2. Tumors of the transverse colon. These usually give evidence of some degree of intestinal obstruction; the stools may be bloody. Examination of the stomach itself by test meals and inflation shows the absence of gastric disorder.

3. Tumors of the gall bladder are situated in their appropriate place, are somewhat movable, and may by pressure upon the surrounding ducts cause early jaundice. At times, however, the differential diagnosis is extremely difficult. While there need be no motor insufficiency, yet adhesions in the neighborhood of the gall-bladder tumor may cause pyloric stenosis and certain signs of gastric cancer. The absence of respiratory mobility may suggest a gastric cancer rather than one of the gall bladder; but a test meal, when possible, will usually reveal the absence of the functional and chemical signs of gastric cancer.

4. Cancer of the duodenum. Here the difficulties are great indeed; it may be impossible to diagnose the true condition. One may have diminution or absence of hydrochloric acid. Lactic acid, on the other hand, may be present, as indeed may most of the other signs of gastric cancer.

5. Omental and peritoneal tumors, whether of a cancerous or of a tuberculous nature, are apt to be confused with cancer of the body of the stomach. In such cases one usually observes that these tumors are not mobile with respiration. The other important evidence of the nature of the disease is furnished by the examination of a test meal. It is especially necessary in such cases, however, not to omit an examination of the rectum. When the peritoneum is tuberculous, the subjects are usually young; there are fever, a longer course of the malady with exacerbations and remissions, and a reaction to tuberculin.

6. Cancer of the liver. This is usually secondary, and less easily fixed with expiration than are tumors of the stomach. A satisfactory means of differentiating is, where possible, to place the hand above the tumor. Then, if the liver can be felt still higher, the tumor is probably gastric; at all events it is not hepatic. The same is true if with inflation of the stomach the tumor alters its position. When the cancer of the liver is primary, the liver becomes rapidly large; jaundice is early and pronounced. The gastric signs are slight or absent and there is no hæmatemesis nor gastrectasis. Moreover, the usual signs after a test meal are not found in the contents of the stomach.

Other conditions which may simulate a gastric tumor are aneurism of the abdominal aorta, swollen glands about this artery, a movable kidney, and enlarged spleen, the last simulating a cancer of the fundus.

Prognosis.—The prognosis in nearly all cases of carcinoma is of extreme gravity. There are very few cases on record in which treatment has effected a cure. All medical treatment is purely symptomatic. Surgical treatment can only be of benefit by complete resection, and this can only be effected in those cases which are diagnosed extremely early. For this reason operation upon cases of carcinoma ventriculi is rather discountenanced by many, and Fitz regards the indiscriminate operation upon cases of carcinoma as of the utmost harm to the patients, causing no relief to the symptoms and only hastening the lethal termination.

Exploratory Laparotomy.—This is to be considered inadvisable where the cancerous nature of a gastric tumor is undoubted, or where the glands are secondarily involved, or other metastases are discovered. Only in doubtful cases, in which one feels sure from the general and local symptoms and signs that a progressive, slowly developing malady of the stomach is present, is one justified in making an abdominal exploration. Such an operation also should only be done with the expectation of carrying out still more radical measures, should the exploration afford any sure indication of its necessity.

In such conditions resection follows an exploratory laparotomy only when the pylorus or a small portion of the lesser curvature is alone involved. A good general condition of health, moreover, is essential to such an undertaking. Obviously, therefore, very few cases indeed ever gain benefit from radical treatment by the surgeon's knife.

Treatment.—This is both surgical and medical. The only rational treatment, so far as cure is concerned, is surgical. But in this respect a proper judgment in regard to the selection of cases for operation is of paramount importance.

The rational surgical treatment depends entirely upon the early diagnosis and the radical extirpation (resection) of the whole cancerous tissue.

Resection.—This is commendable only for cancers of the pylorus, or for more or less circumscribed cancers of the lesser curvature. There must be no adhesions to surrounding parts and no metastases. The general strength of the patient must be in a fair condition, and a certain amount of good motor power is also essential to a good result, in order that one may have thereafter a proper digestion. Without a good motor power the already diseased mucous membrane functionates badly, the undigested food remains too long in the stomach, and the previously existing suffering from dyspepsia continues.

Rosenheim claims to have shown that a motor insufficiency under certain conditions may be cured or much improved by the resection of a cancerous growth.

The failure to make an early diagnosis is the chief cause of failure of resection. In an overwhelming majority of cases resection is done too late and the results are correspondingly bad.

Gastro-enterostomy.—This is performed only when resection is not feasible, and is to be considered merely as a palliative measure. Even this should be undertaken only when the stenosis is so extreme as to render the combined use of lavage and gastric feeding useless to maintain an ordinary nutrition of the patient. The nature of operations indicated in the treatment of gastric cancer is mentioned in the article on the surgery of the stomach.

