time, what is now familiar to us, that the so-called "vicious circle" can be avoided by the particular way in which the operation is performed. It should, therefore, not be considered any argument against performing gastro-jejunostomy for relief in these cases, if, in other respects, its benefits could be shown.

The second explanation of failure is more important because it touches the particular nature of the operative treatment adopted.

Physiologists tell us that the stomach, by reason of the peculiar disposition of its muscle walls, always tends to drive its contents, after a certain period has elapsed, towards the pyloric aperture, and, although an artificial opening exists elsewhere in its parietes, the tendency of the viscus is still to eject its contents by the normal outlet. Further, as practical surgeons, we know that a fistula in any part of the body will close naturally if not kept open by the discharge of material through it. What, therefore, doubtlessly happens in some of these cases, and more particularly in those where the narrowing of the pylorus is not extreme, is that in course of time the gastro-jejunal fistula contracts, and possibly in some cases completely closes, so that sooner or later there is a recrudescence of all the old gastric symptoms. For, although the narrowed pyloric aperture is obstructive, it, nevertheless, is not sufficiently so to counteract the normal *vis a tergo* of the gastric contents, which still prefers the natural to the artificial outlet. This seems to me a perfectly feasible explanation of certain cases where we have no reason to believe that the trouble has lasted sufficiently long to permanently injure the gastric functions, and where, therefore, the improvement always noticed for the first few weeks after operation has not proved permanent.

On the basis, therefore, of this latter assumption, one cannot regard gastro-jejunostomy as a proper course of routine treatment in cases which otherwise may be considered suitable for operative intervention. That easy access to the bowel is required there is no doubt, but this must be effected by other means than by the production of an artificial fistula bimuscosa such as is established by the ordinary procedure of performing posterior gastro-jejunostomy. The only feasible method to adopt, and one which will meet the normal requirement of gastric contraction, is to enlarge the pyloric aperture. We have at present three ways of doing this—by pylorodiosis or dilatation of the pylorus, by pyloroplasty, and by Finney's operation. The first of these is probably too doubtful in its permanency to be worthy of consideration. Of the latter two I think preference should be given to pyloroplasty; for there is no reason to suppose that a part normal in its intimate structure should recontract as it has a tendency to do when invaded by inflammatory cicatricial tissue. The operation also is simpler and takes much less time in execution than does Finney's method.

Before describing briefly in detail the steps to be followed when operation is to be undertaken it should be pointed out that in nearly all these cases relief is obtained by the strictest attention to diet. As long as the patient limits himself to a reduced and easily digestible diet there may be but little gastric discomfort; and if a patient is satisfied to live under such restriction, and the necessary limitations to ordinary life which it involves, there is no reason to suppose that the assumed pyloric abnormality should shorten the natural span of existence; and that when the end does come, it may just as likely be from some other disorder quite unconnected with the stomach trouble. If, however, the patient wishes to be relieved permanently of such restrictions as are otherwise entailed, it will be by such a safe and simple proceeding as the following. The stomach when exposed by an opening made through the abdominal parietes is incised on its anterior wall. By means of this aperture the interior of the viscus is examined digitally, and by speculum if need be. If nothing be found to explain the symptoms except a uniformly narrowed pyloric aperture, the exploratory incision in the gastric wall is closed and pyloroplasty proceeded with.

CONCLUSIONS.

1. That there exists an abnormal condition of the pyloric aperture, of probably congenital origin, which consists in an undue narrowing of the orifice, varying anything between 2 and 10 or 12 mm.
2. That the condition is more frequently met with in

women than in men, and that the age at which the symptoms first appear depends upon the narrowness of the aperture and the general physical or constitutional condition of the patient.

3. That the narrowing leads to a more or less chronic condition of indigestion manifested in various forms and often mistaken for chronic ulceration or chronic gastric catarrh; that in the early stages relief is afforded by careful and strict attention to diet, but that any attempt to return to normal feeding causes a recrudescence of indigestion. The attacks of gastric discomfort are at first separated by considerable intervals, but these lessen in length as time goes on.

