haemorrhage from the bowel, and a very low temperature with extreme collapse and colic.

An abdominal section, however, even if undertaken in mistake, gives the patient his only chance in this as in obstruction. The bowel supplied by the thrombosed vessel almost invariably becomes gangrenous, and a resection of the loop supplied by the thrombosed vessel gives the patient his only chance, though it is a very remote one.

REFERENCES.
¹ Arch. Gén. de Méd., vol. xxviii. ² Journal of the American Medical Association, 1904, 1 and 2.

An Address

ON

STAGNATION OF FOOD IN THE STOMACH.

DELIVERED BEFORE THE MEDICAL SOCIETY OF HAMILTON, ONTARIO,

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No functions are more frequently disturbed than those of digestion. Although not dangerous in themselves, such disturbances nevertheless interfere with the active duties of life, and render their subjects less able to resist the various forms of disease, so that their consideration becomes of vast importance. Of the disturbances of digestion there is none more injurious in its effects than undue retention of food in the stomach.

The stomach is an organ of complex functions. It acts as a receptacle for the food, and at the same time performs an important part in its digestion in converting it into an acid liquid we call chyme.

In the process of chymification of the food the gastric peristalsis performs an essential part; it serves the double purpose of mixing the food with the gastric juice and, as the liquid chyme collects in the pyloric end of the stomach, of forcing it through the pylorus. In normal digestion the chyme does not lodge in the stomach but is passed on intermittently as formed into the duodenum.

Relationship of the Function of the Duodenum to that of the Stomach.

A knowledge of this relationship is necessary to a clear understanding of the digestive process, especially in its bearing on gastric motility. Hitherto the duodenum has been regarded in function as little else than a part of the stomach in which the gastric digestion is continued. Ulcers in the duodenum have been spoken of as peptic ulcers. This view was taken for granted, notwithstanding that the mucous membrane of the duodenum was never shown to secrete any of the ingredients of gastric juice, and that it is separated from the stomach proper by the pyloric sphincter, which effectively divides the two and protects the duodenum from the inroad of too great a quantity of acid chyme as well as of unchymified food.

Until recently physiologists were at a loss adequately to account for the regular occurrence of the secretions of the digestive tract, how the gastric secretion is always followed by that of the pancreas, and that in turn by the secretion of the intestine. There is no intimate connexion between the nerves of the stomach, pancreas, and intestine to account for the close relationships in the occurrence of their secretions. Now it is known that under the stimulus of the acid of the chyme the mucous membrane of the duodenum secretes a substance, secretin, which has been shown to be the active agent in causing the pancreas to secrete its peculiar ferment; it reaches the pancreas through the blood current.

As soon as the chyme is neutralized it ceases to cause the production of secretin, and by this time duodenal peristalsis will have carried it on into the small intestine. Then the pylorus relaxes to permit the passage of more chyme, and as soon as the contents of the duodenum have become sufficiently acid reflex stimulus causes the pylorus to close again. In normal conditions this process continues until the stomach is empty, the digestion being complete.

The pylorus, therefore, has a twofold function; first,

to retain the food in the stomach until it is reduced to chyme, only relaxing from time to time to permit the chymified part to escape; and, secondly, to guard the duodenum from excessive irritation not only from unchymified food, but also from excessive acidity from too great an influx of chyme.

By observation we learn that the time normally required for the chymification of an ordinary dinner and its discharge into the duodenum is six hours, and not more than seven hours as an extreme limit. The retention of food in the stomach beyond that time shows that either or both of two conditions exist: (1) Deficiency in the expelling power of the stomach; (2) abnormal difficulty in the passage of the food through the pylorus.

DEFICIENT MUSCULAR POWER.

Deficiency in the muscular power of the stomach may be actual or relative; not infrequently the two are combined.

Actual weakness or atony of the muscular wall of the stomach is of very frequent occurrence. Debilitating causes, such as anaemia, acute or chronic illnesses, shock, fatigue, overwork, insanitary environments, insufficient and unsuitable food, may render the stomach unequal to its ordinary duty, especially if its power is congenitally defective.

