

pable or not. The course of the disease and the chemical examination of the gastric contents are frequently of the greatest importance in making a diagnosis; still one should remember that ulcers which have existed for several years, or scars of old ulcers, may become the seat of a carcinoma.

Carcinoma which is situated in the pylorus or near it, unless treated surgically, leads speedily to death from inanition.

**Treatment.**—The only successful treatment of carcinoma of the stomach is radical removal of the new growth. In other portions of the body, for instance, in the breast, carcinoma may undergo a spontaneous recovery or contraction of the connective tissue, or it may remain in such a quiet state that the life of the individual is not threatened for a long time. In the case of carcinoma of the stomach such cicatricial and contractile changes will only hasten death from inanition. Washing out of the stomach and the administration of internal remedies are only capable of partially relieving the symptoms, and have no effect upon the progress of the disease.

Operations performed for carcinoma of the stomach may be either radical or operative. If it is possible to remove the tumor together with infected lymph-glands, the indication for operation is absolute. Unfortunately this can only be known after the abdomen is opened. Many tumors which are small and freely movable give the impression that a radical operation is feasible; but when the abdomen is opened, it may be seen that there are extensively involved lymph-glands or metastatic nodules in the peritoneum or liver. In other cases exploratory laparotomy shows that a much larger tumor has not produced metastasis, and hence offers a choice of radical cure. Therefore exploratory laparotomy should be performed in every case unless radical operation is clearly impossible. Absolute counterindications for operation are extensive enlargement of lymph-glands in the neighborhood or elsewhere, metastases in the liver or other organs, and ascites. The strength of the patient is also to be considered. Thus well-marked cachexia is an unfavorable condition for an extensive operation.

The conditions of other organs which counterindicate radical operation are: chronic bronchitis or tuberculosis, or other serious diseases of the lungs, nephritis, or diabetes of well-marked degree. Cachexia, if not extreme, is of itself a counterindication. Mikulicz has operated and obtained permanent cure in cases of cachexia in which the hæmoglobin was only 20 per cent. of the normal.

In most cases a complete diagnosis cannot be made until the abdomen is opened, therefore the first incision should be small and situated in the epigastrium or mesogastrium according to the position of the tumor. Whether a radical operation is to be performed, cannot be decided from the size of the tumor alone since removal of the whole stomach is not technically impractical. If the œsophagus and duodenum cannot be united, the jejunum may be utilized for the anastomosis. However, in most cases in which the whole stomach is involved by the tumor metastases in the lymph-glands or elsewhere will make a

radical operation useless. According to Herczel, the stomach has seventeen times been removed with success, but the date of these operations is too recent to permit one to say what the practical results will be.

If the tumor does not require removal of the whole stomach, resection is preferable to extirpation of the organ because it carries with it less risk, and even a small portion of the gastric wall will dilate and be of great benefit to a patient as a reservoir for food.

The upper incision should be made at a distance of 4, 6, or 8 cm. (1.6, 2.4, or 3.2 inches) from the visible margin of the tumor. (Page 444.) The greater distance is chosen in case of infiltrating cancer. Indeed in such a cancer total extirpation may be preferable to resection because the involvement of the stomach-wall is often far greater than it appears to the naked eye. The lower incision needs to be removed from the margin of the tumor only 1 to 1.5 cm. (0.4 to 0.6 inch).

If the tumor is adherent to the transverse colon, a portion of the latter should be resected. Such resection is also necessary if removal or division of the mesocolon is necessary. Such an extensive operation is rarely advisable, not because of its technical difficulty, but because the chance for radical cure under such circumstances is so slight. If such a condition is recognized before radical operation is begun, the surgeon will do well to confine himself to palliative measures. (Page 383.)

Involvement of the liver is a counterindication for a radical operation, not because of fatal hemorrhage, the fear of which previously kept surgeons from operating upon the liver, but because the chance of radical cure under such circumstances is practically *nil*. Adhesions between the stomach and liver due to an old ulcer do not counterindicate operation. If a small portion of the pancreas is involved, it may be removed without danger. The removal of larger portions is inadvisable on account of the risk of hemorrhage and certain physiological after-effects (diabetes). Adhesions with the spleen are rare and are no counterindication for operation except as they show that the disease is already widespread.

