

may be past associations, nauseous tastes, smells, etc., or again excitement, shock, or grief, for it is well known that excessive mental exercise, worry, and the like impair the appetite.

In insanity, again, anorexia is a well-recognized symptom in many cases; in gastric neuroses diminution in appetite usually implies diminution in the function of the stomach as well. Professional fasters may come under the last category, having habituated their stomachs to less requirements, and to some extent losing the real desire for food, though the metabolism is bound to suffer in consequence.

(c) With reference to the constitutional conditions tuberculosis is an important one—in fact, of so great importance that any marked anorexia without any apparent cause should always suggest a careful examination of the lungs.

In fevers and the various infections, anæmias, cachexias, and wherever there is excessive tissue waste, anorexia is a frequent coincidence. An exception to this last is diabetes.

Excessive physical exertion has the same effect. Lastly, poisons formed in the intestines or in the tissues and excreted into the stomach may disturb the appetite, as frequently occurs in such conditions as uræmia.

It is well to remember two important facts: First, in endeavoring to obtain a history from the patient, his statements in regard to anorexia are apt to be unreliable; second, patients often take too little in disease of the stomach, especially in neurosis, and emaciation is the natural result. Some one has truly said that in gastric diseases more harm has resulted from treatment by starvation than from overfeeding.

Excessive Appetite.—In this there are two different conditions: (1) *Boulimia* (*Βούλιμος*, oxen hunger), by which is meant increased appetite for food, also called *cynorexia*. (2) *Polyphagia*, meaning excessive eating, whether or not the appetite is increased.

Increased appetite may depend on various factors—the condition of the stomach, for example, and especially the presence of hyperacidity. It is therefore often a noticeable symptom in gastric ulcer, in which disease there is apt to be increased acidity, provided of course the pain does not create the fear of eating. It may depend on nervous influences, being often due to an irritable condition of the centripetal gastric nerves. A mental stimulus is in itself sufficient; at other times there may be a neurosis, or hysteria, or neurasthenia, or insanity.

Polyphagia seems more or less natural with some individuals; it is common in children. It is often associated with the presence of intestinal worms, or, again, children through faulty training and bad management are forced to eat when they really do not require food. *Polyphagia* occurs frequently in brain affections, particularly tumors, in sexual disorders, in convalescence from various fevers, especially typhoid, and lastly in diabetes.

Parorexia, or altered appetite, is a neurosis. Apart from an excessive or diminished diet there is a desire for unusual foods and substances which do not come at all under the category of foods.

Thirst.—An increased desire for fluid depends less on the condition of the stomach than does hunger.

The quantity of fluid imbibed during the day varies according to the individual. It naturally should have some relation to the solids, but this too is uncertain.

The physiology of thirst is ill understood. It seems to be connected somehow with diminished fluid in the body; it is probably a nervous phenomenon expressing a demand for water in the tissues to distribute salts between the tissues and the blood, and thus to maintain a proper metabolism. It occurs, first, where there is increased excretion of water, e.g., through the skin (sweating), in physical exertion, in tuberculosis, etc.; through the kidneys—in diabetes mellitus and insipidus, in chronic Bright's disease; through the bowels—in diarrhoea, dysentery, cholera, etc.; through hemorrhages, through vomiting, etc. Again, it occurs in gastric disorders—from faulty diet, e.g., excessive salts, spices, alcohol, etc., be-

cause more fluid is excreted by the mucous membrane than is absorbed; or there may be interference with the absorption of fluids, as occurs, for example, in gastrectasis, especially from stenosis of the pylorus. In such a condition there is marked motor insufficiency, and therefore a notable alteration exists in the relation between the amount of water taken and the quantity of urine excreted. Then, too, it occurs in gastritis secondary to alcoholism or to Bright's disease, in ulcer of the stomach, gastric neuroses, supersecretion, etc.

The sensation of thirst is mainly in the back of the mouth and fauces. To allay it, absorption of fluids is necessary. Hence the great thirst in gastrectasis, where the muscle is so diseased that though much fluid is taken none is pushed into the duodenum, and therefore none is absorbed.

Stimulation of saliva by acids also helps to allay thirst. On the other hand, too much water often hurts digestion, and, vice versa, in some conditions it helps greatly, as, for example, in gout, rheumatism, and many general infectious diseases, where a flushing out of the tissues occurs in this way.

Pain.—Two features of importance should be remembered in this connection:

1. Pain in the stomach, so called, especially that which occurs after meals, is more often merely a sense of weight or discomfort.

2. Oftener than not, pain in the stomach, so called, is really in the intestines, perhaps the colon, or more rarely in the gall bladder or associated with renal calculi, neuralgic conditions, or muscular rheumatism.

Pain when really in the stomach, however, is often a valuable sign, and one should ascertain details in regard to its locality, intensity, time of onset, general characters, etc. It is well to remember that many gastric diseases are quite painless; that in other cases, on the other hand, pain is a mere incident of such a disorder, for example, as simple meteorism.

