An Address

ON

GASTRIC HYPERACIDITY (HYPERCHLORHYDRIA);

ITS NATURE, DIAGNOSIS, AND TREATMENT.

Delivered before the Edinburgh Medico-Chirurgical Society.

By WILLIAM RUSSELL, M.D., F.R.C.P.Ed.,

Assistant Physician, Edinburgh Royal Infirmary; Lecturer on Pathology, Medical College for Women, Edinburgh; Examiner in Pathology in the University of Edinburgh; and Examiner in Medicine in the University of St. Andrews.

RECENT papers and discussions on dyspepsia and gastric dilatation which have appeared either in full or in abbreviated form in the *BRITISH MEDICAL JOURNAL* have led me to add my contribution to a subject of very wide interest. My excuse for doing so is the belief that my observations may clear up points in connexion with gastric disorders regarding which there is much uncertainty and confusion.

It is not many years since it was generally taught and universally believed that gastric hyperacidity was due to the presence of organic acids, the products of the fermentation of food in the stomach, the fermentation being caused by organisms. This widely-accepted view was probably appropriated from the knowledge of the condition of the stomach contents in pyloric obstruction. The inference that the gastric contents underwent fermentation whenever unduly retained came to be applied to all, or nearly all, gastric disturbances. It became a fundamental proposition, a practically unquestioned assumption. In more recent years, with greatly increased knowledge of digestive processes, it has, however, been recognized that there is a gastric hyperacidity which is due not to the fermentation of food stuffs in the stomach, but to a true excess in the amount of the special acid normally secreted by the organ. This excess of hydrochloric acid is suitably, if not elegantly, termed hyperchlorhydria or hyperchylia, and it is to this condition that I propose in this paper to confine myself.

This hydrochloric acid excess is, in my experience, a much more common cause of dyspepsia, and ultimately of gastric dilatation, than is at present recognized. It is the primary fault in many cases that are classed as nervous, neurotic, or irritation indigestion, and not infrequently it stands in the same relation to cases named gastric catarrh or gastric dilatation. I find that of the cases of dyspepsia I have seen at the Royal Infirmary I have placed about 25 per cent. in the category of hyperchlorhydria. The private cases I have seen show an even higher proportion of cases of hyperacidity.

SYMPTOMS.

It requires patience and method to obtain an accurate record or a true picture of the symptoms in gastric disorder. The plan I have developed is simple, scientific, and practical, and gives satisfactory results. I begin by inquiring how my patient feels on getting up in the morning; then the hour at which he breakfasts, and of what that meal usually consists; how he feels after breakfast, and if any pain, discomfort, or other symptom is experienced during the forenoon, and the hour at which these come on, how long they last, and whether they continue up to the time of taking the mid-day meal. If symptoms continue up to the mid-day meal I ascertain the effect that meal has upon them—whether they are at once aggravated, or materially relieved, or entirely removed, at least for the time. I then inquire as to the composition of the mid-day meal. This is followed by inquiries as to the symptoms during the afternoon and so on until bedtime, and later if necessary. This method I have found to be the only way to obtain exact knowledge of symptoms, and the symptoms so obtained are of the greatest value in helping to determine the part of the digestive process which is at fault. Occasionally an observant patient gives all this without detailed questioning, but such patients are rare; the majority give a description which is usually irrelevant and confused, symptoms, times, and explanations being intimately interwoven and mixed.

The history thus obtained is often so characteristic as to warrant the diagnosis of hyperchlorhydria without the chemical examination of the gastric contents. The facts brought out in such a history are somewhat as follows: The patient feels quite well in the morning, and has no discomfort until during the forenoon some time. He can often state the hour at which discomfort begins—one to two, or two and a-half

