

6. Displacement by neighboring disease.
 7. Displacement resulting from pyloric obstruction by malignant disease, an ulcer's cicatrix, hypertrophic stenosis, etc.
- Like most classifications, this is more convenient for teaching than rigidly accurate in application, for in nar-

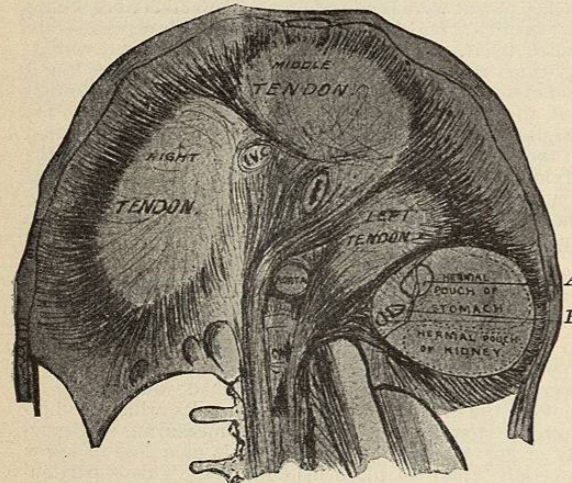


FIG. 450.—Diagrammatic Representation of the Diaphragm seen from Below, showing the Position and Relative Size of the Hernia. A, Large, and B, the small communications between the thoracic and abdominal cavities. Over A and B is indicated the commencement of the omental overgrowth.

ture its divisions occasionally overlap. This is true even in regard to the large divisions "congenital" and "acquired," for examples occur in which it is difficult to say to which class the case belongs, and one meets other cases in which he can definitely prove that the patient acquired by an exciting cause a pathological condition resulting in part from a congenitally inefficient organ. Such was true of a case, about to be related, of congenital defect of the diaphragm combined with true hernia.

In connection with defect of the diaphragm, we have to distinguish between three conditions, viz.:

1. Absolute defect or congenital false hernia with free passage between the thoracic and the abdominal cavities. This is certainly extremely rare, almost undescribed, and of no clinical importance. One can suspect, however, that cases occur and are overlooked, since such a defect prevents any efficient establishment of respiration, thus killing at birth.
2. Acquired false hernia, or rupture of the diaphragm with protrusion of abdominal organs into the thoracic cavity, without, however, any hernial covering (peritoneum or thinned diaphragm). This is by far the commoner variety. Thus, of Leichtenstern's two hundred and fifty-two cases, two hundred and twenty-four were of the "false" type. It may be added here that any descent of thoracic organs into the abdominal cavity in such an accident is not known to occur. The vast majority of these cases are acute, following obvious violence or excessive muscular effort or strain. Thus they form a group of traumatisms, and their treatment, if any, is surgical. This is rendered all the more unsatisfactory, as exact diagnosis is generally difficult and often impossible. All abnormal openings in the diaphragm are much more common on the left side (five or more to one), owing chiefly to the liver's standing sentinel on the right side.

The organs most frequently displaced are the stomach and the transverse colon; next come the small intestine, spleen, left lobe of the liver, and pancreas. The displaced stomach gives the more prominent symptoms. The abdomen may be depressed while the affected part of the thorax may be prominent. Over a considerable area the breathing sounds are diminished or absent, and this area varies, under percussion, with the contents of

the stomach. If the stomach contains mostly air the condition will simulate pneumothorax. The chief symptom is dyspnoea, generally with vomiting.

3. True diaphragmatic hernia, in which there is thinning of the diaphragm so that the abdominal organs, covered by a hernial sac of diaphragm or peritoneum, or both, protrude into the thoracic cavity.

This is the rarest variety, only eleven per cent. of Leichtenstern's two hundred and fifty-two cases being true hernia. For the account of a remarkable case of true hernia, with displacement of the stomach, the reader is referred to the *Montreal Medical Journal*, August, 1895. "A Case of Diaphragmatic Hernia," by F. M. Fry.

Transposition of the Stomach.—One meets with displacement of the stomach in connection with transposition of the viscera in general, even more rarely than that due to defect of the diaphragm.

