A Clinical Lecture

ON

HOUR-GLASS CONTRACTION OF THE
STOMACH

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BY

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I venture to illustrate this lecture with accounts of my first and of my latest case of hour-glass contraction treated by operation. I published a detailed description of the first and most remarkable case, with five others, in the *British Medical Journal* of March 25th, 1911, and in *The Operations of Surgery* (1927, ii, 188). The latest patient has only just left Guy's Hospital.

CASE I.—*Hour-glass Contraction : Duodenal Stenosis :
Gastro-gastrostomy and Finney's Operation*

Mrs. M. D., aged 42, came to me in 1909 with a history of indigestion for many years, and of almost constant pain in the epigastrium and sternum for the last three years. Swallowing immediately made the pain worse, and was followed by vomiting, which eased the pain. Only two or three ounces of liquid could be taken at a time; solids always caused severe pain and vomiting. There was no history of haematemesis or of melaena. The patient was very thin, sallow, and weak, and said that her weight had gone down from 130 lb. to 56 lb. during the last two years. A physician had seen her, and had diagnosed incurable malignant disease of the stomach or oesophagus. Radiographic examination after an opaque meal excluded oesophageal obstruction, but showed tight hour-glass contraction of the stomach, with a very small upper pouch and a very large lower one, with definite pyloric stenosis. Gastro-gastrostomy was performed with great difficulty owing to the small size and high position of the upper pouch; the incision in the latter had to be made almost circumferential in front of the greater curvature in order to get a sufficiently large anastomosis. The pylorus was then enlarged by Finney's operation. There were many gall-stones in the gall-bladder, but the temptation to remove them was resisted. The patient made a good recovery, and had gained over a stone in weight before she left the nursing home five weeks later. In 1912 she weighed over 9 st., having more than doubled her weight. In 1913 I removed a number of gall-stones from the gall-bladder and cystic and common bile ducts. The patient has remained perfectly well ever since.

CASE II.—*Hour-glass Contraction : Partial Gastrectomy*

E. H., aged 44, was admitted, under Dr. A. F. Hurst, on February 18th, 1931, for severe and continuous pain in the left side of the abdomen and the back, which occurred at intervals of two or three months for the past four years. Her brother had a partial gastrectomy for gastric ulcer. She had five children, having had also severe pelvic peritonitis after the birth of her first child, twenty-one years ago. Six years ago she had a hysterectomy, with removal of both ovaries; afterwards she was ill with double pneumonia and in bed for seven months. Four years ago she began to suffer from severe pain in the left hypochondrium, with nausea, vomiting, constipation, and retention of urine. These attacks would last for two or three weeks, and then would give way to a period of comparative freedom from symptoms, lasting for about three months, but even then there was a dragging pain under the left costal margin. The attacks gradually became more frequent until, finally, just before Christmas, 1930, she had an attack which was much more severe than any previous one, and lasted until she was admitted on the above-mentioned date. She usually vomited about two or three times a week. On admission the patient was weak and anaemic. The teeth were in bad condition, and showed extensive caries. The abdomen

was full, and showed numerous brown stains, due to the application of heat. There was resistance and tenderness in the left hypochondrium, and the pain was referred to the left breast and left shoulder-blade. The urine contained albumin, with a little pus, and gave a culture of the *Bacillus coli communis*. An x-ray examination of the renal tract showed no abnormality; the Wassermann test was negative. The pain was almost continuous, but was worse very soon after food; nausea and vomiting followed the pain. X-ray examination after a barium enema demonstrated no abnormality. After an opaque meal had been given, an hour-glass stomach was visible, with a large niche about the middle of the lesser curvature. This was tender on pressure, and was thought to indicate an ulcer penetrating the pancreas. The notch on the greater curvature opposite the ulcer was very deep, but although the channel for food was very narrow, the barium passed quite freely from the upper into the lower pouch. The duodenal cap was normal, but about half the meal remained in the lower pouch of the stomach at the end of six hours. Although the patient improved a good deal on a strict diet, Dr. Hurst did not think the deep and large ulcer would heal under medical treatment, nor did he expect gastro-gastrostomy would be sufficient, especially as there was no delay in the upper pouch. The patient was therefore transferred to my ward on March 19th. As the haemoglobin was 80 per cent., transfusion was considered unnecessary.

