Remarks

ON

HOUR-GLASS STOMACH.

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By hour-glass stomach ("hour-glass contraction of the stomach," "bilocular stomach," "*Sanduhrmagen*," "*l'estomac biloculaire*") is understood that condition in which the stomach is divided into two portions by a constriction at any point between the cardiac and pyloric orifices. In one rare, in fact unique, case under my care the stomach was trilocular as the result of a narrowing, due to old ulceration and cicatricial healing, at two separate points, distant about 3 in. from one another. In another, also unique, there were three points of narrowing, one in the body of the stomach, one at or near the pylorus, and one about 1½ in. beyond the pylorus, in the duodenum. In this case they were four sacs. As a rule the cardiac complement is larger and has thicker walls than the pyloric. It dilates and becomes hypertrophied by reason of the great obstruction met with at the scarred and narrow isthmus, which connects it with the distal portion of the stomach.

The forms of hour-glass stomach are many. As a rule the constriction is near the middle of the organ, or near the pyloric end. The isthmus may be very much indurated, or it may be tubular with very little or no induration, but with some thickening. In most instances the greater curvature seems to be pulled upwards to the lesser, but in one case I have seen the lesser tucked down to the greater.

ETIOLOGY.

Hour-glass stomach is usually described as being "congenital" and "acquired." Of these forms the congenital is said to be more frequent. Thus Fenwick, in his work, writes: "In about 45 per cent. of the cases which have been recorded neither ulcer nor scar could be detected in the stomach, while in the great majority of cases where an ulcer was present it was obviously of more recent formation than the stricture." And again, "That the deformity is a rare result of ulceration is proved by the fact that only one case of the kind is mentioned in the records of the London hospital for forty years, whereas several instances of the congenital form of the disease were encountered during the same period of time."

Meckel considered that a congenital hour-glass stomach might result from an imperfection of development, and Cruveilhier and others have suggested that the sacculations are an instance of atavism, and that there is an analogy between such a deformity and the normal bifid stomach of certain rodents and the pouched stomachs of ruminants.

On examination of specimens of hour-glass stomach there can occasionally be seen two crossing bundles of muscular fibres on each surface of the organ. These were first noticed by Mariotti, but were more fully described by Saake. The bundles are generally half an inch or more in width, and cross at the point of narrowing in the stomach. Traced from the upper side of the cardiac complement, a bundle is seen to pass to the lower side of the pyloric, and from the lower side of the cardiac complement to the upper part of the pyloric, the fibres crossing like the widely opened blades of a pair of scissors. It has been suggested that these outstanding bands of muscle by their contraction determine the hour-glass form of the stomach, and their existence is held to be proof of the "congenital" origin of the deformity. In the only example I have seen of this muscular arrangement the hour-glass stomach was clearly the result of an ulcer whose edges were immensely thickened and whose base had perforated. In this case the bundles of fibres followed the lines of puckering produced by the contraction of the ulcer, and were therefore clearly the result, and not the cause, of the deformity.

Cumston and other writers have said that in congenital hour-glass stomach the two pouches are connected by a tube or cylinder showing no scar or ulceration, and free externally from all adhesions. One such case I have dealt with by operation. I slit up the channel connecting the two sacs, and found a perfect example of "bridle" stricture, the result of healing in an ulcer which, from the mucous surface, was easily seen and felt.

An example of congenital hour-glass stomach is said to have been recorded by Sandifort; the specimen was obtained from

a fetus. This case is referred to by every writer as being a well-marked example of congenital hour-glass stomach. I have read Sandifort's description, and have seen the figure drawn from his specimen. I should certainly decline to admit that there is any warrant for considering this an hour-glass stomach; the very slight contraction seen near the middle of the stomach is nothing more than the result of a slight irregular muscular contraction. The appearance of hour-glass deformity may be mimicked with remarkable accuracy by a condition of dilatation of the stomach and of the upper part of the duodenum as the result of a congenital narrowing of the duodenum at or near the bile papilla. Such a case is recorded by Wyss.

In all the recorded examples of hour-glass stomach where a full examination of the viscus has been made, ulceration has been found. For those who believe that the deformity is congenital, the theory that the ulcer is secondary is sufficient. Thus Cumston writes: "These ulcers are secondary, and are probably produced by the pressure of the food passing through the strictured part of the organ."

