PROLIFERATIVE CYSTS OF THE PANCREAS*

KENNETH C. SAWYER, M.D., J. ROBERT SPENCER, M.D., AND ALEXIS E. LUBCHENCO, M.D.

DENVER, COLORADO

FROM THE SURGICAL AND PATHOLOGIC SERVICES OF THE PRESBYTERIAN HOSPITAL, DENVER

CYSTIC TUMORS of the pancreas are uncommon lesions. This fact is reflected in the series of cases reported from the Lahey Clinic, only 16 having been encountered between the years of 1926 and 1948.[1, 28] From the Mayo Clinic, 108 cases of pancreatic cysts were reported up to the year of 1931. Twenty of these were found at necropsy, the remainder at operation.[16] Of the combined series of 124 cases from the two clinics only four were proliferative cysts, two cystadenomas and two cystadenocarcinomas. We were able to find a total of only 76 cases of proliferative cysts reported in the literature. Because of their rarity and because the reports in the literature are scattered we feel that two cases recently encountered by us, one a cystadenoma, the other a cystadenocarcinoma, warrant reporting. At the same time we wish to correlate features of these two cases with those of other cases reported in the literature and to emphasize certain significant differences between proliferative cysts and the more commonly encountered pseudocysts, particularly since these differences in the two types affect their surgical treatment.

CASE REPORTS

Case 1.—Mrs. E. G., Case No. 5482, a 46-year-old white female, was first seen March 16, 1948. She complained of a mass in the left abdomen noted 3 weeks before examination. There was no history of constitutional symptoms, weight loss or gastro-intestinal complaints.

Physical examination revealed a rather obese woman. Blood pressure was 120 mm. of mercury systolic and 100 mm. of mercury diastolic, the pulse rate 120 per minute, and the temperature 98.6 degrees Fahrenheit. The significant finding was a palpable, smooth, non-tender mass occupying the entire left upper quadrant. This mass was felt to be distinct from the spleen and liver. The remainder of the physical examination was essentially normal.

Routine laboratory data, including urinalysis, blood erythrocyte and leukocyte counts, blood hemoglobin determination and sedimentation rate were within normal limits. An upper gastro-intestinal series demonstrated, besides an incidental esophageal hiatus hernia, a pressure defect along the inferior portion of the greater curvature of the stomach produced by a large soft tissue mass. Roentgenologic examination of the colon following a barium enema revealed a defect from extrinsic pressure along the superior aspect of the transverse colon. This defect appeared to be caused by the same soft tissue mass that was visualized at the time of the upper gastro-intestinal series.

On April 1, 1948, an exploratory laparotomy was performed through an upper transverse incision. Upon entering the abdominal cavity a large, thin-walled, cystic mass was encountered occupying the lesser peritoneal cavity and filling the entire upper abdomen (Fig. 1). Following incision of the gastrocolic ligament the cyst was further exposed. Its attachment to the inferior margin of the pancreas was obvious. When opened, the cyst was found to be multilocular with a ropy, mucinous content. By blunt and sharp dissection the tumor was further mobilized and marsupialized by suturing the peritoneum to the skin. The cyst was then packed with iodoform gauze and the wound closed in layers.

The immediate postoperative course was uneventful except for moderate drainage of the marsupialized cyst. The patient was dismissed on

* Submitted for publication October, 1951.

April 19, 1948. Over the course of the next 7 months drainage of clear fluid from the fistula persisted. Probing of the fistula resulted in evacuation of a cupful of fluid or more on several occasions. On November 18, 1948, the fistula was explored through an incision just above the cutaneous opening. An abscess cavity was found which appeared to extend down to the pancreas. The cavity was opened widely and was packed with two-inch iodoform gauze. One week later the pack was removed and replaced by a Penrose drain, which was left in place 4 weeks. Her subsequent course was much improved, although slight drainage from the wound persisted.

On January 25, 1949, the patient was re-explored. Numerous adhesions were freed, exposing a large multilocular cyst arising from the body and neck of the pancreas. The proximal portion of the splenic artery was ligated, the spleen and distal two-thirds of the pancreas were mobilized and the transverse colon was reflected downward. The cyst, the body and tail of the pancreas, and the spleen were then removed. The pancreatic stump was closed with three layers and was re-enforced with an omental patch over the suture line. A rubber tube and Penrose drain were brought out through a stab wound and the incision was closed.

