THREE CASES OF GASTROPTOSIS TREATED BY GASTROPEXY (ROVSING).

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THE three cases detailed below seem worthy of being placed on record for the following reasons: The patients were the subjects of well-marked gastroptosis, but (1) were males; it is stated that females are more commonly affected. (2) They were not neurasthenics—the usual type of patient in this disease. (3) Occupation appeared to be a predisposing factor in the causation of their complaint. They were all workmen who, over long periods, had, from the nature of their daily employment, to lift heavy weights, a considerable amount of strain being thereby put on their abdominal muscles and viscera. Case I worked in an iron foundry as a labourer, his main occupation consisting in lifting iron bars, weighing nearly a hundredweight, on to a trolley. Case II was employed in a wood yard, lifting heavy logs of wood on to a circular saw bench. Case III was a cloth inspector, and his work necessitated his lifting heavy rolls of cloth from one bench to another, the weight being borne on the upper part of his abdomen. (4) Great benefit has accrued from the operations, as reported in one case after three years and in another one year. The third case is comparatively recent.

CASE I.

A. B., aged 47. First came under observation in August, 1912, complaining of vague abdominal pains, indigestion, and distressing flatulence. Vomiting occurred every third day. Discomfort was most acute while at work, but as soon as he ceased work and went to bed he felt quite easy. There was some loss of weight. The abdomen was lax, but succussion could not be detected. The stomach percussion note was somewhat lower than normal, and over a somewhat wider area. No tumour or thickening at the pylorus could be detected on palpation. Various stomachic medicines and gastric lavage were tried, but with only modified success. Examination by x-ray screen after a bismuth meal showed, in the recumbent position, the shadow of the bismuth well below the umbilicus.

Laparotomy was performed by me in January, 1913. The stomach was found slightly dilated, and could be withdrawn from the abdominal cavity with considerable ease. No stenosis or thickening of the pylorus was present. Rovsing's operation was performed; three moderately strong silk sutures were introduced about 1 in. apart in one side of the wound, through skin, abdominal wall, and peritoneum; then carried through the outer coats of the stomach, nearer the lesser than the greater curvature, in a wavy fashion; the sutures were then brought through the other side of the wound from peritoneum to skin. The sutures were left untied until the layers of the abdominal wall had been separately sutured. The silk sutures were then secured over a roll of lint dipped in iodine spirit. The wound and silk sutures were not touched for eighteen days, and the patient was discharged on the thirty-second day following operation.

At the present time—three years after operation—he is in excellent health, has gained in weight, and follows his employment with no return of the stomach symptoms.

CASE II.

C. D., aged 41, was admitted to the Aberdeen Royal Infirmary in June, 1914. His illness began three years previously with a continual feeling of discomfort and fullness in the abdomen, with actually acute pain coming on from an hour to an hour and a half after food, the pain being generalized all over the abdomen. The pain and discomfort continued on an average for five days, and was then followed by vomiting of a large quantity of very sour stomach contents. Immediate relief followed the vomiting, the symptoms recurring, however, in the course of a few days. The vomited material consisted of a dirty fluid, nothing recognizable as food being observed. No history of haematemesis. The patient suffered much from eructations and borborygmi. Appetite good; constipation obstinate; no loss of weight. With rest and lavage his condition improved, and he was discharged at the end of July. He returned to work in August, but he became worse again, all the above symptoms returning in aggravated form. On readmission in November, 1914, the abdomen showed marked distension, with occasional peristaltic waves passing from left to right, below the umbilicus, pain being most acute during the peristaltic action. Percussion showed the stomach note to be much lower than normal, but there was no marked evidence of dilatation. A skiagram of a bismuth meal was taken by Major Levack, and showed the stomach shadow between the umbilicus and the pubis, the pylorus being markedly displaced downwards. This was very noticeable in screening the patient in the erect position. There was no evidence of dilatation.