Gastrectomy is recommended only for cancer of the cardiac end of the stomach, and the operations recommended by Witzel and Frank would appear to be those most commended.

Statistics as to the results of operations vary very greatly, and the recent communication of Fitz should do much to aid the judgment of surgeons in the proper selection of cases for operation. His after-history of cases upon which laparotomies had been performed tends to show that in the majority of instances patients have become rapidly worse rather than improved by the treatment.

The Medical Treatment.—This concerns, of course, chiefly the inoperable cases, or those cases which, having been operated upon, require still further treatment for a cure.

Inoperable cases must be treated medically for various reasons. One is unable perhaps to resect on account of the advanced condition, or a gastro-enterostomy is not yet required; or, it may be, that a resection is difficult or inadvisable on account of the cachexia or metastases present; or, again, through refusal of the patient to allow an operation to be performed. And lastly, one must treat cases after a gastro-enterostomy has been performed, when the neoplasm and the symptoms reappear *de novo*.

The main treatment is dietetic. The diet, however, should not be too strict, and one must go rather upon general principles than upon any definite lists of foodstuffs. Inasmuch as one can but alleviate rather than cure, the patient's own tastes should be consulted even when spices and other apparently harmful foods are desired. The meals should be small and frequently given, rather than large and few in number. On account of the deficient hydrochloric acid, meat should be limited in amount. It should be finely divided and free from cartilage and other substances difficult of digestion. White meats are to be preferred; chicken, game, pigeon,

veal, and beef in small quantity, and calves' brains and fish, are often well borne. All these proteid foods should be followed, after meals, by small quantities of hydrochloric acid (unless, of course, there is hyperacidity from a cancer engrafted upon an old ulcer).

One may give, as recommended by Fleiner, sauces containing hydrochloric acid, his special one consisting of: Beef juice, ʒ ss.; warm water, ℥ iij., to which has been added ten drops of dilute muriatic acid. Meat jellies and somatose are well borne.

Vegetables may be given in relatively large amounts, though one should avoid those which are coarse and indigestible; those, therefore, with shells, skins, fibres, etc., as well as those which are fermentable. The most suitable of all are perhaps spinach, artichokes, beans, peas, and carrots.

Bread may be allowed, as also gruels and vegetable soups, particularly rice, macaroni, barley, tapioca, sago, and oatmeal.

Milk containing nutrose, eucasin, or plasmon may also be taken, while buttermilk, kephir, and kumyss are likewise often well borne. The fats are best supplied by butter.

For beverages, apart from those mentioned above, one may take the light wines, weak brandy and whiskey. All fluid should be limited in amount because of the motor insufficiency. There is often great thirst because the tissues are dry and hot, and water may often relieve this condition. When the condition is extreme, it may be well to give daily enemata of plain water, one-half to one pint at each injection.

Lavage is the best means of treatment that we have in cases of inoperable carcinoma of the stomach. It helps to stimulate the appetite and the secretions; it washes away food remnants and prevents fermentation. One may use either plain water or water to which salicylic or boracic acid has been added. The lavage is performed in the morning, and if the condition be of an aggravated character a second lavage may be done in the evening.

Medicines.—No medicine is of any great value. Orexin in doses of five grains may help the appetite, as also may an infusion of condurango bark. One finds that alkaline mineral waters before meals sometimes stimulate the secretions, while hydrochloric acid after meals helps proteid digestion.

For the vomiting, especially of blood, rest to the stomach is essential. Nutrient enemata may be given, and then careful feeding by mouth may be begun with small quantities of fluid. For the ordinary vomiting lavage is the best form of treatment.

Diarrhœa should be treated by a proper diet where possible, and by the use of lavage to remove irritating substances which are the probable cause of the condition.

For the constipation, aloes, rhubarb, and cascara are the most effective remedies. Enemata should be given when the condition is aggravated, but this should not be persisted in too long. Authorities differ as to the use of saline purgatives, and doubtless in individual cases their use will have different effects.

For the pain, wet compresses upon the stomach, lavage, and the use of spirits of chloroform may be of value, and it is only in the extreme cases that morphine should be employed.

X. PYLORIC STENOSIS.

There are two main conditions—malignant pyloric stenosis (cancer of the stomach, *q.v.*) and benign pyloric stenosis.

Benign Pyloric Stenosis.

1. *Congenital Atresia.*—This is rapidly fatal. Soon after birth there is uncontrollable vomiting, even before food and drugs have been given. Sometimes there is a tiny opening only into the duodenum, and death is then more gradual and accompanied by inanition. The stomach may be hypertrophied in consequence.