It is in the complete cases that one looks for displacement of the stomach, i.e., a stomach whose cardia is to the right and the pylorus to the left. Arneil (*American Journal of the Medical Sciences*, November, 1902) gives interesting reports from experienced American clinicians, some of whom have never met with a case, while others have seen several only in many years. Arneil adds five cases seen since 1897, in which partial notes on the abdomen are given, and in one of which he mentions that the stomach, on inflation, was found transposed.

A case of complete transposition has recently come to Dr. Martin's notice at the Royal Victoria Hospital, Montreal. The skiagram of the case which I had taken shows the displacement of organs very well, while examination of the stomach by the ordinary methods showed its transposition.

Displacement by corsets is familiar, and we do not purpose enlarging on the widespread evils due to this cause. Certain it is, however, that it plays a great rôle in limiting the functions of the stomach and other organs, chiefly by compromising circulation and muscular action, thus leading to congestion and weak muscles with the resulting ills. The changes in the stomach, noted particularly by English observers, are a more vertically placed organ, narrowed and elongated. Treves insists on having seen these changes in patients in whom compression by corsets did not exist.

Displacement by neighboring disease calls for no lengthy mention here, though slight displacements are almost as numerous as the ills that flesh is heir to. Attention might be drawn to several cases recently recorded in which inflammatory disease of the gall bladder led to displacement of the stomach. Vague gastric symptoms occurred in a patient suffering from gall-stones, and persisted until at operation adhesions were found between the gall bladder and the pylorus, dragging the latter out of place and leading to symptoms due to partial obstruction and interference with circulation. A similar relation has been observed between the gall bladder and the duodenum, producing hypertrophy of the gastric muscle, as in cases of cicatricial contraction of the pylorus or duodenum. But such cases are surgical.

Displacement due to dilatation, apart from general enteroptosis, is common. The organ sags out of place in acute dilatation dependent on pyloric obstruction, malignant or benign. One frequently sees moderate dilatation and descent, especially in young women of the upper classes whose gastric muscle becomes inefficient, apparently on account of irregular and injudicious eating and drinking, lack of exercise and fresh air, constipation, and generally bad hygiene. In some of these cases one fails to find evidence of general enteroptosis, even a movable right kidney, and one gets excellent results from instituting light and dry diet, open-air exercise, regular meals and rest, with strychnine. The condition and the physical signs, however, are the same as in general enteroptosis.

Displacement due to fibrosis within the stomach itself is only too common in connection with malignant disease, in which extreme contraction and withdrawal upward are frequent. There are also cases in which a very small

fibrous stomach is found after death without any ground for diagnosing cancer, and one thinks of atrophy and sclerosis following old chronic catarrhal gastritis or ulcer. These conditions are described under their respective headings.

Displacements occur in patients suffering from marked dilatation who lead their ordinary life and take their ordinary diet. That is to say, in a case of marked dilatation there is great difficulty and delay in emptying the organ and consequent undue stretching of the stomach by the weight of food and by gases, as well as by loading the organ with a meal before the previous meal has been removed. This, unless very early relieved, causes the organ to sag downward out of place. Any pyloric obstruction—which leads to dilatation, as it constantly does—may be an indirect cause of marked displacement. The most common causes of pyloric obstruction are, of course, malignant disease, cicatricial contraction following ulcer, hypertrophic stenosis, adhesion to neighboring organs, and compression from without. These are fully described elsewhere.

Gastroptosis (displacement downward of the stomach).—This nearly always is associated with enteroptosis (*q. v.*).

