case incidentally illustrates the futility of sending the stomach contents to a laboratory for examination, and basing the treatment upon the findings.

Heartburn is due, not to the acid contents of the gastric juice, but to a hyperesthesia of the gastric mucous membrane, which perhaps accounts for its frequent occurrence in the early stages of some cases of gastric carcinoma, where there is yet some free hydrochloric acid and good motility, and none of the organic acids to which it is usually ascribed. Here, as there, the heartburn, in my opinion, is due to a hyperesthesia of the gastric mucous membrane; but in cancer the hyperesthesia is organic, the result of an accompanying irritation, and in some cases inflammation, of the gastric mucous membrane.

Heartburn differs from hyperacidity in being at times psychogenetic, while the latter is always neurogenetic. The difference between the terms "psychogenetic" and "neurogenetic," while it may be merely metaphysical in theory, is quite concrete and useful in practice. Extrasystoles, discovered in a patient who has no heart symptoms, are certainly neurogenetic; but dyspnea, occurring in a woman patient as soon as she learned that she had a murmur (which turned out to be only functional), is certainly psychogenetic. Pyloric stricture in an infant, if due to nervous influences, is undoubtedly neuro- and not psychogenetic, while the constant and noisy belching of gas which occurs in some cases of heartburn where there is no sign

of either gastric or abdominal distention, is probably psychogenetic. Another difference between hyperacidity and heartburn is that the former yields readily to treatment by diet and alkalies, while these measures have but little influence over the latter, which is, indeed, frequently made worse by alkalies.\*

*Diagnosis.* The diagnosis of hyperacidity cannot be made without the use of the stomach tube, as the same symptoms may occur in chronic gastritis and in cases of anacidity in which heartburn is no feature, and which require different treatment.

Hyperacidity, as here referred to, is assumed when the free hydrochloric acid is above 35 and the total acidity above 55. The gastric contents are extracted 50 minutes after a Boas-Ewald breakfast test, and examined, unfiltered, amido-azo-benzol being used for the qualitative and the quantitative determination of the free hydrochloric acid, and the titration with the decinormal sodium hydrate solution is continued until the pink color has almost entirely disappeared. And when, upon the introduction of the stomach tube, there is a sudden gush of a large quantity of a somewhat pale, clear liquid, with but little sediment, the existence of a digestive hypersecretion is assumed.

Hyperacidity is to be differentiated from gastric ulcer and from various other affections in which, according to many authors, it occurs symptomatically, as in gallstones, acid gastritis, chronic appendicitis, nephrolithiasis, chlorosis, chronic constipation, and eye strain. The differentiation from ulcer is easily made by testing the stools for occult blood, which is absent in hyperacidity, and, according to my experience, invariably present in ulcer. From the other affections it is distinguished by the subjective symptoms and objective findings peculiar to these affections. On the other hand, it is somewhat questionable whether the digestive disorders in the above affections, with the exception of gastric ulcer, are actually accompanied by hyperacidity. The observations concerning the nature of these disorders have been only occasional and of isolated cases, and, so far as I know, no systematic examination has ever been made actually to determine this point. This is particularly true of constipation, which, under the name of colonic stasis, has been made responsible, not only for hyperacidity, but also for a variety of other affections. Typical cases of psychoneurosis have been cited by some authors as examples of auto-intoxication due to intestinal stasis, and Penzold even asserts that the bad behavior and ill manners of many children, upon whom punishment has no effect, can be entirely removed by a colonic irrigation. And he even goes so far as to say that adults committing impulsive criminal acts should have

\* Boas, to my knowledge, is the only author who regards heartburn as a separate gastric neurosis; but he does not differentiate it entirely from hyperacidity.

their punishment mitigated if they are found to be sufferers from constipation.

There can be no doubt, however, that the importance of constipation as a cause of disease is here ridiculously exaggerated; and its baneful effects, as described by Penzold and others, are, to my mind, due to metaphysical speculations and not to an accurate observation and logical interpretation of clinical facts. Constipation, according to my observation, is either a secondary or a coördinate symptom of a general or local disorder, and not the cause. In numerous cases of the psychoneuroses, the bowel action is suspended with an aggravation, and resumed with an improvement, of the general condition; in others the constipation disappears while the general condition remains the same. One neurotic young woman, whose symptoms were attributed to colonic stasis, took in one day eight alophen pills, four tablespoonfuls of castor oil, and three enemas, all without any result. But measures directed toward the improvement of her general condition, with oil injections into the rectum, restored the bowel function, without, however, improving the general symptoms. The exaggerated idea among the laity of the importance of open bowels will at times bring about a train of nervous symptoms in patients suffering from habitual constipation, but the symptoms, I am convinced, are not due to constipation as such; they are merely psychogenetic, and can be induced by various other auto-suggestions.

