given, whether by mouth or rectum, were probably produced by the acid, and not by the base of the salt, as no similar accidents have occurred when the carbonate has been given, and the symptoms were quite unlike those generally produced by acute poisoning with heavy metals. The reporters of these cases suggest that some nitrite was formed by intestinal fermentation from the subnitrate, as the symptoms (nausea, cyanosis, prostration, full bounding and rapid pulse, fast respiration) were similar to those of nitrite poisoning.

Mr. Finnemore, Pharmacist to Guy's Hospital, has kindly investigated the question for me from the chemical standpoint. He writes: "Two grams of bismuth subnitrate were added to 50 c.c. of 0.25 per cent. HCl (to represent the gastric juice) at a temperature of 38° C. In eight minutes a portion was filtered off, and only a trace of HCl was found in the filtrate; in fifteen minutes no HCl was present. On testing the filtrate, however, it was found that HNO₃ was present, and on titration it was proved to be nearly of the same strength as the HCl originally employed. The reaction which occurs is

If insufficient HCl is present in the stomach to act on all of the very large doses of bismuth nitrate given, the residue of the salt would be converted by the alkaline juices in the intestines into the oxy carbonate with simultaneous formation of sodium nitrate. The nitric acid would be rapidly absorbed and would circulate as sodium nitrate, and all the sodium nitrate formed in the intestines would also be absorbed. From four ounces of the subnitrate of bismuth one ounce of sodium nitrate would be formed. It has been proved that when large doses of nitrates are taken, a small proportion is excreted as nitrite. Hence it is quite conceivable that when half an ounce, or an ounce, of sodium nitrate is absorbed into the circulation, sufficient nitrite would be formed from it to give rise to serious symptoms of poisoning.

In view of the fact that two ounces of bismuth carbonate produce no constipation in normal individuals, it becomes a matter worthy of further investigation how the ten grains (one ninety-sixth part of the dose!), so often given with apparent success in cases of diarrhoea, can act.

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(To be continued.)

ON A SPECIAL FORM OF DILATATION AND DISPLACEMENT OF THE STOMACH.*

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[Dr. Short commenced his paper with some preliminary remarks on the monotonous, if not unsatisfactory, treatment of flatulent dyspepsia, and then drew attention to a particular form of the disorder which occurs in young or youngish people, which seemed to him to be a distinct condition amenable to treatment. He then proceeded as follows:]

The condition to which I wish to draw attention is associated especially with periodic attacks of severe pain—pain of a very acute type—relieved if the patient can vomit, but usually accompanied by an inability to vomit. In the intervals between the painful attacks discomfort, and especially flatulence, occurs, the latter making its presence known, not only by distension, but also by audible rumblings. There is also a want of proper assimilation of the food taken, as evidenced by loss of flesh, debility, and great depression of spirits, verging at times on melancholia. In investigating a large number

of such cases I have found that the condition present is dilatation, with displacement downwards of the stomach, and in this paper I propose to deal with the causes, diagnosis, and treatment of this particular form of dyspepsia.

It will probably conduce to simplicity if I describe a typical case and then take the main points in detail.

Miss B., aged 28, came to see me, complaining of severe palpitation with a feeling of distension occurring periodically, and associated with acute pain in the pit of the stomach. She was a clever, well-educated woman, and was manageress in the warehouse of a wholesale printing and stationery business. The nature of her work entailed long hours of standing and hurried meals. She was very depressed mentally, and was becoming almost melancholic. The attacks of palpitation were not always accompanied by pain, but on some occasions great difficulty of breathing was experienced, with cough and wheezing in the chest. The painful attacks were so severe that at times she had been known to roll about on the floor of the warehouse. No vomiting had occurred at any time. The attacks were always worse after her periods. Between the attacks she was fairly well, but was gradually losing flesh. The proprietor of the business—herself a woman—thought the case might be one of hysteria and sent her to a gynaecologist, who reported that nothing abnormal could be found in the uterus and appendages. When I saw her the stomach was much distended, and examination showed the lower border to be an inch below the umbilicus. It was dilated, but not excessively. After a course of treatment presently to be described she entirely recovered.

This is a fairly typical case of the kind I am taking as my subject to-day. I have notes of 28 more or less similar cases, all of which have been benefited if not cured by treatment.

CAUSES.

Dilatation due to pyloric obstruction or to the atonic gastrectasis of old people is not dealt with in this paper.

Sex and Age.—The condition I refer to occurs in both men and women, usually below 40 years of age, and frequently between 20 and 30. In one of my cases, a young man aged 22, the lower edge of the stomach was found to be 2 in. below the umbilicus.

