Dermoid cyst of the pancreas: A case report with literature review

Jason Lane[*1], Ansar Vance[2], Daniel Finelli[3], Gary Williams[4], Pars Ravichandran[1]

1. Department of Pathology and Laboratory Medicine, Summa Health System, Akron, USA

2. Northeast Ohio Medical University, Rootstown, USA

3. Department of Radiology, Summa Health System, Akron, USA

4. Department of Surgery, Summa Health System, Akron, USA

* **Correspondence:** Jason Lane, MD, 525 East Market Street, Akron, OH 44304, USA
(*laneja@summahealth.org*)

Radiology Case. 2012 Dec; 6(12):17-25 :: DOI: 10.3941/jrcr.v6i12.1152

ABSTRACT

Pancreatic dermoid cysts represent a rare entity with 35 cases described in the world literature, including the present one. Pre-operative diagnosis is difficult, with definitive diagnosis usually taking place intra-operatively. We report the case of a 63 year old male with a symptomatic, 6 cm cystic mass in the body of the pancreas. The pre-operative evaluation suggested a cystic neoplasm, but was indeterminate as to whether the lesion was benign or malignant. The diagnosis of dermoid cyst was made intra-operatively with frozen section. Although the diagnosis could not be made pre-operatively this retrospective report highlights the difficulty in evaluating cystic pancreatic lesions by imaging and summarizes the current body of knowledge on this rare entity.

CASE REPORT

CASE REPORT

A 63-year-old man with a past medical history significant for non-insulin dependent diabetes mellitus and irritable bowel syndrome presented with vague pain in his lower abdomen and right flank region. His abdominal exam was mostly unremarkable, with only mild tenderness upon palpation. Initial laboratory studies were within normal limits except for an elevated glucose level of 147 mg/dL (reference range: 60-100 mg/dL).

A non-contrast enhanced CT scan of the abdomen revealed a 5.7 x 5.1 x 4.1 cm cystic-appearing mass projecting cephalad and anteriorly from the body of the pancreas. The Hounsfield unit measurement of -1 suggested a cystic lesion (Figure 1). No adjacent inflammation, ductal dilatation, or adenopathy was seen and the bowel was unremarkable. Further laboratory studies revealed normal CEA level of 2.8 ng/mL (reference range: 0-5 ng/mL), but a slightly elevated CA 19-9 of 39 IU/mL (reference range: 0-37 IU/mL).

Endoscopic ultrasound (EUS) performed at an outside institution showed a 6 cm mostly hypoechoic lesion with some areas of hyperechogenicity (Figure 2) and no internal flow. The pancreatic tail, head, and uncinate process were all unremarkable, as well as the common bile duct, gallbladder, and proximal pancreatic duct. No definite adenopathy was noted at the celiac axis origin or in any peripancreatic area. At the time of ultrasound four fine needle aspiration passes through the cystic mass revealed non-specific paucicellular specimens consisting mostly of benign tissue. The result of molecular testing for K-ras mutation and loss of heterozygosity (RedPath PathFinder TG®) on the cytology specimens was indeterminate. At this point the clinical differential diagnosis included cystic lesions such as mucinous cystadenoma and mucinous cystadenocarcioma as well as inflammatory lesions. Due to the symptoms of pain and the uncertain nature of the neoplasm the decision was made to resect the mass.

At surgery the lesser sac was entered and the mass identified. Using sharp dissection, the entire mass was excised off of the body of the pancreas and sent for frozen section

evaluation. Frozen section diagnosis revealed a benign dermoid cyst of the pancreas. The operation concluded with placement of Jackson-Pratt (J-P) drains.

Gross pathological evaluation revealed a 6 x 5 x 5 cm membranous cyst wall with a ragged, reddish tan outer surface and pearly-white, flakey inner surface (Figure 3). Received separately from the cyst wall was a 6 cm aggregate of flaky keratinous debris. Microscopically the cyst was lined by skin with sebaceous glands and the cyst wall adjacent to the portions of skin contained abundant lymphoid tissue (Figures 4, 5). The entire cyst wall was submitted for histologic evaluation and there was no evidence of malignancy within the cyst lining or the surrounding pancreatic tissue. The morphological features were consistent with a benign dermoid cyst of the pancreas.

Post-operatively the patient developed atrial fibrillation and insulin dependent diabetes mellitus and had a prolonged hospitalization secondary to post-operative ileus. Additionally, there was continued drainage from the J-P drains which suggested the possibility of a pancreatic duct leak. The drainage eventually seemed to decrease and the patient was discharged with the drain in place. However, four months later he returned with drainage that had increased significantly. A pancreatic-peritoneal fistula was suspected and an endoscopic retrograde cholangiopancreatographic procedure was performed with pancreatic sphincterotomy and stent placement. The J-P drain was removed and the patient was discharged. Two months later the pancreatic stent was removed uneventfully and the patient has done well since that time with no evidence of recurrence (16 months post-op).

DISCUSSION

Teratomas are tumors that are composed of tissue derived from all three germ layers. They are divided into three categories: (1) mature (benign), (2) immature (malignant), and (3) monodermal or highly specialized. Most mature teratomas are cystic, and due to their preponderance toward ectodermal (skin and skin adnexal structure) differentiation are better known as dermoid cysts. However, in most cases, structures from other germ layers can be identified, such as cartilage, bone, and thyroid tissue. Immature (malignant) teratomas are rare tumors that differ from benign teratomas in that the component tissue resembles that observed in the fetus or embryo (including immature neuroepithelium) rather than in the adult. Lastly, the specialized teratomas are a rare group of tumors, the most common of which are struma ovarii and ovarian carcinoid. Struma ovarii is composed entirely of mature thyroid tissue while the ovarian carcinoid, presumably arises from intestinal epithelium in a teratoma [1]

Dermoid cysts are thought to arise from the embryonic inclusion of skin, at the time of neural groove closure and therefore typically found lying along the midline [2].These tumors are most commonly found in the ovaries and testes, but can theoretically be present in any location along the pathways of ectodermal cell migration. They are found mostly along the midline from the cranium, mediastinum, and retroperitoneum to the sacrococcygeal regions, typically in children[3].