Operation was performed by Mr. Scott Riddell in December, 1914. The stomach was found much prolapsed, and when

brought outside the abdomen the greater curvature could be made to reach almost to the pubis. Gastropexy by Rovsing's method was performed, two supporting sutures being inserted. The parietal peritoneum and the surface of the stomach to be opposed to it near the sutures were scratched gently with a needle to promote adhesions. The patient was kept in bed in the recumbent position for three weeks and fed as in a case of perforated gastric ulcer. The patient made an excellent recovery, and when seen in December, 1915, was in excellent health, free from gastric symptoms, and had gained weight. He has now no difficulty with his bowels, and is able to perform his ordinary work without feelings of pain or discomfort.

CASE III.

A man, aged 51. Came under observation on October 13th, 1915, complaining of symptoms of chronic indigestion of many years' standing. His symptoms were, generally, very similar to those mentioned in Case II. Palpation of the abdomen revealed no evidence of tumour; percussion showed the stomach note to be lower than normal and to reach well below the umbilicus. A skiagram, after a bismuth meal, was taken by Major Levack, and the position of the stomach was seen to be midway between the umbilicus and pubis.

Rovsing's operation was performed by me, in the manner detailed under Case II. At the operation there was no evidence of pyloric stenosis or perigastric adhesions. The patient did well and left hospital, taking full diet without pain or discomfort, and expressing himself as better than he had been for many years.

I am indebted to Mr. Scott Riddell for permission to publish the notes of Cases II and III.

NOTE BY MR. SCOTT RIDDELL.

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The noteworthy points about these cases are: (1) The marked similarity of symptoms in cases of gastroptosis and gastrostasis from pyloric obstruction. (2) The marked assistance in diagnosis which can be got from skiagraphy after a bismuth meal, and particularly by screening and skiagraphy in the erect position; the lesser curvature in one of these cases was found well below the umbilicus. (3) The remarkable benefit which followed on the operation of gastropexy, and which appeared likely to be permanent. (4) The great ease and success with which Rovsing's operation can be performed as compared with Beye's and other operations.

PERFORATION OF A GASTRIC ULCER OCCURRING IN THE SAC OF A LARGE CON- GENITAL DIAPHRAGMATIC HERNIA.

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DIAPHRAGMATIC herniae are rare, and the marked degree of the abnormality and the fact that death was due to rupture of a gastric ulcer and the difficulties in diagnosis lend special interest to the following case.

History.

The patient was a burgher, aged 56, who was taken ill while on active service in the German South-West African campaign. He had completed six months' service, and was apparently able to carry on the active and strenuous life of a burgher on commando. He had only a limited knowledge of English, and was in such pain when admitted to the surgical hospital at Swakopmund that details as to his illness were somewhat vague. For the last four years he had suffered from attacks of "liver," accompanied by pain in the hepatic region, with vomiting, but never any jaundice. During six months on active service he had felt well and fit for duty, but had occasional attacks of indigestion. He had complained for four days of severe pain in the abdomen, which pain became very acute fourteen hours before admission. Vomiting had been continuous since the acute onset of the pain. He had been constipated, but there was no complete obstruction, as the bowels had moved twice within the four days. The motions had been small, and passed after much straining. When admitted he was in great pain, in spite of which he walked into hospital and refused to lie down, remaining standing with the body bent well forward. He was with difficulty persuaded to take to bed, where he maintained this peculiar attitude of flexion until he died.

Condition on Admission.

The patient was a strong, well-developed man, having the appearance of one who had recently been leading an active life. Pain was complained of at the lower end of the sternum and under the ribs in front on the right side. The temperature was subnormal, 96°; the pulse 80. The abdominal wall was nowhere very rigid, nor were the abdominal respiratory movements much restricted. There was no abdominal distension. The liver

dullness was absent, except for a zone of 2 in. wide parallel to the costal margin and extending into the right flank. Above this and in the normal region of liver dullness the percussion note was tympanitic. Most puzzling signs were found when the thorax was examined. On the right side anteriorly a hyper-resonant note—tympanitic, in fact—was obtained from the costal margin as high as the lower border of the second rib; above this the percussion note became normal. Over this area of hyper-resonance the breath sounds were absent, but were present and normal at the apex. Posteriorly the hyper-resonant note extended from the costal margin to the seventh costal interspace, with deficient breath sounds over the same region; above this the lung appeared normal. No moist sounds were heard in any area.