4. That when the patient is advanced in life and shows marked general debility operation will prove of doubtful value.

5. That, barring such considerations as those mentioned in Paragraph 3, pyloroplasty or Finney's operation—preferably the former—should be practised.

A Clinical Lecture

ON

GASTRO-ENTEROSTOMY FOR NON-MALIGNANT DISEASE.

DELIVERED AT THE LONDON HOSPITAL.

By C. MANSELL MOULLIN, F.R.C.S.,

SENIOR SURGEON.

SIXTEEN years ago I performed gastro-enterostomy for the first time. On that occasion I made use of Senn's plates—flat plates of decalcified bone, held together by silk sutures—and inserted one into the stomach, the other into the intestine, for the purpose of obtaining a wide area of coaptation. The patient was a young man with well-marked pyloric stenosis. For five weeks everything went on well. The wound healed up. The patient resumed ordinary diet, and was well enough to go out for a drive. Then, for no reason that could be ascertained, that peculiar condition which has been called enterogenic coma, and which is said by Heile of Wiesbaden to be especially likely to occur in those whose tissues are in a state of chronic starvation from pyloric stenosis, set in. The temperature rose; the pulse became rapid; diarrhoea began; the patient became delirious, and coma followed in the course of a few days, caused by some change in the metabolism of the tissues, comparable to that which occurs at times in connexion with diabetes. At the *post-mortem* examination no cause was found that could account for death. The interesting feature was that the opening, which had been made large enough to admit full-sized plates, had contracted to such an extent that it would only allow the passage of the little finger.

Since that time great strides have been made. All forms of mechanical contrivances, plates, buttons, and bobbins have been discarded. A rounded intestinal needle and fine silk or Pagenstecher's thread are all that are used. Two rows of continuous sutures are inserted—the inner one through all the coats, the outer through the serous and muscular only, and the general principles upon which the operation should be conducted have been well defined. But there remain many details, some of them relating to matters of great importance, concerning which opinions are by no means yet so decided, and it is to some of these that I wish to allude to-day. Before beginning, however, it is necessary, as a preliminary, to come to some understanding as to the aims and objects with which gastro-enterostomy is performed. All cases are not alike. The reasons for the operation differ a good deal according to the condition present, and the details must naturally be guided by them.

The simplest case is where there is an obstruction at the pyloric outlet with well-developed muscular power behind. The object here is obvious, and the result, as a rule, most successful. It does not matter whether the obstruction is due to organic causes, such as contraction of the scar left by an old ulcer, or pyloric fibrosis, or whether it is the result of long-continued muscular spasm; the point is that the difficulty which has to be met is a mechanical one, and

that it is met in the only way in which such a thing can be—mechanically. In such the particular locality and direction of the openings that have to be made in the stomach and intestine respectively may almost be left to the convenience of the moment. Provided they are sufficiently large and are so planned that there can be no valve or other hindrance, such as might be caused by pressure upon an unduly long loop, the stomach is bound to empty itself and will guard itself effectually against regurgitation.

It is more difficult when there is an ulcer of the stomach or duodenum. Here it is no longer a question of mechanical impediment to the exit of the chyme, except such as may arise from transient pyloric spasm. The feature which has to be met in these cases is the intensely acid reaction of the contents of the cardiac end.

This is the chief, if not the sole, cause of the ulceration. It prevents the ulcer healing, and causes the pain and vomiting after food. The prime object, of course, should be to check the production; but in the present state of our knowledge this cannot be done. The next is either to neutralize the surplus acid, perhaps, as Paterson has suggested, by allowing the alkaline contents of the intestine to enter into the stomach through the anastomotic opening; or to diminish the proportion of free acid by not allowing the food to remain so long in the cardiac end. The principle, therefore, upon which the operation is performed in cases of this kind is quite different from the former, and it becomes a matter of great importance where and in what way the anastomosis is made.

