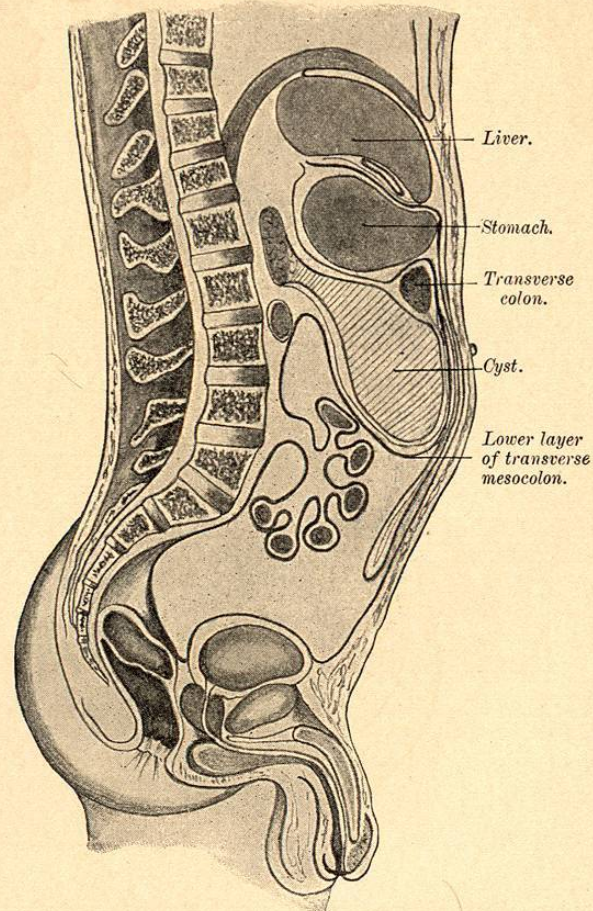


due to pressure upon the stomach. The pain, nausea, and vomiting may be so severe that intestinal obstruction is suggested. There are marked emaciation and loss of strength. If the bile is prevented from reaching the intestine, there will be jaundice. There are no certain specific symptoms due to interference with the pancreas itself. Such a cyst may become very large and by its mere bulk interfere with the

FIG. 340.



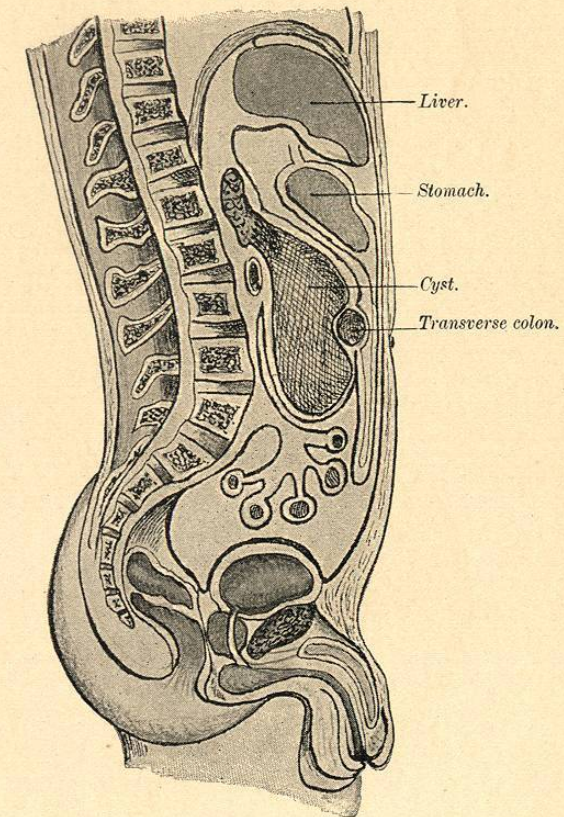
Cyst of the pancreas developing between the layers of the transverse mesocolon and stretching the lower layer more than the upper.

functions of the neighboring organs. (Fig. 337.) The coeliac plexus is situated close to the pancreas, and some of the pain experienced is supposed to be due to pressure upon it. Only in rare instances is the symptom pain wanting.