To our knowledge, the world literature reports 35 cases (including the present one) of pancreatic dermoid cysts with complete data. Therefore, we excluded from the present review the case presented by Lushpai [4] for incomplete presentation of clinical information. Also of note, the case described by Masson [5] in 1929 is simply a more detailed description of the same patient first described by Judd [6] in 1921. An overview of all past cases is presented in Table 1.

Of 35 cases of pancreatic dermoid cyst, 20 were male and 15 were female. The mean age of reported patients was 36.4 years (range 4 months to 74 years old). All but five patients were symptomatic [7-10] and in the symptomatic patients, the most common presenting symptoms were abdominal or back pain. In the pediatric subset of patients, vomiting was actually the most common symptom and was seen in four out of a total of eight pediatric cases [11-14]. The most common physical exam findings in all age groups were a palpable abdominal mass and/or abdominal tenderness. The most common location of the mass was in the head and/or body, with only five cases identified as being wholly, or even partially within the tail [6, 13, 15-17]. Please see Table 2 for a summary of clinical aspects of pancreatic dermoid cysts.

The most common surgical procedure was simple excision (17 cases) followed by distal pancreatectomy (6 cases) and pancreaticoduodenectomy (5 cases) and one case of partial cystectomy [18]. There were four cases of external drainage, with or without marsupialization, and one case of internal drainage via cystogastrostomy. Overall, most patients for which follow-up data were available did well, with the most common complication being fistula formation. Of the three cases that had external drainage and had subsequent follow-up data available, two patients had developed a persistent fistula [19, 20]. There was no follow-up on the case in which internal drainage was performed, therefore the longterm outcomes in this case are unknown. One case in which pancreaticoduodenectomy was performed had a self-limiting fistula [21] and one case in which distal pancreatectomy was performed had a fistula with splenic infarction and abscess formation [22]. In summary, the treatment of pancreatic dermoid cysts has been variable, but good surgical outcomes have predominantly been achieved with simple cystectomy (excision), provided that the diagnosis can be established with certainty pre- or intraoperatively [17].

The difficulty in pre-operative diagnosis of pancreatic dermoid cysts is well-emphasized in the literature. The presence of fat/fluid or hair/fluid levels is considered pathognomonic of dermoids in other locations, but their presence occurs in only a minority of cases [23]. The case report by Markovsky et al. [24] is commonly cited as having pre-operatively diagnosed a dermoid cyst with the use of fine needle aspiration, but their paper does not explicitly state this. Only one case was diagnosed pre-operatively by imaging studies, which included CT scan, and showed characteristic fat/fluid levels [18]. Pathologic evaluation of the cyst in our case revealed abundant keratinous debris, but lacked

significant components of adipose tissue or hair. Therefore, pre-operative radiologic diagnosis would have been difficult without these components to form the pathognomonic fat/fluid or hair/fluid levels. To further confound the issue, on EUS our case was predominantly hypoechoic, which differed from the description of dermoids that contain a predominant fatty component as being echogenic [17, 23].

Additional difficulty in pre-operative diagnosis on imaging studies arises from the fact that the appearance varies depending on the proportion of tissue components present within the cyst [24]. On CT scans, dermoids are usually rounded, well-circumscribed, extremely hypodense lesions with a Hounsfield unit measurement of -20 to -140, in keeping with their lipid content [25]. The cystic material can have different consistency depending on the ratio of the various elements within the wall, and all the ectodermal contents may or may not be present in every patient [26]. The Hounsfield unit measurement demonstrated by our case (-1), essentially identical to water, has been reported in dermoid cysts at other locations, such as the ovary (-1.3 HU) [27], however it is still outside of the usual fatty attenuation range. In the reports by Seki [9] (2 cases) and Ben Ameur [18] the Hounsfield units were specifically listed as +31.4, +36.9 and -17, respectively. Additionally, in the cerebellum there have been cases reported of hyperattenuating dermoid cysts with Hounsfield unit measurements as high as +89.9 [26]. The authors of this case of a cerebellar dermoid cyst biochemically analyzed the contents of the cyst to account for the unusual hyperattenuating features. Specifically, they measured its content of protein, calcium and cholesterol and found high protein and calcium, but very low cholesterol. They attributed the low cholesterol to the relative paucity of sebaceous glands found in the pathology and concluded that the high protein content was the reason for the increased radiodensity on CT. We conclude that our case had a radiodensity that was higher than normal secondary to a predominance of keratinous debris within the cyst and a relative paucity of sebaceous glands and material, as confirmed on the review of histologic sections.

Because of morphologic overlap at imaging, the accurate characterization of cystic pancreatic lesions can be difficult. An imaging classification system for these lesions has been proposed that is based on morphologic features of the lesion [28]. Pancreatic cysts can be classified into four subtypes: (a) unilocular cysts, (b) microcystic lesions, (c) macrocystic lesions, and (d) cysts with a solid component.

Pseudocysts are the most common type of unilocular cyst. Other less commonly encountered unilocular cysts include intraductal papillary mucinous neoplasms (IPMNs), unilocular serous cystadenomas and lymphoepithelial cysts. These lesions are differentiated from pseudocysts on the basis of a lack of clinical, laboratory and imaging evidence of pancreatitis. Communication of the pseudocyst with the pancreatic duct may be seen on CT, and this can also be seen in IPMNs. However, IPMNs demonstrate a narrow neck at the cyst-duct junction on CT. A unilocular macrocystic serous cystadenoma should be considered when there is a unilocular cyst with a lobulated contour located in the head of the pancreas [29].