In every case of gastric carcinoma few or many lymph-glands will be found involved. This involvement is so universal that its absence throws doubt upon the diagnosis of carcinoma. The presence of enlarged glands is not absolute proof of cancer since glands are enlarged in connection with ulcer. In doubtful cases such glands should be examined at the time of operation, but a negative result of such examination carries little weight.

Swollen lymph-glands of both curvatures do not make radical operation impossible. Even if the tumor is small, it is better to remove all the glands as far as the cardia. This is best done by removal of the portion of the smaller omentum in which they are situated. Mikulicz performs resection as follows: The lower omentum is separated from the stomach at the point where the latter is to be resected. The branches of the coronary artery are caught with clamps and then



ligated close to the stomach and divided between the clamps and ligatures. The cardiac portion of the lesser omentum is surrounded by a strong mass-ligature and the pyloric portion is clamped. It is divided between the ligature and the clamp. Then as the vessels are clamped and tied the lesser omentum is separated from the stomach still farther toward the cardia, and this can be carried out step by step until the cardia is reached. The lesser omentum is then tied as high up as possible and the stump cut away. This method of operating permits the certain ligation of the posterior branches of the coronary artery and the first provisional mass-ligature serves as a traction thread to draw down the lesser omentum and bring into view a portion of it which is otherwise inaccessible.

Pancreatic lymph-glands present greater difficulties on account of their deep situation in the pancreas. Frequently it is necessary to remove with them a portion of the pancreatic tissue. If enlarged glands are situated close to important vessels around the portal vein or in the retroperitoneal tissue, radical operation is impossible. Ascites of a mild degree is not an absolute counterindication if there are no visible carcinomatous nodules in the peritoneum.

If there exists a pyloric carcinoma with stenosis whose removal is technically possible, while the condition of the patient is bad, ought one to perform a radical operation or first to improve the condition of the patient by gastro-enterostomy and then to perform radical operation at a later date? This latter plan has been variously recommended, but has proved inadvisable. Sometimes the patient, finding his condition improved, will refuse further operation until the favorable time has gone by. Sometimes the adhesions which follow the first operation render the second one more difficult than it otherwise would have been. If the operator discovers during operation that he can remove the tumor itself, but cannot remove all affected glands, ought this to be done or should gastro-enterostomy be performed? Lengemann has found that not all enlarged lymph-glands in cases of carcinoma are carcinomatous, so that radical cure is not impossible even though some enlarged glands are left behind. Furthermore, with the present technic resection of the stomach is only slightly more serious an operation than gastro-enterostomy. Its mortality has been 25 per cent. as compared with 26.5 per cent. mortality for gastro-enterostomy when performed for carcinoma in Mikulicz's clinic in the last few years. Furthermore, a patient who recovers from resection lives longer and in more comfort than a patient upon whom gastro-enterostomy is performed; at least he is not likely to suffer from local recurrence in the stomach, while a patient after gastro-enterostomy is freed from his gastric symptoms for only a short time, perhaps not at all. Therefore one must admit that resection of the stomach when it is technically advisable is the best palliative operation for gastric cancer.

If resection is not practicable, four palliative operations must be considered, namely, gastro-enterostomy, gastrostomy, elimination of the pylorus, and jejunostomy.

Gastro-enterostomy is indicated with severe motor insufficiency of the stomach if the carcinoma is not so extensive that a speedy death is to be expected. Simple anhydræmia (dryness of the body) is no counterindication for the operation if the hæmoglobin of the blood is relatively abundant. Advanced anæmia and cachexia are counterindications. (See page 293.) Gastro-enterostomy may restore the motor function of the stomach, free the patient from vomiting, and relieve him from inanition. The point chosen for anastomosis should be at least 5 cm. (2 inches) distant from the tumor. If the tumor is situated so high up that anastomosis cannot be made above it, the abdomen should be closed without further operation. If the tumor is so placed that stenosis does not and is not likely to occur, there is no object in performing gastro-enterostomy.

Gastrostomy need only be considered in case of cancer of the cardia or cardiac portion with stenosis.

Jejunostomy is recommended by Maydl for gastric cancer in all cases in which radical operation cannot be performed. The objections to this plan of treatment are stated on page 455.