Direction of Displacements.—Displacement upward has been mentioned in connection with fibroid lung, tympanites, etc. Cases have been described in Germany extreme enough to cause narrowing of the cardiac orifice (Feiner). Lateral displacement has been mentioned. In the downward displacement of enteroptosis, at first sight the entire organ seems lower. Strictly speaking, this is not the case, for the cardiac end remains a fixed point or hinge, the pylorus descending. The commonest form then is

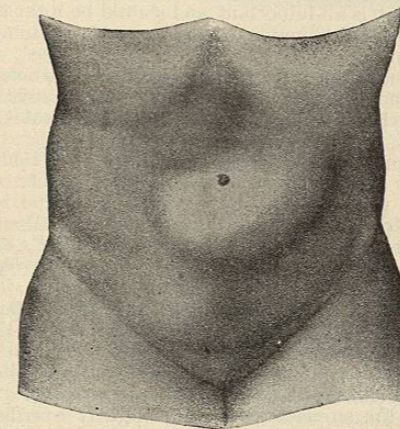


FIG. 451.—Subvertical Descent of the Stomach in a Nullipara, Aged Twenty-eight. (From Riegel.)

the subvertical. In this form the upper curvature, instead of lying horizontally across the abdomen with concavity upward, passes obliquely from the left of the patient downward to the right. Meinert found this surprisingly common in women. In fifty girls, aged about twelve years, fifty per cent. had this displacement, and in his gynecological clinic ninety per cent. had it, while in the males examined only five per cent. showed the condition. In a paralyzed chest, in pigeon breast, this is the form of displacement.

A common form is the loop or horn shape in which the part midway between the cardia and the pylorus sags and descends perpendicularly, while the line joining the extremities of the organ remains nearly horizontal.

In determining the nature of the dislocation it cannot be too strongly emphasized that one must consider the position of the pylorus and that of the lesser curvature. Only when these two are lower than normal can one speak of displacement downward—gastroptosis. The determination of the site of the lower border is valueless in attempting to prove a displacement downward, for a lowering of the greater curvature does not prove gastroptosis.

Normally, the pylorus is hidden under the right ribs at about the level of the ensiform process, and, as the lesser curvature begins at the pylorus, it too is invisible even

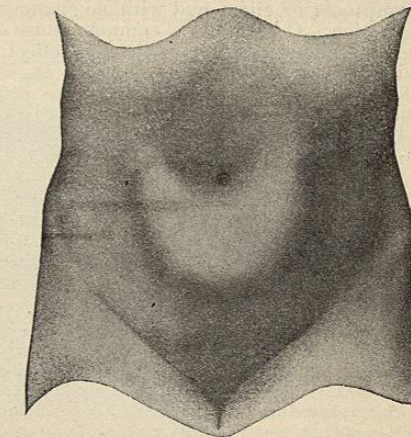


FIG. 452.—Descent of a Loop- or Horn-shaped Stomach in a Married Woman, Aged Thirty-one. (From Riegel.)

when the stomach is inflated. This leaves the body of the stomach to round out into relief the upper epigastrium, which rounded prominence excludes marked gastroptosis.

In gastroptosis the epigastrium is flat or sunken, while below this area there is often a fulness which on further examination may be shown to be the descended stomach. This is pathognomonic of gastroptosis. In extreme cases one finds the lesser curvature at the level of the umbilicus. In an elderly multipara coming to the Outdoor Department of the Royal Victoria Hospital, with rather slight, vague, gastric symptoms, especially sense of weight, we found on inspection of the abdomen, the patient being supine, a relaxed abdominal wall, the upper epigastrium concave, and exactly at the level

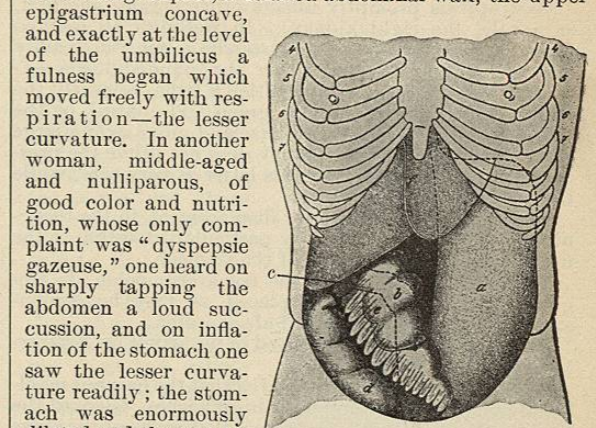


FIG. 453.—Vertical Stomach. (Kussmaul.) Extreme descent, the stomach hingeing on its cardiac orifice. The case illustrates the difficulty and delay which the organ experiences in naturally expelling its contents, and also the dilatation which is sure to result from this state of affairs. a, Stomach; b, pylorus (in dotted lines); c, gall bladder; d, caecum; e, transverse colon with the omentum majus rolled up; lower down, the omentum is wound around the colon.