hours after breakfast—the time varying in different cases, and even in the same case. The pain after lasting an hour or two may pass off, to reappear an hour or longer after the midday meal. If the pain continue right up to the time of taking the midday meal, partaking of this meal removes it for a time, the period of relief varying from half an hour to an hour. The duration of the interval of comfort depends upon the severity of the condition and the composition of the midday meal. This sequence of events—meals, intervals of relief, recurrence of pain or discomfort—may be maintained throughout the rest of the day. If the last meal of the day be taken near bedtime, the patient may be awakened from sleep by pain and other symptoms which may keep him awake for an hour or two. The pain or discomfort varies within wide limits; it may be severe and acute, and described as grinding, gnawing, boring, burning, or the sensation may be of dragging, oppression, or distension. The pain is usually referred to the epigastrium, but it may go through to the back near the spine; it may be present behind either shoulder blade, or be most marked in the normal position of the pylorus, or over the liver behind. The measure and the site of the pain depend upon the duration and severity of the condition more than on any neuropathic tendency in the individual. There is indeed no department where so much is attributed to disordered or disturbed innervation, as in gastric disorders, and the exaggeration of the factor tends to relegate to a subsidiary place the part taken by diet and altered secretion in the production of the symptoms. Symptoms due to one or other or both of these are referred to as nervous, as if a nerve condition were the primary and essential factor, when it is but the sensory index of disordered chemistry. In addition to pain, there may be epigastric tenderness, but this is only present in pronounced cases of considerable duration. The tenderness is quite superficial, and is readily overcome by gently rubbing or handling the skin, and then deep palpation can be practised without causing pain. Other symptoms referred directly to the stomach are flatulent distension, gaseous eructations, heartburn, and acid eructations. The eructation of gas or of a small quantity of acid material gives relief, temporary usually, but often very marked and out of all proportion, one would think, to the amount eructated. The bowels are constipated, or, even if there be daily action, the removal of the intestinal contents is incomplete. In severe cases there is sometimes great physical and mental misery, coming on or attaining their worst when other symptoms are at their height. The most prominent of these is a sense of physical and mental exhaustion, languor, weariness, and weight in the lower limbs, and inability to apply mind or body to any work. Another symptom has been graphically described by Sir W. Roberts under the designation of "paroxysmal pyrosis," and he regarded it as an "abortive and incomplete act of vomiting." While agreeing with him that this special symptom only occurs during the presence of surplus acid in the stomach, I think, that, instead of its being an abortive act of vomiting, it is a pyloric phenomenon.

THE EXPLANATION OF THE SYMPTOMS.

To understand the symptoms of gastric disorder it is necessary to postulate precise knowledge and a clear comprehension of digestive processes in the stomach. Our food consists of three great classes of nutriment—starch, proteid, fat. The main sources of starch are cereals, including rice and potatoes; of proteid are meat, milk, eggs; of fat are butter, milk, meat. The starches are prepared for food by baking and boiling, being unfit for human food in an uncooked state. The object of cooking is to break the starch capsules and to disintegrate the starch particles so as to expose them to the amylolytic enzymes of the saliva and of other secretions. The longer the cooking at a proper temperature is continued the greater are the changes in the starch and the better the prospect of its speedy conversion. The conversion is effected in the first instance by the ptyalin of the saliva, and this under favourable conditions acts with vigour and promptness, converting the disintegrated but insoluble starch into soluble starch, a long chain of dextrins, and finally into maltose. This amylolytic process continues in the stomach until by the pouring out of hydrochloric acid the gastric contents acquire an acidity of 0.003 per cent. according to Chittenden and Smith. At all events when the acidity reaches a certain degree the digestion of starch ceases, but the digestion of proteids, which has already begun, is accelerated by the increasing secretion of hydrochloric acid and pepsinogen. These three chemical phenomena—starch digestion, arrest of

starch digestion, proteid digestion—are those upon which the unconscious comfort or the conscious discomfort of digestion primarily and essentially depends. When the chemical equilibrium and balance during this period is maintained the stomach works without obtruding its existence on our notice. The full significance of this equilibrium has, however, to be realised; it means the existence of a "correct relation" between the amount of proteid food and the amount of gastric secretion. There ought to be no more gastric juice poured out than can satisfy the needs of—that is, can be taken up by—the proteid. When this is satisfied, the secretion of gastric juice ought to cease, and we cannot doubt that under normal conditions this must be the case. If this arrest of secretion does not occur, equilibrium is upset, and the resulting perturbation depends upon the measure of the excess. The element in the secretion which is the disturbing factor is the hydrochloric acid, and not the special enzyme. The effect of this hyperchlorhydria upon the gastric contents is noteworthy, and requires explanation. The proteid elements of the food are digested with promptness and even with exceptional alacrity; and it might be thought that the other food substances, especially the finely-divided starch food, as bread and oatmeal porridge, would readily pass out of the stomach with the dissolved proteids, but this is not what happens. What does occur is that a considerable portion of unaltered starch is kept back and retained in the stomach. This I have frequently found to be the case. The effect of this retained and unaltered starch is to keep up the gastric secretion while presenting no constituent with which it can combine. The physiological concept is that the undigested starch is readily passed into the duodenum, and its digestion completed in the intestine. Even in such conditions as I am now considering, the undigested starch is, as a rule, ultimately passed on, but this only after much local and often general discomfort, but it may be finally rejected by vomiting. Another interesting observation I have made in this connexion is that not only the unaltered starch may be thus retained, but a considerable amount of the fat of milk may also be retained. I have several times noted this when all the casein of the milk had disappeared. I have seen this both when plain milk and peptonized milk had been taken. When it occurs the fat of the milk is found diffused through the acid fluid removed from the stomach, but partly floating upon it, presenting an appearance as if it were a mass of mucus. When the fat of milk is thus retained, it seems to me that it also keeps up the gastric secretion, and, presenting no element with which the hydrochloric acid can combine, the discomforts of hyperchlorhydria emerge. A third important factor in determining the severity of the symptoms is the kind of proteid food taken. The general law is that the less stimulating and the more easily digested proteids cause less discomfort than do those of a contrary character.