The only cystic lesion included in the category of microcystic lesions is serous cystadenoma. In 70% of cases, these benign tumors demonstrate a polycystic or microcystic pattern consisting of a collection of cysts (usually more than six) that range from a few millimeters up to 2 cm in size [30]. A fibrous central scar with or without a characteristic stellate pattern of calcification is seen in 30% of cases and, when demonstrated at CT or MR imaging is highly specific and considered to be virtually pathognomonic for serous cystadenoma [31-33]. The macrocystic or oligocystic variant of these tumors is very uncommon.

Macrocystic lesions include mucinous cystic neoplasms and IPMNs. Mucinous cystic neoplasms predominantly involve the body and tail of the pancreas [34]. Although peripheral "eggshell" calcification is not frequently seen at CT, such a finding is specific for a mucinous cystic neoplasm [35]. IPMNs are classified as main duct, branch duct (side-branch) or mixed depending on the site and extent of involvement. Main duct IPMN is not included in the discussion of pancreatic cysts, however side-branch or mixed types can have the features of a complex pancreatic cyst. Identification of a septated cyst that communicates with the main pancreatic duct is highly suggestive of a side-branch or mixed IPMN [36, 37].

Cysts with a solid component may be unilocular or multilocular. True cystic tumors such as mucinous cystic neoplasms and IPMNs as well as solid pancreatic neoplasms associated with a cystic component or cystic degeneration are included here. Solid tumors associated with a cystic component include islet cell tumor, solid pseudopapillary tumor (SPT), adenocarcinoma of the pancreas and metastasis. Please see Table 3 for a radiologic differential diagnosis of cystic masses of the pancreas on CT, with pathologic correlates.

When cross-sectional imaging does not allow definitive diagnosis, EUS may provide additional useful information. This modality has the added advantage of allowing aspiration of the cyst contents and/or sampling of the cyst wall, for cytologic analysis, biochemical markers and tumor markers. For example, high viscosity of the cyst contents or the detection of extracellular mucin is indicative of a mucinous neoplasm [38, 39]. Also, analysis of the cyst fluid for amylase is used as an indicator of cyst communication with the ductal system. Therefore, amylase would be increased in pseudocysts and often in cysts associated with IPMN, but not in serous tumors or mucinous cystadenomas [28]. Tumor markers such as CEA, CA 72-4 and CA 19-9 have also been utilized to differentiate mucinous from non-mucinous lesions and to identify malignant cystic lesions, with varying sensitivities and specificities [40]. A CEA level greater than 400 ng/mL has been found to be a good predictor of malignancy in mucinous neoplasms [41]. Unfortunately, in our case these important lab investigations were not sent and might have allowed better characterization of the mass prior to surgery.

Although management of cystic pancreatic lesions is beyond the scope of this article, the patient in our case was appropriately taken to surgery due to presence of symptoms. Briefly, besides patient symptomatology, other factors that

influence patient treatment include tumor histologic features, patient's age, surgical risk, and tumor size and location [28].

The pathologic differential diagnosis should include all cystic lesions of the pancreas including pseudocysts, neoplastic cysts such as mucinous and serous cystadenomas, intraductal papillary mucinous neoplasms, and solid pseudopapillary tumors. Pseudocysts are known to lack a true epithelial lining as opposed to true cysts, which possess an epithelial lining. Mucinous cystic neoplasms are true cystic neoplasms lined by mucinous epithelium that are separate from the ductal system and also have cellular subepithelial stroma resembling the stroma of the ovary [42]. Serous, cuboidal, clear cells with uniform, round hyperchromatic nuclei indicate a serous cystadenoma, which can be either microcystic or macrocystic [43]. Mucinous epithelium lining a cystic lesion that is connected to the native ducts is characteristic of an IPMN [44]. The histologic features of SPT are distinctive, with degenerative pseudopapillae, loosely cohesive cells with grooved nuclei, and aggregates of large hyaline globules [45]. To delineate a dermoid cyst from a lymphoepithelial cyst one must recognize that the former presents epidermal appendages (such as hair follicles or sebaceous glands) while the latter does not [46]. Lastly, although no cases of malignant degeneration have been described it is important for pathologic evaluation of dermoid cysts to include complete sampling of the cyst wall in order to exclude the presence of immature foci (most commonly neuroepithelial type), as 7-10% of other retroperitoneal teratomas have been reported to be malignant [47].

TEACHING POINT

Cystic pancreatic lesions encompass a wide spectrum of non-neoplastic, benign, and malignant neoplasms and accurate characterization by imaging is made possible by adherence to imaging classification systems and management algorithms, which includes integration of laboratory and clinical data. Dermoid cysts are benign lesions most often seen in the ovaries and rarely in the pancreas, which frequently can be confidently characterized at imaging due to the presence of fat/fluid levels, hair, or teeth; however, lack of these features on imaging makes preoperative diagnosis elusive and highlights the limitations of imaging in certain circumstances.

