JONES (A. A.)

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# THE TREATMENT OF LACTIC-ACID EXCESS IN THE STOMACH.[1]

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FROM a series of recent investigations Boas has concluded that lactic acid is not present at any time during digestion in a normal stomach; whereas, it has been taught heretofore that lactic acid is present in healthy digestion during the first thirty or forty minutes after the ingestion of food. It is stated that it is absent not only at that time, but also at all periods of the digestion of a test-meal, whether early or late, whether or not the motion of the stomach is normal or tardy, whether or not dilatation exists, and whether or not hydrochloric acid is present. Only one morbid condition of the stomach, so says Boas, is accompanied by the presence of lactic acid, and that is carcinoma. In this disease lactic acid is said always to be present, and Boas further holds that when it is found in the stomach after a test-meal it is diagnostic of gastric carcinoma.

Notwithstanding that Boas[2] has found lactic acid

[1] Read before the Medical Association of Central New York, October 16, 1894.

[2] The Medical Week, September 7, 1894.

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only in gastric carcinoma, my experience in the matter has been quite different. I have found lactic acid in the stomach during the first part of normal gastric digestion, and also under abnormal conditions, such as persistent diminution in the secretion of hydrochloric acid, an absence of free hydrochloric acid, sluggish motility, gastrectasia, and malignant disease, especially when so located as to cause pyloric stenosis.

In the large majority of cases the treatment of lactic-acid excess simply resolves itself into the treatment of its cause, but in some cases the cause cannot be removed except by surgical intervention, as in gastrectasia from cicatricial pyloric stenosis, and in these cases remedies are demanded that, as far as possible, lessen the production of lactic acid and neutralize it after it is produced, thereby preventing the nausea, vomiting, vertigo, headache, or other distressing symptoms that are largely due to lactic-acid poisoning.

In a short paper upon "The Rôle of Lactic Acid in Gastric Digestion"[1] I mentioned several of the causes of an abnormal presence of lactic acid in the stomach. The first of these causes is deficient secretion of hydrochloric acid, which may result from chronic catarrhal gastritis, gastric carcinoma, debilitating disease, such as tuberculosis, or from what may appear as a secretory neurosis.

The presence of hydrochloric acid in the stomach in normal quantity is usually antagonistic to lactic-acid fermentation, owing, probably, to its antiseptic properties. The endeavor should, therefore, be made

[1] THE MEDICAL NEWS, December 30, 1893.

to reëstablish a more abundant secretion of hydrochloric acid, by treating the cause or the causes of its diminution. In the case of catarrhal gastritis, lavage, with the use of boric acid or boroglycerid solution, and the aqueous fluid extract of hydrastis, is very useful. It is a good plan to wash out the stomach three or four hours after a meal, so that some contents yet remain for chemic and microscopic study, using at first, until the viscus is empty, simply warm water, preferably that which has been filtered or boiled, then using boric acid or boroglycerid solution ; and finally to pour in a mixture of bismuth subgallate with the aqueous fluid extract of hydrastis, a part or all of which may be left in the stomach according to the amount used. At another sitting a weak solution of silver nitrate (2 grs. to 8 oz.) may be used after the mucous membrane is perfectly cleansed. This is one of the most effectual washes in catarrhal gastritis.

The scope of this paper does not permit a detailed discussion of the local and general treatment of gastric catarrh, but I wish to emphasize the importance of removing the causative elements underlying lactic-acid fermentation.

While the various measures used to restore the proper secretion of hydrochloric acid when it is persistently below normal are being carried out, the administration of hydrochloric acid about thirty or forty minutes after meals, in twenty-drop doses of the dilute acid, assists materially in temporarily staying lactic-acid fermentation and in relieving the patient of the sensation of weight, distress, and flatulency.

If the cause of lactic-acid excess is found to consist chiefly in impaired motility of the stomach, strychnin or nux vomica in liberal doses before meals or two hours after meals is attended with benefit. The application of the interrupted current directly within the stomach stimulates and strengthens the musculature, and thus the stomach is often made to empty itself in due time after each meal, and so fermentation from food-stagnation is prevented. For this purpose also expert abdominal massage by one who reaches deeply, coaxing and pushing the stomach-contents toward the pylorus, often materially assists the stomach to empty itself. Emersonian exercises and certain Swedish movements seem to aid in emptying the stomach, while they certainly indirectly improve its tone.

Theoretically, physostigma increases gastro-intestinal peristalsis, and in some cases of atony it may be used to advantage. The extract may be given in quarter or half-grain doses three times daily, combined with extract of nux vomica and a little extract of belladonna.

Antiseptics are remedies that may sometimes be used to advantage in conditions of deficient hydrochloric-acid secretion, impaired motility, and gastrectasia, but they are not so effectual actually as theoretically they make promise of being.