As a rule the cyst presents itself as a spherical or half-spherical

projection with tense walls. Its outline is sometimes best shown when the patient stands. It may be of any size. Instances are recorded of cysts containing 15 or 20 litres (quarts) of fluid. The cyst possesses a limited amount of motion, whereas the pancreas is firmly fixed to the posterior wall of the abdomen. If it develops in the tail of the organ or possesses its own pedicle, its mobility is greater. There are a few instances in which such a cyst suddenly disappears (presumably to rupture into the intestine) and then reappears.

FIG. 341.



Cyst of the pancreas developing between the layers of the transverse mesocolon. The colon lies directly in front of the cyst.

A cyst of the pancreas may occupy one of several positions:

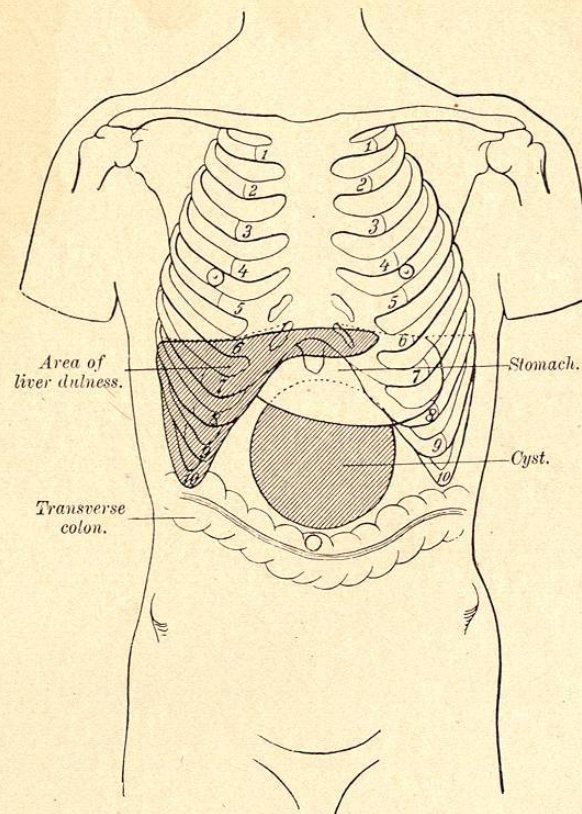
A. As a usual thing it develops in the lesser peritoneal cavity between the stomach and transverse colon. In this case it presses forward the gastrocolic ligament. (Fig. 338.)

B. Less often the cyst lies above the stomach, pushing in front of it the gastrohepatic ligament and crowding forward between the liver and the stomach. Twelve cases of this sort are on record, in one of

which, mentioned by Albert and Payr, the cyst projected through the foramen of Winslow. (Fig. 339).

C. The cyst may develop between the layers of the mesocolon, in which case the transverse colon may lie in front of the tumor, or somewhat above it. (Figs. 340 and 341.)

FIG. 342.

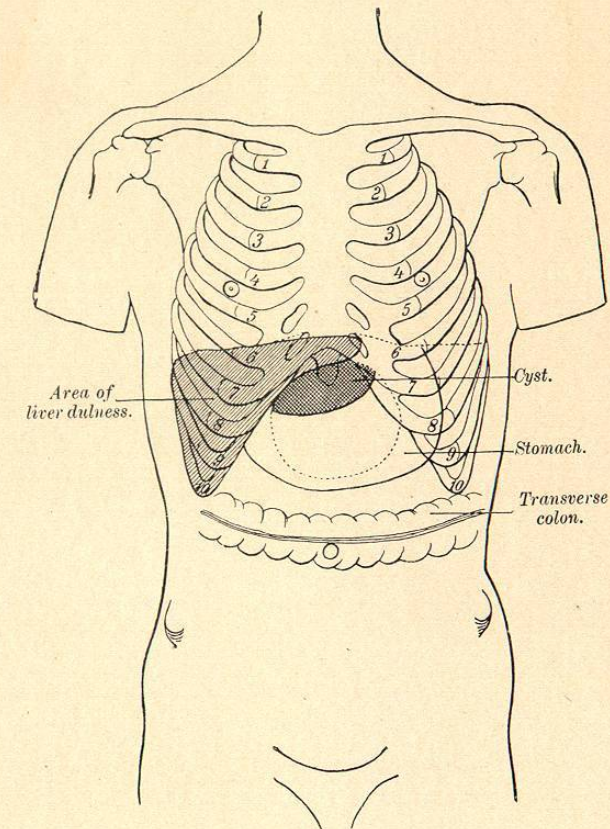


Showing the relations of the liver and transverse colon to the tumor caused by a typical pancreatic cyst. The stomach is displaced upward and partially overlaps the cyst. The transverse colon follows its lower margin.