In gastric or duodenal hæmorrhage, again, the idea that underlies this operation is somewhat different from both of these. Bleeding that comes from an artery of any size must, of course, be treated by local ligature as in any other part of the body, or by ligature or excision of the ulcer itself. But in certain instances neither of these alternatives is available; and there are other cases in which the bleeding takes place from multiple erosions or from the surface of the mucous membrane itself, and is so serious and so persistent as to render recourse to operation necessary. In such as these gastro-enterostomy is sometimes performed, not with the idea of any direct effect upon the bleeding point, but to keep the pyloric portion, from which the bleeding mostly comes, absolutely empty, and to secure perfect rest for it, until such time as the artery has been able to close up and heal permanently, or the mucous membrane has recovered its normal condition.

These, put as briefly as possible, are the main indications for the performance of gastro-enterostomy in cases of non-malignant disease, and the object is not quite the same in any of them. Besides these, it is performed exceptionally for other reasons. In one case under my care, for instance, in which there was intense pyloric spasm with great pain, for which I could find no reason, I divided the thickened band of fibres which surrounded the antrum, and made the anastomosis there with great success. Whether this was due to the formation of the artificial opening, or to the division of the hypertrophied fibres, or to both together, I am not able to say. Gastro-enterostomy, too, has been performed for dilatation of the stomach consequent upon atony, in the hope that effectual drainage, keeping it empty, might at last be followed by contraction; and it has even been done when the dilatation was associated with enteroptosis. But these are quite exceptional, and only likely to be performed under special circumstances in individual cases.

Leaving on one side all the ordinary details connected with abdominal operations, the point of first importance is the selection of the particular spot upon the wall of the stomach and intestine at which the communication between the two should be made. Usually there is a fair amount of choice. It is only in exceptional instances that, owing to the presence of adhesions or for other reasons, there is no option left.

So far as the stomach is concerned, the opening may be made on the anterior or the posterior surface, and at the cardiac or pyloric ends. In Finney's modification of pyloroplasty the opening is at the pylorus itself. Of these, the anterior operation, in which a loop of jejunum is brought up from under the transverse colon and fastened to the anterior surface of the stomach, is practically abandoned in favour of the posterior. It necessitates a long loop of bowel being drawn up, so as to avoid the colon

being compressed or in any other way interfered with; and this necessitates a further anastomosis between the contiguous sides of the intestinal loop to prevent its contents stagnating. But in spite of these drawbacks the ultimate results of this method are just as good as those which follow a similar operation (that is, one in which there is a long loop) performed in connexion with the posterior wall. In many of my earlier cases I made use of it, and the only reason that I can assign for having abandoned it in favour of the posterior is that the adjustment in the latter case seems to be a more natural one, and that the colon is certainly less in danger. Probably in either case, whether the connexion is made on the anterior or the posterior wall, the aperture soon becomes the most dependent part, owing to the weight of the loop of bowel dragging upon it; and so long as the muscular coat of the stomach is in a good state of efficiency, and not atonied, the one will succeed almost, if not quite, as well as the other.

Finney's operation, on the other hand, is of limited application, and is only suited to those cases in which there is pyloric stenosis uncomplicated by adhesions, or thickening, or loss of flexibility in the parts concerned. For such as these, and for those in which there is great pain due to muscular spasm, it answers admirably, and I have for a long time employed it in preference to the posterior method.

The next point is to determine where the opening in the stomach should be made, whether at the pyloric or at the cardiac end, supposing, of course, that there is an option, and that Finney's method does not meet the requirements of the case. This is a matter of real importance, especially in those cases in which the stomach still retains more or less its normal physiological structure, and is not reduced to the condition of a shapeless sac, with walls of approximately the same degree of thickness and strength throughout. In health, and it must be added in youth, the structure of the stomach is by no means that of a simple sac. Cunningham's dissections and x-ray examination after the ingestion of large quantities (2 oz. or more) of carbonate of bismuth, have shown conclusively that the normal human stomach is made up of two divisions, which at times during the process of digestion are completely separated from each other. Each of these again has been subdivided by Gray of Aberdeen into two smaller ones, but this need not concern us here. There is a sphincter-like band of muscular fibres extending from the cardiac end of the lesser curvature transversely across the stomach, dividing it into a more or less vertical portion, the cardiac on the left and a horizontal tubular part, the pyloric, on the right. I have often seen and pointed out this band in the course of operations. Often it is firmly contracted when the abdomen is first opened, and it may easily give the impression that there is an hour-glass contraction present. At the greater curvature this band intersects the oblique fibres coming down from the oesophageal opening, and apparently acts with them, and helps them in separating off the cardiac from the pyloric part.