When from indiscretion in diet, fatigue, or constipation, a sudden attack of gastric fermentation occurs, no drug is better adapted to neutralize the poison and hurry it out of the system than calomel, either in small doses frequently repeated or in

one good-sized dose followed by a saline cathartic. Indeed one-twentieth or one-fiftieth of a grain of calomel given about four times daily in a somewhat lasting condition of lactic-acid fermentation acts admirably as a gastro-intestinal antiseptic. The speediest way of ridding the stomach of an excess of lactic acid formed during an attack of so-called "acute biliousness" or "acute indigestion" is by lavage. The noxious elements are washed out, the intestine no longer receives irritating, improperly-prepared chyme, and the mucous membrane of the stomach is immediately soothed. The greatest relief is afforded by lavage in many cases of gastrectasia when the stomach is loaded with acrid, stagnant, poisonous material, some of which has, perhaps, been lying in it for a number of days. No other means as yet practised is capable of giving the relief or accomplishing the good that an occasional lavage does in these cases of food stagnation.

One or two grams of chemically pure sodium bicarbonate one hour before meals promotes gastric secretion and motion, and in some cases lactic acid is found in very much smaller quantities during and after its use. It has been found that soda given later than one hour before meals does not act as well as when it is given in the manner indicated, while if it is given at the beginning of or during a meal, gastric digestion is retarded.[1]

Drugs that are used as gastro-intestinal antiseptics are very numerous. A few seem to be effective in reducing the formation of lactic acid. Benzonaph-

[1] Gilbert and Modiano: The Medical Week, July 13, 1894.

thol in doses ranging from two to ten grains works well in some cases. It is best given in capsules soon after meals. Resorcin in five-grain doses may be given either in capsules or with glycerin and a little alcohol as a solvent. Oil of eucalyptus is a good gastric antiseptic, and if not administered in capsules it may be advantageously given incorporated in a powder with a little menthol, bismuth subgallate and light magnesium carbonate. When there is much flatulence this combination affords relief, and to it may be added reignited officinal charcoal. Hydrogen dioxid is another antiseptic that has been quite largely used for its effect in the stomach. It is useful in arresting fermentation if given early enough to exert its action before fermentation has gotten well started. Unfortunately the drugs that are used as gastric antiseptics are necessarily given in such small doses that they are "a drop in the bucket" when mingled with the copious mass of semi-fluid, sour, decomposing stomach-contents often present; more especially is this true in gastrectasia with food-stagnation. One of the most effectual drugs in lactic-acid fermentation is pure beechwood creosote in doses of from one to five or more drops given in wine or mucilage after meals. In cases of impaired motility with absence of free hydrochloric acid and with lactic-acid excess, I have seen the latter almost entirely disappear and the former reappear under the use of this drug. Small doses seem to have as much effect as large amounts of the drug.

Sodium sulphite and potassium permanganate are active antiseptics, but in my experience their administration has been attended with a sense of nausea,

gastric distress, or vague discomfort, so much so that they have been necessarily discontinued.

There are some cases of dilatation of the stomach due to cicatricial stenosis of the pylorus following gastric ulcer, in which hydrochloric acid is still secreted, but is not found free in the gastric contents when they are withdrawn, because of the overwhelming amount of lactic acid that arises from active fermentation of stagnating contents. In these cases the total acidity is not infrequently raised to 100 or higher, and the administration of hydrochloric acid after meals gives rise to increased distress, amounting at times to a burning pain. While giving hydrochloric acid in such cases I have failed to find it free in the stomach-contents, and at the same time it has been quite noticeable that lactic-acid fermentation seemed rather to be increased than lessened, and the total acidity of already irritating contents was thus raised instead of lowered.

By stopping the administration of hydrochloric acid and substituting a mixture of cerium oxalate, bismuth subcarbonate, and light magnesium carbonate given between meals and at bedtime, not only was gastric comfort restored, but lactic acid was markedly diminished and free hydrochloric acid was found in the gastric contents. Finally one of the most important of all matters in the treatment of lactic-acid excess is the correction of the diet, the more so as improper diet is the cause of lactic-acid formation in many cases. Milk-puddings, custards, pastry, ice-cream, rich cakes, cheese, thick soups made with milk and cream, fancy entrées

made with cream and starches mixed, salads and salad-dressings, all these should be very much restricted or interdicted entirely. It is noticeable that milk and cream when taken alone do not give rise to nearly as much lactic-acid formation as when they are mixed with such starchy foods as creamed potatoes, cornstarch, tapioca, sago, etc.

As a rule, however, it is best to withhold milk at the outset until lactic acid is no longer formed in any but small quantities. Meats, eggs, stale bread, Zwieback, fish, oysters, and other plain foods should constitute the diet until the system is free from the effects of lactic-acid poisoning.

Lowered general health should be overcome by out-of-door life and appropriate exercise, sunlight, proper sleeping-rooms, hydrotherapy, massage, electricity—indeed, all those things that strengthen the nervous system, improve the blood, and increase muscular tone so that the functions of the stomach may benefit thereby.

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