of the umbilicus a fulness began which moved freely with respiration—the lesser curvature. In another woman, middle-aged and nulliparous, of good color and nutrition, whose only complaint was "dyspepsie gazeuse," one heard on sharply tapping the abdomen a loud succussion, and on inflation of the stomach one saw the lesser curvature readily; the stomach was enormously dilated and the greater curvature reached to the brim of the pelvis.

This association of dilatation and displacement is very frequent and represents a causal relationship. Riegel's experience goes to show that dilatation plays a great rôle in the production of gastroptosis, and the dilated stomach very frequently, if not always, lies lower than normal. Sometimes it is impossible to say which is primary; for the mere overloading of the dilated stomach leads to gastroptosis, and

it is also true that gastropotosis itself renders difficult and delayed the expulsion of food; hence distention and dilatation. Yet gastropotosis is frequent without dilatation, surprisingly frequent in young females without gastric symptoms or signs, and with no changes in the gastric secretion. Corsets are a common cause of this; kyphosis and scoliokyphosis have the same effect.

The more nearly vertical the stomach is, *i.e.*, the farther down the pylorus has descended, so much the more difficulty—as Kussmaul long ago pointed out and figured—has the stomach in emptying itself; and the fundus diminishes in capacity while the pyloric region increases. This leads to actual kinking in the lesser curvature and necessary retention, atony, and dilatation. Cases so extreme as that shown in Fig. 4553 are very rare. More common are the subvertical, or the loop-shaped displacements. All gradations occur, but never a descent of the entire organ, except in marked displacement downward of the entire diaphragm.

ETIOLOGY.—The very great variety of forms of displacement makes it very unlikely that one single cause accounts for all cases (as Glénard believed); and, what is more important, there are many cases of enteropotosis without any relaxation of the hepato-colic ligament. Riegel believes that gastropotosis results from the stomach's accommodating itself to changes in the space conditions in the abdomen, by whatsoever process brought about.

DIAGNOSIS.—The condition is far oftener overlooked than recognized, mainly because we emphasize chemical tests and the position of the lower border, neglecting the motor power and the *site of the pylorus and of the lesser curvature*. Palpation and percussion alone almost never give accurately a diagnosis of gastropotosis. Percussion, after the patient has drunk water, gives information concerning the lower border, but it is not sufficient for a diagnosis of either displacement or enlargement.

There is only one method which is accurate and easy of performance, and that is inspection, with perhaps palpation and percussion, after inflation.

Electric transillumination is more complex and offers no greater accuracy.

Gastropotosis promptly affects other organs, and first, as a rule, the right kidney. In wellnigh all marked cases of gastropotosis, of any standing, one can readily feel the moving kidney, either the rounded lower extremity leaving its normal position a trifle, or nearly the entire organ which one can grasp and control, or the whole kidney which one can seize and move over a large area. A freely movable kidney does not prove the presence of a mesonephron, for this latter is very rare, while the former is fairly common.

The liver, too, comes in for displacement, in the recognition of which one must pay particular attention to the upper border as in the case of the stomach.

The colon, particularly the transverse colon, is frequently found similarly displaced, as may be demonstrated by rectal injections of air or water.

The etiology is fully discussed in the article on *Enteropotosis*, in THE APPENDIX.

SYMPTOMS.—Kussmaul believed that the nervous manifestations produced the motor insufficiency, Glénard the reverse. Most authorities now hold that gastropotosis plays an important part in causing nervous symptoms. There remains the fact that in persons having gastropotosis and other displacements, symptoms of gastric distress, as well as nervous, hysterical, or neurasthenic symptoms, are frequent, though such symptoms occur without gastropotosis, and vice versa. Gastropotosis and these symptoms belong as a rule to women only. If such nervous symptoms depended on gastropotosis we would expect to find them in the few males who suffer from gastropotosis, but Bial found that of the males with the complaint, fifty per cent. had no subjective symptoms. For this reason Riegel believes that a suitable disposition on the part of the central nervous system is essential to the production of these symptoms.

