sufflation of a solution of bicarbonate and chloride of sodium, if there is much nasal secretion, is frequently of service, and the application of cocaine in such cases to the nasal mucous membrane is described by the patients as helping to relieve the attacks. Application of the cautery in some cases relieves hay asthma. In children with large tonsils or with adenoids, in whom asthma supervenes, the surgical treatment of the local condition, although it may be necessary, does not of itself cure the asthmatic attacks, which may persist for months after the fauces and pharynx have been successfully treated. The removal of a nasal polypus may greatly relieve the attacks, but not a few cases persist after removal.

Diet.—Chronic asthmatics—that is, those in whom the attacks have lasted for some months or years, are frequently the subject of indigestion of food, as shown in the symptoms of weight and discomfort after food, and flatulence. This is sometimes the result of over-drugging. In the cases of peptic asthma, the regular attacks of the disease occur after a meal, usually the heaviest meal in the day, and are associated with indigestion of food. The regulation of the diet of asthmatic patients is of great importance; meals ought to consist only of digestible food, and that in moderate quantity, no heavy late meals being allowed. Remedies such as alkalies after meals given with the view of correcting the indigestion, combined with a proper diet, give great relief to cases of peptic asthma. Although the asthmatic ought to be careful as regards the food taken, it is wrong treatment to starve such a patient; only harm can come of it, inasmuch as the best chance of the patient recovering is an improvement of his general health, and this cannot occur without a sufficiency of food. It is for this reason, doubtless, that cod-liver oil does so much good in some cases when every remedy seems to have failed. The improvement if the oil can be taken is sometimes very marked, rendering possible the diminution, or even cessation, of the inhalations which the patient considered his sheet-anchor.

The confirmed asthmatical adult can only be relieved, and that sometimes very imperfectly, by the methods which have been detailed; and indeed in some cases all treatment appears of as little avail as in confirmed epilepsy. It is quite otherwise with the asthma of children under the age of 10 years, at which time a large number of cases arise. By treating the attacks by a careful regulation of the diet and mode of life of the child, and by the avoidance of any "hot-house" treatment over a number of years, the asthmatic child loses his attacks without serious damage to the respiratory apparatus.

A CONTRIBUTION TO THE CLINICAL STUDY OF THE GASTRIC JUICE.

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THE two following cases illustrate the importance, both for purposes of diagnosis and treatment, of a clinical examination of the contents of the stomach in cases of disease of that viscus. It is certainly desirable that such an examination should be carried out in all cases of stomach disorder in which the usual forms of treatment do not quickly relieve the patient. Exact quantitative estimation of the constituents of the gastric juice is unfortunately rarely possible in ordinary practice, but sufficient information for all practical purposes of treatment may be gained by some such method of procedure as was adopted in the two following cases, and can be accomplished in half an hour. More exact data to indicate the direction which treatment should take may thus be obtained than by studying simply the patient's subjective symptoms, and sometimes evidence, not otherwise to be gained, pointing to the presence behind ostensible "dyspepsia" of some more formidable disease.

1. ON THE COMPOSITION OF THE GASTRIC CONTENTS IN A CASE OF TABES DORSALIS WITH GASTRIC CRISES IN WHICH HÆMATEMESIS OCCURRED.

In the case described below gastric crises formed the striking symptoms of tabes dorsalis, the other signs being unobtrusive, and they were attended with hæmatemesis, in

the absence of any symptom of gastric ulcer, and with failure of secretion of HCl during the attacks.