Roger Williams in 1883 described ten examples of "congenital" contraction of the stomach. The account of one of the cases is based on the examination of a wax model; of another, on the inspection of an "inflated dried" specimen; and of a third, on the appearance of a dried stuffed specimen. It is doubtful whether one of the examples can be accepted as an hour-glass stomach. In all the others pathological conditions, ulceration, puckering, thickening, or adhesions were found.

Hochenegg, Carrington, Maier, Saake, and many other writers who describe their examples as "congenital" mention thickening, old ulceration, adhesion to the pancreas or to the abdominal wall, localized perforation, and other conditions which are indubitably the result of chronic ulcer of the stomach. Doyen, in his work on the diseases of the stomach and duodenum, refers to a case in which at the isthmus of the stomach an adhesion to the anterior abdominal wall was found; on breaking through this a gastric fistula was exposed, showing unmistakably that an ulcer had been present, which had been prevented from perforating into the peritoneal cavity only by the anchoring of the organ to the anterior abdominal wall. This is said to be "congenital."

Mazotti relates a case of "congenital" hour-glass stomach in a woman of 50; he believes the deformity to be due to "an unusual development of the transverse muscular fibres in a certain part of the wall of the viscus."

An examination of several specimens and an earnest search through the literature of this subject has convinced me that there is no proof whatever of the existence of an hour-glass stomach due to a congenital deformity. The absence of any observation of hour-glass stomachs in the fetus or the young child is very striking. When those who have been describing their specimens use the word "congenital" they seem to do so without thought or hesitation, accepting, it would appear, the mere existence of the deformity as unquestioned evidence of its congenital origin. So far as I am aware, there is not a single specimen or an accurate record in existence which can be accepted as evidence of the congenital origin of this disease.

The causes of acquired hour-glass stomach are:

1. Perigastric adhesion.
2. Chronic ulcer,
3. Malignant disease.

1. Perigastric adhesions may arise from many causes. Most commonly they are due either to ulcer of the stomach or to gall-stone disease.

2. Chronic ulcer may cause hour-glass stomach in one of two ways. In the first there is a gradual deepening of the ulcer. As the ulcer approaches the serous coat of the stomach a few adhesions form, binding the viscus to the anterior abdominal wall, preventing the bursting of the ulcer into the general peritoneal cavity. If the ulcer be on the posterior surface, a soldering to the pancreas may result, as in one case I have recently seen. When the stomach is anchored in its middle, the pouches on each side, but more especially on the cardiac side, show a tendency to sagging, and this, with the cicatricial contraction taking place in the ulcer, results in hour-glass form of the stomach. In one of my cases a malignant mass in the anterior wall had formed an extensive adhesion to the body wall. Doyen, Steffan, and Finney have recorded similar examples.

In four recorded cases (Siewers, Brown, Thomsen, Leonard Bidwell), and in one of my own, an ulcer at the isthmus of an hour-glass stomach has perforated into the general peritoneal

cavity. In the second form the chronic ulcer in its healing has caused much contraction and induration. The stomach at the point of ulceration becomes markedly puckered and its lumen narrowed. But there is, I believe, in addition to the cicatricial contraction, another factor of chief importance in determining the narrowing of the organ. I refer to spasm. On several occasions during the last few years when operating for chronic ulcer, I have watched the stomach intently for several minutes, and have seen the onset, the acme, and the gradual relaxation of a spasmodic muscular contraction in its walls. Quite gradually the stomach narrows, and the wall becomes thicker and almost white in colour; when taken between the fingers the contracted area feels like a solid tumour. The spasm may be so marked as to prevent a finger being invaginated through the segment affected. The appearance presented is very striking. I have seen it in the body of the stomach and at the pylorus, but never at the fundus. As slowly as it comes on the spasm quietly relaxes, and the stomach assumes its usual form. In one patient I watched four such spasmodic seizures at the pylorus in a few minutes, and the tumour formed by the tightly-contracted muscle was so large that in a very thin subject it should have been felt on palpation of the abdomen. Such constantly-recurring attacks of spasm must lead to hypertrophy of the circular muscular fibres, and this thickening, together with the cicatricial contraction and the induration of the cavity, will amply account for the extreme narrowing of the stomach, with the dense thickening of the walls, met with in many of the examples recorded.

The extent to which spasmodic contraction, invoked by ulceration, is responsible for the narrowing found in hour-glass stomach is not capable of being measured, but my observation of the cases I have seen during the last few years makes me ready to believe that it is not inconsiderable.