Site.—When associated with gastric digestion the pain may be in front. This occurs in dyspepsia with atony of the stomach, and with distention, ulcer, gastropnoia, etc. It occurs in the back in ulcer chiefly; between the shoulders in ordinary dyspepsias of all mild forms; in the chest in cardialgia, whether hyperacidity, hypersecretion, or gastric ulcer be present, or not. It is in the left side or in the axillæ, more commonly, when there is distention or flatulence.

The intensity may vary; it is more severe in ulcer, cancer, great distention, and acute gastritis; it is more mild in atony and chronic gastritis.

As regards the time of onset, the pain may be periodical as in gastroxynsis, or chiefly after eating as in cases of ulcer, gastric or duodenal, and of cancer; or it may appear long after eating, and particularly before a subsequent meal, as in hyperacidity. It is continuous chiefly in cancer.

The general characters refer, for example, to the burning of hyperacidity, the boring pain of ulcer, and the dragging pain of gastropnoia.

The cause may be either a direct irritation or simple nervousness, or the pain may be associated with some general disease not primarily gastric, as is the case in anæmia, chlorosis, tuberculosis, malaria, acute diseases of the central nervous system; more especially in tabes, myelitis, multiple sclerosis, and neurasthenia.

Again, pain may occur as a local neuralgia, the so-called *gastralgia*, in which condition the indications point less to the need of dietetic treatment than to that of rest and of other general measures.

Heart-burn, Cardialgia, Water-brash, and Pyrosis.—These terms, while differentiated by some, are very apt to be used more or less as synonyms. In the case of heart-burn and cardialgia the pain is the prominent feature, while where water-brash and pyrosis are present there is apt to be an associated regurgitation of fluid. Small quantities of fluid, sometimes acid, sometimes alkaline, are regurgitated along the œsophagus and into the pharynx, where they are tasted. The acids are usu-

ally organic acids, and the taste under such conditions is apt to be mawkish rather than burning.

The fluid may be alkaline from saliva, which is excreted at first because of gastric irritation, then swallowed, and again rejected from the stomach.

Sometimes gases alone, chiefly ammonia, cause this condition. According to Ewald, it is purely a motor neurosis, while according to Brunton the lower end of the œsophagus is protruded into the stomach like a prolapsed rectum, and being sensitive, is irritated by the greater acidity of the stomach contents.

The relief for this condition is obtained usually by a proper diet, suitable to the acidity, by the administration of bicarbonate of soda, by suitable purgation, and, if fermentation be present in any large amount, by the employment of lavage. It is only in very severe cases that opium is indicated.

Flatulence implies expulsion of gas from the stomach, and is due to the presence of too much gas in the organ. There are two or three ways in which it reaches the stomach:

1. By the swallowing of air, either associated with the saliva, in which carbonates are present, or with food containing carbonates, or with effervescent drinks.

2. The air may be generated in the stomach, either through fermentation or decomposition, or possibly through the separation of gases from the blood, or through the exchange of CO₂ and nitrogen; or, lastly, it may come from the secretions of the glands.

3. Air may be regurgitated from the intestines into the stomach, as has been demonstrated both experimentally and practically.

In atony of the stomach gas readily accumulates and fermentation is favored; often in neurotic people flatulence is persistent, with perhaps evidence of *gastralgia*. The gas ejected is usually odorless, and if acid eructations are present they are usually due to the organic acids present. The condition is not infrequently associated with supersecretion of hydrochloric acid. If putrid gas-like sulphureted hydrogen be ejected, one may conclude that fermentation and decomposition are taking place. This gas formation, however, is so uncommon in cancer of the stomach that some authors attach some diagnostic value to the fact. Marsh gas is not infrequently formed in the stomach and likewise expelled.

Borborygmi is a name used to imply the presence of air and peristaltic movements of the stomach and intestines, coming as it does from the Greek word *βορβορίζω*, "I have a grumbling in the bowels." In some cases this flatulence yields readily to treatment when the causative factors, such as dietetic errors with too much starchy foods, are removed, when the neurosis is properly treated, or when, as the case may be, decomposition or other disturbances occur in the gastric digestion. For the immediate relief peppermint, carbonate of magnesia, and bismuth preparations with bicarbonate of soda, are perhaps the most suitable. In some cases I have seen persistent relief obtained from the use of ordinary essence of pepsin. When constipation is present the bowels should be regulated.

Vomiting.—This is expulsion of the gastric contents through the mouth. This must be distinguished from retching, which is an effort at vomiting, due to the contraction of the gastric muscles together with the diaphragm and the abdominal muscles, the cardiac end of the stomach being closed or the stomach itself being empty.

It must be distinguished too from regurgitation, which implies simply the flowing back, as far as the pharynx, of food, liquid or solid, through the stomach; while rumination, corresponding to chewing of the cud, implies not only regurgitation of food, but the subsequent mastication and reswallowing.

True vomiting as it affects the stomach is due to local causes, and is to be distinguished from various other forms, of which the two chief ones are the central and the reflex vomiting.