The contents of a pancreatic cyst is an alkaline fluid containing albumin, and with a specific gravity of 1.010-1.020, though in some cases it may be either higher or lower than these figures. Sometimes the fluid is as clear as water, sometimes it is slightly or deeply stained with blood. It frequently contains one or more of the pancreatic ferments. If such is the case, diagnosis is certain, but their absence does not prove that the cyst is not of pancreatic origin, for they are frequently absent in old cysts, but they may reappear in the discharges after the cyst is drained.

Diagnosis.—The diagnosis of a pancreatic cyst rests in the first place upon the history (previous traumatism or inflammation), upon the presence of symptoms due to pressure, and, further, upon the relations of the stomach and transverse colon to a tumor, as shown when these organs are distended with air. Thus, in type A mentioned above, when the stomach and colon are distended they will be found on opposite sides of the cyst. This is the typical relation which exists when the cyst is in the lesser peritoneal cavity. (Fig. 342.)

FIG. 343.



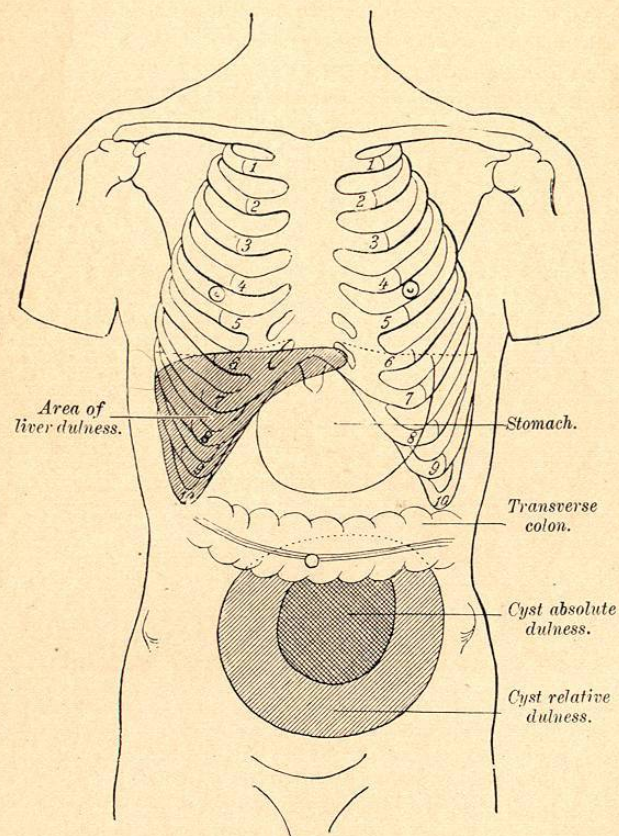
Showing the relations of the liver, stomach, and transverse colon to a cyst of the pancreas, type B. The stomach lies in front of and below the cyst.

In type B the cyst is crowded in between the stomach and the liver, and the stomach and transverse colon are nearly or quite in contact. (Fig. 343.)

In type C the colon when distended either rotates upon the cyst or is situated somewhat above it, so that the cyst cannot be differentiated from the cyst of the mesentery. (Fig. 344.)

In many cases one can do no more than to make a diagnosis of retroperitoneal cyst, unless some of the contents of the cyst are aspirated for chemical analysis. Such aspiration is inadvisable, as it may be followed by the escape of cyst contents into the abdomen and the development of serious or even fatal peritonitis. Furthermore, when the fluid is obtained, a positive diagnosis can only be made in case it contains ferments, and these are often wanting, even in the contents

FIG. 344.



Showing the relations of the liver, stomach, and transverse colon to a pancreatic cyst of type C. The transverse colon lies in front of the cyst or along its upper border.

of a pancreatic cyst. Finally, a differential diagnosis between retroperitoneal cysts is unnecessary. It is sufficient for the purpose of operation to know that there is a retroperitoneal cyst situated behind the stomach and transverse colon.

