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**Pancreatic  
Cysts**

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## I. MEETINGS

### 1. STAFF MEETING

Date: May 24, 1934

Place: Recreation Room,  
Nurses' Hall

Time: 12:15 - 1:10

Attendance: 98

Program: Atresia of Bile Ducts

Discussion: O. H. Wangensteen  
C. J. Watson  
N. L. Leven

Theme: O.H.W.: These patients present problems for diagnosis. In one case, an unqualified diagnosis of carcinoma was made. Dr. Peyton operated upon him and found large stones. Another was diagnosed as stone in the common duct. Operated upon and had metastasis in the liver. In dealing with jaundice, one can say that often "medical" types of jaundice when operated on turn out to be obstructive jaundice. Patient reported today, operated on a year of so ago. After operation, drained bile. Jaundice intervened, drainage ceased. Indicates stricture of duct but it could also be a stone.

At operation, I could not identify the common duct. I cut across the tissues in the gastrohepatic omentum in the hope of opening the duct. Very few acquire large experience with strictures, but upon few patients operated here I have had difficulty in finding the ends. They are fused with the rest of the tissues. Necropsy examination almost necessary to identify them. When ducts are dilated, one could go through the liver near the portal hepatus with endotherm knife to open a dilated duct. Fear of hemorrhage makes one hesitate about doing it. A drain was inserted. This woman did fairly well for a time after operation. She died of hemorrhage. Control of hemorrhage in jaundice patients is very difficult.

In answer to questions, Dr. Wangensteen made the following statement:

"In our experience, transfusions have been of the greatest help in controlling hemorrhage in cases of jaundice. Calcium has been entirely unsatisfactory. The blood calcium is not diminished. Apparently, the bleeding is due to change in permeability of the capillaries. Biliary fistulae may be present for a long period of time in some individuals. Others tolerate them very poorly. In general, with proper attention to diet and the administration of bile these people get along quite well. Many have a perversion for eating raw bile and occasionally some patients show marked fragility of the bones.

C.J.W.: There is nothing I can add regarding chemistry of bile pigment to that which is found in the abstract. There are several forms of bile pigment. The one that is of clinical importance in diagnosis is urobilinogen. Patients with complete obstructive jaundice show no urobilinogen in the stool. There is practically none in the urine. In cases of cirrhosis of the liver, on the other hand, there is a large amount of urobilinogen in the stool but none in the urine.

This relation of stool and urine urobilinogen is the significant feature. I have found it to be of importance in differentiating benign and malignant obstructions of the common duct. Benign obstruction, as in stone, rarely shows complete obstruction and the stool contains some urobilinogen. When liver damage has taken place, another factor is brought in. The urobilinogen absorbed from the bowel is not utilized by the liver and therefore is excreted in the urine. The total quantity in the urine alone is not enough information because if the duct is obstructed none gets into the bowel and therefore none is found in the urine.

As a test for liver function, the relative amount in stool and urine is of great value. If for instance the stool urobilinogen is normal and there is a high urine bilinogen, it is obvious that there is liver damage. If on the other hand, there is no feces urobilino-

gen, the amount in the urine is of no diagnostic value. The test is of value only in diffuse liver destruction. In multiple metastatic masses in the liver, the excess of liver tissue is sufficient to carry on this transformation. In a few cases of obstruction of the common duct with infection of the gall-bladder, urobilinogen formation within the gall-bladder has been described. This may be absorbed and appear in the urine as a small quantity. This circumstance is probably rare.

N.L.L.: Injection of the bile ducts with opaque media has been done for quite a while. At first, bismuth was used. Considerable pressure was applied and bismuth was injected into the finest radicles of the biliary system. Patient developed jaundice and was very ill for a number of hours. Lipiodol has been used freely. Experimentally, it has been injected into the liver without injury. Occasionally, one sees elevation of temperature following the injection. The procedure is very valuable since many patients come in with a fistula. In one case, we were able to visualize a long filiform stricture of the pancreatic portion of the common duct. It was probably due to chronic fibrosis of the pancreas. Here, we have come to use thorotrast. We feel that it gives better visualization. Procedure often helps one decide as to what can be best done. Enough of the common duct may be left to anastomose it to the duodenum. Sometimes, it will help one to find stones which have been overlooked, etc.