Pathologic Report. The specimen consisted of an encapsulated, multilocular cystic tumor weighing 1150 Gm. and measuring 20 x 18 x 12 cm. The spleen weighed 224 Gm. It was loosely attached to the tumor by the blood vessels of its hilus. One portion of the tumor presented grossly recognizable pancreatic tissue on its surface.

Coronal sections through the tumor revealed a multilocular cystic structure containing a ropy, clear, mucinous material. The cyst lining was yellowish-brown, smooth and glistening. The normal portion of the pancreas was clearly demarcated from the tumor. Microscopic examinations revealed a single layer of high columnar epithelium raised into blunt papillary processes resembling the epithelium of pancreatic ducts (Fig. 2). In one section the fibroconnective tissue of the cystic wall blended with the pancreas. Cancerous change was not observed.

Diagnosis: Papillary cystadenoma of the pancreas. The postoperative course was complicated by an obstructive pneumonitis of the left base with pleural effusion and a pancreatic fistula. The pulmonary lesion was entirely resolved after 2 months. The pancreatic fistula persisted for 6 months before finally closing. At the time of this writing, 18 months after surgical excision of the cyst, the patient is enjoying good health and is free of symptoms.

Case 2.—Mrs. I. W., Case No. 6575, a 58-year-old white female, was seen February 7, 1949. She complained of pain in the back and left upper quadrant, fatigue, and epigastric bloating after meals. She had been aware of a mass occupying the left upper quadrant for two and one-half years.

Physical examination revealed a thin woman who appeared her stated age. Blood pressure was 130 mm. of mercury systolic and 80 mm. of mercury diastolic. Her pulse rate was 80 per minute and her temperature was 98.2 degrees Fahrenheit. The examination disclosed no abnormal findings other than a mass occupying the left upper quadrant with a smooth, rounded border which extended from the costal margin to the level of the umbilicus. Routine laboratory examinations, including a complete blood count and urinalysis, were within normal limits. Roentgen ray examination of the upper gastro-intestinal tract was negative except for an extrinsic pressure defect along the greater curvature of the stomach.

On February 16, 1949, a laparotomy was performed through an upper left rectus incision. Upon dividing the gastrocolic ligament the tumor was found to arise from the pancreas. The spleen was mobilized and its pedicle clamped, divided and ligated. The superior mesenteric vessels were identified and separated from the tumor mass, following which the tumor and the portion of the pancreas from the tail to the level of the superior mesenteric vein were removed. The stump of the pancreas was closed and the bed of the cystic mass drained by three Penrose drains. The wound was closed in layers.

Pathologic Report. The specimen was a cystic structure 10 cm. in diameter which contained a thick yellowish-brown to light-green fluid. The wall of the cyst ranged from 2 to 15 mm. in thickness. The lining of the cyst was roughened and presented loosely adherent, meaty, papillary excrescences on one side.

Microscopic examination of sections through the thicker part of the cyst showed clusters of undifferentiated, pleomorphic, anaplastic cells in places extending through the entire thickness of the cyst wall. Other sections showed fibro-epithelial processes covered by high columnar epithelium of the mucinous type. This papillary portion resembled the histology of the first case (Fig. 3).

Diagnosis: Papillary cystadenocarcinoma of the pancreas. She was dismissed from the hospital on March 5, 1949, and was re-admitted on March 25, 1949, because of upper abdominal pain and bilateral leg edema. Laparotomy on April 7, 1949, revealed numerous metastatic nodules in the liver, biopsy of which was diagnosed pathologically as

metastatic adenocarcinoma. There was no evidence of local recurrence at the site of previous subtotal pancreatectomy. Postoperatively the patient progressively became worse and expired April 8, 1949. Necropsy was not performed.

DISCUSSION

The underlying pathologic conditions of pancreatic cysts determines in large part the success or failure of the various surgical procedures that have been advocated in the past for their treatment.

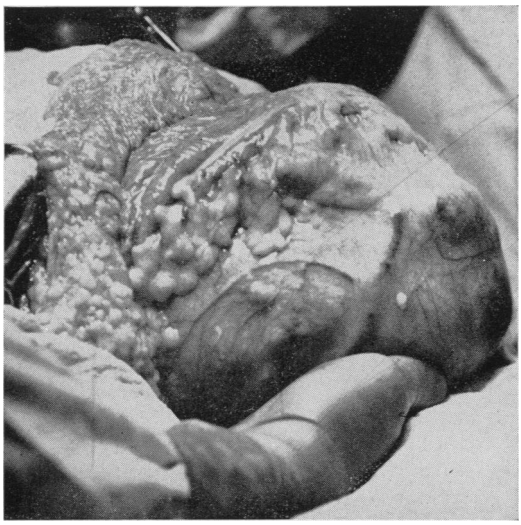

FIG. 1.—Cystadenoma of the pancreas occupying the lesser peritoneal cavity. Transverse colon on the superior surface; transverse mesocolon and midcolic vessels on the inferior surface.

