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Surgical Management of Solid Tumor of Pancreas and Spleen: Review

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Abstract: **The recent review was aimed to evaluate and overview the surgical management of solid tumors of pancreas mainly as well as splenic solid tumors, also we intended to review the different surgical procedures such laparoscopic surgical resection. Following databases; Medline/PubMed, and Embase and Google scholar were comprehensively searched for articles that are concerned with surgical management of Pancreatic and splenic solid tumors, which published up to May, 2017 with English language, and involving only human subject. After all we manually screened the references list of each included articles for more relevant studies to our current review. Solid tumors of the spleen are relatively uncommon. The most usual malignant tumor of the spleen is lymphoma. In the lack of enormous splenomegaly total laparoscopic splenectomy might be a possible and safe procedure for the medical diagnosis as well as therapy of both benign as well as deadly solid tumors of the spleen as shown by this particular instance of splenic hamartoma. Evidence recommended patients diagnosed as SPN ought to get medical resection because of the outstanding prognosis.**

Keywords: **Tumor of Pancreas and Spleen, Strong pseudopapillary tumor (SPT).**

1. INTRODUCTION

Strong pseudopapillary tumor (SPT) of the pancreas, initially reported by Frantz et al in 1959 [(1)], is a uncommon however unique pancreatic neoplasm, accounting for 1%-2% of all pancreatic tumors [(2,3)]. The tumor has actually been offered several various names according to its microscopic and macroscopic character until this name, solid pseudopapillary tumor of the pancreas, was defined by the World Health Organization (WHO) as distinct tumor in 1996 [(4)].

Signs of SPN are often nonspecific and consist of stomach pain, dyspepsia, early satiety, and nausea and vomiting (41% to 64%) [(5,6)]. SPNs are usually localized pancreatic neoplasms, although 10% to 15% of patients will establish metastases [(6)]. These metastases are frequently open to resection, and total extirpation is related to longterm survival [(7)]. Reported histopathologic and medical features predictive of recurrence or metastases include tumor size greater than 5 cm, venous invasion, nuclear grade, and popular necrobiotic nests, [(6,8)] but these features are not consistently reported in all large series [(9)].

These tumors can happen in any part of the pancreas and are typically surrounded by a defined pill. Rarely, the tumor cells may invade the capsule and metastasize, many commonly to the liver [(5,10)]. The treatment of option is surgical resection. The cosmetic concerns may be of significance since many of the patients affected by SPT are young female patients. Laparoscopic surgical removal of this tumor is proper. A low occurrence of recurrence and good prognosis even after reoperation have actually also led to acceptance of laparoscopic surgical treatment. Laparoscopic resection might therefore be appropriate for such pancreatic tumors if highly proficient cosmetic surgeons are available [(11)].

Mass forming splenic tumors are uncommon. Malignancies consist of lymphoma and other less typical sores as primary splenic sarcoma, plasmacytoma, or metastatic disease from non-gastrointestinal tumor (e.g., lung cancer malignancy or ovarian cancer) [12,13]. Benign lesions are exceptionally unusual comprising mostly hemangiomas, cysts and inflammatory pseudotumors [14,15]. Splenic hamartoma is an extremely rare benign tumor with an incidence of 3 in 200000 splenectomies at a single center series and 0,024% to 0,13% in an autopsies evaluation [16,17]. Although hamartoma is benign and generally asymptomatic it is very important to differentiate that from malignancy sore. Medical imaging improvement has actually led a boost in the detection rate of incidentalomas of the spleen that posture an obstacle, due to diagnostic troubles [15]. As a consequence, solitary splenic tumors might require splenectomy to ensure a definitive histological medical diagnosis. Laparoscopic surgery has become the standard method for both benign and malignant disease [17]. Minimally intrusive surgical treatment is especially suitable for benign disease, enclosing hamartoma. Nonetheless to our knowledge just a couple of reports focusing on splenic hamartoma laparoscopic surgery have been released [18,19].