The *central vomiting* is due to direct stimulation of the

vomiting centre, which is in the medulla, and it occurs usually without the usual premonitory signs which accompany true vomiting, or with only a few of them. These premonitory signs are usually yawning, pallor, depression, sweating, salivation, nausea, etc.

Certain drugs induce vomiting, as, for example, tartar emetic, apomorphine, and ipecac. So, also, do various cerebral diseases—tumor, meningitis, and injuries to the medulla oblongata.

Sympathetic causes come under the same heading, as, for example, associations, sensory impressions, seasickness, etc., and lastly, the vomiting of hysteria and neurasthenia.

Reflex vomiting is that which is induced in a great variety of maladies, of which a few may be here cited as examples: Bronchitis, tuberculosis, and emphysema, in which either the cough or the expectoration is liable to induce the vomiting; pharyngitis, especially in alcoholics, where the mucus collected over night is swallowed into the stomach and induces the morning vomiting of drunkards; gall stones and renal calculi, particularly with great pain; strangulated hernia; diseases of the genital organs; severe pain anywhere in the body, and toxic conditions like uræmia. The onset of acute infections, especially in children; pregnancy at certain periods in its course; the chronic form of certain metallic poisons, like arsenic, lead, etc., and Addison's disease—all these are accompanied at times by a vomiting which cannot be classified as any other than *reflex*.

In *true vomiting*, on the other hand, there are premonitory signs. The patient becomes dizzy, pale, often the pulse increases, retching may follow, and then comes the onset of the vomiting. This has sometimes a definite relation to food. If it occurs after meals and is not due to a neurosis, it implies an organic disturbance of the tract; it may be due to ulcer, some inflammation, atony, cancer, stenosis of the pylorus, supersecretion, etc. Sometimes it comes on at once after meals, and sometimes again only several hours later, as occurs chiefly in atony and dilatation of the stomach.

Sometimes, as already mentioned, it occurs only in the early morning (the vomiting of drunkards which is usually associated with pharyngitis), while in supersecretion the vomiting occurs either early in the morning or during the middle of the night.

Periodicity in the vomiting is likewise a not infrequent occurrence in several diseases, such as dilatation of the stomach, where it may be present every two or three days, and then it is usually copious in amount.

The vomitus varies according to the cause, the food, the time, the nature of the gastric conditions, etc. One must note the amount of digestion undergone by the individual foodstuffs, notably the proteids and starches; also the presence of food taken more than seven hours previously, which in itself is an evidence of some dilatation.

There may be pus, blood, bile, saliva, and mucus present, and the color may be the same as that of coffee grounds. This color is frequently due to altered blood, but may have some relation to the previous nature of the food—blueberries, currants, etc.

The odor of the vomitus is comparatively unimportant except in intestinal obstruction, where it, of course, is apt to be fecal in character.

The taste varies; it may be often acid and burning, or simply that of the food taken; but when decomposition has occurred it may be putrid in character.

It is also of some importance to ascertain if the vomiting gives relief, as various diseases are thus in part differentiated.

The quantity of the vomitus is of decided importance. It is considerable in stenosis of the pylorus with dilatation of the stomach; it is usually small, on the other hand, in chronic gastritis and ulcer, unless marked gastrectasis be concurrent.

Dyspnœa.—This is not uncommon in indigestion and is associated with distention of the stomach and pressure upon the diaphragm, as well as with interference with the

ordinary movements of the heart. Usually if the dyspnoea be marked there is some graver underlying condition, such as anæmia, asthma, cardiac disease, etc. It may occur every few hours or only after several days, and is accompanied by a sense of fear and oppression, and usually by some palpitation.

Palpitation.—The anatomical relations of the heart and stomach play only a small part in the causation of palpitation. As a matter of fact, this sensation does not often possess much significance. The more serious form of palpitation is often associated with myocarditis or with angina, and under such conditions a heavy meal is not infrequently followed by a fatal syncope.

Tachycardia is comparatively rare, and when present is usually paroxysmal. It is more frequent after middle age, at the menopause, in neurotic, anæmic, or cardiac patients, and in those too who are habitués of tea and tobacco. It is more frequently present with flatulence.

Drowsiness.—This may be present either after meals or at any time, and is directly due to the relative anæmia of the brain from the extra demand, on the part of the stomach, for circulating blood.

Insomnia may be due to a coincident organic disease of the brain, etc., or to sleeping during the day; or, again, it may be due to motor insufficiency of the stomach, the remains of food being carried on into the night. The insomnia may be a temporary affair merely, or it may be chronic. A late supper may be very slowly digested during sleep, therefore not only is there insomnia but restlessness, and bad dreams are very apt to follow.

Vomiting frequently gives relief in such cases, and when this cannot be induced, lavage will have the desired effect.

Vertigo.—This symptom may be of little or of grave significance. The simple condition is not very uncommon in cases both of acute and of chronic indigestion, when the stomach is either full or empty. Milder forms occur after meals or upon exertion, or even when the patient is at rest. The vertigo is momentary in time, and there is neither fainting, falling down, nor coma. It may be accompanied by nausea and vomiting or some other digestive disturbance, and the taking of food not infrequently relieves the symptoms. Its sudden onset is rather characteristic.