The temporary separation of these two divisions is illustrated remarkably well by a peculiar form of vomiting which occasionally sets in after gastro-enterostomy has been performed. The patient recovers from the anaesthetic, and perhaps is sick once or twice. Then, some hours later, vomiting begins again, often at frequent intervals, and continues for two or three days, with very little effort or straining. The fluid is intensely acid, so acid that I have known it make the patient's lips and the angles of his mouth quite sore. The quantity may be small or large, but a striking peculiarity is that though the vomiting may occur a few minutes after food has been taken, the food does not return. I have several times seen a patient drink some ounces of milk and soda water and be sick within a quarter of an hour, bringing up a turbid brown acid fluid which did not contain a trace of the milk. The two liquids were actually in the stomach at the same time, but were kept apart from each other, so that they did not mix in the least. I have noticed that this is especially likely to occur after the long-loop method with a lateral anastomosis and with the opening near the pylorus. Under these conditions the alkaline bile and pancreatic juice never enter the cardiac end; the operation is expressly devised to prevent such a thing; and as a consequence the acid that is secreted there stands no chance of being

neutralized by them. Under the stimulus of the recently swallowed milk the acid fluid, which has been collecting in the cardiac end passes on into the pylorus, and is at once rejected along the lesser curvature to the oesophageal opening, while the milk is retained. As soon as the swelling and oedema around the newly formed anastomosis subside, an easier route is opened up, and the vomiting ceases.

The structure of these two divisions of the stomach is quite different. The cardiac end consists almost entirely of a thin-walled sac. The pyloric is highly muscular, especially in that part known as the antrum pylori, which is separated off from the rest of the division by a more or less developed sphincter. In the early period of digestion the food is lodged entirely in the cardiac division, where it slowly becomes infiltrated with the acid secretion from the walls. In the later, it passes bit by bit into the pyloric, to be retained there for a time or sent on into the bowel, according to the state of the pyloric sphincter. The globular mass of food at the cardiac end can be seen by means of the *x* rays slowly altering its shape and size as its contents pass in a narrow stream from one part to the other. The function of the two parts is different. Their reaction is different. In the one the acidity is steadily increasing the whole time the food is contained in it. In the other it either remains unchanged or, more probably, steadily diminishes, for there must be a very large amount of alkaline secretion from the pyloric glands. It cannot, therefore, be a matter of indifference with which of these two the bowel is connected, especially when there is a gastric or a duodenal ulcer or when the operation is performed for haemorrhage. If it is merely a case of mechanical difficulty associated with good muscular powers, it is not so important, for the opening naturally is made as near the original one as it conveniently can be.

Now it is the pyloric end that requires relief. It is the pyloric portion (including in this the lesser curvature which lies almost wholly to the right of the transverse dividing band) which is the seat of ulceration. Ulcers at the cardiac end are comparatively rare. It is the pyloric portion that is the seat of the spasm and colic causing the pain of dyspepsia and gastric ulcer. This pain is not due directly to contact of the acid chyme with the surface of the ulcer. The coats of the stomach are not sensitive to pain in this way, as may be seen from the not uncommon occurrence of the sudden perforation of a gastric ulcer of which there had not been previously the least suspicion. The pain is due to the spasmodic contraction of the pylorus dragging upon the parietal peritoneum, the sensitiveness of which has been increased by the absorption of inflammatory products from the surface of the ulcer. And it is the pylorus to which is assigned the control of the passage of the contents of the stomach into the intestine, and with this, because indirectly dependent upon it, the control of the secretion of the pancreas. Where, then, is the opening to be made? At the pyloric end, allowing the contents of the stomach to become more and more acid as they remain in the cardia, and then pass on unmixed with the alkaline pyloric secretion, straight through the artificial opening, into the jejunum? Or at the right extremity of the cardiac part, so that, with as little admixture of the acid gastric juice as possible, they may pass on as soon as they can from the cardia into the bowel, leaving the pyloric portion on one side? Probably in this case some will always continue along the normal route, enough to make sure that the secretion of the pancreas will not fail. Even if it does not, the entrance of the chyme into the first part of the jejunum through the artificial opening seems to answer all the purpose.