Elimination of the pylorus may be serviceable if a gangrenous carcinoma is situated at or near the pylorus.

For the technic of operation see page 478.

**Results of Operation.**—Statistics of resection of the stomach for cancer are particularly unsatisfactory. One surgeon operates upon patients whom another surgeon would consider to be in an inoperable condition. One surgeon operates thoroughly, and the immediate results of operation will therefore not be so good as those of another who makes a less extensive removal. Six years ago Mikulicz began to remove most thoroughly the lymph-glands in every case of resection for carcinoma. The mortality of his operations rose, and has only come down as he has become more familiar with the new technic. Resection of the tumor alone is a simple procedure, while removal of all affected lymph-glands is relatively difficult. In time deaths from technical imperfections, resulting in perforation, peritonitis, gangrene of the colon, etc., will doubtless become fewer and fewer as the surgeon's technic improves. Pneumonia, collapse, and embolism will occasionally follow in severe abdominal operations. In the earlier years mortality was more than 50 per cent., whereas in the last few years the mortality of several operators has fallen to less than 30 per cent. In Mikulicz's clinic up to the year 1898 there were 56 resections of the stomach, 26 of which were followed by death within thirty days, equal to a mortality of 46.5 per cent. Since the year 1898, 44 resections have a mortality of only 25 per cent. Unfortunately the permanent results of operation are less satisfactory. The exact percentage of cures is ascertained with difficulty. Mikulicz has definite reports from 58 patients who recovered from operation; 20 of these were living at the time of report from six months to eight and a quarter years after operation, 17 of them having survived a year or more, 10 more than two years, 4 more than three and a half years. As no one of these 4 shows a sign of recurrence,



they may be considered radically cured. These 4 were part of a group of 23 patients operated upon more than three and a half years previously. Estimated in this manner the percentage of radical cures is 17. Thirty-eight patients died of recurrence at periods varying from two and a half to forty-seven months; 7 of them lived more than two years after operation, 9 more than one and a half years, and 6 more than one year. The average duration of life was over sixteen months.

Unsatisfactory as these results are, they are not bad enough to make one ready to give up resection for cancer of the stomach. As stated above, a few patients are permanently cured, while the life of others is prolonged from one to four years in relatively good health. When one compares these results with the absolute failure of internal treatment, the usefulness of operation is obvious. One sees further that the results of operation upon cancer of the stomach are not so much worse than those of operation upon cancer elsewhere in the body, the surgical treatment of which is everywhere recognized as justifiable. Thus the permanent results of operative treatment of cancer of the tongue and rectum are scarcely better than those of cancer of the stomach. Cancer of the breast and uterus is much more favorably situated for radical removal, but the better results obtained are only of recent years after the technic was much improved. It is reasonable to suppose that further experience will lead to better results after operation upon carcinomatous stomachs.

The condition of the patient who recovers from operation is in most cases satisfactory. Some patients suffer from dyspeptic symptoms of a mild degree, a result of the gastritis which accompanied the cancer. If the hydrochloric acid is deficient, taste for meat may be wanting. Under such circumstances anæmia is apt to persist even though recurrence of the cancer does not take place. Usually there is a prompt increase in weight, sometimes as much as fifty pounds.

The motor action of the stomach is often restored completely. Sometimes it exceeds the normal, although the opposite has been stated by other writers. Usually lactic acid fermentation disappears as the motor function improves, although it may exist in a lessened degree for a long time. In a few cases free hydrochloric acid reappears in the stomach, although it was absent before operation.

If recurrence takes place, the symptoms thereby caused will vary according to whether it is a local or a metastatic recurrence.

Although gastro-enterostomy is a far simpler operation than resection, its mortality in the case of cancer is not much better than that of resection. This is doubtless due to the fact that resection is usually performed in favorable cases and gastro-enterostomy in severe cases in which ulcerating tumors are left behind to set up hemorrhage, perforation, etc. The causes of death are the same whether resection or gastro-enterostomy is performed with general or local anæsthesia.

The duration of life after recovery from gastro-enterostomy varies greatly, but it is considerably less than after recovery from resection.