This atresia may exist in the duodenum, and, if it be situated high up, the symptoms will then be, to all intents and purposes, similar to those mentioned.

2. *Hypertrophic stenosis*—that is, hypertrophy of the fibrous and muscular tissues; this develops slowly and lasts for years.

3. *Foreign body.*

4. *Benign tumors*, especially fibroma (polyp).

5. *Cicatrized Ulcer.*—Such ulcers are of various kinds.

6. *Pressure from Without.*—A movable kidney, as in the case of Dr. Bramwell's patient (*vide British Medical Journal*, October 19th, 1901), may be the cause of such pressure. Adhesions and fibrous bands, such as result from perihepatitis and from cirrhosis of the liver, as in the case of F. H. Murdoch's patient (*vide American Medicine*, January 11th, 1902), may also cause gastric stenosis through pressure.

7. *Duodenal obstruction*, especially when associated with great laxity of the abdominal walls, is competent to cause pyloric stenosis by drawing upon and twisting the horizontal portion of the stomach.

8. *Spasm of the Pylorus.*—This is mentioned, among causes, by Sir William Bennet (*British Medical Journal*, February 3d, 1900).

Symptoms.—The earliest signs of all are shown when dietetic errors, chiefly as regards the quantity of food, cause general gastric distress after meals. Soon afterward, however, other symptoms develop. The main signs in both the early and the late stages are pain and vomiting.

The pain at first is more of an indefinite gastric distress, which develops only after meals. This is followed in one or two hours by vomiting of solids which are excessively acid. This vomiting gives relief. Then, after a variable period of hours, days, or weeks, the symptoms recur and with exacerbations. The pain is greater, more frequent, and may be cramp-like if already hypertrophy of the gastric muscles has occurred. Later, the pain becomes more or less continuous, and is associated then with increased peristalsis, though it may in part be due to the hyperacidity, hypersecretion, fermentation, or an ulcer if present. In the later stages, when there is retention of food, the pain is often marked at night.

Ordinarily the vomiting increases synchronously with the pain. When the muscles are hypertrophied the vomiting which accompanies the cramps is more explosive; it may occur at any time and not merely after meals, and often there may be an interval of a day or more between the attacks. When the diet is not regulated and motor insufficiency increases to a great degree, the vomiting becomes less frequent (once every few days perhaps), more copious, and shows much evidence of fermentation.

The vomitus, on standing for a short time, separates into three layers, the lowest consisting of more or less digested chyme, the middle layer of turbid fluid, and the uppermost of frothy mucus and particles of undigested food.

With these two cardinal symptoms of pain and vomiting there is, in the early stages, a good appetite till fermentation becomes marked. On the other hand, thirst, which is at first not a prominent symptom, becomes distressing with increase of the motor insufficiency.

To the above symptoms loss of weight and strength should be added.

The general constitutional symptoms in such cases affect the heart action, which may be irregular, intermittent, or more rapid than normal. The movements of the diaphragm are limited; there are neurasthenia, anæmia, cold extremities, weak and flabby muscles, a dry scaly skin, progressively developing cachexia, marked constipation, and a diminished quantity of urine.

The Physical Signs.—The early stage may show nothing or merely a prominent epigastrium; peristalsis, though slight, may be visible early. There may be more resistance than normal over the area of the stomach, which may give a more cushion-like sensation on palpation. If the abdomen be thin and flabby, a tumor may already be felt at a comparatively early stage.

Later, when the obstruction is more marked, one is more liable to see peristalsis, either spontaneously or after stimulation, as by flicking the abdomen with the fingers or an instrument. Succussion may be obtained during the period when gastric repose should exist, and a tumor may now be still more evident.

When retention has occurred the above signs will be still more marked and succussion may be obtained at any time during the twenty-four hours. The abdomen is prominent, especially when the stomach is filled with food or gas.

The Tumor.—The pylorus and the regio pylorica, normal or abnormal, are very often movable, and may be found in a great variety of positions. A tumor of this part, therefore, may be felt in various positions unless adhesions be present; and one must decide between a neoplasm, a hypertrophy of the pylorus, and a scarred ulcer. Or, again, the ill-defined mass may be due to an inflammatory exudate, etc., around the outside of the pyloric ring.

The patient should be examined lying on his back. The stomach should be empty and the bowels evacuated. Especial care should be taken to look for the descent of the tumor with inspiratory efforts, as often happens when the tumor is adherent to the liver. Under such conditions the origin of the tumor may be hard to determine, unless one can dip the hand down between the tumor and the liver itself.

At other times the tumor may not only be felt in various parts of the epigastrium and to the right of the median line, but it may even be visible as a projecting lump above the general plane of the abdomen. It sometimes is found below the navel; or, again, because of adhesions, it may be displaced upward, beneath, or next to the liver.