Correction: Page 329, 4-19-34, "urea nitrogen 425 mgs." should read "urea nitrogen 42.5 mgs."

Gertrude Gunn,  
Record Librarian.

## II. CASE REPORT

### MALIGNANT CYSTADENOMA OF PANCREAS.

Case is white male, 51 years of age, admitted to Minnesota General Hospitals 9-22-33, expired 9-28-33 (6 days).

### Examined (?), no tumor (?)

8-25-33 (about) - Injured thigh while at work. Physician called who advised local application. Swelling went down. In this examination, physician found no other condition?

### Jaundice, pain, gastric symptoms

9-1-33 - Observed skin becoming yellow, and itchy. Two or three days later, began having sharp pains in epigastric and right upper abdominal quadrants. At one time, pain penetrated directly to back as though struck by knife. Did not eat because food brought on pain. Pain grew progressively worse, lasting 10 to 15 minutes, and was very severe. No chills, fever or vomiting. Jaundice rapidly increased. Anorexia became complete. Stools became light in color and urine dark.

### Persistent jaundice, weight loss.

9-22-33 - Admitted. No change in course except for progression of jaundice and itching, and increase in severity of pain. Stools clay-colored. Pneumonia 15 years prior; mumps when young man and pleurisy (?) two years ago. Fracture of right femur about 20 years ago. No previous operations. Occasional dizzy sensations when arising from reclined position. Vision poor for few years. Upper teeth extracted. No gastro-intestinal symptoms previous to present illness except for constipation for about one year with occasional lower abdominal pain. Nocturia 1 to 2 times a night, duration not stated. Weight loss of approximately 40 lbs. This weight loss apparently has extended over a period of a few months.

### Physical examination

Extremely jaundiced and uncomfortable. Skin covered with scratch marks and excoriations. Head and neck - injection of throat. Lungs - negative. Heart - blood pressure 140/72, negative. Abdomen - no tenderness or rigidity, liver extends down about 2 cm. below costal margin. Mass about 4 cm. in diameter palpable below liver margin in right midclavicular lines, Spleen not palpable. Extremities - large

callous palpable in middle of right femur. Neurological - negative. Rectal - slight enlargement of prostate.

#### Laboratory

Urine - trace of albumen on several examinations, bilirubin present, no urobilin or urobilinogen on 3 examinations. Blood - Hb. 72%, rbc's 3,430,000, wbc's 11,550, Pmn's 76%, L 23%, E 1%. Gastric analysis - free hydrochloric acid 15°, van den Bergh - direct reaction 80 to 85% maximum color in 30 seconds, 90 to 95% maximum color in 60 seconds. Clotting time - 7 minutes 10 seconds. Stool - clay colored, negative for urobilin. Icteric index - 256 units. Blood - Wassermann negative.

#### X-ray of abdomen, chest

There is an area of density in the 3rd interspace on right anteriorly which resembles healed fibrotic tuberculosis. No other evidence of disease. Abdomen - negative.

#### Progress

Placed on course of paraoral glucose by vein and daily injections of 10 cc. 5% calcium chloride intramuscularly. Temperature normal.

9-25-33 - Icteric index 512 units.

9-26-33 - Bleeding time - 1 minute 50 seconds, clotting time - 9 minutes 30 seconds.

#### Nasal bleeding - incomplete operation

9-27-33 - Stool clay colored, urobilin present in much reduced quantity. Clinical impression - divided between tumor of head of pancreas and common duct stone. It is felt that presence of pain is indication of common duct stone.

Operation: Taken to operating room. Anesthesia started. Skin incision made. Began to bleed from nose. Operation discontinued and posterior nasopharyngeal pack applied. Throughout remainder of day, responded poorly. Blood pressure ranged around 90 systolic. Expecterated great deal of old blood.

9-28-33 - Temperature 99.6. Condition very poor. Respirations labored. Later in A.M., respiratory difficulty increased. 9:10 A.M. - Expired.