At operation, on March 26th, using the left Kocher incision, many adhesions were found in the lower abdomen from the old hysterectomy. There were some calcified glands in the mesentery, especially near the ileo-caecal angle. The appendix did not appear to be diseased, and was not removed. There were many calcified glands in the ileo-caecal region. There was no duodenal ulcer or stenosis. A large ulcer was found at the middle of the lesser curvature, whose crater just admitted the tip of my thumb. There was only a moderate hour-glass contraction; most of the deformity shown on the x-ray pictures was clearly due to spasm, and as the ulcer was deep and partly adherent to the pancreas, and appeared to penetrate the stomach wall, Dr. Hurst (who was present) and I decided in favour of partial gastrectomy. This was carried out, the stomach being divided 1 inch from the pylorus and the adhesions to the pancreas being tied and the stomach divided 1½ inches above the ulcer and joined to the jejunum 8 inches below the duodeno-jejunal flexure, the proximal part being at the greater curvature. When the operation had been completed the distal jejunum appeared kinked and compressed by the root of the transverse mesocolon; therefore an entero-anastomosis was made. During the operation a grey swelling, 1 inch long, was found in the early part of the jejunum, which was suggestive of tuberculous ulceration. The anastomosis was made below this part. No other similar patches were found. After the stomach had been removed the mucous membrane about the ulcer was seen to be very oedematous and congested, and this made the ulcer seem deeper than it really was. It had not quite pierced the outer coat of the stomach.

ETIOLOGY

Hour-glass contraction is nearly always due to a peculiarly chronic kind of gastric ulcer, which is very rare in men but fairly common in women. It generally occurs near the middle of the lesser curvature, but occasionally it may be found much higher or lower down. Opposite the niche of the ulcer on the lesser curvature a deep spasmodic notch is formed on the greater curvature. Gradually the ulcer extends deeply into the gastric wall and causes extensive infiltration of it, especially where it is in spasm. It has a great tendency to heal with the formation of dense scar tissue, which draws up the greater towards the lesser curvature, causing more and more obstruction, with secondary dilatation and hypertrophy of the upper pouch. Spasm of the muscular coat of the stomach and congestion with oedema of the mucous membrane add to the obstruction. These factors vary

from time to time, so that the degree of obstruction is also variable. It is interesting and significant that the type of ulcer which causes hour-glass contraction very rarely becomes malignant. This well-recognized fact has great influence in making the surgical treatment easier and safer and the ultimate prognosis better.

At one time it was thought that this deformity was congenital in origin, a reversion to the type of divided stomach seen in some of the lower animals. There is only one authentic case of congenital hour-glass contraction. In one case the deformity was secondary to a congenital gastric fistula. Bands outside the stomach may squeeze it into an hour-glass shape. I have seen several cases of this kind. In one of these the contraction had followed the perforation of a gastric ulcer with diffuse peritonitis. After some months, a broad band of adhesions remained and passed round the stomach from the ulcer, which was on the lesser curvature and adherent to the liver. In another, a thin band constricting the upper part of the stomach extended from calcified glands above the pancreas. Occasionally syphilis causes hour-glass contraction, and therefore it is always wise to make the Wassermann test. Carcinoma causes about 1 per cent. of hour-glass contractions. The α -ray appearances differ much from those of simple hour-glass contraction.

VARIETIES

Usually the ulcer causing the stricture is near the middle of the lesser curvature, and the upper pouch is larger than the lower, but occasionally the ulcer may be very high up, near the cardia, so that the upper pouch may be very small. Sometimes the ulcer may extend to the cardiac orifice and cause not only an hour-glass contraction but also oesophageal obstruction. Rarely an ulcer near the pylorus may cause an hour-glass contraction with a small lower pouch. In about one-third of the cases, duodenal or pyloric stenosis complicates hour-glass contraction; this has been overlooked before and during operation with serious consequences.

Instances are recorded of two or more contracting ulcers of the stomach dividing the latter into three or more pouches. The contracted part of the stomach is nearly always adherent to the under surface of the liver, the pancreas, the falciform ligament, or the anterior abdominal wall. In the majority of my cases the ulcer had healed or was quite small before the patient came to operation, so that there was no suspicion of malignancy or need to excise an ulcer or stricture, but only to make a good short circuit for the free passage of food.

DIAGNOSIS

Before the introduction and perfection of radiographic examinations the diagnosis of hour-glass contraction was often difficult, and we had to rely upon gaseous distension of the pouches. Nowadays, careful and repeated α -ray examinations make the diagnosis easy and accurate. It is possible, however, to overlook the lower pouch if the stricture above it is very tight, and if repeated examinations are not made after the food has had time to pass into the lower pouch. The notch produced by muscular spasm opposite an ulcer upon the lesser curvature has often led to erroneous diagnoses of hour-glass contraction, so that when the stomach has been exposed at operation the spasm has been overcome by the anaesthetic, and very little narrowing of the stomach has been evident. But, as already mentioned, spasm and oedema of the stomach add greatly to the obstruction produced by real fibrous contraction. The waist of an atonic stomach dragged down by an opaque meal is quite different from that of true organic hour-glass contraction. It does not show the bulge or pouch below and to the left

of the stricture. Reflex spasmodic contraction of the stomach has led to a wrong diagnosis. In one case of this kind, hour-glass contraction was demonstrated on three separate occasions, but none was found at the operation. A subacutely inflamed appendix lying in the pelvis and full of pus had caused the reflex contraction, and its excision cured all the reflex gastric symptoms and signs.