Probably the most frequent cause of relative deficiency is the overloading of the stomach with food, especially if unsuitable and ill-prepared. People who masticate thoroughly seldom overeat, because the desire for food is satisfied before too much is taken, while in hasty eating satisfaction rarely comes before an excess is eaten. Moreover, ill-masticated food fills the stomach with masses that tax and therefore soon exhaust its motor power, the more so as the masses require a much longer time to digest than does finely divided food. Raw fruit as a first course at breakfast appears to add much to the stomach's work, sufficient to overtax those that are weak. In all cases with stasis that I have examined the raw fruit was always one of the last constituents of the meal to be discharged. It is not rare to find it five or six hours after an ordinary breakfast.

PYLORIC OBSTRUCTION.

The pyloric conditions obstructing the passage of the food may be due to functional disturbance or organic disease.

Spasm.

Spasm of the pylorus is no doubt the most frequent cause of obstruction, yet its existence is difficult to demonstrate. In cases requiring operation the spasm usually yields under the anaesthesia before the stomach is even exposed. Its existence may be indicated by the contents of the stomach. If with spasm of the pylorus there is a good motor power, as is usually the case, so that peristalsis is strong, the food will be found minutely divided and the contents appear like a thin gruel; but if the muscular wall of the stomach is atonic, and the peristalsis therefore feeble and soon exhausted, the contents will contain many particles of food that have undergone no change in the stomach, so that their size will depend on the thoroughness or deficiency of mastication.

The gastric secretion in the majority of cases is hyperacid, and to this state of hyperchlorhydria is chiefly due the spasm of the pylorus. The spasm is no doubt in some measure caused by the direct irritation of the pyloric mucous membrane, but chiefly by reflex stimulation from the duodenum; it prevents excessive irritation of the mucous membrane of the duodenum by the highly acid chyme, as already indicated in discussing the physiological relationships.

Organic.

Of the organic changes causing pyloric obstruction, gastric ulcer is the most frequent. In the early stages obstruction is due to spasm of the pylorus excited by the irritability of the ulcer, and in the later stages to the cicatricial thickening and contraction about its site, whether healed or unhealed.

Thickening and stenosis of the pylorus may possibly result from chronic inflammation without ulceration, but this is difficult to prove, as the occurrence of erosions of the mucous membrane that have healed without scarring cannot be excluded. Hypertrophy of the pylorus from over-action is said to occur, and there are numerous

instances on record of congenital hypertrophy of the pylorus.

It is not necessary to do more than mention carcinoma of the pylorus as a frequent cause of obstruction. It is important to remember that it may be preceded by hyperacidity with irritability of the pylorus, and in some of these cases, no doubt, there is simple peptic ulcer.

Perigastric adhesions may kink or constrict the pylorus, as may also the pressure from a tumour. Sometimes the pressure is on the duodenum, and then the pylorus and part of the duodenum above the point of pressure may be dilated and contain stagnant food, in fact, be converted into a part of the gastric cavity. Gastropsis is said to cause obstruction sometimes by kinking the pylorus, but this is rare. In atonic conditions the existence of gastropsis conduces to stagnation of food in the stomach by increasing the difficulty of discharging the gastric contents.

SYMPTOMS AND DIAGNOSIS.

Vomiting of food long after it is taken is the only symptom which shows the unquestionable occurrence of stasis of food in the stomach; all others are quite indefinite. In the milder cases there are only local and general symptoms of disturbed digestion. The local symptoms are: a feeling of fullness and weight in the epigastrium after meals, disappearing usually after a few hours; acidity with eructations of acid fluid, sometimes of food in varying stages of digestion or quite undigested; belching of tasteless or offensive gas, and a feeling of to-and-fro movements in the epigastrium, often with visible peristalsis if there be obstruction at the pylorus. The general symptoms are as various as those of indigestion. The appetite varies, the bowels are usually constipated, and there is often a feeling of depression and malaise. There may be vomiting from time to time, but in such cases there is usually also more or less dilatation. Then there may be thirst and scanty urine, both owing to the small quantity of fluid passing through the pylorus to be absorbed in the intestine. Loss of flesh is common even in the mild cases; in the severe, emaciation may be extreme.