At still other times the tumor is to be felt or seen only on inflation of the stomach with gas. A tumor in the neighborhood of the pyloric region, which upon inflation is displaced to the right and downward (more rarely upward), and which returns to its original position when the stomach is again empty of gas, is undoubtedly a tumor belonging to the pylorus.

The functional signs are more or less characteristic only during the time when stagnation or retention occurs. While the solids of a test dinner are delayed the fluids seem often to pass through the pyloric region much more rapidly than is usually the case with idiopathic gastrectasis. In this case the total acidity is usually high, from the presence of either lactic or hydrochloric acid. With hydrochloric acid there are usually the yeast fungi and perhaps acetic acid, while the sarcinæ ventriculi are also commonly present.

In benign obstruction hyperchlorhydria is the rule. When organic acids are present, malignancy is suggested.

Differential Diagnosis.—Cases are not usually recognized before stagnation has become marked. Suspicion should be aroused when there are recurrent attacks of indigestion, especially with pain and vomiting, in patients who have previously suffered from ulcer, gall-stones, etc.

When the motor insufficiency is advanced, we must decide whether this condition is due to an obstructed pylorus or is idiopathic. (For this differential diagnosis see the paragraph on motor insufficiency.)

From *supersecretion* the diagnosis is not difficult if the stomach can be thoroughly washed out at night and its contents examined again on the following morning. In the fasting stomach no contents should be found when obstruction alone exists; but, if supersecretion be present, more than 30 or 40 c.c. of fluid (which is probably hyperacid) can be removed.

It is by no means easy to decide whether the obstruction is pyloric or *duodenal*. Duodenal obstruction is usually associated with gastroptosis or with cancer, with pressure exerted by a benign tumor, with scarred ulcer, local peritonitis, gall-stones, or some congenital abnormality. If the obstruction be *above* the common duct, it cannot be differentiated from pyloric stenosis. Gastroptosis may be the cause, but it can only be suspected by exclusion. Obstructions *below* the duct are suspected when more than a normal quantity of bile is in the fluid vomited, and when it is found at an early stage of the vomiting.

To decide whether the obstruction is malignant or benign is sometimes easy, at other times quite impossible. The following table may be of some assistance in this respect:

	Benign.	Malignant.
History	Ulcer, toxic gastritis, etc..	
Tumor	Smooth, as a rule	Nodular, hard.
Secretions	Hydrochloric acid normal or in excess.	Hydrochloric acid usually absent or amount small.
	Lactic acid, usually absent.	Usually present and with bacilli.
	Butyric acid, usually absent.	Butyric acid common.
Gases	SH_2	SH_2 uncommon.
Bacteria	Sarcinæ, long present	Absent or soon disappear when lactic acid is present.
Age	Any age	Above 20.
Course	Rapid	More rapid and progressive.
Therapeutic measures.	Rectal feeding benefits	Rectal feeding does not cause benefit.
Metastases	None	May soon appear.

Cancer of pancreas and gall bladder seldom diminish gastric secretion till cachexia is present.

Diagnosis of the Nature of the Benign Obstruction.—It may be (1) cicatricial tissue, the result of a *toxic gastritis*, and this should be revealed by the clinical history.

(2) *Congenital atresia or stenosis.* This should be suggested by the age of the patient, by the onset and the course of the disease, and by the general signs and symptoms.

(3) *Hypertrophic or hyperplastic stenosis*, which may be congenital or acquired. As a rule this is a developmental hypertrophy, but it may be due to spasm of the pylorus from various causes, or it may be the result of a congenital narrowing of the lumen and a secondary hypertrophy of the muscles. The lumen varies in size. The increased tissue is muscular and fibrous, and the mucosa shows often a catarrhal inflammation.

Congenital cases are rare (see *British Medical Journal*, April 28th, 1898). Less than fifty cases have been recorded, and they occurred usually under four months of age; they have been observed more often in male children, and the main signs of diagnosis are as follows:

1. Duration from infancy.
2. Persistent vomiting from no apparent cause, nor with any other sign of indigestion; occurring at variable times after food, or only after several meals have been taken; and sometimes ceasing temporarily with careful dieting and lavage.
3. Emaciation.
4. Constipation.
5. A palpable tumor.
6. Visible peristalsis.

In the acquired cases there is usually a history of persisting gastritis. Examination of the abdomen shows a smooth, non-adherent, regular tumor. The late course is rapid, and unless operation be performed a fatal issue is bound to ensue.

The degree of obstruction, as regards compensation, stagnation, or retention, is easily told by the ordinary tests for the motor power. The quantity of the urine, moreover, in the twenty-four hours, may aid somewhat in estimating the degree of obstruction, provided there be no great perspiration, diarrhœa, vomiting, or renal disease. The course of the disease is another guide in this particular.