One should be careful to exclude the more serious causes of vertigo, e.g., Ménière's disease, an incurable condition in which there is usually deafness in one ear and a sensation of circular movements; petit mal, in which coma and perhaps alternating convulsions are present; tumor of the brain, which has its special signs, as have also tabes, ataxic paraplegia, cardio-renal disease, anæmias, errors of refraction, etc.

Cough.—In indigestion cough is usually associated with some irritation of the throat from pyrosis, and is more especially apt to occur if the tonsils be enlarged or a pharyngitis be present. A distended stomach pressing on the diaphragm may, by mechanical means, induce a cough; but perhaps the most common cause of cough is that which is associated with the ingestion of meals—in various pulmonary disorders, in chronic bronchitis and in emphysema, for example, where the diaphragm is less active and there is defective oxygenation of the blood, and when more mucus collects. For this reason, too, large meals are more apt to cause a cough than small ones. Then, again, the cough may be reflex, as is the vomiting too, as already mentioned in speaking of tuberculosis.

The General Treatment of Indigestion.—The first essential for a good digestion is a proper daily regimen. A suitable environment, physically, mentally, and climatic, is what renders the ordinary health resorts with their regular routine of life so excellent in the treatment of chronic forms of ordinary dyspepsia, and neither the specific drugs nor the specific waters can be said to confer one-half the benefit which accrues to habitués of these sanitarium.

In addition to this, the wearing of proper clothing is an essential element. Clothes worn too tight, and cor-

sets too much laced, interfere with the action of the diaphragm, of the stomach and liver, and in this way easily induce dyspepsia.

The occupation of the patient must likewise be considered; it should, as far as possible, be in every respect free from mental strain or anxiety.

The number of meals should be regulated, as should also the intervals between them. The food should be taken slowly, for digestion in the mouth is extremely important. Mastication and insalivation are essential to proper digestion, and the teeth should therefore be duly cared for.

Rest and exercise should be carried out in accordance with the needs of the case. After each meal and also before meals, it is well for everybody to rest a short time; at other times exercise, if moderate, aids digestion; the gastric motor power becomes more quick and the intestines act more readily. While this is true of healthy people, it is all the more important in cases of disease. After heavy meals all persons should rest, and, later on, they should exercise in the open air. Rest is most essential in cases of gastroparesis, gastrectasis, hyperacidity, and cancer. Not only should the rest be physical but it should also be mental.

As regards the dieting, the prophylactic measures in this respect have already been mentioned, and each case must be treated on its own merits, in accordance with the views already expressed or to be mentioned.

Too much fluid should never be taken with meals, while before meals a glass of water, particularly hot water, is of benefit.

Frequently warmth is of benefit to some patients, and for this reason, and this only, does one obtain relief from the use of flannel belts about the abdomen.

The medicines which are given are perhaps the least important features in the treatment of dyspepsia. To stimulate the secretory and motor power of the stomach when necessary, and to lessen decomposition, are the main factors of use in medicines. As a rule, it is not possible by medicines to accomplish much even in this respect, though other measures, mechanical or dietetic, may be helped by the judicious administration of certain drugs.

Medicines which are intended to increase the appetite and stimulate secretion are numerous, and stomachics, as they are called, are variously lauded or frowned upon by the specialists. Reichmann holds that the use of bitters upon an empty stomach—no matter whether its secretion be normal or abnormal—exerts no immediate effect upon these secretions; it is only a little later that bitters stimulate them somewhat. When taken with the food they interfere with gastric digestion. Riegel strongly recommends the use of condurango bark, while others again successfully employ orexin to stimulate the secretion. This last drug, however, is frequently followed by disagreeable symptoms, such as nausea and vomiting.

A favorite prescription of the English authors is the following: Sodium bicarbonate, gr. x., tincture of gentian, ℥ ss., and peppermint water, ℥ i., three times a day before meals.

When too much secretion is present, on the other hand, powders of bismuth and soda, with perhaps some powdered nux vomica and compound cinnamon powder, may give relief, as recommended by Brunton, both because of their sedative action and from the fact that such powders in bulk the more readily absorb acids.

The Use of Acids, especially Hydrochloric Acid.—It is now well established that the hydrochloric-acid secretion of nature cannot be artificially replaced. If hydrochloric acid is absent from the stomach contents, one cannot administer it artificially so as to get the free acid back after a test meal. Nevertheless, its use, where hydrochloric acid is absent, aids in promoting the digestion of proteids; it should be given with a glass tube after meals, or as a stomachic one-half hour before meals. It is contraindicated when hydrochloric acid is in excess.