Carious Teeth.—The most common cause I have found to be absence or inefficiency of the molar teeth. From this cause the stomach gets overloaded with improperly-masticated food. If the want of molar teeth is associated—as it often is—with rapid eating and large meals at infrequent intervals, the condition is even more likely to occur.

Erect Posture.—Add to these, long hours of standing commencing directly after meals, and the conditions suitable for the production of the complaint are all present. It is in young men and women who serve in shops, young wives who are on their feet nearly all day, clerks and salesmen and others following similar avocations, that these special conditions are fulfilled.

Ill-health and general debility are also conducive, but usually are the results and not the actual cause. When present, however, they help to form the vicious circle.

Neurasthenia.—It has been stated that neurasthenia and allied states are the cause of dilated stomach. Without denying that such may occur in rare instances I can certainly state that I have not met with a case in which the first symptoms have not pointed to insufficient assimilation of food preceding the nervous symptoms. I believe that in by far the greater number of cases the neurasthenia is the result and not the cause of the dilatation. Quite recently I have examined the stomach of a gentleman who was placed in a private asylum on account of severe melancholia, and found that the lower border of the stomach was 4 in. below the umbilicus. The greater part of it was in the left iliac fossa. In several of the cases that are included in my paper the extreme depression of spirits was the cause of their seeking advice and the stomach symptoms were put by the patients into a secondary position.

SIGNS AND SYMPTOMS.

In addition to the continual flatulence and occasional pain the patient feels miserable. There is a dragging-down feeling as if something has given way, and several patients have volunteered the statement that after food their stomach felt to them to be too low, and to be "dragging their insides downwards."

If they should be fortunate enough to be able to vomit, the distressing symptoms are greatly relieved,

* Abstract of a paper read before the Birmingham Branch.

and perhaps altogether removed for several days, and then recur. No blood is seen in the vomit, and the pain does not occur directly after food. The temperature of the food makes no difference. The actual kind of food, fluid or solid, has no remedial effect, and careful dieting leads only to disappointment. Most patients, however, find by experience that a diet quite liberal in variety suits them better than a restricted, and that on the whole the less fluid of any kind they take the better they are.

The distension with wind may be enormous, and large quantities may be belched up time after time, fresh supplies being continually formed. The prolonged attacks of belching have caused the diagnosis of hysteria to be made in several of my cases. In one case I really believe that as the process of eructation gave relief, the habit of swallowing air in order to produce the event was contracted. If relief actually did result it could scarcely be rightly labelled hysterical.

The shape of the abdomen may be altered in a conspicuous manner. If the stomach happens to be full, it presents a rounded swelling, which is either beneath or even beneath and below the umbilicus. The smaller curve of the stomach can sometimes be seen as a curved line, situated from 1 to 2 in. below the xiphoid cartilage.

If peristaltic movement of the wall of the stomach is plainly visible, pyloric obstruction is almost certainly present, and the case belongs to a different category. These waves occur from left to right, and can thus be distinguished from a similar wave in the transverse colon, caused by obstruction in the descending colon or at the sigmoid flexure. After the belching up of wind the tumour may actually be seen to diminish in size.

In many cases it is quite possible to feel the lower margin of the stomach as a rounded, smooth border, especially when, as so often happens, there is a considerable amount of fluid in the viscus. This is a very important guide to the position of the lower border.

Succession is often misleading, because it can frequently be detected in a healthy person after a fluid meal; but if elicited over a large area to the left and below the umbilicus, it is a very suggestive sign, because it is practically always due to the stomach. The bell note produced by striking a coin over the abdominal wall is often a valuable sign. It may be met with over a dilated colon, but if the coins be struck over the stomach area in the epigastrium and the resonant note be heard with the stethoscope well below the umbilicus either to the right or left, the cases in which it is not produced by a dilated stomach must be of very rare occurrence.

The pain complained of is usually extremely acute. Several of my cases have stated that rolling backwards and forwards on the floor more than anything else gave them relief. The pain is neuralgic, and is probably due to sudden distension with inability to force the food past the pylorus owing to the sagging downwards of the bag of the stomach. The recumbent posture nearly always relieves, if it does not remove, the pain. It is also relieved by vomiting, but the inability to vomit effectually is one of the features of the condition; should it occur the pain is removed, but great distress and faintness usually follow. So great is the feeling of prostration that the pain which can be relieved by lying down is often preferred to the collapse following emesis. When vomiting is brought about the ejecta are large in amount and frequently contain masses of undigested food which may have been taken some hours, at times as many as twenty-four, before the vomiting rejects them. They frequently smell foul.