In the milder degrees of food stasis we cannot be certain of the condition without physical examination; but by direct examination of the motor powers of the stomach the diagnosis can be made without difficulty and with certainty. If an examination were made in every case in which there are symptoms of digestive disturbance, we would be surprised to find how frequently a moderate degree of retention of food from atony of the stomach occurs; the atony may be quite latent, disappearing from time to time, and reappearing as the stomach is overtaxed, as it may be, even by light diet taken in moderation.

The length of time beyond the normal that the food remains in the stomach is a fair gauge of the degree of gastric insufficiency, or rather of food stagnation, as the two terms are not necessarily synonymous. To determine the degree of stagnation it is necessary to remove the stomach contents by means of the stomach tube at varying times after food is taken. If the contents found seven hours after dinner are only small in quantity the degree of stasis is slight; still there is some, and material disturbance of digestion would follow the introduction of fresh food before the complete discharge of the contents. In severer cases some food remains may be found in the morning; this indicates a decided degree of stasis. By giving an Ewald trial breakfast of toast and weak tea and siphoning the contents in an hour a very fair estimate can be formed of the motor power of the stomach, and at the same time the opportunity is afforded of determining the condition of the gastric secretion. With healthy gastric motility not more than 1 oz. of this breakfast should be found in the stomach an hour after it is taken. By forcing some air into the stomach with a rubber bulb before withdrawing the tube the position and outline of the stomach can usually be definitely determined. In most cases of prolonged retention of food the stomach is somewhat prolapsed; the converse is also true—namely, that in most cases of material prolapse of the stomach there is also some degree of retention of food.

*For reasons already given, in the majority of cases of pyloric spasm there is hyperacidity of the stomach contents. In my last 400 cases in which the stomach contents were examined the records show probable hyperchlorhydria in 325, and in these there was some degree of food stasis in 250. In many of the 250 cases the fine

comminution of the food indicated good gastric motility, but in more than one-half of the number the coarse-food remains showed a proportionate degree of lack of peristalsis of the stomach. These results are not in accord with the views of some writers on this subject. Riegel¹ says that with hyperchlorhydria there is usually good gastric motility. But, inasmuch as both defective motility and excessive secretion of hydrochloric acid are due to disturbed gastric innervation, my own experience is in accord with what we should expect to find.

The two following cases of neurasthenia may be cited as illustrating protracted delay of food in the stomach—in the first with atony, but in the second with good motility. There was a high degree of acidity in both.

J. M. was a barrister from the North-West of Canada, and, like the people in a new country, had led a very strenuous life. He sought advice on account of insomnia and loss of powers of mental concentration. He habitually took his meals hastily and irregularly. On the day of examination he had taken a breakfast of steak, potatoes, etc., at seven o'clock. At noon, as there were signs of much food still remaining in the stomach, a tube was passed, and apparently the whole of his breakfast removed, the liquid portion flowing through the tube and large pieces of steak, etc., being vomited. The steak had evidently been rather tough and was not masticated, but only crunched once or twice and then swallowed. The coarse pieces of food showed that it had not been subjected to active peristalsis. Like many people, he considered he had fulfilled his duty in swallowing the food; the rest of the process was the stomach's affair, with which he had no concern.

A. T., aged 35, also a barrister, was a man of very nervous temperament who was always in a hurry, and therefore masticated his food imperfectly and ate too much. He suffered for a long time from epigastric distress, with weakness and loss of weight.

On examination there was found continuous hyperacid secretion and prolonged retention of food. Frequently a pint or more of highly-acid liquid holding in suspension fine particles of food could be siphoned from the stomach; even in the morning several ounces of acid liquid could at times be obtained. No thickening could be felt at the pylorus. The stomach was prolapsed considerably. The condition proving absolutely rebellious to treatment, an operation was done to relieve the supposed pyloric stenosis, but the orifice was found to be quite normal, the spasm, if it existed, having relaxed under the anaesthetic.