Still cases have been reported in which patients lived four years or more. Such statistics should not be accepted without question unless the diagnosis has been made by microscopical examination of lymph-glands removed at operation or by autopsy. Mikulicz reports 67 cases in which the patients survived gastro-enterostomy more than a month. Two of them lived more than two years (twenty-seven and twenty-six months), 10 more than one year, 11 more than six months, and the remaining 44 less than six months. The average duration of life was therefore six and four-tenths months.

The condition of the patient after gastro-enterostomy is often such that one cannot speak either of temporary cure or marked improvement. In view of the considerable number of patients who die within a few days after operation and the still greater number who live only a few weeks, one must conclude that gastro-enterostomy for cancer of the stomach is an operation of little value and one which is likely to be performed less and less often.

#### TUMORS OF THE INTESTINE.

**Benign Tumors of the Intestine.**—Benign tumors of the intestine are uncommon. The forms which are found are adenoma, lipoma, fibroma, myoma, myxoma, angioma, teratoma, and such combinations of benign and benignant neoplasms as myosarcoma, fibrosarcoma, etc.

Adenomata spring from the glands of Lieberkühn and simulate their structure. They may be pedicled or sessile, solitary or multiple. They are small or as large as the fist. While commoner in early youth, adenomata may be found at any age. Multiple polypoid adenomata are sometimes found scattered throughout the large intestine, especially in the neighborhood of the ileocecal valve.

Small uncomplicated adenomata give no symptoms and possess only pathological interest. They may lead to important complications, especially invagination. The polyp is pulled upon by the peristaltic action of the bowel below and drags downward with it the mucous membrane to which it is attached. There is first a lateral intussusception which ultimately becomes circular. Adenoma is also of importance since it may represent a step in the development of carcinoma.

If the adenoma is large, it may produce the symptoms common to all large tumors of the intestine which are described on page 392. Heurtaux mentions 2 cases of adenoma of the ascending colon which produced invagination and death. Port mentions 13 cases of multiple polypoid adenomata: 2 of these patients died from invagination, 2 from hemorrhage, and 5 from carcinoma, which developed in some portion of the adenomatous bowel.

Single adenoma, if treated at all, should be removed. If invagination has taken place, this will require the first treatment. Multiple adenomata are scarcely amenable to radical operation, but they may be treated by the establishment of an artificial anus.

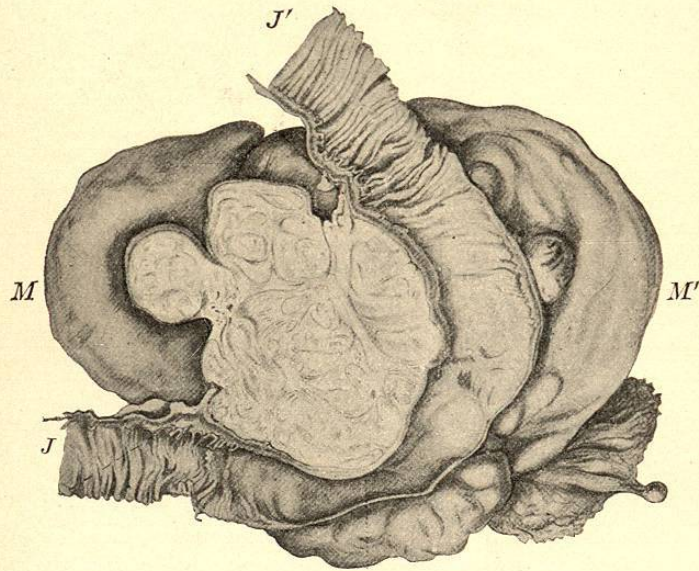
Lipomata of the intestine vary in size between that of a hazelnut



and the fist, in the 18 cases collected by Hiller. These tumors may occur in the stomach, small intestine, or large intestine. They usually grow from the submucosa and may be sessile or polypoid in shape. Invagination of the intestine occurred in 9 of the 22 cases referred to. This is especially likely to happen if the lipoma involves the small intestine.

Myoma of the intestine is perhaps rather more frequent than lipoma. (Fig. 96.) Steiner collected reports of 58 cases of myoma of the stomach or intestine, in one-half of which the tumor was first discovered at autopsy. The patients affected were of all ages and of both sexes.

FIG. 96.



Myoma of intestine: *M, M'*, the tumor, a part of which is cut across to show its loose attachment to the intestine, *J, J'*. (Steiner.)