The prognosis, unless operation is performed, is always grave and in proportion to the degree of obstruction and the cachexia which has developed.

The treatment is both medical and surgical.

The *medical* treatment is symptomatic, not curative, and it is useful when operation is otherwise contraindicated or impossible.

The *dietetic* treatment: In the early stages there should be no excesses and the food should be finely divided. There should be a moderately dry diet consisting of albuminous foods, chiefly meat, poultry, fish, eggs, milk, a few cereals in purée form, and ordinary vegetables in moderation; and one should avoid coarse irritating solids and fermenting liquors, such as beer. The food should be given in small quantities, and nothing that is starchy or sweet should be permitted if hydrochloric acid be abundant. In some cases it is best to give three small concentrated meals. When vomiting persists it may be necessary to give nutrient enemata.

The *mechanical* treatment is to be used in the later stages. Rest is essential. Lavage should be thoroughly performed, either in the early morning or before the evening meal.

The three guiding principles are, first of all, that the stomach should be empty before each meal; second, that the food must be finely divided, readily soluble or easily rendered fluid, and not apt to disturb the secretory or motor functions; and, third, the diet must be varied and sufficient to support or improve nutrition (Van Valzah and Nisbet).

The *medicinal* treatment: For the persistent vomiting rectal feeding and, if pain persists, atropine in doses of gr. $\frac{1}{150}$ hypodermically, may be used. Morphine may be required, though codeine may cause less nausea and be equally effective.

For the constipation, enemata of soapsuds and of oil should be used, or glycerin suppositories may be tried. Purgatives, especially drastic purgatives, should be avoided, and even the mild purgatives should be given as infrequently as possible.

The *surgical* treatment: Many operations have been devised and as quickly rejected. Loreta's digital divulsion is inefficient and therefore not to be recommended.

Pylorectomy is not indicated in benign obstruction when a gastro-enterostomy can be equally well done, as the latter gives eminently satisfactory results, and is in all probability the less dangerous operation.

The two operations which have found most favor are the gastro-enterostomy and the pyloroplasty, as suggested by Heinecke and Mikulicz.

The operative treatment, however, in this condition has been considered in the article on the *Stomach and Œsophagus*. (*Surgical*). The indications for operation, therefore, are mainly these—when the obstruction is continuous, and when the patient cannot be successfully nourished by other means, then operate.

XI. SIMPLE TUMORS.

Simple tumors play a very small part in the diseases of the stomach. There are several conditions which, by producing a tumor in its broadest sense, may cause some difficulty in diagnosis. Of these one may mention:

Tubercle in the stomach is excessively rare. Hale White in "Allbutt's System" reports five cases of tuberculosis in the stomach, in one of which, in a male aged seven years, there were found enlarged and caseous lymphatic glands at the lesser curvature.

Syphilitic gumma in the stomach is less rare, as first shown by Chiari, of Prague.

Phlegmonous gastritis, especially when going on to acute abscess, produces a mass within the stomach. This is extremely rare and generally rapidly fatal in several days. (*Vide* section on Gastritis.)

Hypertrophic stenosis of the pylorus is common in adults and produces tumor and dilatation. A series of forty-five cases in infancy has been reported (Rolleston and Crofton-Aikens), mostly in children under four months, with very few recoveries. Six were operated upon and one was cured. (*Vide* section on Pyloric Stenosis.)

The cicatrix following ulcer, though producing no swelling, may convey a sense of hardness to the touch. Such a cicatrix, although not classed among the new growths, is one in reality.

One form of tumor simulating gastric disease may be referred to, viz., preperitoneal *lipoma*. A young man, complaining only of moderate diarrhœa during five months, showed, on inspection of his abdomen, a small tumor in the epigastrium, discoid, slightly lobulated, and 3.5 cm. in diameter. It was too superficial to be elsewhere than in the abdominal wall, and did not in the slightest degree rise and fall with respiration. It was in fact a lipoma epigastrica. In the surgical department Dr. Archibald pointed out that one such case, which had come to operation, showed that the lipoma, originating in the preperitoneal fat, had become adherent to the omentum, and had so dragged on it as to cause the symptoms of which the patient complained until the operation removed the growth.