TREATMENT

Although medical treatment may greatly relieve the symptoms of hour-glass stomach in its early stages, an operation should be performed as soon as obstruction develops, for it is rarely possible to cause the ulcer to heal completely without seriously increasing the obstruction. Delay has often led to unnecessary suffering and semi-starvation. Many of my patients had become extremely thin and weak before they were sent for operation. Delay may also lead to serious haemorrhage, perforation, or possibly malignant disease. A subphrenic abscess had developed in one of my patients, and had existed for nearly three months before the operation; it is no wonder, therefore, that she died a few days after the operation.

PREPARATION FOR OPERATION

The patient should be carefully prepared for the operation, and all septic conditions, especially in the mouth, throat, and nose, should be efficiently treated at least a fortnight beforehand. The stomach is washed out if there is much stasis, and, after this, the diet should be limited to sterile liquids for two days before the operation. Rectal salines with 5 per cent. glucose may also be given with advantage in severe cases.

The operation should begin as a rapid exploration of the whole abdomen, and any obvious source of infection, such as a diseased appendix, should be treated. The stomach, pylorus, and duodenum must be carefully examined, for without this precaution a cardiac pouch, a trilobular stomach, or associated duodenal obstruction has been overlooked, with disastrous consequences. In six cases mentioned by Veyrasset¹ the upper pouch was overlooked, and only the pyloric pouch was drained by a gastro-jejunostomy, with fatal results. The exact nature of the operation must depend on the conditions found on exploration, for the same operation is not suitable for all cases. Much depends on the size of the cardiac pouch, the presence or absence of pyloric obstruction or adhesions, and any suspicion of malignant disease. The condition of the patient has also to be taken into consideration, for this is frequently too bad for a long and severe operation.

The immediate need is to overcome the obstruction, so that the patient may be saved from starvation. Under these conditions excision, which may seem to some to be the ideal radical operation, may be far too dangerous, and therefore wrong. Experience has also shown that it is rarely necessary.

Hour-glass contraction depends chiefly on the formation of scar tissue in connexion with a chronic ulcer. Recovery under medical treatment is prevented by the increasing obstruction, with the consequent starvation and the forcing of food through the narrow neck of the hour-glass over the surface of the ulcer. When the obstruction is overcome by operation, the food is no longer driven over the ulcer, full diet can be taken with safety, and complete healing may be expected; there is abundant evidence that this does take place.

CHOICE OF OPERATION

The choice of operation depends chiefly on the presence or absence of pyloric obstruction in addition to hour-glass contraction. It follows that the discussion will be facilitated by adopting this natural division.

Simple Hour-glass Contraction

Gastro-gastrostomy is, in my experience, the most commonly applicable and satisfactory operation; when well done it permanently overcomes the obstruction without altering the physiological conditions of the stomach, and without trespassing on the ulcerated stricture, through which the food need never pass again. Moreover, it is the safest operation, and it carries no risk of gastro-jejunal ulcer or of vicious vomiting, which are especially likely to follow gastro-jejunostomy performed under unusual difficulties. When the upper pouch is very small, gastro-gastrostomy may be difficult, but by making a curved incision a sufficiently large opening can be obtained. The vertical gastric incisions figured in some of the books cannot be made nearly long enough to provide adequate drainage. This operation is much more easily done on the front of the stomach for adhesions in the lesser sac, and the distortion of the stomach makes a posterior operation very difficult without any compensating advantages. The essential points of gastro-gastrostomy now require attention. It is of vital importance to make the stomach as large as possible, especially when this is the only operation performed. With this object very large pouches of the cardiac and pyloric parts of the stomach are so secured in strong curved clamps that long curved incisions can be made in them about 1 inch above and nearly parallel to the greater curvature. The points of the clamps are just below and in front of the structure, and their handles below the greater curvature well to the right and left. The pouches are brought together and joined by two continuous fine 'catgut' sutures as in gastro-jejunostomy.

Gastroplasty, as advocated by Kammerer, is not nearly so satisfactory because it trespasses upon the stricture or ulcer; consequently haemorrhage is more likely to follow, and the sewing is more difficult owing to the adhesions which generally bind down the contracted part of the stomach.