The occurrence of rings of contraction in the stomach was first observed by Sir Everard Home in 1807. He refers to an observation of Perrault, published in 1676, in which a narrowing in the middle of the stomach was observed in a lion. The condition, found only on one occasion in the examination of four stomachs—two from lions, two from lionesses—is illustrated by a drawing. Sir Everard Home considered that the contractions found by him were entirely due to muscular action.

SYMPTOMS.

The symptoms and the signs of hour-glass stomach enable a positive diagnosis to be made in the great majority of cases. In my first 6 cases only one was diagnosed; in my last 9, 7 were diagnosed with certainty. The following are the signs:

1. If the stomach tube be passed and the stomach washed out with a known quantity of fluid, the loss of a certain quantity will be observed when the return fluid is measured. Thus, if 30 oz. be used, only 24 oz. can be made to return. Woelfler, who called attention to this sign, said that some fluid seemed to disappear "as though it had flowed through a large hole"—as, indeed, it has, in passing from the cardiac to the pyloric pouch (Woelfler's "first sign").

2. If the stomach be washed out until the fluid returns clear, a sudden rush of foul, evil-smelling fluid may occur; or if the stomach be washed clean, the tube withdrawn and passed again in a few minutes, several ounces of dirty, offensive fluid may escape. The fluid has regurgitated through the connecting channel between the pyloric and cardiac pouches (Woelfler's "second sign.")

3. Paradoxical dilatation. If the stomach be palpated and a succussion splash obtained, the stomach tube passed, and the stomach apparently emptied, palpation will still elicit a distinct splashing sound. This is due to the fact that only the cardiac pouch is drained; the contents of the pyloric remain undisturbed and cause the splashing sound on palpation. For this phenomenon Jaworski has suggested the appropriate name of "paradoxical dilatation." Jaboulay has pointed out that if the cardiac loculus be filled with water, a splashing sound can still be obtained by palpation over the pyloric pouch. The sign of paradoxical dilatation is best elicited after washing out the stomach in the ordinary manner. When the abdomen is examined at the completion of the washing, and when the stomach has been apparently drained quite dry, a splashing sound is readily obtained, for some of the fluid used has escaped into the pyloric pouch through the connecting channel.

4. Von Eiselsberg observed in one of his cases that on distending the stomach a bulging of the left side of the epigastrium was produced; after a few moments this gradually

subsided, and concomitantly there was a gradual filling up and bulging of the right side.

5. Von Eiselsberg also called attention to the bubbling, forcing, "sizzling" sound which can be heard when the stethoscope is applied over the stomach after distension with CO₂. If the two halves of a seidlitz powder are separately given and the stomach be normal or dilated, no loud sound is heard anywhere except at the pylorus; if a constriction is present in the stomach, a loud, forcible, gushing sound can be easily distinguished at a point 2 in. or 3 in. to the left of the middle line.

6. I first called attention, two years ago, to a sign which I have since found of great service in establishing a diagnosis of hour-glass stomach. The abdomen is carefully examined and the stomach resonance is percussed. A seidlitz powder, in two halves, is then administered. On percussing, after about twenty or thirty seconds, an enormous increase in the resonance of the upper part of the stomach can be found, while the lower part remains unaltered. If the pyloric pouch can be felt, or seen to be clearly demarcated, the diagnosis is inevitable, for the increase in resonance must be in a distended cardiac segment. If the abdomen be watched for a few minutes the pyloric pouch may sometimes be seen gradually to fill and become prominent.

7. Schmidt-Monard and Eichhorst have both seen a distinct sulcus between the two pouches inflated with CO₂. In Case x in my list the two pouches, with a hard—as I thought malignant—mass between them, could readily be seen. When both pouches were distended with CO₂, alternate pressure upon them showed unmistakably that they communicated through a very narrow orifice, for the one could be emptied slowly into the other, and the fluid could be felt to ripple gently through. The diagnosis in such a case is simplicity itself. In Case viii a distinct notch was seen at the lower border of the inflated stomach.

8. Ewald has called attention to two signs which he considers of value in establishing a diagnosis. When the stomach is filled with water and examined by gastro-diaphany, the transillumination is seen only in the cardiac pouch; the pyloric pouch remains dark.

9. The deglutible indiarubber bag of Turck and Hemmeter is passed and distended. The bulging caused thereby is limited to the cardiac pouch, which lies to the left of the middle line.

The two aids to diagnosis of greatest value are, it will be seen, the washing out of the stomach and its inflation with gas by the administration of a seidlitz powder in two portions. The fluid used for the washing must be carefully measured before use; the tube is then passed and the stomach emptied, the contents set aside in a separate dish, and the washing commenced. All the fluid now returning is collected in a separate vessel and carefully measured. The two signs of Ewald are of little importance; a correct diagnosis can always be made without them.