S. W., a clothworker, aged 42, complained of severe attacks of vomiting coming on at frequent intervals. He had had no very bad illness, and denied all history of syphilis, but had gonorrhœa at 18 years of age. He attributed his illness to strain during a "tug-of-war" at Aldershot. The first attack of vomiting occurred seven years ago, the next six months afterwards, and during the next two or three years he had about two attacks in each year. Since then they have become more frequent, and during the past year have occurred at intervals of about three weeks. At first they lasted for about half a day, but latterly they have become more violent, and last two to three days. Whilst the attacks last he vomits about every hour; the vomit is intensely bitter in taste, and yellowish or green in colour; towards the end of an attack he has often brought up a fluid like coffee grounds. He can trace no cause for the paroxysms; the kind of food he takes makes no difference; they generally begin in the morning, and leave him much exhausted for a day or so, with a depressing sensation in the pit of the stomach. During the attacks he has an indescribable sensation of 'discomfort in the pit of the stomach, but no acute pain. In the intervals he is well, and does not suffer from vomiting, dyspepsia, or pain in the stomach. Ten weeks before admission he vomited nearly 3 pints of dark-red fluid, apparently blood, with some clots. On examination the patient was sallow and anæmic. The tongue was large, red, covered with a very thin white fur, and indented by the teeth. The thoracic and abdominal organs appeared to be healthy. There was no tenderness in the epigastrium, the stomach was not dilated, and no tumour was felt. The knee-jerks were absent; the pupils were very small, the right being larger than the left, they reacted to accommodation, but not to light. The optic discs were pale; the superficial reflexes were normal. There was no affection of sensation to touch, pain, or temperature, except a little blunting of sensation over the feet. There was no ataxy of gait or other movement. He was not giddy in the dark, and the bladder was unaffected. He had a slight girdle-pain, and on inquiry it was elicited that for at least twelve months he had suffered from attacks of typical lightning pains in the arms and legs, which often came on about two days after a gastric crisis. The urine was normal. From March 10th to 16th the stomach contents were examined at varying intervals, after a test-meal of weak tea, toast, and butter.

The tests used for HCl were Gunzberg's, Boas's resorcin tests, and benzo-purpurin papers, with Congo red papers for detection of free acid. I could not estimate the HCl by the more exact and elaborate methods, but an attempt was made to determine roughly the quantity of HCl by using Gunzberg's reagent after first extracting the lactic acid from the gastric contents by agitating with ether, and separating the ether. Gunzberg's reagent gives a reaction with 0.06 per cent. free HCl, and the 10 c.cm. of gastric fluid was progressively diluted with distilled water until no reaction was obtained, and the percentage of HCl calculated from the number of dilutions. This is, of course, only a rough method, but so far as it went indicated in the following examinations that between the crises the quantity of HCl was much above the normal. The total acidity is given, according to Ewald's plan, in terms of the number of c.cm. of decinormal soda solution required for neutralisation. An hour to an hour and a half after the test meal the total acidity of the gastric fluid withdrawn was 64; the amount of HCl on one occasion at least 0.4 per cent., and a small amount of lactic acid was present. Two to three hours after the meal, total acidity 80, with much free HCl, peptones, and no lactic acid. Four to five hours after the meal the stomach was empty, except on one occasion when it contained a little fluid (four hours later) whose acidity was 108.

On March 17th a gastric crisis began, and continued for 48 hours. The vomited matter was fluid at first, of the colour of coffee grounds, with a few streaks of bright blood, and a quantity of mucus. Under the microscope undigested milk and some altered blood corpuscles were found, but no sarcinæ. Later it became yellow in colour. In all about 80 ounces were vomited, with a total acidity 60, a very marked lactic acid reaction, but no free HCl was present by the above tests. After this attack the stomach contents were examined on three

occasions after test meals. The total acidity varied from 54 to 70 one or two hours after the meal, the amount of HCl present was very large, about 0.4 per cent., with a small quantity of lactic acid. The fluid contained abundance of peptones (albumoses), and digested white of egg rapidly. Three and a half hours after a meal the stomach was empty.

On March 31st another attack of vomiting occurred, and lasted for 30 hours; the patient brought up 80 ounces of fluid of the same characters as before, intensely acid, the acidity apparently due chiefly to the large quantity of lactic acid present; free HCl was completely absent. The attack was to some extent relieved by hypodermic injections of morphine. A feature of these crises was that the patient felt better immediately that they were over and felt inclined to take solid food at once, and was able to keep down a good meal.

On April 13th a third, but milder, attack occurred, and shortly afterwards he left the hospital. The gastric contents were again examined four times in the interval between the two last attacks, and showed a total acidity of 60 to 80, presence of a large amount of free HCl, roughly about 0.4 per cent., with a small quantity of lactic acid, and active proteolytic properties.

The interesting points of the case are:

1. The presence, apparently as a constant feature, in the intervals between the gastric crises, of a large amount (excess) of HCl during the process of digestion, and stomach digestion appeared to be rapidly completed. There was no evidence of secretion of HCl in the intervals between meals when the stomach was at rest.