The epithelial-lined, or true, cysts have been divided into three classes by Mayo-Robson and Moynihan:[18] the retention cyst, congenital cyst, and proliferative cyst. The last are true neoplasms and comprise the cystadenomas and cystadenocarcinomas. Fitz[6] first recognized these cysts as a distinct group comparable in their clinical and pathologic characteristics to corresponding cystadenomas and cystadenocarcinomas of the ovary. They are usually multilocular, conglomerate tumors lined by cuboidal or columnar epithelial cells. Irregular masses of cells may be seen in the interstitial tissues, making differentiation between a benign and a malignant cyst difficult. Of the 76 cases of proliferative cysts that we are able to collect from the literature, 47 were benign[2-4, 9, 16, 19, 23, 25, 29] and 29 were malignant.[1, 7, 13, 14, 25, 26] The incidence is probably higher than these figures reflect, since proliferative cysts frequently cannot be distinguished from the other types of cysts due to incomplete pathologic reports.

Several of the reported cases of cystadenocarcinoma indicated that a malignant transformation had occurred in a previously benign cystadenoma. One[26] showed extension to the abdominal wall ten years after drainage was instituted; another,[14] after an initial period of five years of observation, had metastasized to several abdominal viscera; a third[20] recurred ten years following operation with death from metastasis; a fourth[7] was surgically drained two times with an interval of eight years between, death from metastasis occurring six months following the second operation; a fifth case[30] remained well for five years following partial excision and marsupialization, at which time slight discharge recurred in the abdominal wall. Curettage of the sinus tract revealed papillary adenocarcinoma, a finding later confirmed at necropsy. Of these five proliferative cysts that showed an apparent malignant transformation, three were lined by columnar epithelium of the mucinous type. In the other two cysts the type of epithelial lining was not reported. The epithelial lining was the mucinous type in both of our cases. However, our observation of the case of cystadenocarcinoma was too limited to determine whether the malignancy arose as a primary process or through transformation of a previously benign cyst. The presence of a mass for two and one-half years prior to operation (plus the histologic picture of areas of benign epithelium intervening between areas of malignant epithelium) suggests that malignant transformation had occurred.

In contrast to proliferative cysts of the pancreas, pseudocysts of the pancreas occur

much more frequently than do other types, 306 cases having been reported between the years 1861 and 1949.[5] Two causative factors in their formation are now generally recognized: trauma and acute (or subacute) pancreatitis, either of which may cause extravasation of ferments of the pancreas with resulting inflammatory cyst formation. The absence of an epithelial lining distinguishes a pseudocyst from the true cyst.