#### Jaundice, Scratch Marks, Symptomatic (?), Telangectases

#### Autopsy

Body is well developed and fairly well nourished, white male, 51 years of age, measuring about 170 cm. in length and weighing approximately 140 to 150 lbs. Rigor is absent. Hypostasis is just beginning. Minimal degree of edema of legs. Cyanosis of nails. 4+ jaundice. Pupils are equal, each measuring 5 mm. in diameter. There is a 22 cm. right rectus incision and numerous excoriations (scratch marks) over entire body. Thickening and scaling of skin of hands and forearms, bloody nasal pack with dressings covered with blood and numerous petechiae over shoulders. There appears to be telangectases of skin of face. Subcutaneous fat abundant.

#### Ascites, dilated gall-bladder

Peritoneal Cavity contains about 800 cc. brownish (jaundiced) fluid. Liver does not extend below right costal margin, visible below xyphoid. Gall-bladder extends out from under costal margin and projects as rounded mass measuring about 5 cm. in diameter. Appendix adherent and retrocecal.

Pleural Cavities contain slight excess of jaundiced fluid. Adhesions at right apex, also right diaphragm and right base posteriorly. Pericardial Sac contains no excess fluid. No adhesions.

#### Endocarditis

Heart weighs 300 grams. Mural endocardium smooth. Aortic and mitral valves. Show few, tiny, fresh vegetations, largest being about 2 mm. in diameter and the smallest just visible. There are pale, vesicle-like granulations and also larger reddish, thrombus-like ones. Musculature firm. No softening or areas of infarction. Root of Aorta shows no sclerotic change. Coronaries soft. No thrombus or constriction.

Metastatic tumor

Right Lung weighs 450 grams, Left 375. Slight degree of marginal atelectasis in both lower lobes. No infiltration. No nodules suggesting bronchopneumonia. On right side in lower portion of upper lobe, posteriorly, there is a nodule in subpleural area which is puckered; on cross section is firm, yellowish and appears to be a metastatic tumor although it may possibly be an old tuberculous nodule.

Splenomegaly

Spleen weighs 375 grams, is large, firm, and on cross section very little pulp can be scraped away.

Dilated ducts, no visible cirrhosis

Liver weighs about 1900 grams and is deeply jaundiced. Capsule is smooth. No cirrhosis. On cut surface, ducts are widely dilated and filled with perfectly clear mucoid fluid. No bile in fluid and clear color is in marked contrast to deep jaundiced color of remainder of organ. No metastasis or abscesses found.

Dilated gall-bladder and ducts, Cholesterosis

Gall-bladder is enormously dilated, measuring 15 cm. in length and in its widest portion 7 cm. in diameter. Wall thin. No increase of subserous fat. Mucous membrane shows advanced cholesterosis. No stones present. Two small free bodies present which are firm but not infiltrated with mineral, measuring 1 x 3 x 3 mm. These may be cholesterol bodies. Common duct dilated to about 1.5 mm. in diameter and filled like liver ducts, with clear mucoid fluid. Gall-bladder likewise contains same material. Duct passes into head of pancreas. Stricture present due to pressure of tumor, to be described later. Stricture involves lower 3 cm. of duct. Dilation ends abruptly as duct passes into proximity of tumor. No stones in duct. Orifice of duct measures about 4 mm. in stretched position.

Capillary bleeding(??), swallowed blood (??)

Gastro-intestinal Tract: Esophagus shows no significant change. No varices at lower end. Stomach somewhat dilated and filled with bloody fluid. Mucous membrane red but no ulcerations or actual

bleeding points seen. Duodenum likewise reddish and filled with bloody material. Throughout remainder of small bowel and colon, intestinal content is bloody. No polyps, areas of ulceration or diverticulae.