2. The absence of free HCl from the stomach altogether during the whole duration of the gastric crises, and the presence of abundant lactic acid during these. In other cases Rosenthal and Hoffmann have found a marked excess of HCl during the crises, and other observers have found lactic acid present. In the intervals the HCl did not increase progressively until the onset of the crisis, so that they could not be attributed to excessive irritability of the stomach from this cause.

3. The presence of blood in the vomit. In the attacks observed in the hospital the vomit was at first "coffee ground" and the amount small. It can hardly have been due to the violence of the vomiting, for the blood was generally contained in the first vomited matters, and disappeared when the vomiting had lasted some time. The "coffee-ground" appearance is evidence that it must have stayed in the stomach some little time, at any rate sufficiently long to be acted upon by the gastric juice. In addition the patient had had (according to the account he gave, which there was no reason to doubt) a severe attack of hæmatemesis before admission into the hospital. There were none of the usual signs and symptoms of gastric or duodenal ulcer. One knows, of course, that a gastric or duodenal ulcer may present no signs, and be entirely latent until a profuse hæmorrhage or perforation occurs, and it is possible that the patient may have been the subject of a latent ulcer. It would be expected, however, that some symptoms should have been present after the large hæmorrhage occurred if there had been an ulcer.

A case of gastric crises with hæmatemesis is given by Charcot,¹ and he insists there on the possibility of this occurrence without any other lesion of the stomach complicating tabes.

In respect to the uncontrollable character of the vomiting, its long duration, sudden onset and abrupt termination, with the intense feeling of depression at the pit of the stomach, the attacks conformed to the usual characters of gastric crises.

The only other point to be noticed is that the patient was in the pre-ataxic stage of the disease, and that the other signs, though quite sufficient to make a positive diagnosis, were sufficiently few. The case well illustrates the importance of always bearing in view the possibility of tabes dorsalis in obscure stomach affections, and of searching for the signs of the disease.

2. A CASE OF NEURASTHENIA WITH ANACIDITY OF THE GASTRIC JUICE.

The following case is an example of the fact that occasionally free HCl is absent from the gastric juice in cases of neurasthenia in which dyspepsia forms a prominent feature,

and of the aggravation of the dyspeptic symptoms which at once takes place if the gastric motility is impaired, so that the stomach can no longer discharge its contents into the duodenum at the normal rate. Whilst the stomach can normally empty itself the dyspeptic trouble is comparatively slight in spite of the absence of HCl.

The patient was a thin rather weakly lad, aged 19, who complained of a weak heart and flatulence. He came of a healthy family, and had always been well until the present illness, which he attributed to gradual deterioration of health from his work as a boxmaker, which involved his carrying a considerable weight up two flights of stairs many times a day. He had smoked very little. He had been in good health until July 2nd, 1897, when whilst at work he had an attack of syncope. He returned to work in a few days, but had another attack; after a fortnight's rest a second attempt to resume work brought on a third faint, and since then he had been laid up with shortness of breath, palpitation on exertion, and with excessive flatulence after food.

He was admitted to the hospital on September 4th, 1897, and was then rather anæmic and not well nourished. The pulse was 96, irregular, not compressible, running up to 120 on any exertion or excitement. Respirations 28, temperature normal. The tongue flabby, tremulous, covered with a thin white fur. The breath was offensive, and he was constantly eructating a quantity of wind. The muscles were poorly developed, unduly irritable on percussion, but there was no myoidema.

On examination the lungs were healthy, except for some irregularity of respiration, and an occasional rhonchus. The heart's apex was in the fifth space in the nipple line, the area of dullness normal; a faint systolic murmur accompanying the first sound was audible at the base only, and the second sound was accentuated in the pulmonary area. The stomach was not dilated; the other abdominal organs appeared healthy. The urine was acid, 1022, contained no albumen or sugar, and deposited phosphates on boiling. The appetite was good, the bowels constipated.

Examination of the gastric contents an hour and a half after a test meal gave total acidity 30, chiefly due to acid salts, a complete absence of HCl, small amount of lactic acid, and a marked rosy-red colour with Fehling's solution. Examination four to five hours after a meal showed that the stomach was empty.