REFERENCES

1. Kumar V, Abbas A, Fausto N, editors. Robbins and Cotran Pathologic Basis of Disease. : Elsevier Saunders; 2005.
2. Rosai J. Rosai and Ackerman's Surgical Pathology. : Mosby; 2004.
3. Iacono C, Zamboni G, Di Marcello R et al. Dermoid cyst of the head of the pancreas area. Int J Pancreatol 1993;14(3):269-73. PMID: 7906703.
4. Lushpai VP. A case of pancreatic teratoma. Klin Khir 1997;(7-8)(7-8):100. PMID: 9518075.
5. Masson JC. Dermoid cyst of the pancreas. The Surgical Clinics of North America 1929;9:837.
6. Judd ES. Cysts of the pancreas. Minnesota Medicine 1921;4:75.
7. Assawamatiyanont S, King AD,Jr. Dermoid cysts of the pancreas. Am Surg 1977;43(8):503-4. PMID: 889185.
8. Yu CW, Liu KL, Lin WC et al. Mature cystic teratoma of the pancreas in a child. Pediatr Radiol 2003;33(4):266-8. PMID: 12709759.
9. Seki M, Ninomiya E, Aruga A et al. Image-diagnostic features of mature cystic teratomas of the pancreas: report on two cases difficult to diagnose preoperatively. J Hepatobiliary Pancreat Surg 2005;12(4):336-40. PMID: 16133705.
10. Degrate L, Misani M, Mauri G et al. Mature cystic teratoma of the pancreas. Case report and review of the literature of a rare pancreatic cystic lesion. JOP 2011;13(1):66-72. PMID: 22233950.
11. Decourcy JL. Dermoid Cyst of Pancreas: Case Report. Ann Surg 1943;118(3):394-5. PMID: 17858274.
12. Iovchev II. Suppurative dermoid cyst of the pancreas. Vestn Khir Im I I Grek 1972;107(3):124. PMID: 5027996.
13. Pomosov DV, Shpit'ko FS, Volianiuk MA. Dermoid cyst of the pancreas in a child. Vestn Khir Im I I Grek 1973;110(4):92-3. PMID: 4712370.
14. Komarov IF. Acute destructive pancreatitis in a child. Vestn Khir Im I I Grek 1973;110(4):93-4. PMID: 4712371.
15. Das PC, Radhakrishna K, Rao PLNG. Cystic teratoma of the pancreas. Pediatric Surgery International 1996;11:177.
16. Koomalsingh KJ, Fazylov R, Chorost MI et al. Cystic teratoma of the pancreas: presentation, evaluation and management. JOP 2006;7(6):643-6. PMID: 17095845.
17. Tucci G, Muzi MG, Nigro C et al. Dermoid cyst of the pancreas: presentation and management. World J Surg Oncol 2007;5:85. PMID: 17683548.
18. Ben Ameur H, Boujelbene S, Abdelhedi C et al. Mature cystic teratoma of the pancreas. Updates Surg 2011. PMID: 21983876.
19. Kerr AA. Cysts and pseudocysts of the pancreas. Surgery, Gynecology & Obstetrics 1918;27:40.
20. Dennis WA. Dermoid cyst of the pancreas. 1923;3(1319).
21. Scheele J, Barth TF, Strassburg J et al. Dermoid cyst of the pancreas. Int J Colorectal Dis 2010;25(3):415-6. PMID: 19802626.
22. Badia AC, Serra NP, Prous JF et al. Cystic teratoma of the pancreas. Cir Esp 2010;88(6):419-21. PMID: 20466357.
23. Jacobs JE, Dinsmore BJ. Mature cystic teratoma of the pancreas: sonographic and CT findings. AJR Am J Roentgenol 1993;160(3):523-4. PMID: 8430545.
24. Markovsky V, Russin VL. Fine-needle aspiration of dermoid cyst of the pancreas: a case report. Diagn Cytopathol 1993;9(1):66-9. PMID: 8458286.
25. Brown JY, Morokoff AP, Mitchell PJ et al. Unusual imaging appearance of an intracranial dermoid cyst. AJNR Am J Neuroradiol 2001;22(10):1970-2. PMID: 11733334.
26. Li ZJ, Miao YX, Sun P et al. Unusual CT hyperattenuating dermoid cyst of cerebellum: a new case report and literature review. Cerebellum 2011;10(3):536-9. PMID: 21448632.
27. Lai PF, Hsieh SC, Chien JC et al. Malignant transformation of an ovarian mature cystic teratoma: computed tomography findings. Arch Gynecol Obstet 2005;271(4):355-7. PMID: 15551144.