The recent review was aimed to evaluate and overview the surgical management of solid tumors of pancreas mainly as well as splenic solid tumors, also we intended to review the different surgical procedures such laparoscopic surgical resection.

2. METHODOLOGY

Following databases; Medline/PubMed, and Embase and Google scholar were comprehensively searched for articles that are concerned with surgical management of Pancreatic and splenic solid tumors, which published up to May, 2017 with English language, and involving only human subject. After all we manually screened the references list of each included articles for more relevant studies to our current review.

3. RESULTS

- **Surgical resection of pancreatic solid tumor with splenic metastasis:**

Solid-cystic pseudopapillary tumor of the pancreas appears in all ages, the female to male ratio of 8.3 and the typical age 27-year-old girls are most affected [20]. In current literatures examine with case study [21] and Thirty-nine years of ages female patient concerned our clinic with grievance of abdominal pain. She had no appetite and weight-loss. On physical exam 10 cm mass in the left upper quadrant of abdominal area with spleen growth was palpated. Only comorbidy of patient was high blood pressure. All blood tests and tumor markers were regular. A 12 cm mass was observed in the pancreas invading splenic with stomach ultrasound. Preoperative PET-CT saw a mass size of 12 cm × 11 cm × 12 cm in the pancreas beginning with left adrenal gland attacking the spleen (SUV max: 12) (**Figure 1**). Distal pancreatectomy with mass excision and splenectomy was performed (**Figure 2**) [21]. Cystic and strong mass macroscopically was covered with fibrous pill with nodular structure. Tiny evaluation result was solid cystic pseudopapillary tumor with spleen invasion. Partial internal bleeding, necrosis and mitosis were present in tumor. Patient released with no issue. Patient is well at 8 month postoperative follow up without tumor recurrence [21].

Surgical treatment is an efficient treatment technique for SCPTP. Publication with largest series about SCPTP was released in 2005 [5]. Other major research study was published in 2010 by Yu et al. [20]. In the examination of 492 patients, 4 (0.8%) patients had splenic involvement. In a retrospective evaluation printed by Memorial Sloan Kettering Cancer Center [2], Gastric and blended tumor service, from January 1985 to July 2000, 24 patients were detected as having solid-pseudopapillary tumor of the pancreas (0.9%). Twenty females and 4 males were identified, with a typical age of 39 years. The average size of the sores was 8.0 cm (variety, 1-- 20). At a median follow-up of 8 years, one recurrence took place in 17 patients who underwent complete resection. Four patients presented with concurrent liver metastasis and underwent resection of the primary tumor and the liver transition. Conclusion was that total resection is connected with long-term survival even in the existence of metastatic disease [2]. A multicenter analysis in Korea [22] studied prognostic factors that forecast the deadly behavior of offered pancreatic tumors (SPTs). Among 351 patients, thirty-four patients (9.7%) were male, and 317 (90.3%) were female, with a mean age of 36.8 ± 12.4 years, a tumor size larger than 8 cm, tiny malignant features, and phase IV were considerable prognostic factors for tumor recurrence.