The attacks of pain may be replaced by sudden attacks of faintness and heart palpitation. Three cases were sent to me as possible cases of cardiac disease. The explanation seems to be that the distension through the diaphragm interferes with the proper action and rhythm of the heart, and produces what the patient feels as palpitation.

This palpitation with disturbance of the breathing gives rise in some cases to attacks of dyspnoea which are put down to asthma. Not infrequently the loud, barking, stomach cough is also present, and draws attention to the real cause, or obstinate hiccup may be observed.

The chemical analysis of the vomit does not give much information in these cases. I may say that this method of examination in any form of stomach derangement has in my hands proved very disappointing. I have carried it out in all kinds of cases, malignant and otherwise, and

have been forced to the conclusion that it is usually indefinite, and if free from this defect it is likely to be misleading. In the particular class of case with which I am dealing, an analysis of the stomach contents points merely to the facts that the food is badly chewed, and has been in the stomach for some considerable time.

It will be found that in nearly all stomach disorders, so long as the food can be forced through the pylorus, the patient goes on without requiring much assistance. It is the collection of food within the viscus that commences the trouble. If the patient can vomit, the stomach is relieved from time to time, and the evil day is put off. The absence of vomiting precipitates the decision to seek advice. In cases of pyloric obstruction the constant vomiting is the symptom which attracts attention, associated as it is with loss of flesh and consequently weight; but in the absence of pyloric obstruction vomiting, unless it happens daily, is often a very salutary occurrence. An exception, however, must be made in the case of cancer commencing near the oesophageal end of the stomach spreading along the small curve. Here the pain and emaciation are independent of the presence or absence of vomiting.

I have been particularly struck with the fact that in nearly all my cases of dilated and proptosed stomach the ability to vomit easily has been absent; the patients have frequently stated that they have felt as if a good vomit would have given them relief.

Obstinate constipation is nearly always present in these cases. It seems to be due to the collection of fluid in the stomach instead of its propulsion onwards into the intestinal canal. It is often a very troublesome feature of the case. When relieved by enemata the ejecta are often enormous in amount, very hard and lumpy, and extremely offensive.

Size and Position of the Stomach.

The actual size and position of the stomach can best be determined by measurement. To do this I myself much prefer to pass a tube, empty the organ, see exactly what is in it, and then inflate with an ordinary enema syringe fixed by its nozzle into the free end of the tube. My own experience with effervescent powders has not been satisfactory. They may give the patient great pain, and if the gas evolved is eructated rapidly there is not time to mark the position of the organ on the external abdominal wall. The plan I usually adopt is to inflate very gently, telling the patient to raise one hand if the distension becomes unpleasant, and both hands if any pain is felt. Directly the stomach begins to rise one hand usually goes up. I then stop and sometimes let the air out by removing the nozzle of the syringe. The patient now feels convinced that nothing dreadful will happen, and raises no objection to the inflation being carried to the full. The outline of the distended organ is now marked with a soft blue pencil on the surface of the abdomen. Up to the present no patient has ever objected to this process—praise I cannot bestow on the powder method, which in one case at least was productive of some of the most caustic invective I have ever enjoyed. Should positive objection be taken to the passing of a tube, inflation by powder may be resorted to, but then the great advantage of being able to wash the stomach out is missed.

The lower border of the organ can usually be plainly seen, but not so the upper. When proptosis is also present the line of the small curve may be looked for below the junction of the ribs with the sternum. The position of the lower border is, however, the most useful guide. I have thought that in some cases what appears to be the lesser curve is the edge of the left lobe of the liver outlined against the distended stomach. If the greater curvature is seen to be not lower than the umbilicus there is probably neither dilatation nor proptosis. In my series of 28 cases this curvature was found to be from 1 to 4 in. below the scar. [Diagrams were shown to illustrate the size and position of the stomach met with.]

Assistance is also given by the amount the stomach will hold. Roughly speaking, 2½ pints may be taken as the average amount of water that can be siphoned into the stomach of average normal size. Ewald gives 1,600 c.cm., which is rather more than 2½ pints. With a distensible organ like the stomach in patients of varying size there cannot be any fixed limit. For practical purposes it may be assumed that a stomach which holds more than from

2½ to 3 pints is dilated above the normal. Several of my cases have retained 4 pints quite easily.