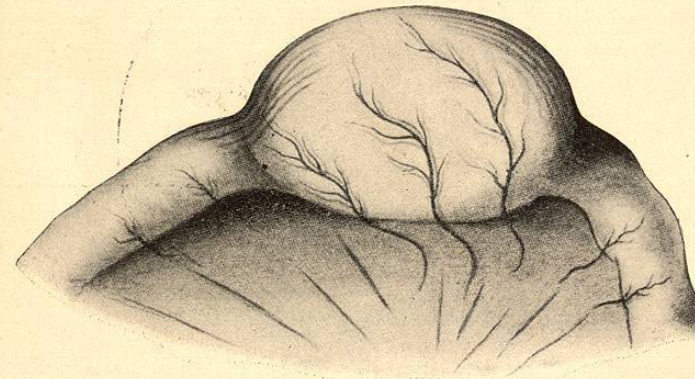
The myoma develops from the muscular layer, and may grow inward or outward and become therefore either submucous or subserous. In 21 of Steiner's cases the tumor was situated in the stomach, in 16 in the small intestine, and in 14 in the large intestine and rectum. There were 27 cases in which the tumor projected into the lumen, and 24 in which it was subserous.

As a rule a submucous myoma does not reach the size of a subserous one. The smaller tumors are smooth, the larger usually nodular. In rare instances the inner surface of the tumor has been found to be ulcerated. Since a myoma may occur in any portion of the circumference of the intestine, it is sometimes found at the junction of the mesentery growing between the mesenteric layers and simulating

the true tumor of the mesentery. In 4 cases subserous myomata were multiple.

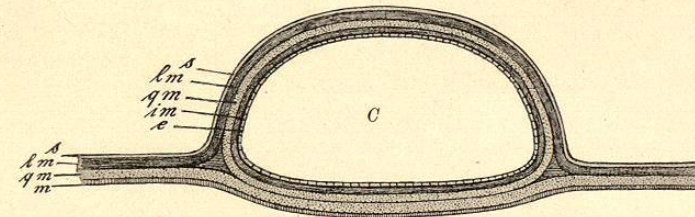
An internal myoma may lead to stenosis or invagination. This complication rarely occurs with an external tumor. The latter, if large, may drag the intestine from its proper situation and press upon other abdominal organs. Any myoma may change into a sarcoma. A small internal tumor may produce no symptoms, or may give rise to the symptoms of chronic intestinal stenosis. If the tumor is pedicled,

FIG. 97.



Cyst of the small intestine.

FIG. 98.



Section of cyst and intestine: *s*, serosa; *lm*, longitudinal muscle; *qm*, transverse muscle; *im*, wall of cyst; *e*, lining of cyst; *m*, mucosa.

there may be intervals in which the patient is wholly free from symptoms. The tumor may lead to intussusception, especially if it is pedicled. Rarer complications are hemorrhage and gangrene, the results of ulceration. The first symptoms of external myoma are those of a gradually developing palpable tumor which does not interfere with the passage of feces until it reaches a considerable size. Even then it rarely produces complete obstruction. It may set up adhesions and thus produce a kink of the intestine. An exact diagnosis of myoma can hardly be made before operation. The most that one can hope to say is that a benign tumor of the intestine exists.



The symptoms of intestinal myoma, the course of the disease, and its outcome vary greatly, as indicated above.

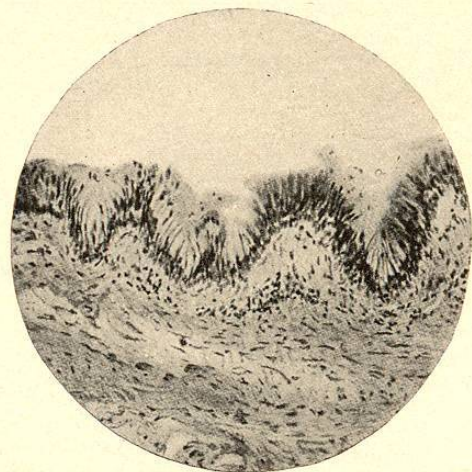
Sometimes a tumor will exist for twenty years. If it is pedicled and projects into the lumen of the bowel, it may be torn away and thus a spontaneous cure result. This happened twice in 7 cases in

FIG. 99.