In all three conditions there is the common factor of continued gastric secretion, continued beyond what is required, therefore beyond what can be utilized. This continued secretion when the stomach contents are examined, provides marked evidence of free hydrochloric acid, and a high percentage of acidity. At this stage the stomach contents may only measure from one to a few ounces of very acid material, mainly fluid, containing starch, some milk fat, and shreds of undigested material according to the kind of food which had been taken. The main residue in ordinary cases is starch. At this period the gastric symptoms are very severe, and I have frequently obtained the contents of the organ when the symptoms were at their height, and have been amazed at the smallness of the amount in view of the intensity of the symptoms. Why a residuum of finely divided although undigested starch should remain in the stomach when other material has passed the pylorus is difficult to explain. The physiological position is roughly this, that the fate of starch in the stomach is of relatively little importance, as it is digested in the intestine; and this, from the nutritive standpoint alone, is true, and explains the fact that sufferers from hyperchylia do not lose flesh unless they adopt a starvation policy in regard to their food. But this physiological truth is one of those truths which has led to a total misapprehension of the phenomena of disordered function such as the physician has to deal with. The interpretation which seems to me to be in accord with my clinical observations is that we have to acknowledge that the unaltered starch is delayed in the stomach, and that it is so even when broken up and digested proteids have escaped. Being thus delayed it continues to stimulate the gastric secretion, and there being no more proteid with which to

combine the secretion accumulates and leads to the hyperacidity in question. That this hyperacidity is due to a true hypersecretion is proved by the great peptonising power of the filtered contents when tested in the usual way. Once the residuum in the stomach becomes hyperacid its continued retention is explained by the fact that the hyperacidity keeps the pyloric sphincter closed, or even causes spasm of it.

ETIOLOGY.

Looking, in the next place, at the etiology of hyperchylia, we find ourselves face to face with terms and designations which only obscure the position. The favourite place in which to find it described is under gastric neuroses, nervous dyspepsia, gastric irritation, gastrodynia, or gastralgia. It is not always clear what writers on gastric disorders mean by some of these terms. Whether the idea which is sought to be conveyed is that the pain and discomfort are merely subjective nervous phenomena, or that an assumed neurotic diathesis determines an increased secretion of hydrochloric acid. The underlying idea seems to be that the nervous mechanism is the part of the system which is primarily deranged. This conception I hold to be erroneous and brimful of evil consequences. We all possess a nervous system, some more finely tuned and more responsive than others, and we all grant and recognise the important rôle played by it. All deviations of secretion from an average standard, all increases of secretion, all modifications of chemico-vital reaction, are not to-day accepted as explained or defined by the word "neurotic," and it is time that the word and the idea were relegated to a less prominent place when considering disturbances of stomach function. In opposition to this neurotic view I would submit as a result of my clinical experience and the examination of gastric contents that certain persons are prone to secrete over-much gastric juice, and that possibly the constituent which is primarily at fault is the hydrochloric acid. I have been impressed with the occurrence of severe hyperacidity in some gouty and rheumatic subjects, and by its occurrence in some persons as a consequence of a diet rich in nitrogenous substances. I think, indeed, there is little doubt that we might add to our list of constitutional conditions an acid dyscrasia. To regard the intense misery of severe hyperchylia as a mere neurosis is an impertinence to some of the victims of the condition. Apart, however, from that aspect of the case I hold the merely neurotic view to be disproved by the following phenomena which I have frequently observed: the instantaneous relief obtained by removing an ounce or two of acrid stomach residuum; a like relief obtained by neutralizing the acid by means of alkalis; and the measure of relief obtained by mere dilution. That the over-secretion is more a chemical and a diathetic error than a neurosis is further strongly supported by the experience that the mechanical removal of the hyperacid residuum in severe cases more promptly overcomes the attack than any dietetic or medicinal measure—as if the removal of the acid removed an overflow which otherwise is difficult to arrest, and which when not removed looks as if it were absorbed and again and again resecreted.