A full account of these herniæ is given in the "Handbuch der praktischen Chirurgie," Bd. iii., Th. 1, where it is shown that the lipoma originates in the preperitoneal fat and grows forward, ever stretching more and more an opening in the lattice-work between the recti muscles, until a firm ring is formed, or several, up to four (Berger), through which as many herniæ are forced. On cutting down on such a lipoma one finds that it envelops a funnel-shaped cord of peritoneum or true sac, which is often empty, but which more frequently contains omentum adherent to the hernial sac. Rarely, the sac contains transverse colon. In 10,000 herniæ Berger counted 137 cases of hernia epigastrica (1.3 per cent.), of which 120 were in males generally with other herniæ, and mostly in elderly spare people. More than half the cases were traumatic in origin, sometimes a muscular strain, sometimes a direct blow on the abdomen, being the exciting cause. Of interest to us are the many "gastric" symptoms caused by these apparently innocent tumors, viz., violent pain, tearing or boring in character, in the gastric region, belching of air and vomiting, distention, and difficult bowel movement, dyspnœa, palpitation, faintness, diarrhœa.

The symptoms may eventually assume a nervous type (hypochondriasis), with loss of flesh. These symptoms suggest the stomach, but only one case is on record and this showed that a part of the stomach was in the sac. In fact, almost all the above symptoms have been reported in cases in which no part of the gut was directly involved, the sac containing only fat lobules together with vessels or nerves. The commonest content of the sac, then, is omentum; less commonly, part of the transverse colon. The symptoms are explained either by traction through the omentum on the colon and through the gastrocolic ligament on the stomach, or by traction and bruising of nerves. In some cases the lipoma is not in connection with peritoneum, but generally it is attached to a large diverticulum of peritoneum which embraces from time to time parts of the omentum, or of the bowel, or both. Careful palpation will reveal an irregularity in the linea alba and the pressure of a hazelnut-sized soft tumor, slightly tender perhaps, which gives way on deep pressure, leaving a pit and a distinct gap in the abdominal wall. Rarely, one can at the height of the paroxysmal pain feel a tension in the tumor, which is relieved by suitable posturing. The symptoms are generally referred by the patient, and indeed by the physician, to other causes, *e.g.*, gastric ulcer or gall-stones. The case referred to above as having been operated on is reported in full by Roth in the *Archiv für klinische Chirurgie*, Bd. 42. After his accident the patient continued to have frequent paroxysms of incapacitating symptoms for seven years, during which time he suffered much of many physicians, and of bath and "cure institutions," until he sought a surgeon, who cut down and found the lipoma enveloping a funnel-shaped tube of peritoneum, to which

a part of the omentum was adherent. It was radically treated and the ring accurately sutured. Fourteen days later the patient felt well and had remained so up to the date of the report.

Another case, in a male aged eighty-three, was seen post mortem; in this case the lipoma was no larger than a hazelnut, but the symptoms (pain, nausea, vomiting) had been prominent. The mass of fat was found adherent to the suspensory ligament of the liver, which, when drawn on by the lipoma, pulled the stomach down, producing, by constriction, a typical hour-glass shape in that viscus.

The true simple tumors in the stomach recorded are:

1. *Fibroma*—a congenital fibrous thickening at the pylorus, leaving a very small lumen—has been seen in the body of an infant five weeks old. Finkelstein reports several. These patients die within several months of birth.

2. *Fibromyoma*—very rare; it occurs up to the size of a pigeon's egg, and projects into the stomach. These tumors consist of unstriped muscle and fibrous tissue, sometimes pedunculated and in some cases multiple.

3. *Lipoma* has been very rarely described.

4. *Polyadenomata* are common and often numerous. Osler says one hundred and fifty were seen in one patient. They raise the mucous membrane into polypoid masses, the "polyadenome en nappe" of the French.

5. *Multiple cysts* in the wall of the stomach (and of the intestines) have been described by H. B. Anderson.

XII. FOREIGN BODIES IN THE STOMACH.

The question of foreign bodies in the stomach, apart from the perennial scares of the nursery, is a matter rather of the music halls and the footlights than of clinical import or medical literature. In the nursery children swallow small coins, buttons, and various hard objects of endless description. The more serious objects do not reach the stomach, being generally arrested at the level of the cricoid cartilage; while of those which reach the stomach the vast majority give no serious trouble, being passed by natural channels in due time. In most cases, then, especially when one has only the statements of surrounding children to go upon, the best treatment is a little judicious letting alone. Peabody, however, reports a case in which

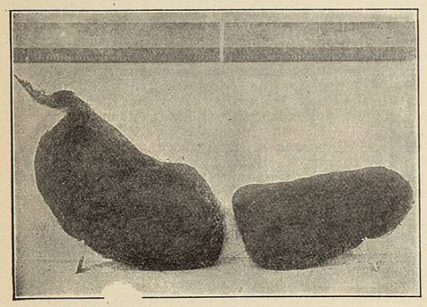

FIG. 4547.—Hai. ı us in the Stomach, Found at Autopsy. The specimen is preserved in the Medical Museum of McGill University, and mention of the case will be found in Osler's "Practice of Medicine," 1901.