Tumor

Tail and body of Pancreas normal; not increased in size. No fibrosis or pancreatitis. Pancreatic duct dissected through full length, shows no dilatation, obstruction or stones. In head of pancreas, in area between pancreatic duct and duodenum (above pancreatic duct), there is a tumor measuring roughly 10 x 8 cm. Tumor is lobulated and cystic. Before incision, various cysts in tumor can be palpated. On cross section, cysts are filled with very heavy mucoid material which is almost gelatinous. In some of cysts, content appears partially necrotic. Color is of uniform deep jaundiced color. Cannot be demonstrated that tumor is infiltrating. Dissection of periphery shows adhesion to various structures but a fairly definite line of demarcation can be found.

Adrenals well-developed. No tumors or areas of degeneration.

Cysts of kidney

Right kidney weighs 250 grams, Left 240. Capsules strip easily on both sides. Surface of kidney and substance is smooth. There are, however, several cysts in each kidney. On right side, five cysts are encountered on cut surface and on left two. Lining of cysts is smooth and thin. Some of cysts are multilocular. None are larger than 2 cm. All are located in cortex? Pelves not dilated.

Prostate shows no significant hypertrophy.

Aorta shows minimal degree of atheromatous change.

Enlarged nodes

Along aorta and celiac axis artery, there is a chain of enlarged nodes measuring up to 2.5 cm. in length and about a centimeter or slightly

more in diameter. About 10 of these nodes are found, all soft and not grossly invaded by tumor.

#### No bile in cerebrospinal fluid

Head: Calvarium and base of skull show no significant change. Dura is normal. Meninges not stained by bile. Very little cerebrospinal fluid found, so it is very difficult to tell color but impression from the little seen is that it is not bile-tinged. No cerebrospinal fluid can be collected for more careful examination. Surface of brain very definitely not jaundiced. It presents a pure white color in marked contrast to jaundice of other organs. This likewise is true of cut surface of brain and interior of ventricles. No tumor, areas of degeneration or softening found in brain.

#### Gross Diagnosis

1. Cystadenoma of pancreas, probably malignant.
2. Metastasis to or tuberculosis of lung (?).
3. Hydrops of gall-bladder.
4. Dilation of common duct.
5. Dilation of hepatic duct.
6. Extreme jaundice.
7. Ascites.
8. Pleural adhesions.
9. Atelectasis of lungs.
10. Operative incision.
11. Multiple hemorrhages into gastrointestinal tract, and nose.
12. Telangectasis of skin (symptomatic?).
13. Multiple cysts of kidney.
14. Acute endocarditis.
15. Splenomegaly.
16. Hyperplasia (?) or metastasis to (?) abdominal lymph nodes.

#### Microscopic

Tumor - Different portions of the tumor show varying structure. In general, the appearance is that of a characteristic cystadenocarcinoma. There is no question regarding malignancy because of the extreme irregularity of the growth. Some areas, however, show a cystic formation in which the epithelium is only slightly

papillary and the cells appear to be adult. It could be said that this latter type of growth represents an original cyst from which a malignant transformation took place but there is no proof of such a process.

Metastases - The tumor in the lung is a secondary growth which has the same characteristics as the primary tumor. None of the sections of lymph nodes show tumor invasion.

Liver - Parenchyma shows a surprising absence of any significant change. The cells are deeply pigmented with bile. Numerous bile thrombi are present. The small biliary radicals are not dilated. There is no evidence of cirrhosis.

Pancreas - Like the liver shows no significant change. There is no fibrosis, atrophy or dilation of the ducts.

Kidneys - Bile-stained coagulated material is present in the tubules. Otherwise no significant change seen. None of the sections contain a portion of the cyst wall. (The gross appearance is very convincing that these were simple cysts and not papillary or adenocystic structures).

The other organs show no noteworthy change.

Final conclusion: Cystadenocarcinoma of pancreas with metastases to lung.

Other conclusions - as above.

#### III. ABSTRACT

##### PANCREATIC CYSTS

#### References

1. Judd, E. S., Mattson, H. and

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2. **Mahorner, H. R. and Mattson, H.**  
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3. **Wangensteen, O. H.**  
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Journal Lancet, (May 15) '30.
4. **Maes, U.**  
Cysts of pancreas.  
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5. **Hick, F. K.**  
Pancreatic cysts.  
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6. **Traver, C. A.**  
Cysts of the pancreas, associated  
with ectopic splenic island.  
Ann. Surg. 95: 127-133, (Jan.) '32.