Stratified epithelium with which the greater part of the cyst was lined.

FIG. 100.



Tall cylindrical epithelium which formed the lining of the cyst in places.

which expectant treatment was followed; the other 5 patients died of hemorrhage, sepsis, or invagination. In general, external myoma is less dangerous than internal, but even then the presence of a constantly growing tumor gives an unfavorable prognosis.

The treatment of external myoma, like that of lipoma, is merely operative. Even though no complications exist, the impossibility of excluding the diagnosis of malignant tumor makes operation imperative. If the tumor is known to have existed a long time and increases very slowly, the indication for operation is less urgent.

If invagination, stenosis, or other complication arises, the treatment is such as is rendered necessary by such a condition.

The operation should in most cases include the radical removal of the tumor. If the myoma is subserous, it may be shelled out without opening the bowel. If the tumor projects into the lumen of the bowel, it will usually be necessary to excise a portion of the whole wall, or to perform circular resection. In cases in which an extensive operation is not advisable entero-anastomosis, or elimination of intestine, or artificial anus must be considered. Heurtaux gives reports of 16 operations, with 14 recoveries and 2 deaths.

Fibromyoma and fibromata and cysts of the intestine (Figs. 96-100) are very rare tumors.

A few cases have been reported of cysts of the intestine containing gas. Their origin is not well understood. A similar trouble occurs rather more frequently in swine.

**Sarcoma of the Intestine.**—Sarcoma of the intestine is rarer than carcinoma. The relation of these two tumors is about as 1 to 20. Sarcoma may involve either the small intestine or the large intestine or rectum, while carcinoma is far more frequently found in the large intestine and rectum. Kruger-Boas, who collected reports of 37 cases of sarcoma of the intestine, found the small intestine involved 16 times, the ileocæcum once, the cæcum twice, the vermiform appendix once, the transverse colon once, both the small and large intestine once, and the rectum 16 times. Smoler reckons 1 case of sarcoma of the small intestine for every thousand autopsies.

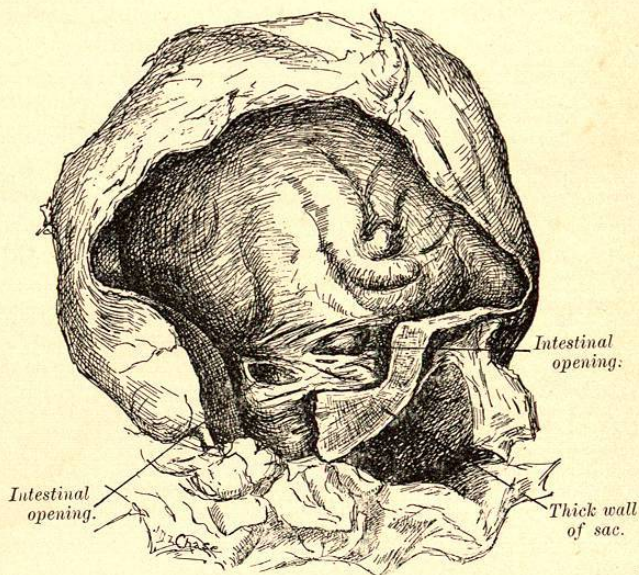
Sarcoma of the intestine may occur at any age, but most frequently between the thirtieth and fortieth years. Most of the cases reported have been in females. In Siegel's collection of 34 cases 19 of the tumors were round-cell and 5 spindle-cell. The other tumors were alveolar or melanotic, cystosarcoma, lymphosarcoma, myxosarcoma, and endothelioma. Tuberculosis and sarcoma may coexist. Usually an intestinal sarcoma begins in the submucosa.

Sarcoma of the intestine may reach a considerable size. In counter-distinction to carcinoma, it involves a considerable extent of the bowel and is much more likely to grow into the neighboring organs, especially the mesentery and omentum. Hence it is not always possible to say in which organ it began. It also sets up metastases in the liver, kidney, spleen, and retroperitoneal glands. In another respect sarcoma of the intestine differs from carcinoma. Several writers have called attention to the absence of stenosis with sarcoma, and indeed the lumen of the affected bowel may be considerably increased. There are, however, instances in which sarcoma has produced stenosis of a high degree. Siegel asserts that symptoms of stenosis occur in about one-half of the cases.



