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 4141 Clarendon Avenue.

THE DIAGNOSIS AND TREATMENT OF ACHYLIA GASTRICA*

BY HORACE W. SOPER, M.D.,
 St. Louis, Mo.

By the term achylia gastrica is meant in the broad sense those cases in which the expressed gastric contents, removed fifty to sixty minutes after the Ewald-Boas test breakfast, show an absence of free HCl. A more intensive study of the condition, however, forces us to make many distinctions. In all cases of achylia, the contents of the stomach after an Ewald-Boas test breakfast, have a very characteristic appearance. The bread shows little change, appearing very much as it did when eaten. No chymification has occurred. A small amount of thin water-like secretion is present. In some cases the rennin and pepsin enzymes are persistently absent, while in others both ferments are present. The total acidity is very low in some instances and quite high in others. Some cases show absolutely no admixture of mucus, while others present a large quantity of intimately mixed stomach mucus. All the above-mentioned chemical variations have an important bearing upon the nature of the achylia, as will be shown later.

Furthermore, achylia was noted to occur in various diseases, such as carcinoma of the stomach, certain forms of chronic gastritis, as well as in the later stages of nephritis, typhoid fever, pernicious anemia, pellagra, tuberculosis, syphilis and other general diseases. The condition was moreover found to be present in individuals appearing to be in perfect health. In other cases, the achylia *per se* appeared to cause severe symptoms, such as loss of weight, cachexia, anemia and diarrhea, symptoms which were often corrected by appropriate dietetic regime and the administration of dilute hydrochloric acid.

Another rare type of case deserves mention, viz., that designated as heteroachylia. By this term, we mean that nervous individuals will sometimes show a complete absence of HCl in the stomach contents, while that at other times a normal or even a hyperacidity may be determined.

From the foregoing it will be understood that we are dealing with a very complex problem. Many investigators have attempted to solve it. One of the most noteworthy attempts is the brilliant work of Rehffuss, of Philadelphia. He devised a tube known commonly as the Rehffuss tube, modeling it after the duodenal tube of Einhorn. The bulb and openings are large enough to permit the passage of quite large food fragments. The rubber tube is small in caliber, so that it may be retained in place for hours without irritating the pharynx. This method is now designated as the fractional method of securing gastric contents. The standard test breakfast that has been finally adopted consists of one pint of thin oatmeal gruel to be taken after the tube has been swallowed. The gruel is prepared as follows: Four heaping table-spoonfuls of oatmeal to a quart of water to which is added a pinch of salt, and this is boiled down to one pint. Serve warm. At fifteen-minute intervals from 15 to 20 c. c. of the contents are withdrawn with a glass piston syringe and examined separately. Rehffuss demonstrated that some cases show a total achylia throughout the entire phase of digestion. These he designates as "true achylia." In spurious or false achylia some secretion of HCl or the ferments is demonstrable usually in the later stages of digestion, from one to two hours after the ingestion of the test meal. He also differentiates between a psychical achylia and a chemical achylia. His observations are based upon Pavlov's original experiments demonstrating the presence of a psychical secretion of gastric juice. In psychical achylia, the secretion of gastric juice, which occurs normally immediately after food is taken into the stomach, is absent. In two cases of true achylia, Rehffuss secured a temporary return of gastric secretion by the administration of parathyroid extract, thus demonstrating the influence of the endocrine glands on the secretion of HCl and gastric enzymes.

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We might proceed further and quote more authorities on the subject of achylia. Before the advent of the fractional method of examination, many crude opinions were held on the subject. Now, the majority of gastroenterologists are in accord with the essential features of the diagnosis and treatment of this condition.

It is obvious that no reliance can be placed upon the Ewald-Boas test breakfast. This test may be used as a routine procedure, but no diagnosis of achylia can be made without the use of the fractional method. If it has been demonstrated that HCl and the pepsin and rennin enzymes are absent throughout the entire phase of digestion, and that no stomach mucus is present, a diagnosis of simple, true achylia may be made.

The diet must be arranged to protect not only the gastric mucosa, but chiefly the intestinal mucous membrane. The cellulose and connective tissue, as well as the gelatinous envelope of the starch grain, can not be digested without the presence of HCl in the gastric contents. It is impossible to give sufficient HCl to supply the deficiency in achylia. Therefore, we must prepare these foods in such a manner that they can be taken care of by the small intestine. In other words, we must rely upon the vicarious action of the intestine and the pancreatic ferments for the digestive process. HCl is, therefore, administered as a stimulant to the digestive hormones.