#### Historical

- 1761 - Morgagni - pathological  
description.
- 1842 - Claessen - first collections  
of cases.
- 1862 - Le Dentu - punctured cyst,  
patient died.
- 1866 - Lucke - drained cyst, patient  
died.
- 1875 - Friedreich - monograph.
- 1881 - Boseman - first successful  
extirpation.
- 1882 - Gussenbauer - devised marsupia-  
lization.
- 1898 - Korte - monograph.
- 1903 - Oser - monograph.
- 1904 - Lazarus - monograph.
- 1912 - Guleke - collected 260 cases.
- 1921 - Judd - report of 41 personal  
cases.
- 1931 - Judd, et al. - Report of  
88 personal cases.

#### Incidence

- Mayo Clinic - 723,397 admissions,  
88 cases.
- Guys Hospital - 6,078 autopsies,  
3 cases.
- University of Minnesota Hospitals  
(surgical service 1930) 3 cases.

#### Classification

Following is taken from Mattson and Mahorner with a few modifications suggested by the work of other authors.

- I. Cysts due to defective development.
  - A. in infants.
  - B. with polycystic kidneys.
  - C. with hemangiomatous cyst of brain.
  - D. dermoids.
  - E. inclusion cysts.
- II. Secondary cysts.
  - A. Trauma.
  - B. Pancreatitis.
- III. Retention cysts.
- IV. Neoplastic (or "proliferative") cysts.
  - A. Cystadenoma.
  - B. Cystadenocarcinoma.
  - C. Teratoma.
- V. Cysts due to parasites.
  - A. Echinococcus.
  - B. Tenia solium.

#### Development

Many of the subdivisions of the above classifications represent pathological curiosities, are rare and the development is entirely unknown. A few cases, in infants, have been reported. While these are generally assumed to be congenital in origin, the possibility of birth trauma is to be kept in mind. The association of pancreatic cysts with cysts in other organs is not constant, i.e., many polycystic kidneys and hemangiomatous cysts occur without pancreatic cysts. In case of the hemangiomatous cerebellar cysts, the lesions in the viscera, including pancreas are not considered to be vascular in origin. Dermoid, inclusion and teratomatous cysts are extremely rare in the pancreas. In 1920, 40 cases of echinococcus cysts in this organ were reported. The cystadenomata may be benign or malignant. A proliferative epithelium with or without a multilocular arrangement is the characteristic feature of this



group. In Judd's 1931 report (47 cases), there were 2 benign and 4 malignant adenomatous cysts. They are not common.

Trauma is considered to be a significant factor in the development of these cysts. Korte in 121 cases considered that 28% were the result of injury. Judd (1921 series) estimated 2%; McWhorter 16% and Judd, (1931 series) 17% were due to trauma. Honigman as early as 1905, collected 70 cases said to be of this nature. The basis for the belief that an injury was the cause is as follows:

1. Onset immediately, within 3 months and occasionally after several months.
2. Presence of hemorrhage, remnants of walls of hematoma, portions of sequestered pancreas within cyst.
3. Position or appearance suggesting peripancreatic or false cyst (pseudocyst).

Pancreatitis is the other factor considered to be significant. The cyst is thought to represent a late stage of an acute necrosis of the gland. Pancreatic digestion, hemorrhage and abscess formation produce the excavation and fluid collection. Encapsulation and subsequent fibrosis of the capsule forms the wall. Gall-bladder disease is a frequently associated lesion. In Judd's first report, 14 of 38 cases showed stones or cholecystitis. In the 1931 group of 41 cases, 16 showed gall-bladder disease. It is unknown whether this lesion is a manifestation of spread of the process which produced the cyst or whether it represents a causative factor.

The two factors, trauma and pancreatitis, are closely related and the genetic process is much the same. Pregnancy has been considered to be the cause in some cases. Here, the straining of labor may produce trauma to the gland (hemorrhage) or cholecystitis and pancreatitis may be initiated by the pregnant state.