CASE I.—August, 1899; female, aged 39. Ten years ago the patient had an illness characterized by profound anaemia. Seven months ago there were clear symptoms of ulcer of the stomach, but neither then nor at any time any acute illness suggestive of perforation. Now vomited after all ordinary food, and more often than not even after small quantities of fluid food. Pain after food was exceedingly severe. On examination of abdomen a dilated stomach could be felt. At one point, a little to the left of the middle line, and slightly below the ensiform cartilage, was an area 2 in. in diameter, which was markedly tender, and offered increased resistance on palpation. This area was found at the operation to correspond precisely with the area of stomach adhesion. The patient had lost weight and deteriorated seriously in general health during the last few months. At the operation an hour-glass stomach was found. The narrow constriction was near the middle of the stomach, and adherent to the anterior abdominal wall over an area equal to a crown piece. On each side of this the stomach dilated and seemed to be anchored by the adhesion. On separating the stomach from the abdominal wall an opening into the viscus was exposed and the stomach contents escaped. The opening was enlarged transversely and the wound and fistula were stitched up vertically. An omental graft was brought to cover in the sutured area in order to guard against future anchoring. The patient recovered. For a month after the operation there was pain at times and loss of appetite. Since then she has been free from pain and in excellent health. Appetite and digestion are good. The patient was seen with Mr. Bailey, Horsforth. In February, 1902, her condition was still perfectly satisfactory. In October, 1903, the patient was reported to be in perfectly good health—"in excellent condition."

CASE II.—April, 1900; female, aged 27. There was no history of gastric ulcer. The patient had complained of irregular attacks of pain in the epigastric region for eleven months, always associated with the taking of food, and coming on about one hour after a meal. Vomiting was occasional and irregular, in rather large quantities; there was no

blood. On examination, the stomach was distended and splashy; contractions were seen when distended. Medical treatment had proved unavailing. At the operation an hour-glass stomach was found. The constriction was about 4 in. from the pylorus; the passage between the two sacs equalled a No. 12 catheter in diameter. There were marked induration and puckering, but no adhesion to the abdominal wall or elsewhere. The strictured neck was divided by an incision about 2½ in. long in the transverse direction and stitched up vertically, the mucous membrane with a continuous catgut suture and the serous with a continuous silk suture. Two additional interrupted sutures were applied at each end of the wound. The patient recovered. There was vomiting for five days after the operation, blood-stained. Since then perfectly well. The patient was seen with Dr. Waugh, Skipton. In March, 1903, she was reported to be in complete health.

CASE III.—January 24th, 1901; male, aged 45. Had been ailing for three years. Pain in the epigastrium, radiating to the left chest. Was worse after food; coming on "within half an hour," and lasting for from two to four hours, unless relieved by vomiting. Frequently vomiting about an hour after food; never any blood. Lately the pain had been almost constant, aggravated by food, and eased by vomiting. Had lost 2 st. 12 lb. Dilated stomach. On distending with CO₂ a notch was noticed at the upper border of the stomach and a tentative diagnosis of hour-glass stomach was made. Free HCl. A trace of lactic acid and a few rod-shaped bacilli. At the operation an hour-glass stomach was found. The scar of the ulcer was equal in size to a florin; was situated close to the lesser curvature and nearer the cardiac orifice than the pyloric. There were much puckering and induration of the surface. There were no adhesions. The index finger entered but could not pass the stricture. An incision 3½ in. long was made transversely, and stitched longitudinally in two layers. A slender adhesion of gall bladder to the pylorus was divided (gastroplasty, gastrolisis). The patient recovered. Before leaving hospital he could take ordinary diet without any discomfort. Weight before operation was 7 st. 6 lb.; has gained 1 st. 8½ lb. The patient was seen with Dr. Trevor Pritchard, Retford. In March, 1902, he was reported to be quite well.