Gastro-jejunostomy.—When there is no pyloric obstruction and the cardiac pouch is of large size, posterior gastro-jejunostomy, engaging the lower part of the cardiac pouch, is attractive, because it not only overcomes the gastric stricture in a simple way, but it also corrects the excessive secretion of acid, which is such an important cause of the persistence of the ulceration when a low gastric stricture has once formed.

Excision of the Ulcer.—In some cases it is possible and advisable to excise the ulcer upon the lesser curvature without approaching too near the greater curvature. When the V-shaped opening thus made is closed, the narrowing is abolished, and the natural shape of the stomach is restored. This operation has the merit of immediately removing a chronic ulcer, which is slow to heal and may be regarded as a possible source of malignant disease, but it is unnecessarily difficult and severe for bad cases, and is only to be undertaken at any time by surgeons of considerable skill and experience in gastric surgery. Recurrence of ulceration with more severe hour-glass contraction occurred within a year in one of my cases; gastro-gastrostomy was then performed, and proved satisfactory. It must always be remembered that gastro-gastrostomy, which is a comparatively easy operation, cures these patients at a much smaller risk.

Partial Gastrectomy.—Removal of the part of the stomach bearing the stricture either by sleeve resection or by the classical partial gastrectomy is recommended by some surgeons, but as a rule it is unnecessarily severe and exposes a feeble patient to undue risk. It is certainly necessary in a few cases, especially when the ulcer is large or when malignant disease is either suspected or anticipated. I have only performed it in four out of my sixty cases of simple hour-glass contraction. In one patient who had a very large adherent ulcer causing hour-glass contraction, I divided the stomach a little above the contraction, closed the distal opening, and joined the proximal one to the jejunum, thus excluding the ulcer and distal part of the stomach. Three months later the

patient had completely recovered, and she has remained quite well and able to work hard for six years following the operation.

Retrograde Dilatation.—Moynihan² records a remarkable case in which it was impossible to join the cardiac pouch to the pyloric pouch or jejunum owing to adhesions. He opened the pyloric pouch and dilated the stricture in a retrograde manner, and to his surprise the patient made a good recovery.

Temporary jejunostomy has been performed in some cases when no other operation could be done with advantage (Eusterman).³ The rest afforded to the stomach for some months may improve the local conditions so much that a secondary radical gastric operation may become possible.

Hour-glass Contraction with Pyloric or Duodenal Stenosis

Gastro-gastrostomy followed by Finney's Operation.—I prefer this combination whenever possible. When the pylorus and duodenum are movable Finney's operation appears to be the best method of overcoming duodenal stenosis, for it is simple and effective, and can be performed very quickly when time is important in these enfeebled patients requiring two anastomoses, and particularly because it carries no risk of vicious circle or gastro-jejunal ulcer. Sometimes lateral gastro-duodenostomy is easier and better, but gastro-jejunostomy is preferable when there is active ulceration with deep and firm fixation of the duodenum.

Double posterior gastro-jejunostomy is not satisfactory in these circumstances for various reasons. It is difficult to drain the two pouches thoroughly through the limited space available in the mesocolon. Moreover, there are as a rule extensive and firm adhesions behind the stomach, and the mesocolon may be considerably shortened and adherent. In some of my cases it seemed impossible to join the jejunum to the posterior surface of the very small cardiac pouch, without undue risk of angulation or obstruction of the long-drawn-up loop of the jejunum, around which the mesocolon, although sewn to the stomach, is very likely to contract.

Partial gastrectomy is worth considering when duodenal ulceration or duodenal stenosis complicates hour-glass contraction in a patient who is not too feeble, but so far I have been content with the simpler and safer methods described above.

RESULTS OF OPERATION

Mortality.—Veyrasset's¹ statistics published in 1908 show a mortality of 16 per cent. for 260 operations for simple hour-glass stomach, but six of the deaths were due to draining the pyloric instead of the cardiac pouch. The death rate has much diminished since then, especially when great care is taken to select the operation, or combination of operations, most suitable for each case. As a rule gastro-gastrostomy is applicable and is attended by a very small risk, considering the state of nutrition of these starved patients. I have operated on over sixty cases with only two deaths due to the operation. It is fair to put the mortality at under 4 per cent.

Ultimate Results.—These are very good when the obstruction is thoroughly overcome. In the majority of my cases I have adopted gastro-gastrostomy and added either Finney's operation or gastro-jejunostomy when it was necessary to overcome duodenal stenosis. Very few of my patients required a secondary operation. There were three secondary gastro-jejunostomies, one secondary partial gastrectomy, and one secondary gastro-gastrostomy seven years after the first.

REFERENCES

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- ² Moynihan, Lord: *Lancet*, 1904, i, 413; *Abdominal Operations*, 1918, i, 284.
- ³ Eusterman, G. B.: *Mayo Clinics*, 1914, v, 20.