#### Gross Pathological Features

Size: Largest recorded contained

20 liters. In Judd's last series, 6 cases of 10 cm. or less are reported. The cysts found incidentally at autopsy are usually all small.

Site: has been poorly studied because nearly all the material is surgical and the exact point of attachment cannot be studied at operation. From the data available, there does not appear to be any significant difference in frequency in different parts of the gland. Korte in 46 cases gave location as follows: Head -- 16, body 6, body and tail 12, tail 12.

The contents of the cyst are extremely variable. In 41 cases, only 7 contained clear fluid. In the others, the contents were described as hemorrhagic, thick, turbid, milky, etc. The ferments within the fluid are of no significance. In Korte's 60 cases, 12 showed no ferment, 14 a starch, 3 a fat, and 3 a protein splitting ferment. In 20, there were two ferments and 14 showed 3. The starch digestion of the fluid is not of any diagnostic value since other fluids will also show the same power. The anatomical position is quite constant. The cyst lies in the lesser omental bursa and as it becomes larger it projects between the stomach and liver; rarely it passes downward behind the mesenteries of the small bowel or sigmoid. A few rare cases have descended down into the pelvis. The fairly constant position between stomach and colon forms the basis for some of the diagnostic procedures.

#### Microscopic Features

are of no special interest. The wall is fibrous and usually hyalinized. Pancreatic remnants may sometimes be found in the wall. A lining epithelium in nearly all cases is absent. In the neoplastic types, the usual adenomatous or adenocarcinomatous formations are present.

Clinical Features

Age: Judd's group of 47 cases were distributed by decades as follows:

<u>Decade</u>	<u>Number</u>
3	11
4	9
5	12
6	9
7	5
8	1

Sex:

<u>Author</u>	<u>Number</u>	<u>Males</u>	<u>Females</u>
Judd	47	19	28
Korte	<u>116</u>	<u>60</u>	<u>56</u>
	163	79	84

Apparently there is no significant difference and the sex distribution does not correspond to that of gallbladder disease.

Association with other disease

This factor is important because the associated disease frequently produces symptoms which may be wrongly attributed to the cyst. Some of the differences in the statement regarding subjective symptoms may be due to this factor.

No. cases (Judd)    % with gall-bladder disease

41 (1921)	41
47 (1931)	34

Subjective Symptoms

No specific complaints are present. The history resembles that of many other upper abdominal diseases.

Pain in Judd's group was present in 91%. This may come in acute attacks or it may be dull, constant or an indefinite distress. Sometimes the pain radiates to the left side (Wangensteen). Hemorrhage into the cyst may cause sudden severe pain. The other complaints may be listed as follows:

Weight loss	29
over 25 lbs.	12
under 25 lbs.	17

Nausea and vomiting "common".

Tumor (primary complaint)	24
Jaundice	10 (or 13?)
(Korte: 9 cases in 121 patients)	
Diarrhea	3
Tarry stools	1
Constipation	18

Physical Findings

Tumor was palpable in all of Judd's cases and in 114 of the 121 cases collected by Korte. The location characteristically is above the umbilicus (95%, Judd).

	<u>Judd</u>	<u>Korte</u>
Above umbilicus	45	58
left	21	40
midline	11	48
right	13	10
Below umbilicus	1	16

The mass characteristically is smooth, hemispherical, usually tense and nearly always relatively immobile. A few cases (11 in 47, Judd) are movable and these are the tumors occurring in the tail of the pancreas. The cysts develop gradually but sudden onset or rapid growth has been described. Sudden growth or sudden increase in size is frequently due to hemorrhage. The longest duration recorded is 40 years. In Judd's cases, the period varied from 2 weeks to 20 years.

<u>Duration</u>	<u>Number</u>
Over 1 year	22 (47%)
Under 1 year	25 (53%)
Under 1 month	5

Percussion is valuable. Nearly always the tympany of the stomach separates the dullness of the cyst from that of the liver and spleen.