If any proptosis also exists, its amount is not necessarily proportionate to the degree of dilatation. Thus in one case in which the lower margin of the stomach was seen to be 4 inches below the level of the umbilicus in the middle line and 5 inches towards the left iliac fossa, the smaller curve was seen just above the umbilicus and the stomach held only four pints. It is usually not difficult to tell when the stomach is fully distended. These cases have not the thin attenuated walls of the atonic gastrectasies of older people, and their stomachs bear over-distension badly. The fluid is returned by the side of the tube. This gives a double current and is useful to clean out the organ, but is also apt to cause sudden rejection of the tube. Directly it occurs the funnel should be at once depressed and the pressure relieved, or the tube will be thrown out.

DIAGNOSIS.

The principal condition that is likely to cause difficulty in diagnosis is ulcer, either of the stomach or duodenum. In ulcer of the stomach the pain is much more continuous, and although it may not be present all day, it is nearly always present several times in each day. The pain follows food, and usually soon after its admission into the stomach. Vomiting relieves the pain for a short time only, and not for several days, as may be the case in dilatation. The pain of ulcer is also not so acute as a rule. In ulcer any tenderness present is generally localized; in dilatation it is spread all over the stomach area. The recumbent posture relieves the pain of dilatation much more readily than that of ulcer. If the ulcer be on the posterior surface, the supine posture may even make the pain worse. Haematemesis or melaena of course points to ulcer; but the difficulty in diagnosis generally arises in those cases in which no bleeding has occurred.

In ulcer of the duodenum the pain generally comes on some time after food, and is more persistent. The position of pain over the duodenum and the occurrence of melaena, if bleeding occur, materially assist the diagnosis; but in the absence of these, the diagnosis between duodenal ulcer and dilatation may prove very difficult.

Perhaps the most difficult condition in diagnosis is where an ulcer of long standing has been followed by fibrous growth in the scar and puckering with alteration in shape of the stomach. Should this occur near the pylorus some obstruction may result and dilatation follow, or a shape more or less resembling hour-glass contraction may be present. Exploration seems to be the only method of diagnosing with certainty such a condition. I do not think that this condition is so rare as was thought a few years ago. It has probably been mistaken many times in former years for cancer.

In a doubtful case the passing of a tube may be resorted to if the proceeding is carried out with care. In such cases I think the inflation with a syringe much safer than sudden violent distension with an effervescing powder, because the amount of distension is always under control, and can be stopped at any moment.

Even if an ulcer is present I am not sure that washing out the stomach need necessarily do any harm. In a doubtful case that I recently saw with Dr. Taylor of Coventry Road, the stomach was washed out, and the last washings were very visibly tinged with blood. The ulcer, however, healed rapidly, and the patient made a good recovery. As is well known, the presence of an ulcer may be first indicated by sudden perforation, but, if any suspicion exists as to its presence, I should not pass a tube, but wait and treat for ulcer first. If, however, the question of exploration arises, I should prefer to perform lavage first.

When forming a diagnosis it is important to bear in mind that cases of dilated and proptosed stomachs may come to us under the guise of heart affections, melancholia, chronic chest affections, and asthma.

[Special reference was here made to points attracting attention in the different cases.]

TREATMENT.

The treatment that I have found of most value is based on keeping the stomach as empty as possible for three weeks, while at the same time the organ is encouraged to assume its normal position by keeping the body of the

patient supine and raising the hips. A flat bed is used and if the bed or mattress sags in the middle fracture boards are made use of to produce a level. Only a small pillow is allowed, just sufficient to support the head, and on no account must the shoulders be raised from the bed on the pillow. The lower legs of the bed are raised on blocks or bricks, and if necessary a pillow is also placed under the hips.

The washing out of the stomach commences the treatment, and is of much benefit in itself. Frequently large quantities of tough viscid mucus are removed. When this is seen in the washings the process is facilitated by adding an alkali, such as sodium bicarbonate, to the water. After the stomach has been thoroughly cleaned out as little as possible should be given by the mouth for three days. In the cases I have seen there has not been any great degree of thirst, provided a large saline enema is given once in each twenty-four hours, iced water or weak tea in teaspoonful doses amounting to a few ounces in the twenty-four hours being all that is called for. On no account should the patient be given ice to suck; although grateful at the time it is followed by increased thirst. Three nutrient enemata are given in addition in each twenty-four hours, at 8.0 a.m. and 3.0 and 10.0 p.m. In this way the patient is not interfered with during the night. On the fourth day a little diluted milk is given, still in teaspoonful doses up to half a pint in the twenty-four hours until the end of the first week.