28. Sahani DV, Kadavigere R, Saokar A et al. Cystic pancreatic lesions: a simple imaging-based classification system for guiding management. Radiographics 2005;25(6):1471-84. PMID: 16284129.
29. Cohen-Scali F, Vilgrain V, Brancatelli G et al. Discrimination of unilocular macrocystic serous cystadenoma from pancreatic pseudocyst and mucinous cystadenoma with CT: initial observations. Radiology 2003;228(3):727-33. PMID: 12954892.
30. Sarr MG, Murr M, Smyrk TC et al. Primary cystic neoplasms of the pancreas. Neoplastic disorders of emerging importance-current state-of-the-art and unanswered questions. J Gastrointest Surg 2003;7(3):417-28. PMID: 12654569.
31. Curry CA, Eng J, Horton KM et al. CT of primary cystic pancreatic neoplasms: can CT be used for patient triage and treatment? AJR Am J Roentgenol 2000;175(1):99-103. PMID: 10882255.
32. Box JC, Douglas HO. Management of cystic neoplasms of the pancreas. Am Surg 2000;66(5):495-501. PMID: 10824753.
33. Fernandez-del Castillo C, Warshaw AL. Current management of cystic neoplasms of the pancreas. Adv Surg 2000;34:237-48. PMID: 10997221.
34. Warshaw AL, Compton CC, Lewandrowski K et al. Cystic tumors of the pancreas. New clinical, radiologic, and pathologic observations in 67 patients. Ann Surg 1990;212(4):432,43; discussion 444-5. PMID: 2171441.
35. Loftus EV,Jr, Olivares-Pakzad BA, Batts KP et al. Intraductal papillary-mucinous tumors of the pancreas: clinicopathologic features, outcome, and nomenclature. Members of the Pancreas Clinic, and Pancreatic Surgeons of Mayo Clinic. Gastroenterology 1996;110(6):1909-18. PMID: 8964418.
36. Tanaka M. Intraductal papillary mucinous neoplasm of the pancreas: diagnosis and treatment. Pancreas 2004;28(3):282-8. PMID: 15084972.
37. Sugiyama M, Atomi Y, Kuroda A. Two types of mucin-producing cystic tumors of the pancreas: diagnosis and treatment. Surgery 1997;122(3):617-25. PMID: 9308621.
38. Lewandrowski KB, Southern JF, Pins MR et al. Cyst fluid analysis in the differential diagnosis of pancreatic cysts. A comparison of pseudocysts, serous cystadenomas, mucinous cystic neoplasms, and mucinous cystadenocarcinoma. Ann Surg 1993;217(1):41-7. PMID: 8424699.
39. Sedlack R, Affi A, Vazquez-Sequeiros E et al. Utility of EUS in the evaluation of cystic pancreatic lesions. Gastrointest Endosc 2002;56(4):543-7. PMID: 12297771.
40. Brugge WR. Evaluation of pancreatic cystic lesions with EUS. Gastrointest Endosc 2004;59(6):698-707. PMID: 15114319.
41. Van Dam J. EUS in cystic lesions of the pancreas. Gastrointest Endosc 2002;56(4 Suppl):S91-3. PMID: 12297757.
42. Kloppel G, Kosmahl M. Cystic lesions and neoplasms of the pancreas. The features are becoming clearer. Pancreatology 2001;1(6):648-55. PMID: 12120249.
43. Zamboni G, Scarpa A, Bogina G et al. Mucinous cystic tumors of the pancreas: clinicopathological features, prognosis, and relationship to other mucinous cystic tumors. Am J Surg Pathol 1999;23(4):410-22. PMID: 10199470.
44. Hruban RH, Takaori K, Klimstra DS et al. An illustrated consensus on the classification of pancreatic intraepithelial neoplasia and intraductal papillary mucinous neoplasms. Am J Surg Pathol 2004;28(8):977-87. PMID: 15252303.
45. Klimstra DS, Pitman MB, Hruban RH. An algorithmic approach to the diagnosis of pancreatic neoplasms. Arch Pathol Lab Med 2009;133(3):454-64. PMID: 19260750.
46. Truong LD, Rangdaeng S, Jordan PH,Jr. Lymphoepithelial cyst of the pancreas. Am J Surg Pathol 1987;11(11):899-903. PMID: 3674287.
47. Gonzales-Crussi F. Extragonadal teratomas. Atlas of Tumor Pathology 1982:44.
48. HOANG-SU, NGUYEN-SANG, THON-THAT-TUNG. Case of teratomatous dermoid cyst (monstre endocymiere parasitaire) operated as pancreatic cyst. Pol Tyg Lek (Wars) 1956;11(40):1710-3. PMID: 13388866.
49. Bittner K, Sarrazin O. Pancreatic teratoma in a 2-year-old girl. Wiad Lek 1970;23(14):1251-2. PMID: 5455922.
50. Tobik S, Starzewski J, Walewski W. Case of retroperitoneal cystic teratoma simulating a pancreatic pseudocyst. Pol Przegl Chir 1974;46(2):179-81. PMID: 4816377.
51. Lazaro da Silva A, Moreno Junior M. Surgery of pancreatic dermoid cyst with ligature of superior mesenteric vein. Arq Gastroenterol 1984;21(4):183-6. PMID: 6536257.
52. Vermeulen BJ, Widgren S, Gur V et al. Dermoid cyst of the pancreas. Case report and review of the literature. Gastroenterol Clin Biol 1990;14(12):1023-5. PMID: 2289662.
53. Mester M, Trajber HJ, Compton CC et al. Cystic teratomas of the pancreas. Arch Surg 1990;125(9):1215-8. PMID: 2205176.
54. Jentschura D, Bohrer MH, Geiger G. Para-pancreatic dermoid cyst. Chirurg 1990;61(7):548-9. PMID: 2203644.
55. Kraimps JL, Zins J, Levillain P et al. Dermoid cyst of the pancreas. Eur J Surg 1993;159(8):437-9. PMID: 8105979.
56. Fernandez-Cebrian JM, Carda P, Morales V et al. Dermoid cyst of the pancreas: a rare cystic neoplasm. Hepatogastroenterology 1998;45(23):1874-6. PMID: 9840167.
57. Strasser G, Kutilek M, Mazal P et al. Mature teratoma of the pancreas: CT and MR findings. Eur Radiol 2002;12 Suppl 3:S56-8. PMID: 12522604.
58. Salimi J, Karbakhsh M, Dolatshahi S et al. Cystic teratoma of the pancreas: a case report. Ann Saudi Med 2004;24(3):206-9. PMID: 15307462.
59. Rivkine E, Goasguen N, Chelbi E et al. Cystic teratoma of the pancreas. Gastroenterol Clin Biol 2007;31(11):1016-9. PMID: 18166898.
60. Zhang AY, Thompson SK, Game PA et al. Images for surgeons. Cystic teratoma of the pancreas: a rare entity. ANZ J Surg 2008;78(12):1130-1. PMID: 19087058.