It does not follow, however, that constipation need not be combated, or that it is not likely to aggravate any acute or chronic pathologic condition; exception is merely taken to its being considered a cause of disease.

*Etiology and Pathogenesis.* Hyperacidity and heartburn are practically forms of nervous dyspepsia, and their causes are the same. Nervous dyspepsia is not a local gastric neurosis, in the original sense of von Leube, but a general neurosis with dyspeptic symptoms, the latter being either a symptom or part and parcel of the general nervous disorder. Dreyfus, whose description and classification of nervous dyspepsias has brought order into chaos, divides them into the following two groups, and cites cases to illustrate the different types:—

Group 1. Degenerative psychopathologic conditions with dyspeptic symptoms:

- (a) Psychopathy (psychasthenia, constitutional neurasthenia) with psychopathic reactions as a cause of dyspepsia;
- (b) Psychogenetic dyspepsia;
- (c) Hysteria as a cause of dyspepsia;
- (d) Cyclothymia as a cause of dyspepsia.

Group 2. Acquired neurasthenia with dyspeptic symptoms.

If we accept this classification, it follows that nervous dyspepsia is not a clinical entity, but that it varies according to its etiology, and that it should, therefore, for practical purposes, be

spoken of according to its dominant symptoms, as hyperacidity, heartburn, nervous vomiting, nervous anorexia, etc. Besides, the types as described by Dreyfus, while they clear and define our conception of nervous dyspepsia, are not so easily differentiated in practice, and do not offer any special indication for treatment, which must be symptomatic as well as general.

The conception of nervous dyspepsia as a part of a general neurosis answers the question as to why hyperacidity is occasionally found to exist without causing any symptoms. The explanation, according to my mind, is as follows:—

With a normal nervous system (the term "normal" being relative only) there is also a normal sensibility of the gastric mucous membrane, which is not affected by a little more acid in the gastric juice. With a disordered nervous system, and therefore with a hyperesthetic mucous membrane, an increased acidity will cause an abnormal local reaction. In the severer forms of the neuroses the hyperesthesia of the mucous membrane is increased to such an extent that the mere chyme, with little or no free hydrochloric acid, is sufficient to cause severe gastric symptoms. This view is also in accord with clinical observations, as hyperacidity is usually found in the milder forms, while heartburn, with normal or subacidity, is encountered in the severer forms of the neuroses. This rule, however, has only general and not universal validity, as heartburn may at times be associated with hyperacidity and be present in the severe forms, while normal or subacidity, without heartburn, may be found in the milder forms of the neuroses. But these deviations from the general rule are due, to my mind, to the fact that the neuroses, as found in practice, are not always well circumscribed, but that there is an overlapping in a great many cases.

It may be asked whether a chronic functional disorder of the stomach may not exist independent of a general neurosis, and be due entirely to local causes, such as highly-spiced or over-rich food, or the abuse of tobacco, etc. This question, I believe, must be answered in the negative, unless one agrees with Albu that there is a form of hyperacidity which is a forerunner of gastric ulcer. But this pre-ulcer stage of Albu can no more be substantiated clinically than can the pre-cancer stage of tumors, which is assumed by some authors.

As to the nature of hyperacidity, nothing definite is known. We know from the researches of Pawlow that there is an intimate relation between gastric functions and certain mental and emotional states. But why such states should in some cases give rise to a hyper- and in others to a hypo- or an acidity, is no more known than why such states, which, in the majority of cases, give rise to an acceleration of the pulse, should, in some instances, cause a retardation of the same. The suggestion of Bickel and Rubow that hyperacidity is due, not

to an increased acid secretion, but to either a hypermotility or a hypersecretion, is invalidated by the fact that a hypoacidity is found at times in spite of hypersecretion and normal motility.