CASE IV.—March 6th, 1901; female, aged 28. Symptoms of gastric ulcer for more than five years. Was under treatment at the beginning of her illness at the infirmary. Had been gradually getting worse. Vomited now after every meal; pain and vomiting came on from about half an hour to one hour after food; vomit was very "sour." On examination, hour-glass stomach. On distending with CO₂, the cardiac half increased considerably, forming a very large lymphatic area. The pyloric half was distended but little; the division was clearly seen. On auscultation, a forcing, gurgling sound was distinctly heard. On operation, an hour-glass stomach was found. The cardiac side of the constriction was much dilated and larger than a normal stomach. Rather beyond the middle of the organ was a constriction that would just admit the forefinger; round the constriction were much induration and many adhesions; especially noticeable was one thick cord-like one coming from the liver. This was divided between ligatures. The liver was slightly torn on separating widespread adhesions along the lesser curvature. Below it on each side the stomach sagged, and between the cavities an anastomosis was made which readily admitted three fingers (gastro-gastrostomy, gastrolisis). The patient recovered. March, 1902, perfect result. He eats well and heartily and has no discomfort. The patient was seen with Dr. Waugh, Skipton.

CASE V.—March 9th, 1901; male, aged 55. Stomach troubles for sixteen years. At first pain after food and occasional vomiting. Five years ago an acute attack of haematemesis, melaena, and general swelling of the body, which it was feared might prove fatal (perforation). No ease in the stomach since then; constant vomiting, pain after every meal, and great wasting. Now looked thin, pinched, and shrivelled. For three weeks had had no food, only sips of water and nutrient enemata. On examination, dilated stomach. Free HCl. At the operation an hour-glass stomach was found. At first it was thought to be a dilated stomach. On tracing the stomach towards the pylorus, an extremely-narrowed isthmus (barely as thick as the little finger) was come to which was supposed to be narrowed pylorus, but on tracing beyond it stomach was still found. On invaginating a finger from each side of constriction no opening could be felt. Many adhesions were separated until all was clear and free. Then incision into stomach or cardiac side of the isthmus, and a probe-director was passed through constriction, which it fitted snugly, the opening being no bigger than a No. 4 or No. 5 catheter. Gastroplasty was performed. On the pyloric side of the stricture was a column of mucous membrane forming a bridle stricture. This was ligated, divided at both ends, and removed. The patient recovered. The patient was in the infirmary under Mr. Littlewood, and was operated upon by me in his absence.

CASE VI.—April 6th, 1901; male, aged 46. Symptoms for twelve months; pain, heaviness, discomfort after meals; loss of weight and general deterioration in health. At Christmas had an attack of acute pain and haematemesis, and was very ill for several days; since then has never taken any food (solid or liquid) without pain. Has noticed on several occasions that the stools were "black as ink." Vomits now every day. At the operation two ulcers were found near the pylorus, one on gastric, one on duodenal side. A mass equal in size to a walnut was found at the pylorus. Pylorus was very narrow, adherent to liver and gall bladder by dense bands. At the middle of a hugely dilated stomach was a constriction that would admit four fingers. Posterior gastro-enterostomy to pyloric pouch. At the necropsy two ulcers (duodenal and gastric) were found, the former very adherent to the gall bladder; the latter had perforated into a mass of adhesions, its base being partly formed by the pancreas. The patient died. The patient was sent by

Dr. Crawford Watson, Harrogate. All went well for three days; then a large prolapse of rectum (from which he had previously suffered) came down during the night, and was not discovered for four hours. When I saw him the prolapse was livid and oedematous, and could not be reduced until ether had been administered. From this time patient became gradually worse; the temperature ran up to 104° and 105°, and he died four days later. The following is an abstract from the necropsy record, written by Dr. Maxwell, Telling: "The stitches are quite sound, the opening good, and surgical technique perfect. No peritonitis. The haemorrhoidal and inferior mesenteric veins are full of disintegrating clot (septicaemia)."

CASE VII.—May 24th, 1901; male, aged 48. For many years has vomited after food, and is eased by vomiting. In November, 1899, and May, 1900, had severe haematemesis. Three years ago was in the infirmary, and a diagnosis of "cancer" was made. On examination, an irregular dilated stomach. On inflation a distinct notch was seen in the lower border; just above this a very loud, forcing, gushing sound heard. Hour-glass stomach diagnosed. Signs 1, 3, 5, and 6 present. At the operation an hour-glass stomach was found. The cardiac pouch was much dilated, pyloric small and not dilated. The constriction was about 3 in. from the pylorus. At the upper border of the isthmus a hard mass, equal to a walnut in size, with puckering of stomach, and lesser omentum (posterior gastro-enterostomy). The patient recovered. The patient was sent by Dr. Isaac Taylor. His weight before operation was 3 st. 2 lb.; weight on January 15th, 1903, was 10 st.