During the following fortnight he had no vomiting, but suffered a good deal from flatulent distension of the stomach; the pulse varied from 98 to 120. He gradually improved, and on September 28th was discharged better. His diet was carefully regulated, and he took a mixture containing acid. hydrochlor. dil., strychnine, and pepsine, during his stay in the hospital. On his discharge his pulse had fallen to 80, was regular, improved in strength and tension. The dilatation of the stomach had disappeared. His appetite was good and there was no vomiting.

On October 19th (three weeks later) the patient returned, saying that he had not been able to do any work and that walking quickly or uphill brought on distressing attacks of palpitation. He had had six attacks of faintness, which came on suddenly, made him feel for a few minutes as if all use had gone out of his limbs and were accompanied with noises in the ears. He never fell down or lost consciousness in these attacks. He had a great deal of flatulence after meals, a burning pain behind the sternum and in the left hypochondrium, but no vomiting, and the bowels were regular. On examination there was pulsation in the third, fourth, and fifth left intercostal spaces, and in the second during expiration only; the second sound in the pulmonary area was rough and reduplicated, otherwise the heart sounds were normal and the area of cardiac dullness was not enlarged. The pulse was 96, running up to 116 on any excitement or exertion. The stomach was somewhat dilated, otherwise the abdominal organs were normal. He was constantly bringing up an extraordinary quantity of wind.

He was put on a carefully regulated rather dry diet of easily digestible food and the stomach washed out daily before breakfast. He took after meals three times a day a mixture containing acid. hydrochlor. dil. π xv-xx, liq. strych. π ijj, strontii bromidi gr. x. Examinations of the gastric contents on three occasions, one hour, two hours, and three hours after

a test meal gave respectively total acidity 16, 23, and 16. No free HCl, to any test; a small quantity of lactic acid and some butyric acid, sugar and peptones were both present, the latter in greatest amount two hours after the meals. Examined four to five hours after a meal the stomach was found to be empty or to contain a very small amount of fluid. As the stomach was washed out each morning there was no chance of any residuum from the food of the previous day being present, and indeed after washing out a few times the gastric dilatation present on admission ceased.

On November 3rd the gastric symptoms had much improved, but as the pulse still continued to be weak, rapid—92 to 116 to the minute—and irregular, the Schott treatment by graduated exercises and baths, at first simple brine baths then carbonic acid baths, was regularly carried out.

On November 16th the washing out of the stomach was stopped. Under the above treatment he had improved steadily, the pulse had become stronger and more regular, and the rate 84 to 92 beats to the minute. On two occasions he felt faint in the bath, and the pulse was then found to rise to 104. He had improved so much in all respects that on November 30th the baths and exercises were stopped, and he was sent to a convalescent home on December 3rd. The gastric contents were examined on many occasions during November at intervals of one to three hours after a test meal; the total acidity varied from 7 to 16. Free hydrochloric acid was always found absent. The acidity was due chiefly to free acid, lactic acid being found on each occasion; on one there was an odour of butyric acid. Peptones and sugar were always found.

He attended as an out-patient on his return from the convalescent home, and appeared to be much stronger and better. He had no shortness of breath, and the pulse was more regular, but still rapid, varying from 84 to 96 per minute. The indigestion and flatulence now troubled him very little.

The stomach emptied on February 4th, one hour and a-half after a test meal gave total acidity 37; lactic and butyric acids, peptones and sugar present, but no free HCl.

On February 11th, four hours after a meal, only a few teaspoonfuls were obtained, and this contained a little free HCl for the first time, and peptones.

On February 18th, one hour and a-half after, total acidity was 35, lactic acid was present, and again a small quantity of free HCl.

Portions of the gastric juice were on two occasions kept at the body temperature with small cubes of boiled white of egg, and were found to exercise in two and a-half hours a digestive action upon it with formation of peptones, though somewhat feebly. In the above account the peptones should probably be called albumoses; no attempt was made to differentiate between them. The total acidity is expressed as recommended by Ewald in terms of the number of c.cm. of decinormal soda solution required to neutralise 100 c.cm. gastric juice.

The patient expressed himself as feeling quite recovered on February 18th, 1898, and returned to work.