Gastropotosis itself has a train of symptoms—*e.g.*, a sense

of fulness and weight after meals, an increase of the length of time required for digestion, eructations of gas a long time after meals, borborygmi, especially on the left side, and generally relieved by removing tight clothing. It not uncommonly leads to motor insufficiency, while the chemistry in the stomach is likewise sometimes disturbed. The chemical changes, however, are not always directly due to the displacement. The motor insufficiency, however, does lead to retention, fermentation, and gas, all of which rarely irritates the mucous membrane and affects the secretion. Much oftener the altered secretion is a complication. This gastropotosis is accompanied sometimes by increased, sometimes by diminished secretion. So chlorosis often has with it hyperchlorhydria. But hyperchlorhydria and gastropotosis, though associated, are independent, and both or either may accompany chlorosis.

TREATMENT.—The treatment of this displacement is multiform. Those examples which are due to the wearing of constricting clothing are preventable. After parturition a great deal can be done by aiding the abdominal muscles, combating tympanites, opening the bowels regularly, keeping the patient supine till the abdominal muscles are fit to do their work. The treatment of the gastropotosis itself, as of nephropotosis, is largely mechanical, and a well-fitting belt or properly adjusted corset gives great comfort and distinct assistance. Some mild cases are cured by the horizontal position assumed in the treatment of some other complaint. The German "fat cures" do increase the fat, but aid more probably by the horizontal position being more frequently chosen. In acute cases, lying down with the clothes loosened may be definitely prescribed.

The diet is all-important and should be light and dry, given in small amounts, easily digested and nourishing; for example, eggs, milk, cocoa, junket, toast, meat in small quantity, and greatly restricted carbohydrates; but it should always be adapted to the gastric juice in the individual case, as made out by chemical examination.

Surgeons have obtained good results by folding and stitching the enlarged and displaced stomach, reefing it in as it were, but results are not as yet satisfactory enough to warrant operative procedure in all cases that give symptoms.

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STOMACH, THE SHAPE, POSITION, AND MOVEMENTS OF.—The best method of studying the form and size of the stomach is to remove the organ as soon after death as possible, to inflate it with air, then to tie off both extremities and permit it to dry. By this method the stomach is usually slightly overdistended, and attains a size not quite reached during life. The usual form of the stomach is represented by Fig. 4554, and cannot easily be described by a phrase. The part to the left of the oesophageal orifice is called the fundus; that part which lies nearest the pylorus is called the antrum pylori. The right half of the stomach is called the pyloric half; that to the left the cardiac half. The stomach is exceedingly variable in shape. When empty it contracts, and after a prolonged fast of many hours it may be almost cylindrical in shape. This cylindrical appearance is most marked in the pyloric half, so that this portion of the stomach may markedly resemble the transverse colon in contour. The same condition of the pyloric half may be found at the autopsy if death has occurred during the height of digestion. It is not uncommon, under such circumstances, to find a constriction near the middle of the stomach, separating in a greater or less degree the cardiac from the pyloric half.

The measurement of about two hundred adult stomachs gives the following average dimensions: Length, 25.5 cm.; vertical diameter, 12.5 cm.; antero-posterior diameter, 11.9 cm.

The length is a trifle more than twice the height, or as 100 to 49; the height is to the antero-posterior diameter as 100 to 95. Berry and Crawford state that the antero-

posterior never exceeds the vertical diameter. I have found the antero-posterior diameter longer not infrequently, especially in very young children, and it may be that as the children grow older the vertical diameter develops more rapidly than the antero-posterior one. The vertical diameter is subject to very marked variations; it may be so great as almost to



FIG. 4554.—Normal Adult Stomach.