## Differential Diagnosis

The following conditions and the essential distinguishing feature have been described:

<u>Condition</u>	<u>Distinguished by</u>
Ovarian cyst . . . . .	Pelvic examination
Mesenteric cyst . . . . .	Marked movability?
Liver cyst . . . . .	Dulness continuous with liver
Hydrops of gallbladder . . . . .	Dulness continuous with liver
Suprarenal cysts . . . . .	Laparotomy
Cysts of stomach wall . . . . .	Laparotomy
Fluid tumors of kidney . . . . .	X-ray
Splenic cysts . . . . .	Dulness continuous with spleen
Aneurysm . . . . .	Pulsation
Ascites . . . . .	Distribution of fluid
Hair ball of stomach . . . . .	X-ray, barium
Retroperitoneal tumors . . . . .	Position, x-ray of ureters.

### X-ray examination

Study of the stomach, duodenum, colon and ureters with opaque media in most cases localizes the tumor. Displacement of the stomach and colon; enlargement of the duodenal loop and absence of displacement of the ureters are characteristic features. The ureteral examination is especially recommended to differentiate retroperitoneal neoplasms.

### Treatment

Whenever the diagnosis of pancreatic cyst is made, regardless of the degree of discomfort, surgical treatment is advocated. Small cysts may be entirely excised. Because of technical difficulties and the probable injury to large amounts of the pancreas by excision, it is recommended that large cysts be treated by partial excision, drainage or marsupialization. Puncture through the abdominal wall is discredited by all. The procedures carried out by Judd were:

	<u>Cases</u>
Excision	7
Drainage, marsupialization (1st stage)	33
Partial excision, drainage	6
Exploration alone	1

All the cysts completely excised were small (6 to 10 cm.). One 20 cm. cyst was removed.

Complications following operation are fistula and diabetes. Judd does not consider the postoperative fistulae left by the drainage or marsupialization procedures as very serious. In his group, the fistulae usually persisted for only "a few weeks." In a "few instances", drainage continued for a year and "rarely" for two years. In the literature, fistulae draining for 15 years have been recorded.

Diabetes sometimes occurs. In Judd's group, there were 3 instances.

### Impressions

1. The literature on pancreatic cysts is quite limited. Very little has been written on the subject in the past two years.

2. First pathological description of pancreatic cysts was given by Morgagni in 1761. Surgical treatment by puncture of cyst was done in 1862 and by drainage in 1866. In 1881, Boseman did the first successful extirpation. In 1882, marsupialization was first done. In 1912, 260 cases were collected. In 1931, one personal series of 88 cases (largest on record) was recorded.

3. Incidence is low. In one hospital, in 6000 autopsies, there were only 88 cases. In our own insti-

tution up to 1930, there were 3 cases.

4. There are 3 common types of cysts. One is thought to be due to defective development, such as occurs in association with polycystic kidneys and hemangiomas of the brain also in infants and dermoids. The second type of cyst is not a true cyst (pseudocyst) and follows trauma and pancreatitis. The third type is neoplastic and is classified either as a cystadenoma, cystadenocarcinoma or teratoma. A few other types of cysts have been recorded, such as retention cysts due to obstruction of the duct and cysts due to parasites.

5. The pancreatic cyst found in association with cysts in other parts of the body, such as polycystic kidneys, is usually a simple thin-walled type and may be multiple. The cysts in the pancreas are not always present. (In our own experience, they are more often absent than present).

6. The cystadenomata may be either benign or malignant and present approximately the same features as the cystadenomata of the ovary. In one series of 47 cases, there were 2 benign and 4 malignant adenomatous cysts. The total number of malignant cystadenomata in the literature is still very small.

7. The significant number of all cysts of the pancreas are secondary to direct mechanical trauma. From 15 to 30% are considered to be of this type.

8. The basis for the belief that an injury was the cause is as follows: (1) Onset immediately, common within 3 months or occasionally after several months after injury; (2) presence of hemorrhage, remnants of hematoma or sequestered pancreas within the cyst cavity; (3) position and appearance, both gross and histological, suggesting a false cyst wall.

9. Pancreatitis is the other factor considered to be significant in etiology. Acute pancreatitis with digestion, hemorrhage and abscess formation produce excavation and subsequent encapsulation and fibrosis produce the cyst wall. In

some of the series, almost 50% of the cases showed evidence of gall-bladder disease, although this does not prove that there is any etiological relationship. The cholecystitis may very well be a result rather than the cause.