The *treatment of hyperacidity* is, aside from measures directed towards the underlying neurosis, mainly dietetic. All sorts and varieties of diets have been recommended; thus Riegel advocated a pure proteid diet, because the proteids, combining with the free hydrochloric acid, diminish the gastric acidity. Albu advocates a lacto-vegetable diet and Juergenson a carbohydrate diet, based upon the experiments of Pawlow, which show that the gastric secretion is less stimulated by these substances than by the proteids. Von Leyden and Klemperer have suggested a diet of stale white bread, which, according to them, absorbs the free hydrochloric acid, but which will hardly satisfy American patients; while von Noorden and Zweig are in favor of a mixed diet, as the latter claims that neither the proteids nor the carbohydrates have any appreciable effect upon the gastric acidity. The same diversity of opinion exists among American authors. After trying several of these diets with more or less success, I have finally adopted a kind of mixed diet, but without meat, as the latter, at the beginning, disagrees with most patients, the proteids being supplied in the form of eggs, cheese, peas, and string beans. It is practically a modified ulcer diet, and is somewhat as follows: The first week, the patient is allowed only stale white bread, butter, eggs, milk, cream, buttermilk, cream cheese, and gelatine. The second week are added breakfast foods and cereals, thoroughly cooked, mashed potatoes, and oysters. The third week, vegetables in purée form, such as string beans, green peas, cooked celery, spinach, asparagus tips, carrots and turnips; lean fish, such as haddock, perch, flounder, pike, pickerel, all boiled or broiled, and cooked fruits. Lean boiled or broiled meats, as chicken, lamb chops, and roast lamb, are not given until the end of the fourth week in the milder cases, and in the severe cases not until the end of the sixth or seventh week. In the milder cases cereals and light vegetables can be allowed from the start. All smoked and salted meats and fish, spices, raw fruit, raw vegetables, salads, pastry, as well as macaroni and spaghetti, are excluded. It is, however, useless to emphasize the negative side of the diet, *i.e.*, telling the patient what not to eat; it is better and simpler to give him a diet list with instructions to eat nothing but what is on the list.

The diet, as here outlined, has been successful in all cases of pure hyperacidity. Whether it has actually reduced the hyperacidity I am unable to tell, as my patients refused a second examination with the stomach tube; but the dyspeptic symptoms have disappeared or have been greatly improved in all cases, even when the general nervous symptoms remained the

same. Most patients also gained in weight, as the diet, even in the first week, can easily be so arranged as to contain about 4500 calories, which is practically an overfeeding in many cases. These dietetic measures are aided by medicinal treatment in the form of alkalies, which are useful in all cases, and indispensable in the case of those patients who have neither the leisure nor the facilities to carry out the prescribed dietetic treatment, and who must have, from the start, a diet which, under other circumstances, is not allowed until the third week. The light magnesia and sodium citrate are preferable to sodium bicarbonate, which causes distention by the carbonic acid it generates; and the effects of the alkalies are enhanced by the addition of bismuth and a small quantity of menthol in the following proportions:

Menthol .....	1. O
Magnesiæ ustæ, Sodii citrici .....	35. O
Bismuth subcarb. ....	20. O

*Sig:* One half teaspoonful in a little water half an hour to one hour after meals.

No laxatives are used, as the medicinal and dietetic measures mentioned are sufficient to maintain bowel action, and it is only in exceptional cases that pulv. rad. rhei. 15. o is added to the above mixture. Frequent meals, in order to absorb the free hydrochloric acid, as recommended by many authors, have not been found necessary, especially not after the first week, and the appetite improves in most patients when the meals are restricted to three a day.

The *treatment of heartburn* is very unsatisfactory, as it is difficult to arrange a diet which will be suitable to all cases. One woman patient with heartburn, who consulted numerous physicians without obtaining any relief, claimed to have no symptoms on a diet of bread and raw vegetables (radishes, tomatoes, lettuce, onions, etc.) recommended to her by an old Italian woman! When the acidity is normal or slightly subnormal, the dietetic treatment is that of hyperacidity in the third week, although the results are far less satisfactory; but when it is associated with a marked subacidity, the diet is purely empirical. Milk and cream are not well borne by most patients. Some do moderately well on carefully prepared cereals and vegetable purées; others thrive better on boiled or broiled lean meats and fish. The difficulty of the dietetic treatment of heartburn is undoubtedly the reason for the variety of diets recommended for hyperacidity, which most authors confuse with heartburn. As to the medicinal treatment, the alkalies are not only useless, but they even increase the heartburn, and they are regurgitated sour when there is an associated hypersecretion. The bromides, combined with small doses of chloral, act well in a number of cases, but they cannot be continued for any length of time, on account of the disfiguring acne which they produce in these patients after

a few days' use, and the chloral alone does not act so well. In a few cases I have used small doses of opium combined with the tincture of cannabis indica and belladonna, with seemingly satisfactory results.