The Use of Alkalies.—Reichmann's experiments show that sodium bicarbonate, taken either on an empty or on

a full stomach, has no influence whatever on gastric secretion, but it lessens total acidity; that is, it acts upon the juices abnormally secreted, as takes place, for example, in hyperacidity, hypersecretion, and gastric ulcer, where it is useless to stimulate the secretion. One should never give alkalies unless hydrochloric acid is the cause of the acidity; it should also never be administered where organic acids are present. An excellent way of administering alkalies is in powder form, combining sodium bicarbonate, calcined magnesina, and powdered cinnamon; they may also be given in the form of Carlsbad salts, or of Kutnow's powder, in the early morning before breakfast.

The Use of Pepsin.—Pepsin is employed in various forms: powder, pill, combined with hydrochloric acid, in fluid essence, and as various tinctures. The pure article, the so-called absolute pepsin, is by far the best; it should be given in doses of from five to fifteen grains; the official preparation is given in doses of from thirty to forty-five grains. Most preparations of pepsin, it may be said, are unreliable. Those which are combined with various alcoholic media are useless, except for the alcohol which they contain, and which is largely responsible for the aid which they give to digestion. Technically and *in vitro*, there would seem to be no benefit, or but little, from the use of pepsin. There is always enough secreted even when the hydrochloric acid is plentiful, as well as when it is deficient in quantity.

The indications for the use of pepsin are found in those conditions in which it is either deficient or absent. Now if it be deficient, the only requirements are medicinal amounts of hydrochloric acid to make the pepsin active. If, on the other hand, pepsin be entirely absent, so much hydrochloric acid is required to make the pepsin active that it is impossible to administer the drug in that way. However, it must be admitted that one often meets in practice instances in which the benefit derived from the use of this drug is undoubted, the fluid essence perhaps being the most suitable preparation of all.

Pancreatin.—Pancreatinized foods are used where hydrochloric acid is deficient, in order to aid intestinal digestion. The powder acts on the stomach itself, and its value is probably confined to cases such as those mentioned. Unfortunately, most of the preparations when tested are found to be negative. Some, however, made by the more reliable firms are good, and are used in pellet form with sodium bicarbonate.

Saliva is never much diminished in indigestion, but a very great excess of hydrochloric acid causes it to lose its activity, and under such conditions *ptyalin* is sometimes of benefit.

The preparation known as *takadiastase* acts in the presence of even 0.05 per cent. of hydrochloric acid, and hence is apt to be better than others, which act in only 0.01 per cent. of hydrochloric acid.

When much decomposition occurs in the stomach, lavage is probably of much more use than medicines. The medicines, however, which give considerable relief for this disorder are *thymol*, which is prescribed in minim doses with alcohol, and *creosote*, which may be given in the form of the carbonate, or pure, as a pill.

III. MOTOR INSUFFICIENCY.

1. *Relative* or symptomatic, as in stenosis of pylorus (*g.v.*), or in cancerous or benign obstruction. This may be atonic or hypertonic.

2. *Absolute*, as in idiopathic dilatation, simple atony, atonic dyspepsia, simple gastrectasis.

Definition.—Motor insufficiency is a relative or absolute lack of power on the part of the muscular wall of the stomach to propel the food through the pylorus within the normal time.

(For relative insufficiency see paragraphs on stenosis of the pylorus, carcinoma ventriculi, etc.)

Absolute motor insufficiency, or idiopathic dilatation, has two periods:

1. *Stagnation*, which has two forms: mild atony and severe atony. In stagnation there is delay in evacuation of the stomach contents. In mild cases the stomach becomes empty between any two successive meals; in severe cases it is empty only in the early morning.

2. *Retention*.

Etiology.—(a). Excessive work for the stomach is the essential cause. Such excessive work is inflicted by deviations from the normal diet; e.g., the taking of food which is faulty as regards quantity, quality, or mode of preparation.

(b) The propelling power may become weak through other causes, e.g., hereditary weak stomach; trauma or peritonitis may weaken the gastric muscle; wearing improper clothing; prolonged sedentary habit; disease of the stomach itself; organic changes in the muscular coat; ulcer or cancer in other parts than the pylorus, apart from stenosis; chronic gastritis; degenerations—fatty, colloid, or amyloid; cirrhosis of the stomach; the use of narcotics and of alcohol; constitutional troubles, e.g., chlorosis, anæmia (Collier's stomach, as described by C. Allbutt), tuberculosis, typhoid fever, and nervous troubles. Great anxiety or grief may aid an already existing cause. There are acute and chronic causes.

Acute.—It may be induced *acutely*, though this is rather rare and sometimes fatal. In advanced cardiac disease with previous atony the latter is doubtless sometimes the final direct cause of sudden death. German students have it at times after severe bouts of beer drinking. Dietetic errors from mechanical causes exert most influence. The overloaded stomach may drag upon the duodenum and cause kinking and occlusion. Hasty eating and the eating of indigestible foods favor such atony, especially in children and after prolonged illnesses, in anæmia, and in various forms of dyspepsia. This is usually temporary and fairly common, and may be mistaken for acute gastritis. It is not due to spasm of the pylorus, as some think, for this orifice is often found open in such cases, and bile has frequently been present in the organ. Neither is there evidence of gastritis, neurosis, or fermentation.