FIGURES

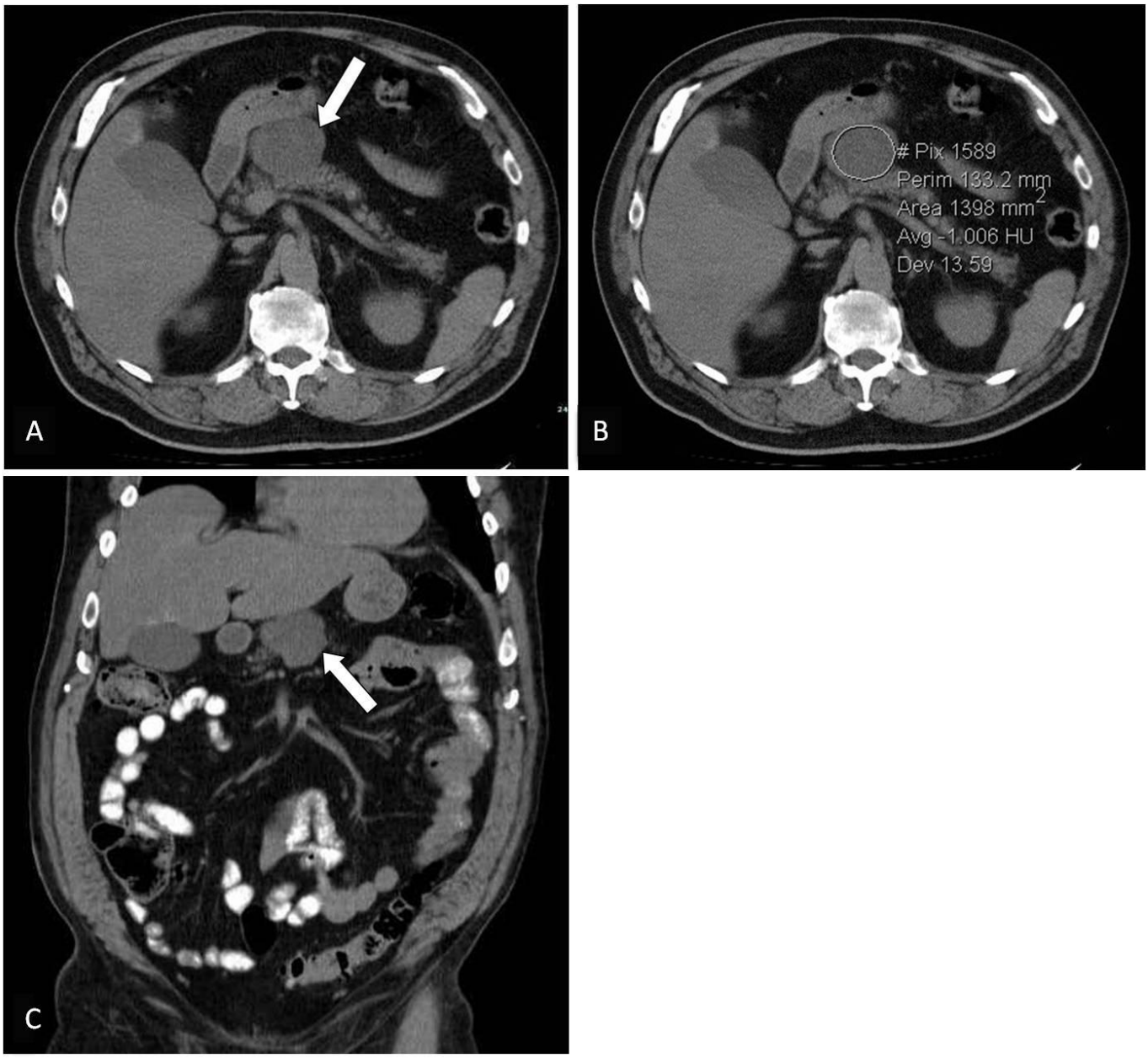

Figure 1. 63 year old male with a dermoid cyst of the pancreas. Axial and coronal, non-contrast enhanced abdominal CT images performed using a Toshiba Aquilion 16 CT scanner (kVp 120, mAs setting 200 (range 10 - 500), 1 mm slice thickness). Images demonstrate a 5.7 x 5.1 x 4.1 cm cystic-appearing mass (Fig 1A, 1C, arrows) that projects cephalad and anteriorly from the body of the pancreas. The Hounsfield unit measurement of the mass was -1 (Fig 1B), which suggested a cystic lesion. No adjacent inflammation, ductal dilatation, or adenopathy was seen and the bowel was unremarkable.

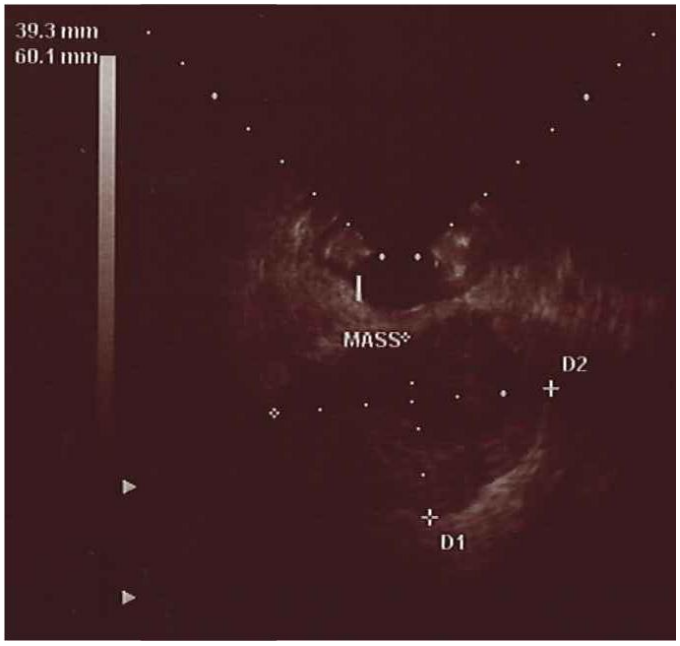

Figure 2. 63 year old male with a dermoid cyst of the pancreas. EUS obtained with a Pentax linear endoscopic ultrasound device (EG-3630U, curved array scanning transducer variable frequency of 5MHz/7.5MHz/10MHz,). The image demonstrates a 6 cm mostly hypoechoic lesion with some areas of hyperechogenicity anteriorly. The pancreatic tail, head, and uncinate process were all unremarkable. No definite adenopathy was noted at the celiac axis origin or in any peripancreatic area.

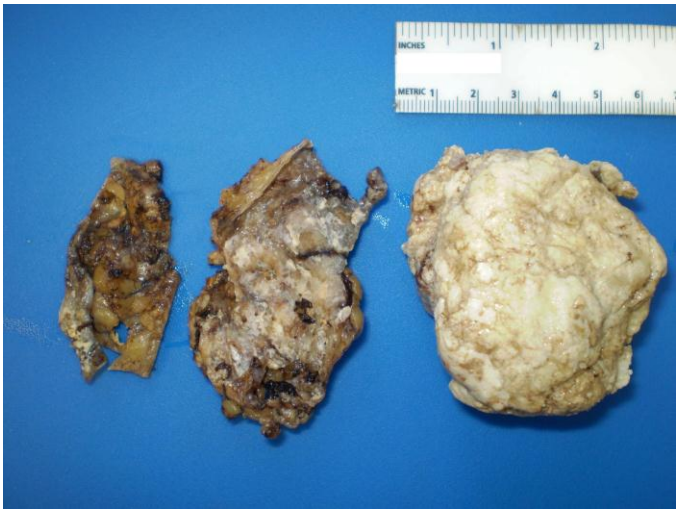

Figure 3. 63 year old male with a dermoid cyst of the pancreas. Gross photograph of the resected pancreatic dermoid cyst shows the 6 x 5 x 5 cm membranous cyst wall, seen in two fragments at the left and middle of the image. Seen to the far right is the 6 cm aggregate of flaky, keratinous debris that was contained within the cyst wall prior to being disrupted.