a pin pierced the œsophagus and reached the heart, while Dock mentions an ear of barley reaching the liver. At an operation for appendicitis in the Royal Victoria Hospital Dr. Bell showed a large pin snugly embedded in the mucous membrane of the appendix. Music-hall artists do, apart from optical illusion, actually swallow metallic objects, considering the plaudits of the gallery and an increased salary sufficient reward for their loss of internal comfort. The more experienced the performer is, so much the finer will be the collection which he makes,

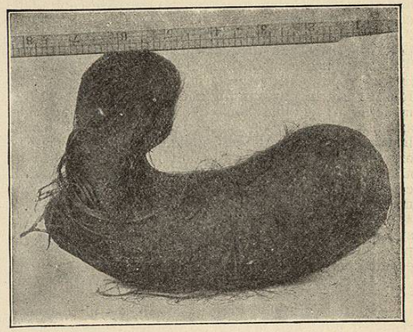

FIG. 4548.—Dr. James Bell's Case of Hair Bolus in the Stomach. Royal Victoria Hospital, Montreal.

and he need never feel that the loss of the treasures will be permanent, for at some period in his career his life will become intolerable, and he will by the aid of the surgeon recover the goods. In fact, every year one reads in literature, medical as well as lay, of several persons being admitted to hospital with slight, vague gastric symptoms. On opening the stomach a truly remarkable store of manufactured articles is revealed. Countless pins, nails, buttons, coins, false teeth, iron plate, buckles, and chains are among the favorite articles, while the knives or portions of other cutting instruments excite the greatest astonishment.

A medical friend assures me of having seen in the Dupuytren Museum in Paris a full-sized silver dinner fork which was found in the human stomach. It is well known that painters occasionally swallow spirituous shellac, which may harden and lodge in the stomach. In the Canadian Northwest there are Indians who, when suffering from lack of food, feel better with something in the stomach, and deliberately place there great pieces of caked earth.

Riegel mentions the fact that a stomach tube has been lost in the organ for long periods, and states that foreign bodies in the intestine may ulcerate into the stomach. Sarcina ventriculi has produced an obstructing tumor in the stomach (Riegel). The remarkable hair tumor in the stomach, common in cattle and swine, though rare in human beings, is well known. Osler, writing in 1901, states that there are only sixteen cases in the literature. He has made famous an example (Fig. 4547) of such in the McGill Medical Museum, Montreal. Such cases occur mostly in hysterical young women from fifteen years of age upward and in the insane. Several cases, however, have been reported in children who formed the habit of swallowing their own hair. One case is on record in which a young fair-haired girl swallowed not only her own hair but also that of her black dog, and in her stomach was found a correspondingly variegated hair bolus. These bodies are puzzling, especially when only partially filling the stomach, and are generally overlooked or pronounced cancer. Of the 16 cases mentioned by Osler 9 were recognized only at autopsy, 7 were operated on, of which 6 recovered. The literature shows that, as a rule, there are masses of hair in the intestines also, and these commonly kill by perforating ulceration. A very remarkable case was reported (Montreal *Medical Journal*, February, 1903) by Dr. James Bell, in the person of a twelve-year-old girl, who was admitted to the surgical wards of the Royal Victoria Hospital, November 13th,

1902, with a "tumor of the stomach," and complaining of vomiting and diarrhœa. She had had good health till January, 1901, when vomiting and diarrhœa were severe for ten days, and less so for the following three months. There was some pain in the lower part of the abdomen. The vomiting had no relation to eating, and brought up mostly frothy mucus. In May, 1901, she returned to school for a year (May, 1902), during which time she had fair health, with only occasional vomiting and diarrhœa. She then (May, 1902), however, had the same symptoms in very severe form, and left school. At this time a mass was felt, and was thought by a physician to be abscess of the liver. Through the summer of 1902 she was walking about, though showing some similar symptoms. Her appetite was very capricious; she took meals very irregularly and would never consent to eat much at a time. On admission, November 13th, 1902, she was a slight girl, weighing forty-nine pounds; temperature normal, pulse 144. In the position of the stomach there was a painless, hard mass, and a diagnosis of probable hairball was easily made. On November 17th, 1902, operation; abdomen opened in the median line, wound packed, and incision four inches long made in the anterior surface of the stomach, midway between the curvatures. The pyloric prolongation was hooked out and the mass delivered (Figs. 4548 and 4549). Some of the hairs were found to be eighteen inches long. A small detached mass was seized in the intestine. The stomach and the abdomen were closed without drainage. After operation some diarrhœa continued. The child was very intelligent at school, and she was known, three years previously, to break her hairs with her fingers, but was never seen to put them in her mouth. Mits were bound to her hands and the habit was apparently cured, for nothing was seen of it in the last two or three years. The hair in the stomach in this case is much darker than that on the patient's head; and the same fact has been noted by all previous observers. This is due to chemical action, the exact nature of which is a matter for theorizing. One can imagine, as Dr. Bruère points out to me, that some of the ample supply of sulphur in the keratin of the hair combines with hydrogen in the stomach to form sulphureted hydrogen, which latter, having a powerful affinity for iron, combines with the iron in the melanin granules occurring in and between the cells of the hair,