During the *second* week two nutrient enemata are given instead of three, and a little solid food is added, usually milk-bread, custard, breakfast crisps with milk or cream, cornflour mould, or milk pudding.

During the *third* week only one nutrient enema is given, and small quantities of fish, chicken, or mutton, usually minced or pounded, are allowed.

During the *fourth* week the patient is allowed up each day for an hour, gradually increased to two. Before rising a soft pad about as large as the whole hand is placed across the lower part of the abdomen, just above the pubic bone. This is best kept in place by a spica bandage, and is pinned to keep it from slipping upwards. When up the patient may assume any posture at pleasure, but for the rest of the twenty-four hours the inclined recumbent position may be assumed.

From this time the patient is allowed up a little longer each day, until at the end of a period varying from four to six weeks the usual habit of life may be resumed; but for at least six months it is necessary that all food be taken in small quantities at a time, very well chewed, and taken as dry as possible. Fluid to relieve thirst should be taken about an hour before a meal.

Whether the pad should be continued or not depends very much upon the case and patient. If the dilatation is not excessive it can frequently be dispensed with in a few weeks, but several of my patients have voluntarily resumed it, saying that they felt more comfortable with it, and have worn it for several months. If it can possibly be arranged, the recommended position should be assumed for half an hour after each meal for at least six months. An ordinary sofa answers very well for this purpose, with the knees over the head of the sofa and the body on the flat of the seat.

For the treatment of the constipation the greatest success in my hands has attended the use of equal parts of the liquid extracts of cascara and liquorice. Two teaspoonfuls of the mixture should be given every night. The usual purgative doses of salts or pills frequently give great pain in these cases, and even if any action is produced constipation usually follows. I have tried faradism to the stomach in several cases, and thought that it did good. Both poles may be placed over the stomach as far apart as possible, and the skin very thoroughly wetted with salt and water, or one pole may be placed in the front and the other on the back.

It is a good plan to have any teeth that require extracting removed before the treatment commences. This gives the gums a chance to harden, and fresh teeth may be put in as soon as possible after the patient is up and about again. In nearly every case in which new teeth are necessary, the plea is urged that the patient does not feel strong enough, and wants to get well first. Nothing could be more absurd, as the presence of foul teeth have in themselves a deleterious effect upon the secretions of the alimentary canal, as is well known by

recent investigations on cases of pernicious anaemia, in addition to the defect they present as efficient grinders of food. I may say, however, that I have had more difficulty with regard to this part of the treatment than with any other.

Whether the cure becomes permanent depends very much upon the future life of the patient. If the conditions which produce this state of the stomach are resumed, the dilatation and proptosis may occur again. In one of my cases, that of a man whose employment necessitated his standing all day, a recurrence after two years brought him back to me, and he has been greatly benefited by undergoing the treatment again after this lapse of time. In most of the cases, however, so very decided an improvement has resulted that I have been encouraged to bring the details before the profession.

SOME PHYSIOLOGICAL ASPECTS OF GASTRO-ENTEROSTOMY.

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[From the Guy's Hospital Physiological Laboratory. The expenses of this work were defrayed by a grant to Dr. Pembrey from the Royal Society.]

SINCE the work of Pawlow¹ and his fellow-workers in St. Petersburg, and of Bayliss² and Starling in London, has become widely known, the question—Is gastro-enterostomy a harmless operation?—has been asked with increasing frequency. These workers have given to us a new conception—the *continuity* of the process of digestion. So long as the process was looked upon as a series of isolated actions and reactions, each independent and separate, so long as pancreatic digestion was regarded merely as following gastric digestion, and in no sense occasioned by it or modified by it, so long might surgeons have little hesitation in performing such short-circuiting operations as gastro-enterostomy, pylorotomy, or partial gastrectomy. But when we learn that the adequate secretion of pancreatic juice is dependent upon the changes which the food has already suffered in the process of digestion—that is to say, upon gastric activity—then we may very well wonder to what extent the mutilation entailed by the “short-circuiting” of the duodenum impairs the stability of the whole process. By the operation a link in the chain has been broken. The resulting modification in the patient's powers of digestion and absorption is at any rate of considerable *theoretical* interest.