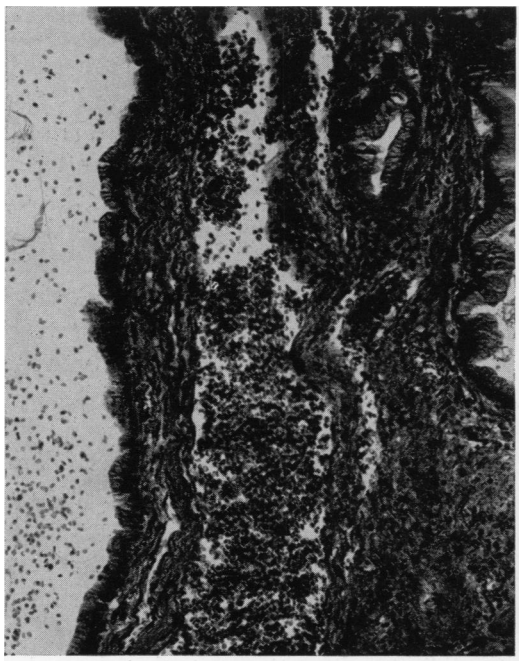

FIG. 2

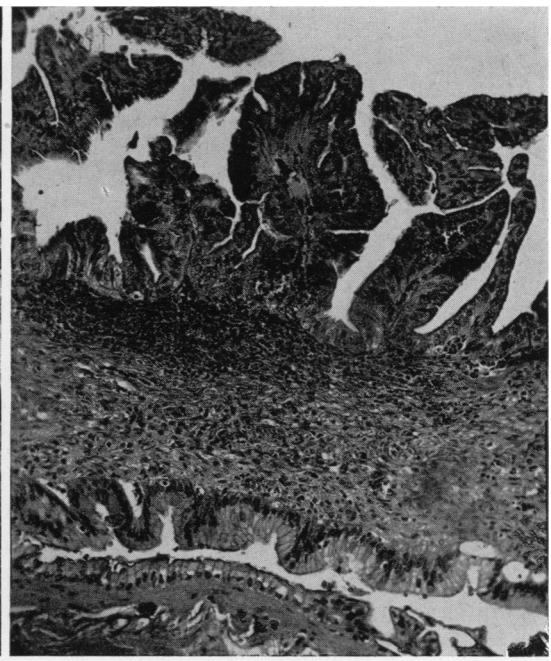

FIG. 3

FIG. 2.—Microscopic section showing lining epithelium of the cystadenoma, x 185.
FIG. 3.—Microscopic section of cystadenocarcinoma showing low-grade malignant transformation at the top of the section; benign epithelium in the lower portion of the section. Other areas showed diffuse infiltration of the entire thickness of cyst wall, x 185.

The surgical procedure to be employed is dependent to a large extent upon the type of cyst encountered. Total excision is generally agreed to be the ideal goal of treatment for all pancreatic cysts. However, excision of pseudocysts is often limited by the inflammatory reaction which accompanies their formation. This inflammatory reaction makes dissection difficult, thereby jeopardizing such important structures as the superior mesenteric and splenic vessels, the portal vein, hepatic artery, and common duct. The technical difficulties attending attempts at total excision have been ably presented by Carter and Slattery[3] and are reflected in the figures collected by Collins, who found that of 306 pseudocysts reported in the literature only 13 per cent were treated by total excision. Proliferative cysts, which are usually free of an accompanying inflammatory reaction, are more readily dissected free from contiguous structures, and hence are more frequently amenable to total excision. Of 31 cases reviewed by Mozan[22] 21 were treated by total excision.

One of several types of drainage may be employed as an alternative to total excision. Simple external drainage[15] and marsupialization[8] have met with variable success. Judd and co-workers[11] reported that of 33 cases treated by marsupialization none had drained for more than two years. Most of these cases were pseudocysts. For prolifer-

ative cysts they advocated destruction of the epithelial lining in addition to marsupialization. Wangensteen[27] referred to six pseudocysts successfully treated by a simple drainage procedure. Scott,[25] on the other hand, reported a marsupialized pseudocyst with persistent drainage after an interval of six and one-half years. Others have likewise reported failures from marsupialization which, in the case of the epithelial-lined cysts, frequently lead to a permanent fistula as occurred in our case.

Anastomosis of the fistula or the cyst itself to an upper abdominal hollow viscus is another type of drainage used.[10, 12] Paul[23] advocates the Jurasz procedure which employs the trans-gastric route of anastomosing the cyst to the posterior gastric wall. This procedure, infrequently used, is regarded with suspicion by Maxeiner[17] who reported gastric ulceration and severe hemorrhage following its use in one case. Cystojejunostomy has been successfully used in the treatment of several cysts not amenable to total excision.[1, 4, 21, 24]

Successful results from one of the various types of drainage procedure is to be expected in cases of pseudocysts but not in cases of proliferative cysts because the features that attend success in one are absent in the other. The inflammatory, fibrous lining of the pseudocyst facilitates gradual obliteration of the cyst following prolonged drainage; whereas the epithelial lining of the proliferative cyst, if not destroyed, maintains a secretory activity that prevents obliteration through prolonged drainage. Malignancy occurring subsequent to or existing at the time a drainage procedure is carried out constitutes a threat to the life of the individual having a proliferative cyst, whereas malignancy is not a threat to the successful outcome of the treatment of a pseudocyst. Total excision, therefore, should be strived for in treating the proliferative cyst. Because total excision of a pseudocyst is generally more difficult and hazardous, simple external drainage, marsupialization, or drainage through anastomosis of the cyst to an upper abdominal hollow viscous may be the procedure of choice.

SUMMARY

1. Two cases of proliferative cyst of the pancreas, one benign and the other malignant, are reported. A review of the literature reveals 47 cases of the benign type and 29 cases of the malignant type.

2. Proliferative cysts reported in the literature to be lined by a columnar, mucinous type of epithelium showed a definite tendency to malignant transformation. Such a transformation is suspected, but unproved, in one of the cases herein reported.