The pronounced symptoms of gastric disorder in this case, and the accompanying dilatation of the stomach, were obviously part of a general neurasthenic condition in which the heart also shared. In this "nervous dyspepsia" an interesting feature was the absence of free hydrochloric acid from the gastric juice for so long a period. Ewald in his work mentions other instances of severe neurasthenia in which there was "nervous anacidity of the gastric juice," and says that he has repeatedly observed it in hysteria.² It seems that in such conditions the HCl is more often diminished than altogether absent. In this particular case the age of the patient and the other symptoms present put the diagnosis of cancer of the stomach, which is the most frequent condition in which free HCl is absent, out of the question. Moreover, the washings of the stomach did not show that amount of mucus which is found in the so-called "mucous" variety of chronic gastric catarrh in which HCl is generally much deficient in quantity. In spite of the absence of free HCl, a certain amount of peptones or albumoses was formed, indicating that the secretion of pepsin proceeded.

The gastric symptoms were relieved after a course of washing out the stomach had got rid of the dilatation, and the

gastric walls had recovered their normal motility; the great flatulence was also soon relieved by this measure, and was in part due no doubt to the excessive fermentation allowed by the absence of free HCl combined with stagnation of the gastric contents. Recovery of the motor power of the stomach walls was thus followed by improvement in the dyspeptic symptoms, although HCl was still absent. It is further interesting to note that on recovery secretion of HCl into the stomach returned, though in small amount.

The sudden fainting attacks may be attributed to the heart muscle sharing in the general weakness, and to the disturbance of the action of that organ by the excessive flatulent distension of a dilated stomach.

REFERENCES.

¹ *Leçons du Mardi*, 1888-89, p. 343. ² *Diseases of the Stomach*, New Sydenham Society's translation, p. 617.

A DEMONSTRATION OF INTRAGASTRIC INSTRUMENTS.*

I.—PROFESSOR FENTON B. TURCK, M.D.,
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PROFESSOR FENTON B. TURCK (Chicago) demonstrated certain intragastric instruments and gastric methods devised by himself. The mode of introduction and the actual use of the different forms of apparatus were shown clinically upon patients accustomed to and skilled in the passage of the stomach tube.

1. THE GYROMELE.

The gyromele consisted of a flexible cable, to the end of which was attached a sponge covering a spiral spring, which could be removed from the cable at will and changed. The cable passed through a rubber tube, and this again was attached to a revolving apparatus, not unlike a dentist's drill, for the purpose of producing revolutions of the sponge.

When it was wished to explore the stomach cavity a sponge was fitted over the lower end of the cable. On introduction of the sponge-capped end into the stomach it glided along the larger curvature, and was then made to revolve. The exact location of the sponge in the greater curvature was palpable through the abdominal wall. In some cases it even was possible to pass it through the pylorus into the duodenum. The distensibility and extent of dilatation of the stomach could also be determined by means of cables of various degrees of flexibility used with the gyromele. The stiffer cables when introduced into the stomach and allowed to glide along the greater curvature distended the stomach wall, while the more flexible cables failed to stretch it. The difference between the two indicated the degree of distensibility and dilatation. The revolutions of the sponge within the stomach could be readily palpated through the abdominal walls. The exact location, position, size, and shape of the stomach was easily determined by its use, and the area outlined with pencil on the body; in the cadaver subsequent examination had shown such results to be accurate. With the gyromele, also, the material adhering to the sponge could be tested chemically and bacteriologically. To obtain an uncontaminated sample of the gastric contents or of the mucus, together with the material entangled in it, adhering to the stomach walls, a silk web tube encased the metal cable and sponge, and was itself encased in a wider soft rubber tube, supplied with a protective cap of rubber over the terminal opening. This cap was kept applied to the end of the tube by means of an attached piece of string passing along the lumen of the tube. When the end of the tube had reached the stomach cavity—all parts of the apparatus were rendered strictly aseptic beforehand—the cable was pushed down, the string relaxed, the cap separated from the tube, and the sponge, therefore, accessible to the stomach contents.

The therapeutic effect produced by the gyromele was largely mechanical in origin. It removed the mucus, etc., from the stomach walls, especially if green soap solution (1 oz. in 2 pints of water) was used to soften it; rendered

* In the Section of Pharmacology and Therapeutics at the Annual Meeting of the British Medical Association, held in Edinburgh, July, 1898.