Chronic.—The main causes are frequent heavy meals; hasty eating, especially of vegetables; drinking much fluid frequently. In this way the forced milk cures are sometimes responsible for prolonged atonic conditions of the stomach. So, too, beer and gaseous fluids may induce the same condition.

Pathological Anatomy.—Simple slight atony shows no obvious pathological changes. When gastrectasis exists there may be partial dilatation, e.g., a diverticulum, or general idiopathic dilatation. The lowest point is first involved—the fundus and greater curvature. The muscle is thinned and atrophied, and if the condition has lasted long enough there may be fatty degeneration. Sometimes the wall is compensatorily thickened. Displacement of abdominal viscera may be present.

Symptoms.—These depend on the degree.

Simple Atony.—In *mild atony* there may be no symptoms, or very indefinite ones, with lassitude and heaviness, or a sense of pressure and fullness after meals; perhaps flatulence, with or without a tasting of food taken previously. *This is the commonest of all forms of so-called dyspepsia.* The symptoms are at first present only after the chief meal; later, after each meal. The appetite varies; it is good before the meal, but easily appeased, and there may be cardialgia, and even cramp-like movements (peristalsis), without pyloric obstruction. In such cases there is usually increased secretion of HCl, or of the total gastric juice. There is usually increased thirst owing to the non-propulsion onward of the water, and thus less is absorbed (water is not absorbed by the stomach).

Dizziness, headache, depression of spirits, stupidity, physical languor, and deafness are not infrequent; they are doubtless due to the abnormal dryness of the tissues, to auto-intoxication, and to inanition. The patient may complain of insomnia, especially if hypersecretion is also present. Circulatory disturbances with palpitation or intermittency, also urticaria and erythema, may be super-

added. Cold extremities are complained of, and if the disorder is prolonged the patient often looks sallow and his features drawn.

Vomiting.—There is nausea, and even in mild cases sometimes vomiting, though slight and intermittent and at long intervals.

Intestinal symptoms may supervene, with pain, diarrhoea, and mucous stools. Unless there are complications or faulty dieting, the general health and strength are maintained.

Objective Signs.—These depend also on the degree of the atony. The food may be merely stagnant or it may be retained.

Inspection usually shows nothing, or at most slight distention or prominence of the epigastric region.

Palpation often gives a peculiar sense of *even resistance*—flabby, however, rather than tense.

Percussion enables us sometimes to find a somewhat increased gastric area. This increase pertains chiefly to the fundus, which pushes up the diaphragm and gives great increased resonance up to the fourth rib and backward to the posterior axillary line. Or we may find succussion, seven hours after a good meal or two hours after a large tumbler of water. Succussion soon after a meal, obtained in persons who do not complain of indigestion, is suggestive of some atony. We may find dullness at the left parasternal line (on a level with the navel), obtained in the sitting posture, and altering when the recumbent position is adopted. In an atonic stomach percussion areas alter greatly within a very short time.

These methods are all, however, more or less unreliable. **Insufflation** by means of the Higginson's bulb syringe, or **inflation** with CO₂, are better means, and enable us to note the site of the lesser curvature, and to decide on the presence or absence of gastroptosis. **Auscultatory percussion** is unsatisfactory and not to be relied on. Of real importance is the breakfast test, as a preliminary examination. In great stagnation of food this should show the presence, say, of more than 100 c.c. of contents. Another valuable test for the motor power should be employed, viz., an examination of the state of the stomach in the early morning before breakfast. Should this reveal gastric contents there is retention of food—i.e., marked gastroectasis.

Motor Insufficiency with Retention.—(Synonyms: Gastroectasis [Idiopathic Dilatation], Myasthenia Gastrica with Retention.) This is the severer form of motor insufficiency. To mere atony is added fermentation and retention; there is no interval of gastric repose.

Inspection.—The stomach is found to be flabby and much enlarged; the greater curvature may be as far down as the pubis. When patients have thin and relaxed abdominal walls the outline may be easily seen. (Unless ptosis is present the lesser curvature remains high in the epigastrium.) In uncomplicated cases the prominence of the stomach is above the umbilicus, in contradistinction to the prominent swelling of gastroptosis, which is situated lower down.

Inflation with tartaric acid and sodium bicarbonate, or **insufflation** with a stomach tube or Higginson's syringe, will readily reveal the size and situation. **Succussion** will be present in the early morning, and can often be produced at will if the patient suddenly depresses the diaphragm. Sometimes one can feel the gas going through the pyloric orifice, and it may also be heard on **auscultation**.

Percussion gives a deep tympany over the stomach. When fluid is present a dullness may be obtained in the lower part of the gastric area when the patient stands, and this will alter when he assumes a recumbent position. As a means of diagnosis for motor insufficiency this test has but a minor importance.