If the tumor is of type A, a diagnosis of pancreatic cyst can be made with considerable degree of probability. If the tumor is of type B, one must bear in mind the possibility of echinococcus cyst growing

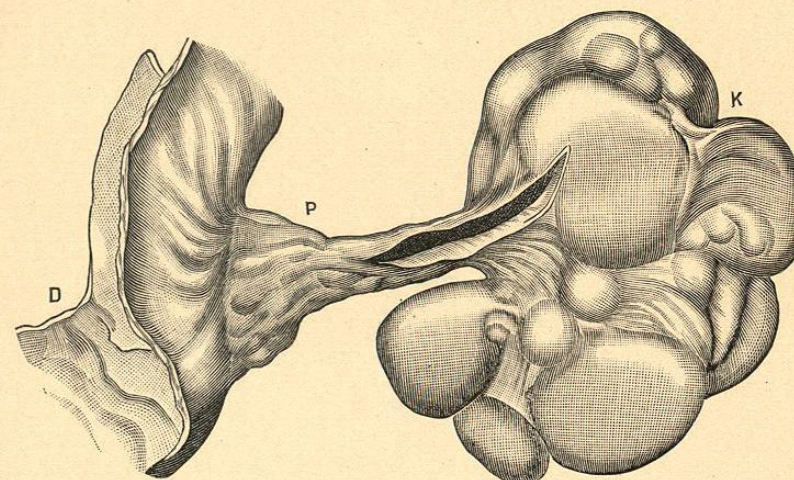
from the lower surface of the liver. If the tumor is not in the median line, cysts of the kidney and suprarenal body must be considered. If a puncture can be made from the loin, the procedure is permissible provided it is to be followed immediately by operation.

A cyst of the mesocolon has exactly the relations of a pancreatic cyst of type C. The operation for its removal is the same. Other conditions to be considered in differential diagnosis are cysts of the omentum, or of the posterior wall of the stomach, or of the retroperitoneal lymph-vessels, or of the remains of the Wolffian ducts.

Cysts of the pancreas cause serious symptoms, interfere materially with digestion, and expose the patient to the risk of rupture with fatal result; therefore operative treatment is clearly indicated.

Treatment.—Puncture of a pancreatic cyst has rarely led to a cure. In most cases the fluid reaccumulates. It may trickle into the

FIG. 345.



Cystic adenoma (K) of the left half of the pancreas (P); D, duodenum. (Lancereaux.)

abdominal cavity and set up serious inflammation. For these reasons puncture is not to be recommended. In case it is performed the facilities for an immediate laparotomy ought to be at hand.

In most cases of pancreatic cyst suture of the cyst-wall into the abdominal wound with drainage is the typical method of treatment. Extirpation is indicated in only a minority of cases.

An incision is made over the crest of the tumor. When the abdominal cavity is opened, the surgeon determines by examination at what point the cyst is most accessible. It lies usually behind the gastrocolic omentum, less often behind the gastrohepatic omentum, or below the transverse colon. In the last situation it is covered by the omentum and the lower layer of the transverse mesocolon. The reduplication of peritoneum which covers the cyst, whatever its origin, is torn through or divided between ligatures of its vessels, and the

wall of the cyst is exposed. If the cyst is movable, this extirpation may be possible. If its layers are adherent, as is usually the case, it must be treated by a suture to the cut edges of the injured peritoneum. The peritoneal cavity should be protected during this suture, as the wall of the cyst is often thin and easily torn. The needles used should be small and round. If a fairly good suture is possible, the cyst should be at once incised, irrigated with saline solution after its contents have escaped, and sponged out with gauze, so that any necrotic portions of the pancreas may be removed. It is then drained with a rubber tube surrounded with gauze. The edges of the abdominal wound are partially sutured and protected from the eroding influence of the secretion by a zinc oxide salve. If the cyst is situated far to one side, a counterdrain may be inserted through the loin. If the wall of the cyst is full of bloodvessels, or for any other reason it cannot be sutured to the parietal peritoneum, the wound should be tamponed with gauze and incision of the cyst postponed until adhesions have formed.