**Symptoms.**—The symptoms of sarcoma of the small intestine vary greatly. There is often a palpable tumor which for a time is freely movable. There are rapid loss of flesh and development of cachexia, as the tumor grows much faster than carcinoma. Ascites and metastatic tumors are frequent complications. The life of the patient rarely continues more than one year.

FIG. 101.



Sarcoma of intestine producing dilatation.

**Diagnosis.**—Sarcoma of the intestine has to be differentiated from other intestinal tumors, and especially from carcinoma. Such a differential diagnosis is only possible in the case of a rapidly growing tumor which does not produce stenosis. In most cases nothing more definite than a probable diagnosis can be made until the abdomen has been opened, and even then a microscopical examination may be necessary to determine the nature of the tumor.

**Treatment.**—Treatment is purely operative, and is the same as the treatment of carcinoma of the intestine. Thus far the results of operation have not been satisfactory. Almost all the patients were seen too late to expect the best results from radical treatment. Still in a few instances the surgeon has succeeded in removing the tumor so completely that the patient was permanently cured.

**Carcinoma of the Intestine.**—Carcinoma of the large intestine is much more common than that of the small intestine. The rectum is the favorite seat of this disease. Of 100 cases of carcinomata situated above the rectum, in 5 instances the tumor was in the small intestine, in 19 in the cæcum, in 39 in the colon above the sigmoid flexure, in

31 in the sigmoid flexure itself, while in 6 cases the seat of the trouble was not exactly stated. Other statistics are in substantial accord with these. In nearly one-half of all cases of carcinomata occurring in the alimentary tract below the stomach, the tumor involves the rectum. For the sake of comparison, Hiemann's collection of statistics from the Prussian hospitals in the years 1895 and 1896 are given. He found 20,544 cases of cancer, in 10,537 of which the alimentary canal was involved as follows: tongue, 269 times; mouth and throat, 192; œsophagus, 1011; stomach, 4288; intestine, 1706 times. The small intestine was involved 20 times, the large intestine 224 times, and the rectum 1204 times; while in 255 cases the portion of intestine which was involved was not given. The cancer involved the liver and gall-bladder 979 and the pancreas 92 times. Cancer of the large intestine exclusive of the rectum occurs most frequently in the sigmoid flexure, then in the cæcum, then in the hepatic and splenic flexures and other portions of the colon.

Three times as many men as women are affected. Like carcinoma in other portions of the body, that of the intestine is most frequently found between the thirtieth and fiftieth years of life, although it is also seen as early as the sixteenth year. It is almost invariably primary and solitary. Multiple nodules may in rare instances arise as such, or they may be due to projection through the mucous membrane, or be the result of metastasis through the peritoneal cavity. There have been several instances reported in which these peritoneal metastases have so far developed as to produce one or more stenoses in the intestine.

The different forms of cancer occur in the following order: cylindrical with a glandular structure, medullary, gelatinous, scirrhus. In structure and method of growth carcinoma of the intestine closely resembles carcinoma of the stomach. (Page 370.) Carcinoma of the intestine leads to early ulceration, with the perforation of small hemorrhages and possibly perforation into the free peritoneal cavity, or into some hollow organ, or externally. It also tends to grow circularly, and thus to produce stenosis with hypertrophy and dilatation of the intestine above it. (Page 296.) There may be acute obstruction with ileus. Even in the rare cases in which the tumor grows longitudinally stenosis is still likely to occur. Or invagination may be the result. The effect upon the mesentery is at first to lengthen it; later it becomes involved by the carcinoma and contracts.

Carcinoma of the intestine, like that of the stomach, may extend by continuity, by the bloodvessels (liver), by the lymph-vessels, and by the peritoneum. Early metastases are the exception. Hauser says that gelatinous carcinoma produces metastasis in the serosa, the lymph-vessels, and the bones rather than in the liver; but medullary carcinoma infects chiefly the regional lymph-glands, and scirrhus produces metastasis in the liver.

The clinical symptoms due to carcinoma of the intestine are chiefly those of chronic intestinal stenosis. Usually a tumor can be