Hypersecretion occurs either with hyperacidity or with heartburn, and its treatment is that of the condition with which it is associated. Atropine has been highly recommended by Riegel, but it does not seem to have any effect upon the hypersecretion.

No reference has been made to the anomalies of motility, because they do not, according to my observation, dominate the clinical picture, nor do they offer any special indications for treatment. Impaired gastric motility, or motor insufficiency, unless due to stricture of the pylorus, or to some other organic affection (or perhaps to Stiller's disease) is, to my mind, of little moment, and its treatment is completely covered by the treatment of the affection with which it is associated.

#### SUMMARY.

Hyperacidity and heartburn are separate gastric disorders, and both are forms of nervous dyspepsia.

Nervous dyspepsia is either a symptom or part and parcel of a general neurosis.

Hypersecretion is not invariably associated with hyperacidity, as it occurs at times in hypacidity.

Constipation is either a secondary or a co-ordinate symptom of a general or local disorder, and not its cause.

The nervous symptoms in habitual constipation are psychogenetic, and not the result of an auto-intoxication.

No chronic functional disorder of the stomach exists independently. Any such disorder, when not a part of a general neurosis, is due to some organic affection anywhere within the body.

The anomalies of motility, when functional, are clinically of little importance, and do not require any treatment apart from the treatment of the condition with which they are associated.

Hyperacidity is treated by a carefully selected mixed diet (with the exclusion of meat) and by alkalies.

The treatment of heartburn is empirical.

#### ARTIFICIAL PNEUMOTHORAX.

By HERBERT F. GAMMONS, M.D., CARLSBAD, TEXAS.

THE use of artificial pneumothorax in the treatment of pulmonary tuberculosis has passed the experimental stage. While there is no question but that many patients have been injured by the injudicious use of this remedy, and while undoubtedly many of the published statistics in regard to this subject are so vague

and uncertain as to be useless as a guide for future operations, there is no doubt but that the procedure of artificial pneumothorax, properly carried out, with patients under close supervision, is capable of doing much good. There has been a somewhat too prevalent idea that the absolute rest of the lung caused by the pneumothorax necessarily brought about a cessation of the disease and that no new tubercles developed in the compressed lung. That this is not necessarily the case has been shown by Dr. Allen Krause of Saranac Lake, who has clearly demonstrated that fresh tubercles may develop in collapsed lungs.

The results here presented were obtained at the Texas State Tuberculosis Sanatorium. I am indebted to Dr. J. B. McKnight, the superintendent, and to Dr. J. V. Wright for advice, coöperation and assistance.

By means of the stethoscope and percussion, the best field for operating was selected. The customary apparatus was used, including the "refill needle," as devised by Dr. Shortle. Subcutaneous emphysema was rare, except with the initial puncture. Atmospheric air instead of nitrogen gas was used, Dr. Gerald Webb having shown that nitrogen gas soon became changed into atmospheric air after remaining in the pleural cavity a short while. Except in hemorrhage cases, inflations were given every week. In hemorrhage cases, they were given as indicated. In every instance I endeavored to produce a neutral pressure, except in hemorrhage cases, where the pressure was continued until the bleeding stopped. Patients with an ulcerated process in the lung showed the most improvement in the way of decrease in cough, lessened expectoration and fall in temperature; inflammatory cases showed a decrease in physical signs, but practically no decrease in temperature. All, except two, patients showed an improvement in color. In two instances a collapse could not be produced on account of adhesions; two patients died following treatment, one as a result of military tuberculosis, and one following an intravenous infusion.

The following is a brief summary of the cases under treatment:

Artificial pneumothorax was attempted in 53 of these cases—26 were advanced, 14 moderately advanced, and 13 were hemorrhage cases. In two patients, both advanced cases, the process was apparently arrested, while in four moderately advanced cases the disease became quiescent. Ten were improved and are still under treatment, and in seven hemorrhage cases the injections were stopped because the hemorrhage ceased. Four patients left the institution improved, to continue treatment elsewhere. Five left unimproved. In four cases the use of artificial pneumothorax was stopped because of active trouble developing in the opposite lung, or for other reasons.