The first recorded experiments which show the digestive capacity of patients after gastro-enterostomy are those of Joslin.³ From results obtained in Ewald's laboratory Joslin stated that in two cancerous patients upon whom gastro-enterostomy had been performed, the digestion both of proteids and fats was greatly impaired. Quoting these results, Paterson,⁴ in his Hunterian Lectures on gastro-enterostomy, remarks, “Joslin's experiments have been used as an argument against the performance of gastro-jejunostomy, except as a last resource, and have had a considerable effect in retarding a more general use of the operation in gastric ulcer and other non-malignant affections of the stomach.” That a knowledge of Joslin's results has delayed or vetoed the performance of the operation of gastro-enterostomy in a single instance I take leave to doubt. Surgeons are rightly in the habit of estimating the success or failure of their work by the measure of their own experience. The knowledge that an infant upon whom gastro-enterostomy has been performed for congenital pyloric stenosis may attain to a healthy and vigorous manhood, the evidence of the increasing weight of patients upon whom they themselves have operated, will far outweigh the results of such experiments as Joslin's, however indubitable and however consistent their results may be.

Therefore, I say that the result of such experiments is of only *theoretical* interest. It is foolish to tell a surgeon that gastro-enterostomy can no longer be considered a harmless operation. Tracheotomy is not a harmless operation, and yet it has its usefulness. The question cannot be decided in the abstract, but it must be answered for each individual case. A man with a gastro-

enterostomy may not be as good a man as his neighbour; and yet he may be in far better case than before the operation. There are, indeed, surgeons whom it may be salutary to remind that the operation does entail some alteration of function—surgeons who seem to regard the new relation of stomach and bowel as though it were an alternative scheme of Nature to be substituted as quickly as possible whenever the old arrangement shows signs of disorder—but the majority stand in need of no such advice.

The progress of surgery is, in a sense, retarded because of the priceless value of the material with which it deals. Advance must be made by the method of observation alone, for the method of experiment is to a great extent denied to it, and rival theories—the true and the false, the wheat and the tares—must grow together until the harvest. In other branches of science theory must precede experiment. In surgery, theory must come later—framed to accord with observation. It is true that experiments upon animals, in surgery as elsewhere, have increased our knowledge. In the study of gastro-enterostomy, the work of Cannon and Blake, and more recently of Legett and Maury, has been of great value and utility. Yet surgeons are rightly chary of transferring the results obtained from animals to the precious metal of humanity.

The theoretical considerations which follow have been brought forward not so much to suggest possible alterations in surgical procedure, as to ascertain to what extent theory and practice coincide, and to attempt, in the great variety of conditions relieved by gastro-enterostomy, to find the explanation of the benefits conferred in each. For instance, the experiments quoted below show that patients after gastro-enterostomy have complete power of digesting a mixed diet rich in fat, while their capacity for digesting a purely milk diet is considerably diminished. Apparently the experience of surgeons has led them to appreciate this difference, for it is their usual practice to abandon a purely milk diet as quickly as possible after the operation, usually after two or three days at the most.

Again, it will be maintained that the benefit of gastro-enterostomy in acute ulceration of the stomach is due to this—that the operation permits the regurgitation of alkaline duodenal juices into the stomach, and thus diminishes the gastric acidity; and it will be argued on theoretical grounds that most regurgitation will occur and the maximum benefit be conferred where the simple no-loop method is adopted, and entero-enterostomy, or the Y-shaped junction, avoided. In practice, guided by observation of the results obtained, since January, 1905, the Mayos have entirely given up the more complicated methods in these cases, and always perform the simple *no-loop* method.

The following points may be discussed in order:

1. The abnormal course followed by the food.
2. The removal of the valvular action of the pylorus in regulating the passage of the gastric contents into the duodenum.
3. The regurgitation of alkaline duodenal juices through the artificial opening.
4. The changes in digestion and absorption brought about by the operation.

1. *The Abnormal Course followed by the Food.*

In cases of obstruction to the pyloric outlet there can be no doubt that the food leaves the stomach by the artificial opening. The same is, of course, true where the gastro-enterostomy follows a pylorotomy or partial gastrectomy, unless an end-to-end anastomosis has been made. Where there is no obstruction to the outlet at the pylorus, it is in the highest degree improbable that the food deviates from the normal course. Cannon,⁵ in cats upon which gastro-jejunostomy had been performed, proved by the bismuth and x-ray method that in these animals the food took its normal course. In attempting to confirm these observations upon patients in Guy's Hospital I met with the difficulty that, although very large quantities of bismuth subcarbonate (3ij) were given, I was never able, in any position of the patient, to photograph the duodenum, nor even to identify it on the screen with enough precision and certainty. Clinical observation, however, strongly confirms Cannon's conclusions. Thus, a man suffered from a