As a rule the large cavity shrinks rapidly and granulations spring from its walls. Sometimes the inner lining of the cavity sloughs out. A fistula often remains and discharges pancreatic juice in varying quantities up to 1000 c.c. a day. This discharge, if allowed to come in contact with the skin, may produce digestive ulcers. Such a fistula may persist for years, or it may heal spontaneously or after it has been injected with astringents such as tincture of iodine, zinc chloride, or silver nitrate; or after cauterization, curettage, or excision. In one case it is mentioned that a fistula which had existed a year and a half eroded the splenic artery, producing a fatal hemorrhage.

In rare instances the fistula closes and the cyst re-forms.

Suture of a pancreatic cyst in the abdominal wound with drainage is not a dangerous operation. In a series of 141 cases 7 patients died immediately after the operation, and 1 at a later date from infection developing in the fistula. The chief risk of the operation is from the escape of cystic contents into the peritoneal cavity, with resulting peritonitis.

In only a few cases is extirpation of the cyst possible or advisable. This operation should not be attempted unless the cyst-wall is practically free from adhesions to the surrounding organs. It is easy if the tumor has a sort of pedicle, which is apt to be the case with a cyst of the tail of the pancreas. In performing the operation the cyst is first exposed and its relations determined. Unless these are satisfactory, the idea of extirpation should be given up, for 4 of 9 patients in whom a difficult extirpation was attempted died. Even in favorable cases extirpation may prove difficult. The wall of the cyst is freed little by little, injury to the stomach and intestine and large vessels being avoided. Ligation of the vessels of the mesocolon is apt to be followed by gangrene of the bowel. The splenic artery may be ligated without injurious result. Dissection of a cyst from the pancreas is followed by a considerable hemorrhage which must be carefully controlled. If

there is a pedicle, this is more easily ligated and divided. Zweifel removed with a cyst so much of the pancreas that only the head remained. Temporary glycosuria was the result. The retroperitoneal wound which remains after the removal of the cyst should be covered by a suture of the posterior peritoneum; or, if there is still some bleeding, gauze drainage is preferable, perhaps through the loin. There are recorded 22 cases of extirpation of pancreatic cyst, with 4 deaths. In 1 of these fatal cases peritonitis existed at the time of operation, and portions of the transverse colon and stomach were excised with the tumor, which proved to be cystosarcoma.

SOLID TUMORS OF THE PANCREAS.

Carcinoma is the commonest solid tumor of the pancreas, and its type is usually scirrhus, less often adenocarcinoma, while gelatinous and giant-cell forms are still more rare. Adenoma, sarcoma, and lymphoma are other rare tumors which occasionally occur. Tuberculosis is seldom found. Syphilis may exist in the form of gumma or as a chronic interstitial inflammation.

It is impossible to differentiate clinically between primary carcinoma and sarcoma of the pancreas. These tumors occur usually in middle life, though they may develop at a very early age. At first they cause few symptoms; later there are a peculiar pain in the epigastrium, rapidly increasing cachexia, and then a palpable tumor. In the early stages such characteristic symptoms as fatty stools and glycosuria are wholly wanting, and even in the later stages they are not always present. Contraction of the common duct is a late complication. In view of these facts an early diagnosis is most improbable. The presence of a palpable tumor is the chief point of diagnosis, and its relations to the stomach and intestine can be made out in accordance with the rules given in the preceding section.

Experiments upon animals seem to show that the removal of the entire pancreas carries with it the risk of diabetes, but the subject needs further study. Franke removed the whole pancreas from a woman on account of carcinoma. The patient lived five and a half months, during which time the stools were normal, and the operation was followed by only a temporary glycosuria. Tricomi removed for carcinoma all of the pancreas except a small portion of the tail. His patient suffered from no symptoms which could be attributed to the loss of the gland, and died four months later from metastasis in the liver. These instances seem to show that the whole pancreas can be removed without seriously affecting the life of the patient, but the operation is one of great technical difficulty.

The results of partial resection for malignant disease are most unsatisfactory. This operation has been performed in 13 cases with 7 deaths. The patients who survive the operation usually die from recurrence of the tumor within a short time. These unfavorable results are due to the difficulty of making an early diagnosis.