CASE VIII.—May, 1901; female, aged 50. Ailing many years; the symptoms dating from an illness in which "gastric ulcer" was diagnosed. A diagnosis of "hour-glass stomach" was made by Dr. McGregor Young. Signs 1, 3, and 6 present. At the operation an hour-glass stomach was found, the isthmus being about 2½ in. from the pylorus. The stomach and all the intestines were thin and translucent and seemed almost devoid of muscle. On exposing the posterior wall of the cardiac pouch a second ulcer was seen. Posterior gastro-enterostomy was performed. After the operation regurgitant vomiting of such severity and persistence that a second operation was undertaken, and the proximal and distal segments of the jejunal loop were united (jejunio-jejunostomy). The patient recovered. The patient was seen with Dr. McGregor Young. The result of the operations has been most satisfactory; the patient is much better than she has been for many years.

CASE IX.—June, 1901; male, aged 39. Has had stomach troubles for nine or ten years. Then began quite suddenly to have great pain after food and to vomit two or three times a day; no haematemesis. The pain usually came on about an hour and a-half after food. Seen four years ago by a consulting physician, who diagnosed dilated stomach, and advised lavage, which has been done ever since. Relief at first very great, but lately, a serious relapse and no relief from washing. Hour-glass stomach diagnosed. Signs 1, 2, 3, and 6 were present. At the operation an hour-glass stomach was found. The constriction just admitted the end of the forefinger; and was situated about 3 in. from the pylorus, and a point where loud gushing sounds were heard before operation. The cardiac complement was enormous; the pyloric a little dilated (posterior gastro-enterostomy; pylorodiosis). The patient died. The patient was sent by Dr. Ellis, of Halifax. After the operation the patient had suppression of urine; in four days secreted only 1½ oz., tinged with blood. Pulse became very rapid and of poor volume. Five pints of saline solution infused. Urine was secreted almost at once. Gradual improvement then for nine days; then suppression for forty-eight hours, and death. Both kidneys diseased; the left small and granular and cirrhotic, the right granular. Operation area normal. The urine before operation had been frequently examined, and nothing abnormal discovered.

CASE X.—June, 1901; female, aged 25. For three years has suffered from vomiting, pain after food, inability to take ordinary diet. Has never vomited blood, but has seen vomit which "resembled tea." Vomiting now almost continuous. Has lost 3 st. in weight. On examination a hard mass above and to the left of the umbilicus. On distending the stomach with CO₂, a distinct swelling on each side of tumour. Hour-glass stomach clearly seen. At the operation an hour-glass stomach was found. A large mass, 4 in. in diameter, was found at the junction of the two pouches, densely hard, immovable, and adherent firmly to the pancreas. Several enlarged glands. Supposed to be malignant. Stricture between the two pouches dilated freely. The patient recovered. The patient was sent by Dr. Crawford Watson, Harrogate. Her weight before operation was 5 st. Vomiting ceased at once, and food was freely—almost greedily—taken. The tumour quickly disappeared. Patient looks ruddy and well. Her weight is now 7 st. 7 lb. In October, 1903, she was reported to be over 8 st. in weight, and quite well.

CASE XI.—April, 1901; male, aged 40. About six months ago was suddenly seized with acute, intolerable pain in the upper part of the abdomen. Constant stomach troubles since; pain, weight, "dragging sensations." Has lost flesh quickly. On examination, a smooth globular swelling between mid-line above umbilicus and left costal margin; soft and fluctuating. At the operation, the stomach was found to be of hour-glass shape; the constriction was adherent to the anterior abdominal wall. On separating the adhesion, the stomach was opened and gastroplasty was performed. The tumour pushed the stomach forward. The great omentum below the stomach was torn through and the finger passed into the lesser sac. A smooth globular cyst was found projecting into the cavity and springing from the pancreas. The patient recovered. The patient was sent by Dr. J. Exley, Wortley. A

pancreatic fistula remained for several months. Health and weight fully regained. In October, 1903, reported to be quite well.

CASE XII.—July, 1901; female, aged 28. Had six years' history of increasing indigestion, dating from an illness described by the doctor as "ulcerated stomach." Pain comes on one hour after food, worse when lying on the right side. Vomits after nearly every meal. Is getting steadily thinner. Signs 1, 2, 3, 4, 5, 6, and 7 all present. At the operation an hour-glass stomach was found and very tight pyloric obstruction. Gastroplasty and posterior gastro-enterostomy into the distal pouch. The patient died. The patient was seen by Dr. Baxter-Tyrie of Keighley. Death from pneumonia on the fifth day. The anaesthetic was badly taken, lividity and rigidity of abdominal muscles being present throughout.