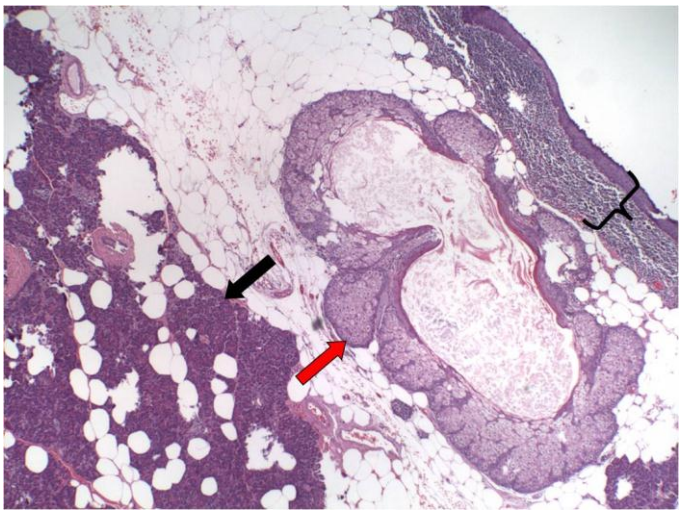

Figure 4. 63 year old male with a dermoid cyst of the pancreas. Microscopic examination (hematoxylin and eosin (H&E), 40x magnification) showed stratified squamous epithelium with underlying lymphoid tissue (bracket) and sebaceous glands (red arrow) adjacent to pancreatic parenchyma (black arrow).

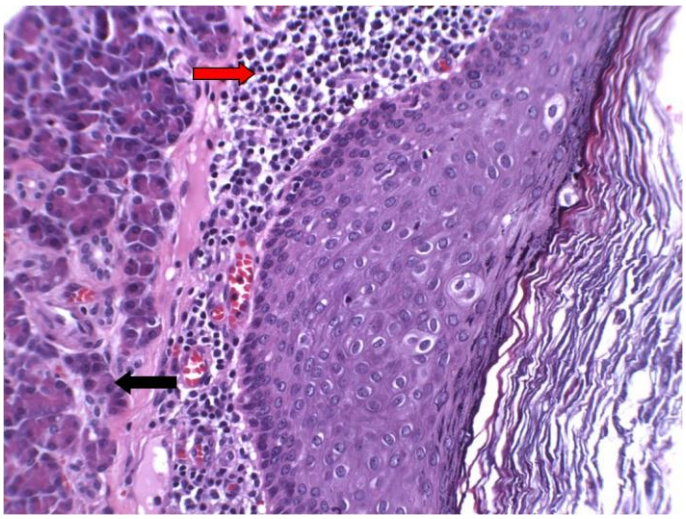

Figure 5. 63 year old male with a dermoid cyst of the pancreas. Higher power magnification (H&E, 250x magnification) showing stratified keratinizing squamous epithelium at right, complete with granular cell layer, as well as underlying lymphoid tissue (red arrow). The pancreatic parenchyma is seen at left (black arrow).