FIG. 1.

On the left side nothing abnormal was noted. The heart sounds were very faint; no apex beat could be seen or felt, nor could the outline of the heart be made out definitely by percussion. There was no jaundice. The urine was acid; it contained no albumin, pus, or blood.

The diagnosis was difficult. It was evident that there was an acute abdominal condition, but no satisfactory explanation of the lung signs could be arrived at. That a

large diaphragmatic hernia was present was not considered. The question whether we should operate immediately for the acute obstruction was made doubtful by the lung signs. Did these point to the thorax being the primary seat of the acute illness? It was decided not to operate at once, and the patient rapidly grew worse and died with signs of acute general peritoneal infection.

Necropsy.

On opening the abdomen it was seen that recent general peritonitis was present and that a perforation of the stomach had taken place; it was not evident at first where this had occurred. It was found that half of the stomach passed up through a large opening in the diaphragm and occupied a huge hernial sac extending into the pleural cavity, and that the perforation had occurred within the sac at the pyloric end of the stomach. The ring of the hernial sac was situated on the right anterior portion of the central tendon of the diaphragm in front of the liver and measured 4 in. in each diameter. The margin was firm and tendinous with muscular fibres of the diaphragm blending with the tendinous ring anteriorly. The peritoneum became continuous with the serous membranelining the sac. I was not able to satisfy myself that the right pleural and peritoneal cavities were thrown into one or whether the peritoneum had extended through the opening forming a true hernial sac. On passing the hand through the large ring the sac was found to extend upwards as far as the second intercostal space and an inch to the left of the left lateral sternal line, thus lying in front of the heart.

Laterally the sac extended to the costal wall, posteriorly to the vertebral column, except to the level of the seventh rib, above which the small rudimentary lung was situated. There was no lung between the sac and the antero-lateral aspect of the chest. The contents of the sac were: (1) Most of the omentum, (2) the pyloric half of a largely dilated stomach, (3) the first part and the upper portion of the second part of the duodenum, (4) the right half of the transverse colon starting from the hepatic flexure, and (5) portions of the small intestine (the exact length was not measured). All these organs were tightly packed into the sac and very firmly held at the ring. The parts within the sac were much congested and showed that a certain degree of strangulation was present. It was only with a certain amount of force that the contents could be withdrawn from the sac. On the stomach being pulled down a perforation was found situated on the anterior wall 1 in. from the pylorus and therefore lying within the sac. The perforation was due to a rupture of a gastric ulcer having all the characteristics of that lesion, and not of ulceration the result of acute strangulation. It was apparently of recent formation. The hernial sac contained pus, the inflammation of the peritoneum having evidently started within the sac and spread to the general peritoneal cavity.

The stomach measured 18 in. in its long diameter, and was greatly dilated. Near its middle was a constriction dividing the organ into two parts. The constriction was due to the hernial ring, so that the pyloric part of the stomach occupied a position within the sac. The transverse colon showed similar constriction bands, one at the hepatic flexure, and the other midway between its two extremities—evidence of their permanent position within the sac.

The right lung, situated at the apex of the right thoracic dome, was small. Its lower margin extended in front to the

second rib, and behind to the seventh. On the left it extended beyond the left lateral border of the sternum in its upper part about half an inch. It was about the size of a man's fist. It appeared healthy and functional. The left lung showed compensatory enlargement, as it filled the entire left pleural cavity, the costo-phrenic angle being completely occupied by the lung.