10. A number of cysts have been observed almost immediately after pregnancy. It has been suggested that the straining during labor may have produced hemorrhage or pancreatitis in the gland.

11. Size of the cyst varies enormously. They range from a few centimeters (autopsy specimens) to as much as 20 liters in size.

12. The site of the cyst is difficult to determine because most of the cases are operative specimens and no opportunity is available for careful study of location of the base of the cyst. In one group of cases, the cysts were approximately equally distributed in the different portions of the pancreas.

13. There is no uniformity in the nature of the contents of the cysts. It is either clear, hemorrhagic, thick, turbid, milky, etc. The ferments within the fluid are not of significance. The fluid may contain 1, 2 or 3 ferments and no single one is constantly present. Other body fluids occasionally show the power of digesting starch.

14. The anatomical location into which the cyst grows is fairly constant. In most cases, the cyst enters the lesser omental bursa and projects between the stomach and liver. Rarely, it projects below the stomach or colon and rarely it presents in the lower part of the abdominal cavity.

15. Microscopic appearance of the cyst wall is not of interest. In nearly all cases, it is fibrous and hyalinized with no remnant of epithelial lining. (This has also been our experience). In the case of the neoplastic cysts, the usual adenomatous or adenocarcinomatous formations are present.

16. Most of the cysts come to the

physician during the period of middle life. In one group of 47 cases, 32 were admitted between the third and fifth decades.

17. There is an almost equal distribution between males and females in two combined series, totalling 163 cases.

18. Association with other abdominal diseases is of importance because of differentiation of symptoms. The most important of these is the associated gallbladder disease. In two series, 41% and 34% had gall-bladder disease.

19. Symptoms are not distinctive. Pain is present in about 90%. Sometimes, it radiates to the left shoulder and occasionally hemorrhage into the cyst produces sudden aggravation of the pain. Other complaints which have been listed are weight loss, nausea and vomiting, presence of tumor, jaundice, diarrhea or constipation.

20. On physical examination, a tumor is found in practically all cases. In a series of 121 collected cases, it was palpated in 114. The location of tumor is characteristically above the umbilicus (95%). It is usually in the midline or toward the left and more uncommonly toward the right. The mass characteristically is smooth, hemispherical, tense and relatively immobile. A few tumors located in the tail of the pancreas have been movable.

21. A sudden onset or sudden increase in the size of the tumor has been very frequently noted. Apparently, this is due to hemorrhage. The duration is variable, ranging from two weeks to forty years. In one series of 88 cases, 53% came to the physician under 1 year after onset. Percussion of the tumor is an important procedure. The relation of the tympany and dulness of stomach, bowel, liver and spleen and tumor gives a good impression regarding the location and attachment of the mass.

22. The conditions which have been described as requiring differentiation are cysts of the ovary, mesentery, liver, suprarenal, stomach wall, spleen; hydrops of gall-bladder, tumor in the kidney,

aneurysm, ascites, hairball of stomach and retroperitoneal tumor.

23. In addition to careful physical examination, x-ray has proven of great help. Displacement of the stomach and colon, enlargement of the duodenal loop, absence or displacement of the ureters are the features which are particularly noted.

24. Surgical treatment is advocated as soon as the diagnosis of pancreatic cyst is made. Small cysts may be entirely excised. Because of surgical difficulties, large cysts must be treated by partial excision, drainage or marsupialization. Blind puncture through the abdominal is discredited by everyone.

25. In one series of 47 cases, the procedures which were carried out were as follows: excision 7; drainage, marsupialization 33; partial excision and drainage 6; exploration alone 1.

26. The complications which follow the operation are the formation of fistulae and diabetes. One author felt that postoperative fistulae left after drainage or marsupialization were not very serious. In his experience, the fistulae usually persisted only for a few weeks and in a few instances drainage continued for one year, rarely for two years.

27. Diabetes sometimes follows. In one series of 88 cases, there were 3 instances.

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