Fermentation is common, as there are many bacteria present; there are also pyrosis, distention, and vomiting. Vomiting is the rule, and affords great relief; it is characteristic in the following particulars: It is often explosive, but the stomach is by no means fully emptied by the emesis. Periodical recurrences are the rule, and

days will often intervene between two attacks. The onset may occur some hours after eating, sometimes showing food that has been retained in the stomach for twenty-four hours or longer. The vomitus is copious; it may amount to one quart or more. It is bitter; usually it has a putrefactive or rancid odor, and is acid in reaction, from the presence of organic acids. Hydrochloric acid may be absent, however, or diminished, normal in quantity or increased, according to the underlying condition. Three layers are apt to form: the lowest containing more or less partially digested solids; the middle layer containing turbid fluid; and the uppermost is foamy, with perhaps some undigested foodstuffs, etc.

Microscopically, there are shreds of mucus, yeast cells, especially if HCl be present, and many putrefactive bacteria. Hydrogen sulphide occurs with benign obstruction chiefly, and marsh gas is not uncommon. The foodstuffs will show different degrees of digestion, according to the presence of HCl, etc. Starch is usually abundantly present, and the granules may still manifest their peculiar characters; the iodine test is also available. There are crystals of fatty acids, epithelial cells, and yeast cells, and sometimes blood cells or pigment. Sarcinae as well as the various bacteria abound.

General Signs: The *nutrition* suffers proportionately to the degree of dilatation, especially when the secretions are diminished. The tissues become dry, especially the skin. Emaciation may be great on account of the intestines failing to do their part in digesting food which comes to them so badly prepared. The temperature is subnormal, though temporary fever may occur from an associated gastritis.

Constipation results from atony of the bowel, and dry, hard scybala are passed. There is rarely diarrhoea. Sometimes mucous colitis develops. The appetite is worse, and there is more mental depression and more insomnia than in a mild case. The urine is diminished according to the degree of the gastroectasis. It is more concentrated and has a higher specific gravity. The phosphates are increased, and the alkalinity will be marked if there be a hyperchlorhydria. The chlorides are diminished. Sometimes there are albuminuria, acetonuria, and diacetic acid.

The *heart* may be rapid and irregular, owing to the pressure of the distended stomach on the thoracic organs. Sometimes there is bradycardia, though the reasons for this are ill understood. **Dyspnoea** may occur; it should not be confounded with asthma. It is often due to tympanites; hence its temporary duration.

Neuroses of various kinds develop, and especially hypochondriasis. **Tetany** is not rare, and may be present when cases run a severe course. In two patients I have seen death result during a time when dilatation and tetany were combined and no other grave condition was present. Epileptic seizures sometimes occur.

Diagnosis.—The easiest method is by a test meal and an examination of the quantity which remains at a given time. Thus, one hour after a test breakfast there should be not more than 75–100 c.c. of contents left; anything more implies a motor insufficiency. To diagnose the degree of insufficiency one may take three steps:

1. Examination after a test breakfast: If less than 75 c.c. is extracted, the motor power is normal; if the quantity extracted is larger, proceed to the second step.
2. Examination seven hours after a dinner: If no food remains, the motor insufficiency is of the nature of a simple atony; if food still is found, one proceeds to a third and final examination, viz.:

3. Examination of the stomach in the early morning before breakfast: If the stomach be empty there is merely stagnation; if, on the other hand, food be present, the patient is suffering from the third and severest degree of motor insufficiency, i.e., retention, which is equivalent to a gastroectasis.

In the *differential diagnosis* one must exclude:

1. Megalogastrica, i.e., a congenitally large stomach (whose motor power is normal).
2. Chronic hypersecretion, in which fluid (gastric

juice) may be found in the stomach in the early morning. This may be decided by careful lavage on the previous evening, when, if mere dilatation is present, little or no fluid will be found in the morning; whereas if supersecretion exists, juice may be removed at that time.

3. **Gastroptosis.** Sometimes dilatation exists with this condition. The differential point is the determination of the situation of the lesser curvature.

4. **Neurasthenia.** In this condition the symptoms are usually out of all proportion to the amount of retained food. Solids, too, cause more trouble than liquids in neurasthenia, while the reverse holds in gastroectasis.

5. **Gastritis,** pure and simple, has no motor insufficiency. The stomach is of normal size and there is mucus.

6. It is of the greatest importance to decide whether the insufficiency is idiopathic or due to an obstruction at the pylorus. The following table will assist the diagnosis:

	Atonic motor insufficiency.	Obstructive motor insufficiency.
History.....	None other than dietetic excesses.	Previous gall-stones, ulcer, carcinoma, etc.
Course.....	Slow.....	Rapid.
Emaciation..	Slow.....	Rapid.
Pain.....	Insignificant.....	Is a marked feature.
Contents....	A dyspepsia of liquids mainly.	Preeminently solid contents.
Peristalsis..	Little or none.....	Much present and easily excited; the wall is hypertrophic and peristalsis may be visible and palpable.
Dilatation..	Usually moderate.....	Extreme.
Vomiting...	Infrequent, copious, liquid, incomplete, less painful.	Frequent, copious, thick, and with much solids, complete, painful; may show blood and pieces of mucus.
Tumor.....	None.....	Present.
Lavage.....	Quick inflow, slower outflow.	Slower entrance, sometimes quick exit of fluids, expression of fluids easier.
Therapeutic tests.	Improvement decided with lavage.	Progressively worse in spite of lavage.