The heart was displaced upwards to the left and backwards, being at a depth of two inches from the posterior surface of the sternum. Between the sternum and the pericardium lay the right lung above, and below this a part of the hernial sac with its contents. The right margin was half an inch interior to the right lateral sternal line and the upper portion reached to the lower border of the first intercostal space on the left side. A diverticulum of the pericardium was found in its posterior aspect which extended for one inch to the right immediately behind the hernial ring. It was attached to the upper surface of the diaphragm, the opening looking to the left. It resembled the thumb portion of a rubber glove.

The liver was displaced downwards, the right lobe being elongated and resembling a Riedel's lobe; this part extended to the iliac crest with the ascending colon lying in front of it. The left lobe did not extend beyond the left of the mid line. The anterior border was pulled backwards, lying well under the dome of the diaphragm and behind the ring of the hernial sac. The whole organ appeared to have been tilted backwards, downwards, and to the right. It showed early cirrhotic changes. The gall bladder was filled with stones, but none were impacted in the common bile duct.

The kidneys and spleen were in their normal situations; they showed acute congestive changes, but appeared otherwise normal.

FIG. 2.

Few reported cases of congenital diaphragmatic hernia have been diagnosed during life. The signs and symptoms which would make one suspect that a diaphragmatic hernia was present are:

1. Restricted respiratory movement on one side of the thorax.
2. A tympanitic note on percussion with breath sounds limited in some part of the thorax. If the bowels which occupy the hernial sac contain contents, then no tympanitic note may be obtained.
3. The heart is usually displaced, the displacement, of course, depending on the relationship of the heart to the ring of the hernia.
4. Signs of intestinal obstruction if strangulation of the hernia occurs.
5. Borborygmi may be heard on auscultating the tympanitic ring.
6. The most certain sign is that obtained from a ray after a bismuth meal. The bismuth will show the position of the bowel above the level of the diaphragm.

A sign which in this case was of interest and which may be of some diagnostic value was the peculiar attitude the patient adopted. He stood, or sat up in bed, with the body bent well forward and the knees bent. He refused to lie down, stating that the pain was increased when he tried to do so. The attitude appeared to be one which most relieved the tension of the diaphragm.

The first four of the above signs were present in this case. The fact that perforation of the gastric ulcer had occurred within the hernia and that the resulting peritoneal inflammation was at first limited to that surface within the hernia would explain the want of rigidity of the abdominal wall muscles and also why the pain was more thoracic than abdominal in position when the patient was first seen. The free abdominal respiratory movements may also be thus explained. Certainly the clinical picture was not typically that of acute peritonitis resulting from a perforation of a viscus.

In the light of the *post-mortem* appearances, it was evident that had the patient been operated on when first seen the prospects of recovery would have been small. The contents of the sac were so large that it would have

been impossible to keep them from returning when reduced. The size of the ring precluded its obliteration by any method, flap or otherwise. Further, if drainage had been decided on it would have been necessary to drain the pleural cavity or sac (regarding these as identical in this case) as well as the abdomen. That the patient suffered from gall stones, of which there were a large number, added to the complexity of the case. The history suggests that the first event was incarceration of the hernia. The patient had pain four days before admission to hospital with some vomiting and constipation; these symptoms, on the other hand, may have been due to the gall stones. The very acute pain coming on fourteen hours before being seen would correspond to the perforation of the gastric ulcer. It was impossible from the *post-mortem* appearances to say what had been the start of the terminal illness, but they pointed strongly to incarceration and commencing strangulation of the hernia as being the first factor.

When the multiplicity of the pathological findings are considered, it seems extraordinary that the patient should have been able to carry on the active life he had for the previous six months. As a burgher he was constantly in

the saddle. The case further emphasizes the fact that patients with congenital diaphragmatic hernia either die in early infancy or live well on towards old age.

As regards the treatment of hernia in this region, it has been found that in cases of strangulation no attempt should be made to repair the opening through the diaphragm, relief of the strangulated gut being all that is justified. The mortality is high.