I believe that this spot, lying almost vertically under the left extremity of the lesser curvature, intersecting the band of muscle that separates off the cardiac sac from the pyloric part, is the seat of election in cases of this kind. The opening should, of course, be as near the greater curvature as it may be; it should be at least 2 in. in length, and it should lie parallel to the greater curvature, for in this way the transverse band of fibres, when it contracts, will tend to keep it open for the contents to pass out. Granted these conditions, such an opening will prevent the food from collecting and fermenting in the cardiac end; will enable the cardiac division to empty itself before its contents have become too acid; will save

the pyloric part from the irritation that causes pain and vomiting, and will give a sufficient stimulus to the mucous membrane of the jejunum to ensure the action of the pancreas, without being so acid as to cause a peptic ulcer. In some instances, of course, especially in those in which there is a considerable degree of atony, this band is not well marked; but I think evidence of its existence can be found in most cases in which gastro-enterostomy is performed for gastric or duodenal ulcer, or for haemorrhage.

The choice of the particular part of the intestine that should be joined on to the stomach also deserves some consideration. In principle it is not very difficult. The higher up the opening the better, and that is one reason why Finney's operation gives such good results. It interferes less than any other with the natural arrangement of the parts. If for any reason this method is not advisable, the first portion of bowel that is available is with rare exceptions the beginning of the jejunum; and the question arises whether this should be fastened to the stomach so that there is no loop, or as little of a loop as possible; or whether another portion some few inches lower down should be selected, leaving a dependent portion between the suspensory ligament of the bowel and the point of attachment to the wall of the stomach.

In most instances the results obtained are equally good, no matter which method is adopted. The one is as easy of execution as the other. So far as the mechanical transmission of the food is concerned, the cutting out of a few inches of intestine, more or less, does not appear to make any difference. There is no evidence in either case that the secretion of the pancreas is affected; and it has never been shown that peptic ulceration of the jejunum is more likely to occur in one than in the other. If a loop of any length is left, it is advisable to make a lateral anastomosis between the contiguous sides of the intestine, to avoid any possibility of the contents stagnating in it; and also to secure the bowel to the margin of the opening in the transverse mesocolon, to prevent subsequent displacement of the intestine upwards, which has been known to occur. This addition to the operation naturally takes a few, but a very few, minutes longer. Theoretically the no-loop method interferes more than the other with the movements of the stomach, especially with the rotation forwards of the greater curvature which is described as taking place when the stomach becomes full. Practically it does not seem to make the least difference. Nor does it appear to matter whether the direction of the incision, and consequently of the first portion of the jejunum, is downwards to the right, when the stomach is lying in its natural position, or downwards to the left. There are equally good authorities for both, and, as I have said already, my own predilection is for an incision that is almost horizontal, parallel, that is to say, to the greater curvature. The no-loop method undoubtedly favours the entry of the bile and pancreatic juice into the stomach; and because this at one time was believed to be the cause of that variety of persistent after-vomiting known as the "vicious circle," the loop with the lateral anastomosis came into favour. It is known, however, now, that this idea was erroneous; and that the stomach will tolerate the presence of both of these secretions perfectly well, so long as they are healthy. This idea that the entry of bile into the stomach led to vomiting probably originated in a misinterpretation of the events that take place in what is known as bilious sickness, and in the grass-green vomiting of general septic peritonitis. In neither of these, however, does the regurgitation begin with the stomach. The duodenum, the part of the bowel that is, if any, accustomed to the presence of bile, is affected first. It has to vomit its contents into the stomach before this can pass them on; and in all probability the prime cause is not the presence of bile in the stomach, but the presence in the bile of some poisonous constituent excreted from the liver. Some have even gone so far as to attribute the success of gastro-enterostomy in no small measure to this very thing. They consider that the constant entry of small quantities of an alkaline secretion into the stomach neutralizes the hyperacidity which was the original cause of the ulceration, and which may persist and continue to do harm afterwards. This, however, scarcely seems to be probable, as it is the exception to find any bile in the contents of the stomach if this is washed out some time after the opera-