3. Proliferative cysts of the pancreas usually lack the inflammatory reaction that accompanies the formation of pseudocysts and are therefore usually amenable to complete excision.

4. Complete excision is to be strived for in cases of proliferative cysts because of (a) their propensity for malignant transformation and (b) their frequent failure to obliterate following drainage procedures.

BIBLIOGRAPHY

1 Adams, R., and R. Nishijima: A. Surgical Treatment of Pancreatic Cysts. Surg., Gynec. & Obst., **83**: 181, 1946.

2 Carter, R. F., and L. Slattery: Cystadenomata of the Pancreas. A Surgical Report. Am. J. Digest Dis., **3**: 705, 1936.

3 ————: Factors Influencing the Management of Pancreatic Cysts. S. Clin. North America, **27**: 411, 1947.

4 Case Records of Massachusetts General Hospital. Cabot Clinic Case Report. New England J. Med., **237**: 194, 1947.

5 Collins, D. C.: Pseudocysts of the Pancreas; Total Excision. Report of a Case. Arch. Surg., **61**: 524, 1950.

6 Fitz, R. H.: Multilocular Cystoma of the Pancreas. Tr. A. Am. Physicians, **15**: 254, 1900.

7 Friedenwald, J., and T. S. Cullen: Pancreatic Cysts, with the Report of Seven Cases. Am. J. M. Sc., **172**: 313, 1926.

8 Gussenbauer, C.: Quoted from M. Paul.

[9] Hueper, W. C.: Cystadenoma of the Pancreas. Arch. Path. & Lab. Med., **5**: 261, 1928.
[10] Jedlicka: Quoted from M. Paul.
[11] Judd, E. S., H. Mattson and H. R. Mahorner: Pancreatic Cysts, Report of 47 Cases. Arch. Surg., **22**: 838, 1931.
[12] Jurasz, A.: Arch. f. klin. Chir., **164**: 272, 1931.
[13] Kennard, H. E.: Papillary Cystadenocarcinoma of the Pancreas. Surgery, **9**: 65, 1941.
[14] Lichtenstein, L.: Papillary Cystadenocarcinoma of Pancreas. Am. J. Cancer, **21**: 542, 1934.
[15] Lloyd, J.: Brit. Med. J., **2**: 1051, 1892.
[16] Mahorner, H. R., and H. Mattson: The Etiology and Pathology of Cysts of the Pancreas. Arch. Surg., **22**: 1018, 1931.
[17] Maxeiner, S. R., Jr., and S. R. Maxeiner: Pancreatic Cystogastrostomy. Discussion and Report of Case. Surgery, **27**: 919, 1950.
[18] Mayo-Robson, A. W., and B. G. Moynihan: Diseases of the Pancreas. W. B. Saunders Co., Philadelphia, 1903.
[19] McKechnie, R. F. H., and J. T. Priestly: Multilocular Polycystic Tumor of the Pancreas. Canad. M. A. J., **36**: 592, 1937.
[20] McWhorter, G. L.: Cysts of the Pancreas. Arch. Surg., **11**: 619, 1925.
[21] Mills, W. M.. and D. C. Wakeman: Surgery of Pancreatic Cysts. J. Kansas M. Soc., **49**: 57, 1948.
[22] Mozan, A. A.: Cystadenoma of the Pancreas. Am. J. Surg., **81**: 204, 1951.
[23] Paul, M.: Pancreatic Cysts. Brit. J. Surg., **37**: 99, 1949.
[24] Poer, D. H., and R. H. Stephenson: Late Results in Treatment of Pancreatic Cysts by Internal Drainage. Surg., Gynec. & Obst., **89**: 257, 1949.
[25] Scott, J. V.: Pancreatic Cyst. Arch. Surg., **59**: 1304, 1949.
[26] Speese, J. J.: Cystadenoma of the Pancreas with Extension to Abdominal Wall 10 Years After Drainage of a Pancreatic Cyst. Ann. Surg., **61**: 759, 1915.
[27] Wangensteen, O. H.: Surgical Diseases of the Pancreas. Minnesota Med., **20**: 566, 1937.
[28] Warren, K. W.: Pancreatic Cysts. S. Clin. North America, **28**: 753, 1948.
[29] Yamane, M.: Beitrage zur Kenntnis der Pancreaszysten. Bern, Paul Haupt, 1921.
[30] Young, E. L.: Pancreatic Cyst. Report of a Case. New England J. Med., **216**: 334, 1937.