Every effort should be made to improve the appetite and to formulate a diet that is high in caloric value. The fats must be emulsified. Therefore, one should give butter and cream freely. The fats contained in meats, particularly in bacon, must be avoided. The starches must be finely comminuted. All meats should be cooked thoroughly enough to gelatinize the connective tissue. Hence, boiling and broiling of meats should be continued until they are thoroughly done. Another principle in diet must not be overlooked, viz., that the citric and lactic acids are powerful stimulants to pancreatic function. Consequently fermented milk, orange juice and grape fruit juice are important elements of the dietary. The meat extracts, such as meat broths and soups, should be given freely, because of their stimulating effect upon the digestion and

appetite. Careful and prolonged mastication of the food will correct many errors in cooking. I prefer to give the dilute HCl in fifteen- to twenty-drop doses, well diluted, and taken slowly after the meal.

Many of these cases present diarrhea as a complication. Careful study of the feces in such cases will usually demonstrate the presence of a catarrhal condition of the small intestine. Macroscopical examination of the feces will show an intimate admixture of finely-divided mucus. Microscopically, small islands of mucus and many leucocytes and occasional red blood cells are seen scattered through the field. Thos. R. Brown, of Baltimore, has recently demonstrated that such cases are not due to pancreatic insufficiency, as the diastatic ferment is present in normal quantities in achylia stools. Moreover, he demonstrated that the diastatic content in the feces is much lessened in chronic pancreatitis and is absent in extensive carcinoma of the pancreas. The diarrhea is usually corrected by appropriate diet and the use of small doses of dilute HCl. The presence of an inflammatory process involving the small intestine is one of the worst complications that can occur in achylia and explains the failure of the most careful form of treatment.

Constipation occurs in the majority of cases of achylia gastrica. In the uncomplicated cases, i. e., with a colon that is neither contracted nor atonic in character, a glass of strained orange juice given in the morning upon arising, is usually very effective. In the atonic forms, especial attention must be given to abdominal supports, carefully planned exercise of the abdominal muscles and the administration of finely ground agar agar. Each small particle of agar agar is converted into a small gelatinous cube which facilitates the passage of fecal matter through the colon without irritating the intestinal mucosa. The spastic form of constipation is amenable to treatment if one will remember that the spasticities are located in the lower third of the colon as a rule. Over one-half of them, as I have shown in a paper published some years ago, occur in the upper rectum, sigmoid flexure and descending colon. Enemata of 6 ounces of sterilized cotton seed oil given at bed time and retained through the night are

very efficacious in correcting the spastic form of constipation. Even more efficient are direct local applications of magnesium sulphate solution to the spastic segments through the sigmoidoscopic tube. The magnesia sulphate applied locally produces a reflex stimulation of the inhibitory phase of peristalsis, thus physiologically overcoming the hypertonic condition of the gut. Cathartics must be avoided, as nothing can be more disastrous than the constant irritation of purgation to a small intestine already damaged and overworked.

In cases where stomach mucus is intimately mixed with the gastric contents after the standard test meal, a diagnosis of anacid gastritis can be made. One type of such a condition has been designated by Pilcher as achlorhydria hemorrhagica gastrica. In these cases of gastritis we almost invariably find that free HCl and the enzymes appear in the later stages of digestion. This condition of chronic anacid gastritis is usually also present in carcinoma of the stomach as well as in the general diseases as above enumerated.

The differentiation from cancer is now readily made by the roentgen ray. Formerly, reliance was placed upon the presence of lactic acid, occult blood and Opple-Boas bacilli. The Wolff-Jungmans test for excessive albumin in the gastric contents was also useful in the differential diagnosis. Unfortunately, these tests are positive only in the late stages of the development of the cancer. Our only hope for an early diagnosis lies in the x-ray examination. As confirmative evidence of progress along this line, I might state that 50% of our cases of carcinoma studied in the last two years show the presence of HCl in the gastric contents. Before this time achylia was the rule in nearly all of our cases, diagnosed as carcinoma. In other words, we are now able to make the diagnosis at an earlier stage, before achylia has resulted, thanks to the development in the technique of gastric x-ray diagnosis.

The treatment of anacid gastritis, whether primary or secondary to some general disease, is practically the same as that described above for the cases of total achylia. Referring again to the question of the administration of HCl, it has long

been noted that some cases are remarkably improved by it, while others are not benefited. It has been my observation that the cases in which gastritis is present do not do well on HCl, while the true achylia respond beautifully to it.

The question of the achylia which occurs in pernicious anemia is an extremely interesting one. Indeed, it has been regarded by many authors as the primary cause of pernicious anemia, and treatment such as gastric lavage has been instituted. We know that achylia is an almost constant accompaniment of pernicious anemia. I recall but one case in which HCl was not absent. It was present throughout the entire course of the disease.