tion has been performed; and of course, if it entered in the early days after the operation, when the margins of the opening are swollen and congested, it would continue to do so later. On the whole the no-loop method is to be preferred, though results quite as good can be obtained by the other with practically the same degree of certainty.

Another point worth considering in connexion with gastro-enterostomy is the question of the degree of relief, and especially the permanence of relief that is to be expected from it. In no small measure this depends upon the condition of the patient at the time of the operation, and upon the care as regards the mode of living that is likely to be exercised afterwards. If, as in my first case, the operation has been preceded by years of chronic starvation, or if the patient is reduced to such a condition of neurasthenia that he is no longer capable of realizing what it is to be free from pain, the result is not likely to be perfect. Gastro-enterostomy cannot work miracles or undo the mischief that has been wrought in past years; and if the patient continues to lead the same kind of life after the operation that he led before, and to take no more care of himself, it is not to be expected that much benefit will follow. It stands to reason that if the conditions of living that led to the production of hyperacidity and ulceration when the stomach was healthy and uninjured, are allowed to continue without any check after the operation, the consequences will be the same or even worse. I have found it very difficult to make patients realize this. Time after time have I known them indulge themselves in all sorts of ways as soon as they were released from observation, and then complain of the consequences. They do not seem able to grasp the fact that gastro-enterostomy can only relieve them from the results of their previous want of care. It can never turn a naturally weak digestion into a good one.

The local condition, however, the seat and character of the lesion that renders operation necessary; the presence of adhesions; the shape and size of the stomach; the condition of its muscular coat, and similar details are of greater importance in determining this question. If, for example, there is merely mechanical obstruction at the pylorus and all else is healthy, relief ought to be complete. A new outlet is formed, and provided the stomach retains some portion of its original muscular power, or can regain it if it has been lost already, the artificial outlet will to all intents and purposes answer as well as the natural one. Moreover, the relief is permanent. It is true that in the first operation I performed the opening had contracted in the course of six weeks to the size of one's little finger; but the original incisions were far too small (they were stretched to allow the introduction of the plates used), and no portion of the mucous membrane was excised. On the other hand, I have notes of cases in which gastro-enterostomy had been performed eight and twelve years before, in which the opening was found *post mortem* to be patent and efficient. I do not attach much importance to the experiments that have been performed upon animals with the view of elucidating this question of permanence, as the conditions are not sufficiently similar to admit of comparison being made.

But when a chronic gastric or duodenal ulcer is the reason that calls for operation, and not merely the scar left by an ulcer long since healed, many other factors have to be taken into consideration. The question is no longer a mere mechanical one. What has to be done now is much more complicated. The hyperacidity of the contents of the stomach has to be lessened or neutralized. The ulcerated surface has to be protected from irritation and prevented from spreading until it causes perforation. The absorption of inflammatory products from the surface of the sore has to be stopped. Pain has to be prevented by checking the spasmodic contraction of the stomach which makes it drag and pull upon the surrounding peritoneum, hypersensitive because of the irritated sore so close to it. And above all, though it is not as yet sufficiently appreciated, the subsequent development of cancer has to be prevented. In every other part of the body it is notorious that cancer is especially prone to develop at the site of an ulcer which is prevented from healing by constant irritation. The stomach is no exception. In no less than 60 per cent. of the patients who die from cancer of the stomach is there the history of long-continued suffering, suggesting by the character and

persistence of the symptoms the pre-existence for many years of a neglected and irritated gastric ulcer.