In order to raise the greater curvature nearer to the level of the pyloric orifice, and thus facilitate the passage of the food, gastroplication was done. He made a slow recovery, and after a few months was in fair condition and able to attend to business.

By the following spring the symptoms recurred as severely as formerly. He was not benefited by three months at the seaside, followed by a month's rest in bed, with massage, etc., although the greater curvature of the stomach had not fallen from the level to which it was raised by the gastroplication. Gastro-enterostomy was then done, and since that he has enjoyed fair health and has been equal to close application to business.

This case furnishes a good illustration of the clinical history of cases of continuous secretion of hyperacid gastric juice and of the difficulty in their treatment. I am not able to say definitely from my records how frequently this condition is met with, but it is not rare. It occurs much oftener in men than in women.

TREATMENT.

Gastric stasis being but a symptom, it follows that treatment is as varied as the causes on which it depends. Whatever the cause may be, the first object to be aimed at in all cases is to secure complete emptying of the stomach within the proper time.

There is a certain analogy between the functions of the stomach and those of the urinary and gall bladders. They all act as receptacles. It is well recognized that retention of contents by the two latter is soon followed by infection, and that the infection causes decomposition of their contents, and catarrhal inflammation of their mucous lining. When such a condition is established, the only effective treatment is prompt and complete drainage. If that is secured, the contents of each soon become aseptic, and the inflamed mucous membrane is quickly restored to a normal state.

The same statements are applicable to the stomach. Bacteria in great numbers and variety are always present in its contents, which quickly become decomposed if retained, and the irritant products excite catarrhal inflammation of the mucous membrane. If, under such circumstances, the decomposing gastric contents be promptly and

effectively drained away, the decomposition is quickly arrested, and the mucous membrane restored to a normal condition. The marked effects of good drainage in gastric ulcer is well shown by the prompt relief of the symptoms and the healing that usually follow gastro-enterostomy. This appears to me to afford strong ground for the opinion that in most cases the development of the ulcer is preceded by, and its continuance associated with, some degree of food stagnation. This is a reasonable theory, because the hyperacidity usually occurring in association with gastric ulcer will often cause spasmodic closure of the pylorus. The correctness of this view is supported by the frequency with which free drainage of the stomach by gastro-enterostomy is followed by the healing of an ulcer. Of course an ulcer situated near the pylorus is relieved of the irritation of the passing chyme if the passage be short-circuited by a gastro-enterostomy; but an ulcer away from the pylorus should not be relieved by drainage in this way more effectively than by equally prompt discharge through the pylorus itself. There is at least considerable reason to believe that in all cases of intractable ulceration of the stomach there is some degree of gastric stasis, and that the persistence of the ulceration is due to the irritation caused by the stagnant acid food. If this be true, our first object in treatment should be to secure as prompt and complete discharge as possible of the stomach contents. If we can prevent delay of the food in the stomach beyond the time required for its chymification, healing should be rapid and permanent.

In the treatment of the large class of cases in which stasis is due to atony of the stomach, our first care should be to search for and remove the cause of the atony. It is often a part of general debility, but in many cases the evidences of general weakness may be very slight. The general condition should receive suitable treatment. All habits and conditions detrimental to health should be corrected—such as insufficient rest and sleep, indulgence in alcohol, insanitary surroundings, unsuitable food, overeating, excessive drinking (especially of iced liquids with food), and insufficient time between meals. Of all injurious habits, imperfect mastication is the most prevalent, and probably the most effective, in causing gastric stasis. Besides furnishing the stomach with masses that often cause traumatic injury to its walls and overtax its motor powers, the rapid eating attending this habit invariably leads to overeating. Physicians whose work leads them to examine the stomach contents of many persons must be struck by the great frequency of insufficient mastication. The unbroken masses of food increase enormously the labour of the stomach; if it is weak from any cause it is certain to be unequal to the task thrust upon it, and stasis of food must occur sooner or later. If the stasis recurs from day to day, in time it will be continuous and dilatation must be the ultimate consequence. How minutely should the food be made before being swallowed? That depends very much on the individual. The robust labouring man does not require food that is as finely divided or as easily digested as the office man with feeble digestive powers, or the neurotic woman "who enjoys her ill health." For both these latter all food should be reduced to fine gruel-like particles in the mouth before being swallowed. This is the best antidote to the taking of food improper in quantity and quality.