Achylia is really to be regarded as an incident in the development of pernicious anemia and is not connected with the etiology of this disease. A case of extreme interest illustrating this point deserves mention. The patient had been under my care for some years with dyspeptic symptoms. Her acidity was normal and at times even a hyperacidity was shown. Some three years after I had first observed her she developed a true pernicious anemia. During this illness it was demonstrated that she had a total achylia. After six months of illness, splenectomy was done. At the present time—five years after the operation—she is in perfect health and has completely regained her HCl and gastric ferments.

It has been stated that gastric hypermotility occurs in achylia. Dr. R. Walter Mills, who has recently made x-ray studies of motility in a large number of cases, comes to the following conclusions:

"In x-ray studies of gastric motility of cases of achylia gastrica, after a standard barium-marmellade meal of average volume, approximately 100 c. c., there is nothing to indicate that the time of total motility varies from that of normal subjects. Neither is there anything that suggests that pyloric tonicity is greater or less in achylia than where full gastric secretory power is present. In a series of 63 cases of achylia gastrica without organic lesions, the average time of total gastric motility in the different physical types was as follows: In sthenics, 4 hours, 19 minutes; in hyposthenics, 5 hours, 47 minutes; and in asthenics, 5 hours, 19 minutes, approximately the same motility times as in normal persons of the same anatomic types."

The reason for the assumption that hypermotility was characteristic of achylia was probably due to the fact that the gastric secretion was of such a character that but little of it could be secured by the stomach tube.

Some cases of achylia develop a severe form of secondary anemia. Therefore, the blood must be watched in all cases. Achylia patients rarely develop carcinoma or pernicious anemia.

The rules for treatment can be briefly summarized as follows: liberal diet as outlined above. Forced feeding must be resorted to in order to maintain a high degree of nutrition. The administration of small doses of HCl in selected cases. The juices of citric acid fruits and fermented milk and meat broths should form an important part of the dietary. Proper correction of constipation. Regular physical exercises must be insisted upon. The prognosis is good in all cases of achylia, many attain very good health, even though the acid never reappears. Chronic enteritis is a complication to be feared, inasmuch as the future health and life of the achylia patient depends upon the integrity of the small intestine.

A STUDY OF THE FUNCTIONS OF THE THYROID GLAND*

By JNO. P. STEWART, M.D.,
Attalla, Ala.

Our interest in the thyroid gland followed observation of the results produced in persons suffering from diseases of this body. Being a ductless gland, there is not the ordinary way of ascertaining the nature of its secretion (if any) or its function. But observation and study of the condition of those suffering from an affection of the thyroid led to many experiments which have resulted in very definite conclusions.

The diseases of the thyroid, of most common observation, are goitre, Graves' disease, cretinism and mixedema, and often are associated with chlorosis, amenorrhea, obesity, eczema, hysteria, epilepsy, melancholia, adiposidolorosa, lipomatosis and senility.

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In all diseases of the thyroid, the important thing to the sufferer is how much does it effect its secretions or what effect does it have on its function. A very large goitre does not always mean that there is a hypersecretion. In fact the swollen condition may arrest or retard the functions of the gland by a destruction of, or a compression on, its secreting tissue.

What is the result of a hyperthyroidia? A rapid heart's action, neurosis, arteriosclerosis, exophthalmic goitre, tendency to high fevers, excitability, heart failure, apoplexy, etc. In the hypothyroid variety, we have a slow heart, dull, apathetic mind, wrinkled skin, slow growth, myxedema, etc. How to determine a case of thyroid trouble, outside of these palpable cases, is of extreme importance.

That we have cases that baffle our diagnostic powers, goes without argument. May not many of them be due to a disturbed function of the thyroid? Let us see what part the thyroid plays in the economy of the body.

Sir Amroth Wright announced the theory that the opsonins of the blood was dependent upon the secretions of the thyroid gland. To prove this, Stepanoff and Morbi by many experiments showed the disappearance of the opsonins upon the extirpation of this gland. Thus we see at a glance that the thyroid protects us from infectious diseases, as we well know that the opsonins of the blood are the antagonists of all infectious organisms. For further proof, Charrin showed how dogs were easily infected by contagious diseases after extirpation of the thyroid. Greenfield, Murray and Lanz, after much study of persons suffering from myxedema, stated that they often died of tuberculosis or some other infectious disease. The protective role of the thyroid gland against infectious diseases is further evidenced, according to Roger, Garnier and Torre, by their observation of the fact that during an epidemic of typhoid without exception persons with diseased thyroids succumbed to the fever.

That the thyroid gland governs oxidation has been shown by Lorand and Moebius. For instance, a hyperactivity of the secretion, as in Graves' disease and fevers in which we have increased oxidation, is nearly always followed by an exhaustion of the thyroid function, a con-