How far all this can be accomplished in any individual case depends upon the success with which the short-circuiting is carried out. The object of gastro-enterostomy in these circumstances is not to drain the stomach, but to short-circuit the part that is involved, so that it may be left entirely on one side, at rest, until it has thoroughly recovered. Whether the patient is cured or merely relieved for the time depends upon the success with which this is done. If, for example, the ulcer is a simple one, near the pylorus, without any complications, and this part of the stomach is thoroughly excluded, so that it gets no work to do, all the symptoms will subside; the ulcer will heal, and, as I have seen on many occasions, great masses of indurated tissue, so large and so hard as to suggest the presence of scirrhus, will be completely absorbed. On the other hand, ulcers at the other end of the lesser curvature, especially saddle-shaped ones, which distort the shape of the stomach and drag upon the lesser omentum, are much more difficult. Where it is possible, these must be excised to obtain the best result, though this often involves a long operation upon the stomach before the gastro-enterostomy is begun, and the same thing is true of those ulcers, fortunately much more rare, at the cardiac end. Adhesions, again, require the closest attention. If they are left, relief from pain is rarely complete. Unfortunately, in many instances—when, for example, the liver or pancreas is deeply involved—it is impossible to remove them. Recurrence can only be prevented by dissecting them off at both ends and suturing the base from which they have been detached, so as to leave a smooth serous surface. The moral, of course, is the old and trite one that has been so often drawn—the operation should be performed while there is yet a possibility of really curing the patient, and should not be blamed if, through delay, which is now inexcusable, the state of things has become so bad that it cannot be remedied.

TETANY IN THE ADULT.

By J. A. GIBB, M.B., M.Ch.

Cases of tetany are of sufficiently rare occurrence to merit publication. I have seen three cases: two in adults, and one in a child between two and three years old. In the case of the child the tetany was no doubt due to rickets—late rickets. At the time the child was being improperly fed. I will report the cases of the two adults. They were both fatal. The child recovered and became healthy under proper treatment.

CASE I.

On May 7th I was called to see a lady aged 52 years who was said to have fainted. I found her lying on the floor with her shoulders raised. She was pale with dark rings under her partially-closed eyes. Her pulse did not suggest cardiac failure; it was of good volume, regular, and rather slower than normal.

I proceeded to remove the pillows from under her; this brought on a convulsion. The corners of her mouth were drawn up, the jaws were locked so as to prevent my putting the handle of a table-fork between her gums; she had no teeth. Her head was distinctly drawn back. Her breathing became difficult, and she groaned as one lifting a heavy weight. Her forearms were flexed. The thumbs were adducted and flexed into the palms, the fingers flexed over the thumbs. The chest and abdominal muscles were fixed and hard; the thighs, legs, and feet were extended, and the toes adducted. It was almost impossible to extend the flexion, or flex the extension. The pupils very slightly and very slowly reacted to light. The convulsions relaxed, but never completely passed off between one and another; her breathing was decidedly stertorous, her left cheek being puffed out with each expiration. She vomited, bringing up material that she had for tea at 5 p.m.—it was then 9.30.

The daughter told me that she had not been well for a few days previously, complaining of severe headache, chiefly frontal.

Having decided that it was a case of tetany, I injected hypodermically, during a convulsion, morphine and atropine. She was not conscious of the prick of the needle. She did not answer questions or show any sign of consciousness.

I waited half an hour, by which time the convulsions had almost stopped. I saw her daily for a week, and her condition improved.

I prescribed purges, and gave her liq. arsenicalis and liq. hydrarg. perchlor. internally. On May 14th, a week after my first visit, I was sent for at about 9 p.m., and found her unconscious. Pupils in the same condition as when I first saw her,