The position of the opening in congenital diaphragmatic hernia is almost always behind the liver through that portion of the muscle which in the fetus corresponds with the pleuro-peritoneal canal in the posterior part of the diaphragm near the vertebral column. Most frequently the hernia is on the left side, but on whatever side it is situated, if well posterior to the central tendon of the muscle, an embryological explanation can be given, whereas in the case described the position of the ring does not fall into line with what we know of the development of the diaphragm.

The present case, owing to the position of the opening in the diaphragm, and apart from its clinical interest, appears to be an extremely rare abnormality.

INJURIES AND DESTRUCTIVE EFFECTS OF AEROPLANE BOMBS:

WITH SUGGESTIONS ON THE PRECAUTIONS TO BE
TAKEN DURING HOSTILE AËRIAL RAIDS.

BY

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[The following observations refer only to bombs dropped from aeroplanes. They were made during a period of five months in various parts of France and Belgium antecedent to February, 1915, but their publication at that time was not deemed advisable.]

TYPES OF BOMBS.

The bombs the effects of which were observed were of two kinds:

(a) *High Explosive Percussion Bombs.*

The high explosive bombs weigh from 10 to 20 lb., and consist of a metal case $\frac{1}{4}$ in. thick, filled with high explosive only. It is presumed that no shrapnel bullets are contained in them, as we have never been able to demonstrate such either in the wounds or in the wreckage of property produced. By visiting the spots immediately after the explosions we have been able to secure various pieces of the bombs—for example, the handle, the base, and pieces of the casing of various size, as shown in Fig. 1.

The destructive effect is due to the high explosive and to the metal case being broken up into fragments of various sizes, which are propelled in all directions at tremendous velocity.

The bombs may be released from the aeroplane by hand, either over the side of the machine or through a hole in the floor of the fuselage, or by a special bomb-dropping device, by means of which the bombs are released by hand levers or foot pedals.

As the bomb leaves the aeroplane a pin is withdrawn, which allows a small metal propeller to unscrew itself; this sets the internal mechanism ready for explosion on

contact. As a precautionary measure the mechanism is not set ready for detonation until the bomb has fallen about 200 ft. Fixed steel vanes keep the bombs steady on their downward flight. Sometimes these bombs fail to explode on percussion, and have been found intact.

(b) *Incendiary Bombs.*

The incendiary bombs used to set fire to collections of stores, etc., consist of a thin metal casing containing a medium soaked in some highly inflammable substance, such as petrol. A percussion device in the bomb ignites the inflammable contents.

FLIGHT OF BOMB.

Bombs are dropped from aeroplanes usually at a height varying from 4,000 to 7,000 feet. Below this the machine comes well within the danger zone from anti-aircraft guns.

The forward speed of the aeroplane determines the first part of the bomb's flight, which will be in a forward direction until gravity asserts itself, and then the course will be directed downwards. But from our experience we venture to make the statement that there is a certain amount of forward deflection, perhaps small, in the whole course of the bomb's flight. Lateral deflection in the bomb's flight may also occur, and this may be due to one of two causes. First, if the wind is across the aeroplane's path some lateral deflection of the bomb's flight must be

expected, depending on the wind velocity and the height of the aeroplane from the ground. Secondly, if a bomb is released as the machine is being banked centrifugal action comes into play and will cause some lateral deflection.

A bomb was dropped from an aeroplane at about 6,000 ft. A cross wind was blowing and the bomb fell, as estimated by competent observers, at a spot 200 yards lateral to the aeroplane path.

A bomb was dropped from a height of 6,000 ft. and struck the front of a house in a narrow street. The house was struck at the level of the first floor; to do this the bomb must have had either forward or lateral deflection.

The accuracy of bomb dropping is thus influenced by many factors—for example, height of aeroplane from ground, its air speed, its ground speed, wind velocity, gravity, etc.; thus the chances of obtaining a direct hit on

FIG. 1.—Showing various pieces of exploded aeroplane bombs dropped by German aviator.