There should be no difficulty in differentiating gastroectasis from conditions such as ovarian cyst or other abdominal tumor, ascites, distended urinary bladder, pregnancy, though such difficulties are said to have occurred.

Prognosis depends upon the cause and the chance of its removal. The concurrent presence of gastritis or of intestinal disease is unfavorable. Moderate atony is easily curable, by a careful regulation of the diet. Acute cases usually recover; rarely they die. Chronic cases depend upon the degree of insufficiency. If no obstruction exists, the conditions are more favorable. The earlier the treatment is instituted, the better the prognosis. Surgery may often relieve what medicinal treatment has failed to accomplish, and a gastro-enterostomy may restore even the most advanced kind of benign motor insufficiency.

Treatment.—Prophylaxis consists in the taking of nutritious, non-voluminous food (i.e., concentrated), and in advance of those causes mentioned above. The diagnosis of the condition in its early stage is of paramount importance.

Treatment is based on the etiology in regard to food and methods of eating and drinking; it must also have reference to the constitution of the patient and to the fact whether the weakness has followed some general disease like typhoid fever, tuberculosis, etc. In the latter condition, especially, atony is common, and the greatest care is required to prevent the condition from becoming chronic and intractable. Stagnation must be prevented and weakened motor power restored. For this reason no further strain must be placed on the muscular wall of the stomach. The rules and regulations concern mainly, (1) dietetic, and (2) mechanical measures (lavage, electricity, massage, baths, bandages).

Diet: Small amounts taken at short intervals will be better than three large meals during the day. The food should not consist too largely of fluids, as motor insufficiency is essentially a dyspepsia of fluids. For this reason food may be given chiefly in the form of soup, and made up of nutritious constituents in small bulk. The passage of fluids into the intestine is delayed if too much solid food be simultaneously taken. Water alone goes through fairly easily if not in excess. *Multum in parvo* is the guide (i.e., concentrated non-bulky nourishment). Milk is therefore good, and one may add some fine cereals to the milk—e.g., barley, tapioca, rice, etc. Bouillon with egg is also a form of concentrated nourishment. The diet should depend, however, to no small extent on the condition of the secretions.

When hydrochloric acid is deficient: Fluid food and soup-like fluids are preferable to dry diet; they should be taken in small amount and frequently. If meats be taken, they should be white meats, or others hashed finely, or fish. Vegetables should be finely divided. Milk is often well borne with cereals, or with nutrose of plasmon. Lactoglobulin is also an excellent preparation.

When hydrochloric acid is increased: Solids are better, especially proteid foods, like meat; starches must be limited; butter is the only safe fat to employ.

In extreme gastroectasis feeding by the mouth may be so insufficient that nutrient enemata will be necessary. In any case water enemata may be used twice daily, even if the condition of dilatation be only moderate. One pint of water with half a teaspoonful of salt may be injected twice daily, or broths, when more nourishment is required, and to this an egg may be added. Alcohols and sugars should be avoided because their absorption induces an extra flow of water into the stomach.

Rest after meals is essential. Exercise at such times tends to injure the muscular coat of the stomach.

Mechanical Measures: Lavage is indispensable in the medical treatment of motor insufficiency if it be at all marked. In the mild cases this may not be required, though it often affords great relief, and is not merely a symptomatic treatment, but even curative, i.e., in the early cases. As a rule, however, early mild cases merely require strict attention to diet and daily regimen to effect a cure. One must judge according to the individual case how much lavage is necessary in severer cases. Moderately severe cases require lavage, as delayed food leads to decomposition and hinders repair.

If food remains in the stomach even till early morning, lavage may be required twice daily: (1) before breakfast, and (2) before the evening meal. The essential is that the lavage be thorough, and that the return flow of water be finally quite clear. It may be necessary to wash out the stomach with the patient in various positions, standing and lying down. Much time and patience may be needed, and often an hour is required before the water returns perfectly clear. The method is similar to that described under "Methods of Examination," on p. 490.

How long should one keep up lavage? This must depend on the remains in the stomach. It should be done daily till we are sure that digestion is not delayed over night. Mere warm water suffices, unless there is great fermentation, and one may then employ salicylic acid (two per mille) or boracic acid in a two-per-cent. solution.

Electricity, while often used in vain, is certainly of benefit sometimes, notwithstanding the contrary evidence of experiments upon dogs. Faradism over the stomach, with large electrodes, has a stimulating effect which benefits digestion, either because of its general effect or through the local stimulus to the abdominal wall. There is no advantage to be gained by intrafaradization.

Massage is beneficial in a general way, but it must be employed systematically, and over a sufficient period of time. It is not supposed to be of direct benefit to the muscle of the stomach.

Hydrotherapy is of the greatest benefit; in fact, apart from lavage there is no treatment which compares with