Further Local Effects.—The retention in the stomach of hyperacid residuum gives rise further to catarrh and to atonic dilatation. In fact, so-called "atonic dilatation" is very often not primarily an atonicity, but due to a hyperchlorhydria. The steps of this process are too apparent to need further words. In some severe cases relief is ultimately obtained by vomiting. Within the last six months I have twice had a man under my care suffering from intense hyperchylia, whose gastric contents when brought up by vomiting were green in colour from admixture with bile, but were never green when removed by the stomach tube. What evidently happened here was that with the onset of nausea there was a reflux of bile from the duodenum which seemed to determine active vomiting.

TREATMENT.

The treatment to be selected depends upon the severity of the condition and the history of the case, and only the general principles can be indicated here. In mild degrees, associated with constipation, the correction of this may be sufficient. In other instances an alkali taken some time before food neutralizes any acid residuum and facilitates the transformation of the starchy elements of the next meal. In other instances relief is obtained by the administration of even a small dose of an alkali as soon as discomfort begins. This has for some time been to me a clear practical fact, and it has now the support of Pawlow's work on the secretions of the digestive glands. I have had no success with the administration

of acids in this condition, although in some other gastric disorders I use them with good effect. As regards diet this also has to be determined by the severity of the symptoms. In some cases the prohibition of the more common forms of starch such as potato and untoasted bread is sufficient; in others still greater care must be exercised in the selection of the most readily digested carbohydrates. Another class may get past their immediate discomfort by the use for a day or two of readily digested pure proteid diet, and the gradual addition to this of the most soluble carbohydrates available.

A few weeks ago I promptly gave relief to a young woman who had been sent to me with pain coming on an hour or more after every meal, and so severe that she was almost afraid to touch food of any kind. A couple of days on raw eggs, and then the gradual addition of suitable carbohydrate gave complete relief. In the severest cases I find the removal of the gastric residuum the speediest means of temporary cure. I say temporary, for as I hold the condition to be a chemical dyscrasia, and not a neurosis, permanent cure or anything approaching it can only be looked for from a dietary adapted to counteract or prevent the chemical dyscrasia manifesting itself.

The considerations determining the dietary are (1) the proteids ought to be reduced to a physiological minimum, and ought to be so selected and cooked as to be easy and ready of digestion; (2) the starches should be as much altered as possible; (3) the quantity of food should not exceed the physiological requirements. Proceeding on these broad lines we may have every confidence in assuring our patients of recovery, and that continuance on the lines indicated will carry with them the reward of physical and mental well-being.

NOTE.

¹ Of these there are now several on the British market suitable for ordinary daily use.

An Address

ON

THE OPERATIVE TREATMENT OF ENLARGED PROSTATE.

Delivered before the Section of Surgery of the Royal Academy of Medicine in Ireland.

BY SIR WILLIAM THOMSON, C.B.,

Surgeon to the Richmond Hospital, Dublin; Hon. Surgeon to H.M. the King.

REMOVAL of the prostate, or of portions of it, because of obstruction to urination, is a procedure which, in this country at all events, has the attractiveness of novelty. I think I may say that there are few here to-night who have seen the operation performed, and perhaps still fewer who have themselves done it. Prostatic obstruction, with all its attendant miseries and its tendency to cause the death of the patient, has until recently been viewed as a condition impossible to cure, and the surgeon's ingenuity has been directed to palliating the victim's distress by the use of the catheter and the administration of soothing drugs.