Source, year	Age, Sex	Symptoms	Physical Exam	Location	Procedure	Follow-up
1. Kerr, 1918 [19]	55F	Epigastric swelling, "Fermentation" (indigestion)	RUQ/epigastric mass	Head/body	Ext. drainage, marsupialization	Partial excision and drainage 2 mos later; persistent fistula
2. Judd, 1921/ Masson, 1929 [5, 6]	33F	Backache, weakness	LUQ/epigastric mass	Tail	Resection	Cholecystectomy after 2 yrs
3. Dennis, 1923 [20]	40M	Backache	RUQ/epigastric mass	Head	Ext. drainage, m arsupialization	Persistent fistula after 1 yr
4. DeCourcy, 1943 [11]	2F	Vomiting, dehydration	Epigastric mass	Body	Resection and drainage	Uneventful
5. Hoang-Su, 1956[48]	18M	Abdominal mass	Epigastric mass	-	Resection	-
6. Bittner, 1970[49]	2F	Liver failure	Epigastric mass	Head,	Resection	Well after 6 mos
7. Iovchev, 1972[12]	8M	Vomiting, fever abdominal pain	LUQ tender mass	Body, suppurative	Ext. drainage	Well after 7 mos
8. Pomosov, 1973[13]	6M	Abdominal pain, fever, vomiting	Mass, LUQ	Tail	Distal pancreatectomy	Well after 6 mos
9. Komarov, 1973 [14]	4F	Pain, vomiting	Epigastric mass	-	Ext. drainage	-
10. Tobik, 1974 [50]	34F	Abdominal pain	LUQ mass	-	Int. drainage via Cystogastrostomy	-
11. Assawamatiyanont 1977 [7]	11F	Asymptomatic	LUQ mass	Body	Resection	Uneventful
12. Lazaro, 1984 [51]	21M	Painless mass, nausea, constipation	LUQ mass	Pancreas/retroperitoneum	SMV ligation, biopsy, and drainage	Resection after 3 mos
13. Vermeulen, 1990[52]	46M	Incidental finding, mild abdominal pain	Unremarkable	Body	Distal pancreatectomy	Uneventful
14. Mester, 1990[53]	25F	RUQ chronic pain, nausea, vomiting	RUQ tenderness	Head	Resection, Penrose drain	Well after 14 yrs
15. Jentschura, 1990[54]	56M	Abdominal pain, backache	LUQ mass	Body	Excision	Uneventful
16. Jacobs, 1993[23]	57F	Wt. loss, post-prandial abd pain	Unremarkable	Body	Resection	-
17. Markovsky, 1993[24]	53F	LUQ abdominal pain	LUQ non-tender mass	Body	Resection	Uneventful
18. Iacono, 1993[3]	26F	RUQ/epigastric pain, fever	RUQ tender mass	Head	Pancreaticoduodenectomy	No recurrence at 6 yr follow-up
19. Kraimps, 1993[55]	42M	Weight loss, nausea dyspepsia	-	Head	Pancreaticoduodenectomy	Uneventful
20. Das, 1996[15]	4 mos F	Abdominal mass	LUQ non-tender mass	Body/tail	Resection	Uneventful
21. Fernandez-Cebrian, 1998[56]	74M	Backache, dysuria	LUQ non-tender mass	Body	Distal pancreatectomy	Well after 2 yrs
22. Strasser, 2002[57]	44M	RUQ pain	-	Head	None, previous Dx of teratoma	-
23. Yu, 2003[8]	2M	Asymptomatic	Epigastric mass	Head/body	Resection	-
24. Salimi, 2004 [58]	16M	Progressive jaundice, weight loss	Icterus, hepatosplenomegaly	Head	Resection, choledochoduodenostomy	Well after 4 yrs
25- 26. Seki, 2005 [9]	60F	Asymptomatic	-	Body	Resection	-
(2 cases)	57M	Asymptomatic	-	Body	Partial (middle) pancreatectomy	-
27. Koomalsingh, 2006 [16]	52M	Epigastric pain	Mild epigastric tenderness	Tail	Resection	Well after 16 mos
28. Rivkine, 2007[59]	45F	Abdominal pain	-	Head/uncinate	Resection	Uneventful
29. Tucci, 2007[17]	64M	L4-S1 chronic radiculopathy	-	Tail	Distal pancreatectomy	-
30. Zhang, 2008[60]	67M	Chest tightness, shortness of breath	None	Body	Distal pancreatectomy	Unknown
31. Scheele, 2010[21]	40M	Upper abdominal pain	-	Head/body	Pancreaticoduodenectomy	Self-limiting, pancreatic fistula
32. Badia, 2010[22]	43F	Epigastric pain, vomiting	Mass	Head/body	Distal pancreatectomy	Pancreatic fistula, splenic infarction
33. Ben Ameur, 2011[18]	64M	Epigastric pain	Epigastric mass	Head	Partial cystectomy	Recurrence free at 10 mos
34. Degrate, 2012[10]	61M	Asymptomatic	None	Uncinate	Pancreaticoduodenectomy	Recurrence free at 1 yr
35. Lane, 2012	63M	Lower abdomen/right flank pain	Mild abdominal tenderness	Body	Resection	Self-limiting fistula, no recurrence at 16 mos.

Table 1: Review of all reported cases of dermoid cyst of the pancreas. (Partially adapted from tables in references [5],[48],[50],[53],[54],[8])

Etiology	Congenital
Incidence	Rare, only 35 cases reported in literature
Gender ratio	Slight male predilection (M:F; 2:1.5)
Age predilection	None, average age 36.4 years (range 4 months to 74 years old)
Risk factors	None
Clinical features	Most common presenting symptoms are abdominal/back pain
Treatment	Surgical treatment with simple excision
Prognosis	Excellent, although rarely fistula formation occurs
Imaging findings	CT scan: dermoids are usually rounded, well-circumscribed, extremely hypodense lesions with a Hounsfield unit measurement of -20 to -140 EUS: dermoids that contain a predominant fatty component are usually echogenic

Table 2: Summary table of pancreatic dermoid cysts.

	CT Findings	**Pathologic Findings**
Pancreatic pseudocyst	Unilocular cyst in a patient with history of pancreatitis; communication of the pseudocyst with the pancreatic duct	Cyst wall is fibrous and inflamed, lacking a true epithelial lining
Serous cystadenoma	Microcystic morphology; fibrous central scar with or without a characteristic stellate pattern of calcification	Serous, cuboidal, clear cells with uniform, round hyperchromatic nuclei lining cystic spaces
Mucinous cystadenoma	Involves body or tail of the pancreas; peripheral "eggshell" calcification	Mucinous cells lining cystic spaces with underlying ovarian type stroma
Solid pseudopapillary tumor	Solid tumor associated with a cystic component, unilocular or multilocular	Degenerative pseudopapillae, loosely cohesive cells with grooved nuclei, and aggregates of large hyaline globules
Intraductal papillary mucinous neoplasm (side-branch or mixed)	Septated cyst that communicates with the main pancreatic duct often with a narrow neck at the cyst-duct junction	Mucinous epithelium, lining a cystic lesion that is connected to the native ducts
Dermoid cyst	Rounded, well-circumscribed, extremely hypodense lesions with a Hounsfield unit measurement of -20 to -140	Combination of both cystic and solid elements, including teeth, hair, cartilage and dermal appendages such as hair follicles, sweat glands, and abundant sebaceous material

Table 3: Radiologic differential diagnosis of cystic masses of the pancreas on CT with pathologic correlates.

ABBREVIATIONS

CA = cancer antigen
CEA = carcino-embryonic antigen
CT = computed tomography
EUS = endoscopic ultrasound
IPMN = intraductal papillary mucinous neoplasm
SPT = solid pseudopapillary tumor

KEYWORDS

Pancreas; dermoid cyst; mature cystic teratoma; computed tomography; pathology

ACKNOWLEDGEMENTS

The authors would like to acknowledge Betty Hertzi from Dr. Williams' office staff and Linda Van Scyoc from the Pathology Department secretarial staff for assistance in acquiring the clinical information pertinent to the case.

Online access
This publication is online available at:
www.radiologycases.com/index.php/radiologycases/article/view/1152

Peer discussion
Discuss this manuscript in our protected discussion forum at:
www.radiolopolis.com/forums/JRCR

Interactivity
This publication is available as an interactive article with scroll, window/level, magnify and more features.
Available online at www.RadiologyCases.com

Published by EduRad
www.EduRad.org