It will not be necessary to speak of the necessity of fresh air, recreation, and a proper holiday, with the tonic effects of change of scene.

Baths, hot and cold douches, cold compresses to the epigastrium at night, and massage, do good. Regular exercises, more particularly of the abdominal muscles, are of much service, especially in women, as their dress interferes greatly with the proper action of these muscles, which are further injured in child-bearing. Systematic exercises taken morning and night are of great service in strengthening these muscles. It is irksome treatment, but the benefit from it will amply repay the time and trouble required.

Drugs are of little use in relieving gastric stasis. As there is excessive secretion of hydrochloric acid in the great majority of cases, the bitter tonics and stimulants, so much used, tend to increase the acid secretion, and may therefore aggravate the condition.

The drugs of chief use are probably those of a sedative and antiseptic character. As there is usually some general nervousness as well as gastric hyperaesthesia,

short courses of bromides often do good. The strontium salt is the best. The natural salicylate of sodium is a useful antiseptic, as it inhibits especially the growth of yeast cells. It also increases the flow of bile by rendering it more liquid.

The cases due to pyloric obstruction fall into two classes: those due to spasm of the pylorus, and those due to organic stenosis. Peptic ulcer in or near the pylorus in the early stage causes obstruction by exciting spasm; later there may be cicatricial thickening and contraction. These cases are often extremely rebellious, and the tendency of late has been to refer them for operation at once. But although the results of gastro-enterostomy are usually very satisfactory, it does not restore the stomach to a state as good as normal. Therefore it should not be resorted to until judicious patient treatment has failed to give relief. We should make an effort to lessen the acidity by giving a liquid or very soft diet free from particles and irritants, and the use of antacids for the relief of pain and the lessening of excessive acidity. Regular lavage should be done for a time if there is material retention, and, after emptying the stomach, some sedative, as bismuth subcarbonate in full doses, may prove useful. Large doses of pure olive oil are often of benefit in soothing the stomach; they have the effect, also, of lessening the secretion of acid (Pawlow). If necessary, rectal feeding may be depended on for a short time, and then a gradual return made, first to a liquid diet, and later to solid food.

If these means fail, there remains only a resort to surgical aid, but such a course should not be undertaken until medical treatment intelligently carried out for a sufficient time has failed to afford relief. During the last few years I have had gastro-enterostomy done in five cases in which no organic disease in the stomach could be demonstrated. In one, a farmer, pylorotomy was done before the bowel was attached to the stomach. He was very ill after the operation, but he made a very good, although slow, recovery. Reference has already been made to the case of the barrister. He is now relatively very well. In two others the result was satisfactory, and had continued so when they were last heard from. All these cases gained from 30 to 40 lb. each in weight.

In the fifth case a blacksmith, who was addicted to alcohol, there was a high degree of acidity and considerable catarrh of inflammation of the stomach. He made a good recovery from the operation but soon afterwards began to suffer from attacks of colic with symptoms of obstruction and peritoneal irritation. Indigestible food and constipation appeared to excite these attacks; they lasted from half an hour to twelve hours. Six months after the operation he died in an attack, the symptoms being those of obstruction and peritonitis. A necropsy was not permitted. There were probably some adhesions about the seat of operation that caused obstruction, which a second operation, if permitted, might have relieved.