If the tumor is so situated that a median incision is employed, the first care of the surgeon should be to expose the tumor itself and its relation to the stomach. If the stomach is situated low down, the tumor may be reached above its lesser curvature through the lesser omentum. In other cases a tumor is better exposed by dividing the gastrocolic ligament, and in still others the greater omentum and transverse colon may be raised up out of the way and the tumor reached through the transverse mesocolon.

When the tumor has been exposed in one of these ways, the question of its enucleation or the removal of a part or the whole of the pancreas must be decided. Enucleation is useless unless the tumor has a distinct capsule. Thus it is useless to enucleate carcinomatous nodules. The chief risk even during enucleation is from hemorrhage, for the pancreas is very full of vessels. Smaller vessels should be ligated, larger ones avoided as far as possible. The wound in the pancreas can be reduced in size by suture. Unless the control of hemorrhage is perfect the wound had better be tamponed.

If the tumor cannot be enucleated, the difficulties of operation are increased. Above all things, the surgeon should avoid wounding the portal vein or the vena cava. The splenic vessels may be ligated with safety, as the circulation of the spleen is also supplied through the branches of the gastric artery. Ligation of the superior mesenteric artery or its branches is followed by gangrene of the intestine. In separating the head of the pancreas from the duodenum which curves around it, the superior and inferior branches of the pancreaticoduodenal artery and the common bile-duct should be avoided. The latter often passes through a part of the pancreas.

Tumors of the tail of the pancreas are more easily removed, for the body of the organ often forms a sort of pedicle which can be ligated and divided. Tampons are best inserted in the form of a handkerchief dressing. In a few cases a tumor of the tail of the pancreas develops retroperitoneally toward the left, so that it is accessible through a lumbar incision.

In most cases of malignant tumor of the pancreas radical operation is not feasible on account of the late stage of the disease when the diagnosis is first made. There are two complications which may be relieved by a palliative operation. These are, jaundice due to pressure on the common duct, and stenosis of the duodenum. The evil effects of jaundice may be avoided by performing cholecystostomy, or by establishing a fistula between the gall-bladder and the small intestine. The former operation is simpler, but it leaves the patient during the rest of his life with an annoying biliary fistula. If an anastomosis is established between the gall-bladder and the intestine, the patient is saved from a biliary fistula, but is exposed to the risk of infection proceeding from the intestine into the biliary ducts. In most cases the jaundice is not an important complication, and it is only in exceptional instances that these operations for its relief are advisable.

If a tumor situated in the head of the pancreas presses upon the

duodenum, the symptoms thereby produced may be sufficiently serious to make it advisable to perform gastro-enterostomy or jejunostomy. The former operation is preferable since the normal methods of nutrition are maintained, while a patient upon whom jejunostomy is performed will always be subjected to the annoyance of the introduction of nourishment through the fistula.

CALCULUS OF THE PANCREAS.

Calculi composed of calcium phosphate and carbonate may form in the pancreatic duct, presumably because the flow of secretion is obstructed. They set up inflammation of the parenchyma, which may go on to abscess formation or lead to a chronic dilatation of the pancreatic duct. Such a calculus may have produced attacks of colic similar to those due to a biliary calculus. It also produces disturbances of gastric and intestinal digestion, with resulting emaciation.

Glycosuria is a frequent symptom of calculus. Fatty stools are occasionally noticed. In some instances there is ptyalism. Pressure upon the common duct may produce jaundice.

The diagnosis cannot be made with certainty. In a few cases attacks of the character mentioned have been followed by the discharge of a calculus through the rectum, and in other cases pancreatic calculi have been removed from abscesses. The cases in which calculi have been removed from a pancreatic duct by operation are very few indeed. If a calculus is suspected at operation, the whole gland should be carefully palpated; and if a calculus is felt, it should be cut down upon by one of the methods described for cysts and tumors. In operations upon the bile-ducts, it is well to palpate the head of the pancreas in order to see if it contains a calculus. If a calculus is found in the main duct or one of its branches, it should be cut down upon through the substance of the gland and removed. If it is impacted in the papilla like a biliary calculus, it is most easily reached by opening the duodenum. If there is no acute inflammation around the calculus, the incision in the pancreas may be sutured. If suppuration exists, tamponade is preferable.