CASE XIII.—April 22nd, 1902; female, aged 42. Has had chronic indigestion. The symptoms came on gradually—pain after food, vomiting, and constipation. Eighteen months ago had haematemesis, and since then the symptoms have been greatly increased. Signs 1, 2, 3, 5, and 6 present, and a diagnosis of hour-glass stomach made. At the operation an hour-glass stomach (a perfect example) was found. The constriction in the body admitted the little finger snugly. In the narrowed isthmus, on the posterior surface, a densely hard indurated area, at least $\frac{1}{2}$ in. in thickness; the lesser and greater omenta both puckered up. Gastroplasty—a scar of the ulcer seen on mucous surface of posterior part. A very tight stricture found at the pylorus, the pyloric pouch being dilated also. Posterior gastro-enterostomy from pyloric pouch. The patient recovered. The patient was sent by Dr. H. H. Greenwood. A very rapid pulse for four days after operation. Report in October, 1903:—"Quite well; six months pregnant."

CASE XIV.—November 29th, 1902; female, aged 27. Nine years' history. Pain after food and vomiting were the symptoms first noticed. Soon all solid food caused pain, and was rejected. The food became "sour," and the gas belched up smelt putrid. On several occasions blood has been vomited. The signs and symptoms of hour-glass stomach were elicited, and a confident diagnosis made. The two pouches of an hour-glass could be distinctly seen on inflation. Signs 1, 2, 3, 5, and 6 present, and an hour-glass stomach diagnosed. At the operation an hour-glass stomach was at once exposed, but on tracing the stomach up to the cardiac orifice another stricture and another pouch were found. There were thus two annular constrictions in the stomach and three pouches. The first pouch was the largest, the pyloric the smallest, being only of the size of a lemon. Gastro-gastrostomy and gastro-enterostomy were performed. The stomach was scarred almost universally. The patient recovered. The patient was sent by Dr. Knowles, Newstead, Halifax. She made a most excellent recovery. In October, 1903, she had gained $1\frac{1}{2}$ st., and was taking food well.

CASE XV.—January 20th, 1903; female, aged 34. Nine and a-half years ago vomited a "great deal" of blood. Dr. Mackenzie then diagnosed ulceration of the stomach. Since then has always been ailing, especially after a moderate meal. Five years ago was very ill; had acute abdominal pain, severe vomiting, and haematemesis. Was in Manchester Royal Infirmary with "ulcer of the stomach." One year and a-half ago had haematemesis. For several years has taken no solid food, and has never had an ordinary meal. Has lived on milk, custards, porridge. On examination an hour-glass stomach was diagnosed. Woelfler's two signs; paradoxical dilatation; increase in subcostal tympany; gurgling sound at left end of stomach, all well-marked. At the operation an hour-glass stomach and an hour-glass duodenum were found. There were two large stomach pouches, united by a narrow isthmus, at the lesser curvature. Tight constriction at the pylorus; the first portion of the duodenum was dilated to form a sac the size of a lemon; beyond this another constriction. The pyloric pouch of the stomach was more densely scarred than any stomach I have seen: its texture was almost wholly fibrous. On its posterior surface also many scars were seen. Gastro-gastrostomy, and posterior gastro-enterostomy to the pyloric pouch. The patient recovered. The patient was sent by Dr. Mackenzie, Burnley. Within three weeks of the operation she ate solid food heartily and had taken all the vegetables in season.

CASE XVI.—July 14th, 1903; female, aged 35. For the last six years has had abdominal pain, to the left side of the epigastrium chiefly, especially after food. Has vomited every week during this time; and six years ago, three years ago, and in February, 1903, had haematemesis. Since February has had constant pain and vomiting; is unable to take any solid or semi-solid food, and but little fluid. Is wasting rapidly, and looks thin, haggard, and very wasted. At the operation an hour-glass stomach was found. A deep pucker on the anterior wall and upper surface, pulling the lesser curvature down to the greater. From the centre of the dense indurated stenosing ulcer, a thick band and a web of adhesions passed up to the liver. The posterior surface of the stomach also was very adherent, so that a posterior gastro-enterostomy was performed with great difficulty. The patient recovered. The patient was sent by Mr. Jessop, and operated upon in his absence. Her recovery was most satisfactory.

Malignant Cases.

CASE XVII.—March 3rd, 1901; male, aged 54. Vomiting of fluid if taken in quantities exceeding an ounce. At the operation an hour-glass stomach was found. Narrowing close to cardia due to malignant disease which had invaded the stomach everywhere (jejunostomy). The patient recovered. The patient was seen with Dr. Sykes, Cleckheaton. Died April 9th.