equal the long diameter, or, on the other hand, it may be very short. The fundus also varies greatly. Nearly one-half of the stomach may lie to the left of the cardiac orifice; or the fundus may be altogether wanting. As an average the part to the left of the oesophagus is a little more than one-fourth of the total length of the stomach. This proportion holds true for all ages, from early fetal life to old age. I have examined many fetal and infantile stomachs, and cannot detect any peculiarities of outline belonging to any particular age. The fundus is developed very early in fetal life, often as early as the third month of utero-gestation; and fetal stomachs present as many variations of shape as do adult stomachs. If an inflated stomach is examined on its upper surface it will be noticed that the oesophagus does not enter the stomach at a point equidistant from its anterior and posterior surfaces. The cardiac orifice is invariably much nearer the anterior than the posterior wall of the stomach (see Fig. 4555). This asymmetry of insertion is constantly present, occurring in all the stomachs, both fetal and adult, which I have examined; but it varies considerably in degree. In general it may be stated that about two-thirds of the antero-posterior diameter lies behind the cardiac orifice, and one-third in front. Rarely is the orifice very near the centre of the antero-posterior diameter; never at the centre or behind it.

An explanation of this anatomical peculiarity may be found by attention to the development of the stomach. Originally the stomach is a simple tubular prolongation of the oesophagus. In human embryos of the sixth week the form is no longer cylindrical. The posterior surface of the tube (that directed to the spinal column) bulges considerably (greater curvature); the anterior surface is slightly depressed (lesser curvature). During the third month the stomach undergoes decided change in position. In the first place it twists on its sagittal axis in such a manner that the long axis of the stomach instead of lying parallel with the spinal column thereafter lies obliquely, the fundus thereby moving to the left of the median line, the pylorus to the right.

In the second place, a twist occurs in the long axis of the stomach and lower part of the oesophagus in such a

way that what was the left side becomes the anterior one; what was toward the right turns backward. Owing to the more rapid development of the posterior part of the tube, the cardiac orifice assumes a position nearer and nearer the anterior surface of the stomach. In human embryos of three and four months this asymmetry can be clearly seen, and becomes more and more marked as development progresses.

Position.—A simple way to study the position of the stomach is to make an oesophagotomy as soon after death as possible, to introduce a rubber tube through the orifice into the stomach, and then to fill the organ with water. When this method is employed the cardiac orifice is always found on the left side of the body in front of the tenth dorsal vertebra. It is there held firmly in position. The greater curvature ascending from this point rises as a rule to the upper border of the sixth rib in the anterior axillary line, sometimes so high as the fifth rib, causing the fundus to lie behind the heart. The greater curvature then sweeps around, descends vertically a short distance, then turns in its descent to the right, passing the free border of the ribs on about the level of the junction of the ninth and tenth ribs, runs from one to three inches above the umbilicus, and finally turns up and to the right to reach the pylorus.

The pylorus in the male lies as a rule on the body of the first lumbar vertebra, 4-6 cm. to the right of the

median line. It is always more or less movable, usually not more than 2 cm. in any direction. The pylorus lies 6-8 cm. lower than the cardia, and about the same distance to the right of it. It is evident that the lesser curvature, which is the shortest line of the stomach connecting the cardia with the pylorus, must run, taking its course as a whole, downward and to the right. It would seem easy to describe the main axis of the stomach from these data, but matters are confused by the different degrees of distention in which the stomach is seen. I have called attention above to the contracted appearance of the stomach after a several days' fast. In these cases the long axis of the stomach runs directly from above and to the left, downward to the right, and the position of the stomach is unequivocally oblique.

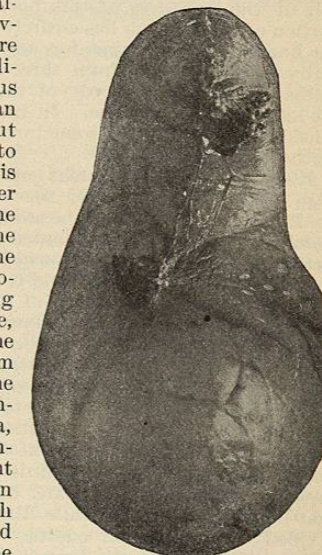


FIG. 4555.—Stomach of Three-Year-Old Male, seen from Above.