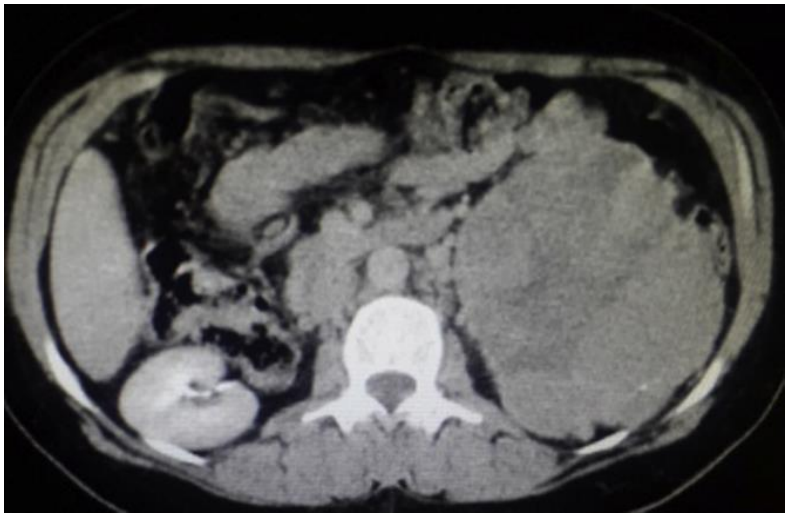

Figure 1: PET-CT view of solid-cystic pseudopapillary tumor of the pancreas.

Figure 2: Solid-cystic pseudopapillary tumor of the pancreas with spleen.

- **Laparoscopic surgical management of pancreatic & splenic solid tumors:**

Considering that the introduction of laparoscopic pancreatic surgical treatment at our organization in 1997, open pancreatic surgical procedure for sores found in the body or tail of the pancreatic and also encapsulated tumors in the head of the pancreas has been made use of just in very few situations with presumed vascular involvement. The medical technique for laparoscopic pancreas resection has actually previously been described thoroughly [23,24]. Patients with lesions in the body or tail of the pancreatic were put in a 30 ° to 45 ° modified right side position. When tumors were local to the head of the pancreas, the patient was put in a supine position and trocar 2 was put on the ideal side of the appropriate rectus sheath, instead of the epigastrium, as received (**Figure 3**) [23,24].

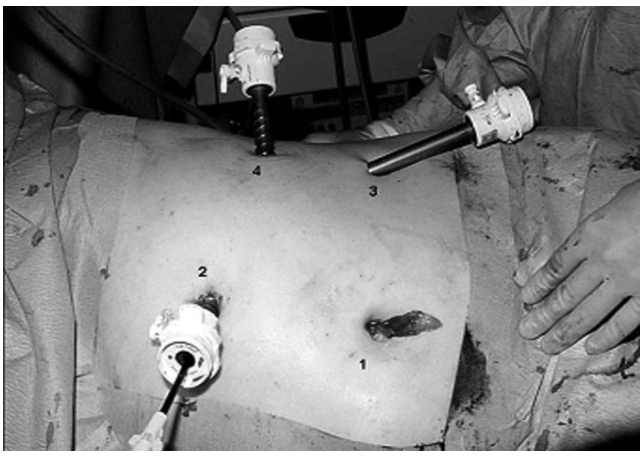

Figure 3: Postoperative view showing the standard trocar placement for a distal (left-lateral) resection.

In one recent study [25] 13 of 273 patients that undertook laparoscopic treatments on the pancreas were found to have solid pseudopapillary tumors, 1 of which had a spleen-preserving procedure, whereas 4 underwent enucleation of the tumor. In 3 of the patients that undertook enucleation, the tumor lay in the head of the pancreatic, hence avoiding major surgical procedure such as pancreaticoduodenectomy (Whipple resection). Among these 3 patients underwent rebuilding hepaticoduodenostomy after enucleation of the tumor with resection of the distal bile duct as well as cholecystectomy.The typical operative time was 197 mins (range, 68 - 320 minutes), and the median blood loss was 50 mL (variety, <50-- 750 mL). Distal resections were carried out with a direct stapler. Four patients had postoperative complications. The typical length of healthcare facility remain was 5 days (array, 2-- 12 days). Throughout a typical follow-up period of 11 months, no neighborhood recurrences or far-off metastases were located [25].

Postoperative problems were seen in 4 patients. Of these, one patient was reoperated on laparoscopically the exact same evening due to intra-abdominal bleeding (Accordion quality 4 difficulty). There was a little blood loss artery at the corner of the pancreatic resection area, which was treated with a clip [25].