CASE XVIII.—July, 1901; female, aged 38. At the age of 17 had a gastric ulcer; vomiting and haematemesis for several weeks. Since then has always had gastric uneasiness. Ten years ago "an ulcer burst" after a long walk. She suddenly experienced acute pain in

epigastrium and fainted; during the subsequent night she vomited a "chamber utensilful" of blood, and latter coffee grounds material. Since this attack has never enjoyed a hearty meal. For last few months has lost flesh rapidly; for the last three years she has been in bed, and has not been able to take anything but milk and water, and has returned most of that. Gastric tetany in limbs. Free HCl present. At the operation an hour-glass stomach, nearer the cardiac than the pyloric end, was found. The stomach was adherent over an area about $2\frac{1}{2}$ in. in diameter to the anterior abdominal wall and liver. On detaching, the stomach was opened. The opening was about $1\frac{1}{2}$ in. in diameter, the edges over $\frac{1}{2}$ in. thick, and the mucous membrane greatly thickened and pouting. At the point of adhesion the stomach was markedly narrowed. The ulcer and a surrounding mass of stomach were excised and gastroplasty performed. Pylorus would only admit the passage of a director, and pyloroplasty was therefore performed. The patient died. The patient was sent by Dr. Cheetham, Guiseley. She seemed to be going on well until the fourth day when the pulse rapidly failed. The examination of the excised mass showed malignant disease to be present. The lower margin of the ulcer was greatly thickened by heaped-up granulation tissue, which, on microscopic examination, proved to be carcinomatous.

TREATMENT.

In many cases of hour-glass stomach there is a narrowing, not only in the body of the stomach, but also at the pylorus. This illustrates the undoubted fact that gastric ulcer is often multiple. The result, so far as the treatment of the condition is concerned, is that in many of the cases no single operation will suffice to fulfil all the requirements. If gastro-enterostomy is performed from the cardiac pouch, the pyloric pouch remains undrained. Symptoms of stasis are then observed, as in a case recorded by Terrier, and a second operation is necessary. An anastomosis from the second pouch is obviously futile. A gastroplasty which relieves the obstruction in the body of the stomach does not deal with the pyloric narrowing. In many cases it will be necessary to perform a double operation, gastro-enterostomy from both pouches, gastroplasty combined with gastro-enterostomy from the pyloric pouch, gastro-gastrostomy with gastro-enterostomy, or gastroplasty and pyloroplasty.

Thus I performed—

Gastroplasty alone in Cases, I, II, III, V, XI.

Gastro-enterostomy alone in Cases VI, VII, VIII, IX.

Gastroplasty and gastro-enterostomy, XII, XIII.

Gastro-gastrostomy alone in Case IV.

Gastro-gastrostomy and gastro-enterostomy in XIV, XV.

CONGENITAL NARROWNESS OF THE PYLORIC ORIFICE A CAUSE OF CHRONIC GASTRIC DISEASE IN THE ADULT,

ILLUSTRATED BY SEVEN CASES SUCCESSFULLY TREATED BY OPERATION.

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In operating upon various cases of chronic gastric derangement I have met with a condition of the pyloric orifice that seemed to me not only sufficient to explain the symptoms which existed, but to suggest that the condition itself was probably of congenital origin.

I shall possibly best introduce the subject by first narrating the history of the cases upon which the subsequent observations are based. It might be reasonably contended that the fullest details of every case should be given in order to eliminate all causes that might be considered, were they present to offer an explanation other than that which I shall venture to give. But I am compelled, in order to bring my contribution within reasonable limits, to introduce only such salient features in each case as appear to me fairly to support the views I hold.

CASE I.

Mrs. A. B., aged 31 years. Gastric symptoms commenced when 24 years old; were of a simple dyspeptic character. Later the symptoms were those of chronic gastric catarrh; much mucus present both in vomit and in motions; much emaciation, and relief only obtained by lavage; food generally caused pain. Dilatation occasionally present. No history of haemorrhage. Patient in good station of life and unable to account for the early appearance of her symptoms.

Operation.—On May 14th, 1902, in private home. Direct external examination of stomach negative. Internal examination, mucous membrane livid and coated with much mucus. Pyloric orifice with rather tight ring admitting index finger with difficulty. Posterior gastro-jejunostomy performed. Eighteen months after patient in excellent health, in every way a different woman.