To these I may add a sixth and most interesting case:

The patient was a hotel-keeper aged 60. The stasis was extreme and there was much dilatation. The hydrochloric acid secretion was very high. He was very anaemic and considerably emaciated. No tumour could be felt. He had taken alcohol daily in excessive quantity for several years. At the time of operation there appeared to be some thickening of the pylorus. He made a rather slow but an excellent recovery, and gained over 60 lb. in weight. Notwithstanding the continued excessive use of strong alcoholic drink, he remained in good health for over two years; after that the symptoms of digestive disturbance gradually recurred. Examination indicated the probable existence of carcinoma, and such proved to be the case, the liver being chiefly involved, apparently secondarily to disease of the retroperitoneal glands. At the necropsy the stomach was found to be the seat of some infiltration of the pylorus, but apparently secondarily. At the time of operation the possibility of the pyloric thickening being malignant was considered very grave, but his general condition did not seem to warrant a pylorotomy; we regretted afterwards that the attempt to remove the pylorus was not made, although the possibility of a fatal termination from such an operation was very great.

In the cases of stasis complicated with ulcer, gastro-enterostomy usually suffices to secure healing. Whether the ulcer should be excised is questionable. It is probably unnecessary in most cases, as healing usually follows relief from irritation from the retained food, and the removal of the ulcer does not ensure against the recurrence of ulceration in the vicinity of the old one.

In malignant pyloric obstruction each case has to be dealt with on its own merits. If diagnosed early, before

infection of the adjacent lymph glands takes place, the removal of the pylorus would seem to be the rational course. This opens up the question of the advisability of operation in previously healthy persons whose dyspeptic symptoms begin after the age of 40 or 50, and who show signs of pyloric irritation, while the gastric contents contain abundance, even excess, of hydrochloric acid. These cases are so frequently malignant that an early operation seems not only justified but advisable.

In a man, aged 53, whom I saw some years ago there was much distress after meals apparently due to hyperchlorhydria. Treatment gave relief and he regained both his normal weight and strength, but the gastric symptoms recurred from time to time. I then lost sight of him. Between two and three years later his distress became continuous and after some months he died with unmistakable evidences of carcinoma of the stomach.

In more advanced cases in whom removal of the pylorus is not feasible, gastro-enterostomy is often followed by very gratifying improvement, only temporary of course, but then improvement in any disease and even cure is only temporary.

A few years ago a man under my care in the hospital had marked pyloric obstruction with pain, vomiting, and much weakness. Gastro-enterostomy was done and followed by great improvement. His appetite returned, digestion became comfortable, his former weight was regained and the cachectic colour disappeared. He was for some months able to resume his former occupation. Gradually the malignant masses increased in size and the disease invaded the gastric walls, in time occluding the artificial opening. The growth filled and caused protrusion of the upper zone of the abdomen. At the necropsy there was not sufficient healthy stomach remaining to permit of a second gastro-enterostomy being done.

In a similar case under the care of the late Dr. L. MacFarlane, complete relief of symptoms followed gastro-enterostomy, even free hydrochloric acid returning to the gastric secretion. The man lived about a year of comfortable, useful life before death took place.

REFERENCE.

¹ *Nothnagel's Encyclopaedia*, American Edition: Diseases of the Stomach, p. 309.

A REVIEW OF A SERIES OF OPERATIONS FOR CANCER OF THE STOMACH.*

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SINCE my first case on August 23rd, 1897, up to July 1st, 1905, I have operated upon 59 cases of cancer of the stomach. The operations practised have been as follows:

<i>Gastro-enterostomy</i>	35 cases, with 5 deaths
Anterior (all with Murphy's button)	7 cases, 2 deaths
Posterior (all with suture)	28 cases, 3 deaths
<i>Gastrectomy</i>	10 cases, with 3 deaths
Complete	1 case, 1 death
Partial	7 cases, 1 death
Partial, with resection of transverse colon	2 cases, 1 death
<i>Gastrostomy</i> , for carcinoma at cardiac end of the stomach	5 cases, 0 death
<i>Jejunostomy</i>	3 cases, with 0 death
<i>Exploratory laparotomy</i> (operation not necessary or not possible)	6 cases, 1 death

During the same period I have seen 11 patients suffering from cancer of the stomach in so advanced a stage that I have advised against operation. One of these patients was operated upon elsewhere, and died six hours after gastro-enterostomy had been performed; of the remaining 10, 9 lived for periods varying from three weeks to fourteen weeks, in 1 no further history was obtained.