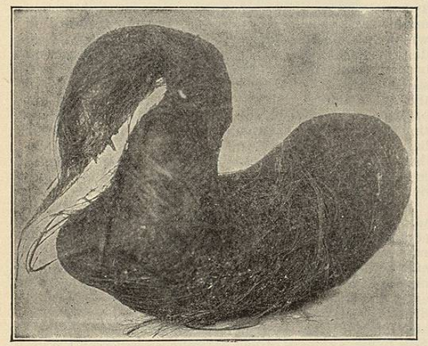

FIG. 4549.—Slightly Different View of the Hair Bolus Found in Dr. Bell's Case, showing a cast of the duodenum.

to form sulphide of iron. This sulphide may do the staining. Dr. Bell has kindly stated that after the operation (November 17th, 1902) occasional vomiting and considerable diarrhœa with fœtid stools persisted. On December 13th a hard mass was palpated in the right hypochondrium, and on December 15th the abdomen was reopened and a tear in the ileum found through which a tuft of hair protruded. The mass, when extracted, proved to be a cast, eight inches in length, of the intestine. On December 20th a third operation was performed and a new perforation was sewn with Lembert suture. On December 23d, at the fourth operation, the small intestine was found riddled with openings, and two inches of gut were removed and the cut ends were united by sutures. On December 26th a fæcal fistula established itself, and one hair came away in the dressing. At three more operations fresh perforations were found and closed. On January 22d a large opening was found, but the patient's condition prevented a resection. On January 29th it was found that sutures would not hold in the intestines. In March a resection was done and the divided ends of the bowel were united by a Murphy button, which has been passed since. Now (April 18th) there is no fæcal fistula, and the patient, after eleven operations, is apparently, on the high road to recovery.

XIII. DISPLACEMENT OF THE STOMACH.

In the fœtus, and in fact at birth, the stomach appears to be an ill-defined portion of the alimentary tract, or a mere loop, slightly dilated it is true, of the gut. At necropsy its limits are not readily made out, and in removing the organ in order to ligature its orifices and inflate the stomach, with the view of measuring its capacity or for teaching purposes, one is at a loss to know precisely where to place his ligatures. This is particularly true of the pyloric end, where the muscle is not yet concentrated into a sphincter-like mass as in the adult; while at the cardiac end one notes an absence of that expansion in the adult organ called the fundus. Furthermore, the entire stomach occupies a position much more nearly vertical than is the case in adult life.

Bearing this in mind, one is at times struck with the resemblance, in an abnormally placed adult stomach, to the fœtal form and position. At such a time one can think of a persistence of fœtal conditions.

Normally, the stomach is a large, flexible, hollow viscus, whose thin, mostly flaccid walls and more or less empty condition render it utterly unable to hold its own (position and form) against the many moving organs with which it is in immediate relation. It is ever completely at the mercy of the diaphragm. There is thus, accurately speaking, no one normal site for the stomach. It also falls a ready victim to pressure from an abnormally placed liver, spleen, or other abdominal organ, and has been seen dislocated by inflammatory disease or tumor in the pleura and the pericardium above, in the intestine below, in the gall bladder to the right, in the spleen to the left, in the abdominal wall to the front, and in the spinal column behind.

Physiologically, every demand on the stomach and every filling of it leads to a change in size and form; and the same holds for the intestine. There is thus a constant elbowing for room among the abdominal organs in the performance of their respective functions, and an equally constant accommodation to conditions of space on the part of each individual organ, especially the stomach.

One must think then of mere abnormal exaggeration of function in explaining some pathological displacements. Indeed, one finds the most typical dislocations in connection with what gives the greatest demands on the abdominal organs, namely, pregnancy.

Displacements of the stomach are (1) *congenital* and (2) *acquired*.

The *congenital* cases of medical interest or of any clinical importance are caused by two conditions, viz.: (1) Defect of the diaphragm, and (2) transposition of the viscera (thoracic and abdominal).

The *acquired* cases are comprised under:

1. Enteroptosis, or Glénard's disease.
2. Rupture of the diaphragm (traumatic).
3. True diaphragmatic hernia.
4. Descent of stomach owing to dilatation apart from general enteroptosis.
5. Displacement by corsets.