- **Diagnosis of solid tumors of spleen:**

Solid sores of the spleen are rather uncommon and also generally asymptomatic. Regarding half of these are inadvertently spotted during imaging research studies executed for unconnected causes [26]. Differential medical diagnosis consists of primary malignancies, particularly non-Hodgkin's lymphoma and also angiosarcoma, which is one of the most usual nonlymphoid malignant primary tumor of the spleen [27]. Lung cancer, melanoma, ovary, uterine cervix, and various other nongastrointestinal tumors splenic transition are also reported [28,29]. Benign lesions are extremely rare (7/100000 autopsies) as well as have generally vascular beginning [30]. Inflammatory miofibroblastic tumor, shared fungal or mycobacterial infections, as well as sarcoidosis are additionally consisted of in the differential medical diagnosis [31].

Splenic hamartoma is a rare benign tumor which happens in any type of age group and has the exact same man and women occurrence. Its size has the tendency to be much longer in women, possibly because of hormone influence on tumor development [32]. The tumor is usually detected as a singular sore with a diameter ranging from a few millimeters to a number of centimeters. Signs such as pain, palpable mass, or spontaneous tear are associated with longer lesions. Hypersplenism, including thrombocytopenia, anemia, pancytopenia, or deadly hematologic problems, is described even if unusual [33,34].

Review of evidence:

Today, radical resection is the treatment of option for SPT even with metastasis or regional extension [35,36,37,38] Local resection or enucleation can be carried out for little tumors with total amicula. Distal pancreatectomy integrated with or without splenectomy can be done for pancreatic body and/or tail tumor, and pancreatoduodenectomy for pancreatic head tumor. Total medical excision is curative in more than 95% of patients with SPT limited to the pancreatic [39]. The low grade of malignancy of this tumor, and also since the mass is normally bordered by a dense fibrous pill, led some surgeons, especially for children, to do easy enucleation of the tumor [40,41]. Intrusion to the portal capillary or premium mesenteric artery should not be consisted of as a requirement for nonresectability of these pancreatic tumors (39). For the metastases, there is also general agreement that medical debulking need to be performed [39,41]. In general, SPT can be removed laparoscopically because they are normally benign as well as have thick fibrous capsules. Nonetheless, the choice to perform laparoscopic surgery needs to be made carefully to prevent the risk of rupture [42,43]. The duty of radiation treatment as well as radiotherapy in treatment of SPT is improperly defined at present, considering that only few records are available on them [44,45].

The prognosis of SPT patients despite having neighborhood recurrence and also transition or invasion is good. It has actually been reported that the general 5-year survival price of SPT patients has to do with 95% [5]. Because of the beneficial prognosis and long survival price of SPT patients with neighborhood reappearance or transition, it is hard to determine the predictive factors for their survival time. Recurrence, neighborhood invasion, and restricted transition are not the contraindications for resection, as well as some patients with unresectable SPT may additionally have a long survival time [5,46].

4. CONCLUSION

Solid tumors of the spleen are relatively uncommon. The most usual malignant tumor of the spleen is lymphoma. In the lack of enormous splenomegaly total laparoscopic splenectomy might be a possible and safe procedure for the medical

diagnosis as well as therapy of both benign as well as deadly solid tumors of the spleen as shown by this particular instance of splenic hamartoma. Evidence recommended patients diagnosed as SPN ought to get medical resection because of the outstanding prognosis. Shut follow-up is suggested after surgical treatment, also in patients without pathological deadly potential.

REFERENCES

[1] Frantz VK. Tumors of the pancreas. In: Atlas of tumor pathology. Armed forces Institute of Pathology, Washington DC. 1959:32–33.

[2] Martin RC, Klimstra DS, Brennan MF, Conlon KC. Solid-pseudopapillary tumor of the pancreas: a surgical enigma? Ann Surg Oncol. 2002;9:35–40.

[3] Papavramidis T, Papavramidis S. Solid pseudopapillary tumors of the pancreas: review of 718 patients reported in English literature. J Am Coll Surg. 2005;200:965–972.