I propose to discuss the cases in the order already given.

GASTRO-ENTEROSTOMY.

In the earlier cases I used the Murphy button, and performed the anterior operation. There were 7 cases and 2 deaths, 1 from shock and exhaustion in a very enfeebled and wasted patient, 1 from continued vomiting and exhaustion.

In the later cases I have performed the posterior operation by simple suture in the manner I have described in detail in my work on *Abdominal Operations*. There were 28 cases with 3 deaths, 1 from pneumonia, 1 from shock or exhaustion, and 1 from septic peritonitis.

The value of the operation of gastro-enterostomy in malignant disease of the stomach has been variously estimated by surgeons. Recently a well-known London surgeon pronounced unhesitatingly against it in all cases; other surgeons are accustomed to practise it in all cases in which irremovable malignant disease is encountered. It has seemed to me that the indication for the operation is perfectly clear; it should be performed when obstruction to the food is caused (or is likely to be caused in its increase) by an irremovable growth at the pylorus, or in the body of the stomach near the pylorus. If no obstruction is caused, gastro-enterostomy is not indicated, and will not give, if performed, a degree of relief commensurate with the risks of the operation, though some temporary improvement may be noticed. If there is obstruction due to a growth which can be removed, gastro-enterostomy alone should not be performed unless the condition of the patient is such that the more serious operation of partial gastrectomy is not permissible. In such circumstances gastro-enterostomy may be performed, and two or three weeks later, when the patient's condition may be much improved, the removal of the growth can be safely undertaken. A growth is considered irremovable when it is adherent over a large area to the pancreas (the result of injury to which is most serious), or when extensive adhesions, the presence of many enlarged fixed glands, or secondary deposits in the liver or parietal peritoneum, or elsewhere, make its complete eradication quite impossible. The extent of the growth in the stomach only and the enlargement of the glands along the curvature are negligible factors so far as the question of removal is concerned, for both are conditions surmountable by the operation which I now adopt.

A tumour growing on the lesser curvature well away from the pylorus may by its increase in size cause obstruction to the food. Gastro-enterostomy in such cases gives some measure of relief, though by no means so much as when the obstruction is due to an invasion of the pylorus.

The contrary to the rule mentioned is also in need of emphasis; it is that if obstruction is not caused, or is not likely to be caused, by the growth in its extension, the operation of gastro-enterostomy should not be performed; for the absence of obstruction implies that there is a free passage through the stomach to the duodenum; the making of a new opening is therefore clearly not necessary.

Duration of Life after Gastro-enterostomy.

I have not been able to trace the final stages in the history of all my cases. Of the 30 patients who survived operation, 20 have been traced to the time of their death, 6 are alive and well, of 4 nothing is known. The earliest death amongst these occurred in the fourteenth week after operation, the latest two years and four months after operation. The length of life in the series is as follows: Fourteen weeks, fifteen weeks, eighteen weeks, five months, five and a half months, six months, 1 between six and seven months, 2 between seven and eight months, 2 between eight and nine months, 3 between nine and twelve months, 2 between twelve and eighteen months, 2 between eighteen months and two years, 2 over two years. The patient who survived longest was a woman upon whom I operated on June 13th, 1902, with Dr. Norman Porritt, of Huddersfield. Writing to me on October 27th, 1904, Dr. Porritt said:

You found pyloric enlargement and enlarged glands, and at the operation expressed the opinion that the case was one of malignant disease. The immediate recovery from the operation was very satisfactory, but convalescence was slow, and oedema of the legs coming on seemed to confirm the correctness of your opinion as to the nature of the case. But the patient went to Blackpool, and came back a different woman, and has been in first-class health until about five or six months ago. The leg oedema quite disappeared. About five or six months since she began to lose flesh and condition, a tumour appeared in the middle of the lower part of the epigastrium, and the patient went downhill, and died from malignant disease of the stomach two days ago.

Of the 6 patients who are still alive, I was operated

* A paper read before the Clinical Society of London, February 9th, 1905.