We have almost vainly hoped for a method comparatively safe and rapid of removing for good and all the body which produced the trouble. In the efforts to attain this McGill, of Leeds, and Belfield, of Chicago, stand prominent, and others have occasionally followed their example. But somehow to the majority of surgeons the radical operative methods have not commended themselves, and in the fourteen years which have elapsed since McGill's reports there certainly has been no general adoption of prostatectomy. If to-day British and Irish surgeons stand in the position that the principle of operative interference is accepted and practised on some approved line, I think I am right in claiming for Mr. P. J. Freyer, of London, that it is due to his strong advocacy and to the remarkably successful results which he has achieved.

I do not intend to discuss the cauterizing or cutting operations upon the prostate through the urethra by the methods of Bottini or Norton, in which the object is to remove only such portions of the gland as cause obstruction to the flow of urine. I wish to refer rather to those operations which aim

at removal of the whole gland, or of adenomatous masses, which, for practical purposes, may be regarded as the gland. These may be divided into two great classes—the suprapubic and the perineal; and a subclass may be added in which the two procedures are combined.

HISTORICAL.

Suprapubic cystotomy for the removal of tumours of the wall, or of stone, appears to have suggested to the late Mr. McGill, of Leeds, that a like course might be successfully pursued in regard to the prostate. His first operation was done in March, 1887, and this, with three others, was reported to the Clinical Society of London in November of the same year. His example was followed by his colleagues, and two years later he reported the results at the annual meeting of the British Medical Association. Twenty-four operations had been done, and the number was made up as follows: McGill, 12; Atkinson, 5; Mayo Robson, 3; Jessop, 3; Pridgin Teale, 1. Of these, 4 died, and of the remaining 20, 7 no longer required the use of a catheter and were able to expel urine normally. You will notice, therefore, that only about one-third of the surviving patients were restored to freedom of urination.

But in comparing these results with what we expect to-day it is important to note particularly the nature of McGill's early operations. He says: "The growth has been removed partly by tearing with forceps and partly by a strong cutting instrument which I have devised for the purpose. This is a tedious and not very elegant proceeding; it will, if the operation prove a useful one, probably be improved. The piecemeal removal which I have practised has, however, been thus far satisfactory."

Now when we look into the details of the reported cases² we find that in most instances only a partial removal was effected, and that the patient had still to run the risk of a continued growth of the parts left behind. Thus, we have these descriptions of the parts removed: (Case 2) Middle lobe size of a bean; (3) collar enlargement, size of a walnut; (8) middle lobe, size of a filbert; (12) piece, the size of a small pea; (16) middle lobe, size of a filbert. Atkinson snipped off a middle lobe with scissors, and enucleated the lateral lobes with the finger. In the eighteenth case McGill "enucleated a portion" of the prostate; and in the twentieth, having removed the middle lobe with the forceps, enucleated the lateral lobes. These cases, therefore, were in the main partial removals by means of scissors and forceps, and the enucleation was apparently an unexpected incident, arising during the operation. The fact that adenomata of the prostate could be so removed was already known. Harrison had reported such a result in the course of a perineal operation for stone. In 1878 Bickersteth, of Liverpool, in performing lateral lithotomy had shelled out an adenoma the size of a hen's egg. In 1870 Sir William Fergusson "narrated a case where, in a patient 80 years of age, after removing the stone by lithotomy, he extracted the lower part of the prostate with the finger as readily as if it had been a stone." Other like cases are on record.

VARIOUS METHODS.

The possibility of enucleation, then, had been known for many years, and two years after his first case McGill, with larger experience, laid down the principle that "the prostate should be removed as far as possible by enucleation with the fingers, and not by cutting." Nevertheless, this fact, and the promising successes of McGill and his colleagues, appear to have made hardly any impression upon the surgical mind in these countries. Only here and there did their suggestions produce any effect; there was no general acceptance, and the position may be taken as accurately described by Buckston Browne, who so lately as last year declared: "The fact is that prostatectomy has been abandoned by the majority of surgeons as too dangerous an operation to be undertaken save under very exceptional circumstances." It was only a year ago that Freyer's reported cases and the heated controversy which they excited, awoke the profession generally to the powers within our reach in this branch of surgery. The American surgeons—notably Belfield and Fuller—were not, however, unimpressed by English experiences, and in that country the operation has reached a stage of marked development.

The operation which I have carried out is that advocated by Freyer, and it is to him I owe it that I have had some success in dealing with enlargement of the prostate. The method is thorough, and it requires no instrument for the ultimate steps. The bladder is opened in the suprapubic