[4] Kloppel G, Solcia E, Longnecker DS, Capella C, Sobin LH. Histological typing of tumors of the exocrine pancreas. In: World Health Organisation. International histological classification of tumors. 2nd edition. Springer, Berlin, Heidelberg, New York. 1996:120–128.

[5] Papavramidis T, Papavramidis S. Solid pseudopapillary tumors of the pancreas: review of 718 patients reported in English literature. J Am Coll Surg. 2005;200:965–972.

[6] de Castro SM, Singhal D, Aronson DC, et al. Management of solid-pseudopapillary neoplasms of the pancreas: a comparison with standard pancreatic neoplasms. World J Surg. 2007;31:1130–1135.

[7] Hassan I, Celik I, Nies C, et al. Successful treatment of solid-pseudopapillary tumor of the pancreas with multiple liver metastases. Pancreatology. 2005;5:289–294.

[8] Nishihara K, Nagoshi M, Tsuneyoshi M, et al. Papillary cystic tumors of the pancreas. Assessment of their malignant potential. Cancer. 1993;71:82–92.

[9] Choi SH, Kim SM, Oh JT, et al. Solid pseudopapillary tumor of the pancreas: a multicenter study of 23 pediatric cases. J Pediatr Surg. 2006;41:1992–1995.

[10] Lam KY, Lo CY, Fan ST. Pancreatic solid-cystic-papillary tumor: clinicopathologic features in eight patients from Hong Kong and review of the literature. World J Surg. 1999;23(10):1045–1050.

[11] Nagri S, Abdu A, Anand S, Krishnaiah M, Arya V. Liver metastasis four years after Whipple's resection for solid-pseudopapillary tumor of the pancreas. JOP. 2007;8(2):223–227

[12] W. Bostick, “Primary splenic neoplasm,” The American Journal of Pathology, vol. 21, pp. 1143–1165, 1945.

[13] R. M. Walsh and B. T. Heniford, “Laparoscopic splenectomy for non-Hodgkin lymphoma,” Journal of Surgical Oncology, vol. 70, no. 2, pp. 116–121, 1999.

[14] S. Moriyama, A. Inayoshi, and R. Kurano, “Inflammatory pseudotumor of the spleen: report of a case,” Surgery Today, vol. 30, no. 10, pp. 942–946, 2000.

[15] J. A. Blansfield, R. T. Goldhahn Jr., and R. K. Josloff, “Littoral cell angioma of the spleen treated by laparoscopic splenectomy,” Journal of the Society of Laparoendoscopic Surgeons, vol. 9, no. 2, pp. 222–224, 2005.

[16] A. J. Shapiro and E. D. Adams, “Inflammatory pseudotumor of the spleen managed laparoscopically. Can preoperative imaging establish the diagnosis? Case report and literature review,” Surgical Laparoscopy, Endoscopy and Percutaneous Techniques, vol. 16, no. 5, pp. 357–361, 2006.

[17] M. L. Silverman and V. A. LiVolsi, “Splenic hamartoma,” American Journal of Clinical Pathology, vol. 70, no. 2, pp. 224–229, 1978.

[18] K. Y. Lam, K. H. Yip, and W. C. G. Peh, “Splenic vascular lesions: unusual features and a review of the literature,” Australian and New Zealand Journal of Surgery, vol. 69, no. 6, pp. 422–425, 1999.

[19] B. Habermalz, S. Sauerland, G. Decker et al., "Laparoscopic splenectomy: the clinical practice guidelines of the European Association for Endoscopic Surgery (EAES)," Surgical Endoscopy and Other Interventional Techniques, vol. 22, no. 4, pp. 821–848, 2008.

[20] Yu P.F., Hu Z.H., Wang X.B., Guo J.M., Cheng X.D., Zhang Y.L., Xu Q. Solid pseudopapillary tumor of the pancreas: a review of 553 cases in Chinese literature. World J. Gastroenterol. 2010;16(March (10)):1209–1214.

[21] Yagmur Y, Yigit E, Gumus S, Babur M, Can MA. Solid cystic pseudopapillary tumor of pancreas with splenic metastasis: Case report and review of literature. *International Journal of Surgery Case Reports*. 2015;14:50-52. doi:10.1016/j.ijscr.2015.06.042.

[22] Kang C.M., Choi S.H., Kim S.C., Lee W.J., Choi D.W., Kim S.W., Korean Pancreatic Surgery Club Predicting recurrence of pancreatic solid pseudopapillary tumors after surgical resection: a multicenter analysis in Korea. Ann. Surg. 2014;260(August (2)):348–355.

[23] Edwin B, Mala T, Mathisen O, et al. Laparoscopic resection of the pancreas: a feasibility study of the short-term outcome. Surg Endosc. 2004;18(3):407–411.

[24] 13. Rosok BI, Marangos IP, Kazaryan AM, et al. Single-centre experience of laparoscopic pancreatic surgery. Br J Surg. 2010;97(6):902–909

[25] Afridi SA, Kazaryan AM, Marangos IP, et al. Laparoscopic Surgery for Solid Pseudopapillary Tumor of the Pancreas. *JSLS : Journal of the Society of Laparoendoscopic Surgeons*. 2014;18(2):236-242. doi:10.4293/1086 80813X13753907291837.

[26] V. Makrin, S. Avital, I. White, B. Sagie, and A. Szold, "Laparoscopic splenectomy for solitary splenic tumors," Surgical Endoscopy and Other Interventional Techniques, vol. 22, no. 9, pp. 2009–2012, 2008.

[27] R. M. Walsh and B. T. Heniford, "Laparoscopic splenectomy for non-Hodgkin lymphoma," Journal of Surgical Oncology, vol. 70, pp. 116–121, 1999.

[28] T. Berge, "Splenic metastases: frequencies and patterns," Acta Pathologica et Microbiologica Scandinavica, vol. 82, no. 4, pp. 499–506, 1974.

[29] L. Morgenstern, J. Rosenberg, and S. A. Geller, "Tumors of the spleen," World Journal of Surgery, vol. 9, no. 3, pp. 468–476, 1985.

[30] S. Moriyama, A. Inayoshi, and R. Kurano, "Inflammatory pseudotumor of the spleen: report of a case," Surgery Today, vol. 30, no. 10, pp. 942–946, 2000.

[31] Á. Cosme, Á. Tejada, L. Bujanda et al., "Littoral-cell angioma of the spleen: a case report," World Journal of Gastroenterology, vol. 13, no. 48, pp. 6603–6604, 2007.

[32] R. S. Yu, S. Z. Zhang, and J. M. Hua, "Imaging findings of splenic hamartoma," World Journal of Gastroenterology, vol. 10, no. 17, pp. 2613–2615, 2004.

[33] C. Abramowsky, C. Alvarado, J. Bradley Wyly, and R. Ricketts, "Hamartoma" of the spleen (splenoma) in children," Pediatric and Developmental Pathology, vol. 7, no. 3, pp. 231–236, 2004.

[34] T. C. Hayes, H. A. Britton, E. B. Mewborne, D. A. Troyer, V. A. Saldivar, and I. A. Ratner, "Symptomatic splenic hamartoma: case report and literature review," Pediatrics, vol. 101, no. 5, p. E10, 1998.

[35] Yu CC, Tseng JH, Yeh CN, Hwang TL, Jan YY. Clinicopathological study of solid and pseudopapillary tumor of pancreas: emphasis on magnetic resonance imaging findings. World J Gastroenterol. 2007;13:1811–1815.

[36] Pelosi G, Iannucci A, Zamboni G, Bresaola E, Iacono C, Serio G. Solid and cystic papillary neoplasm of the pancreas: a clinico-cytopathologic and immunocytochemical study of five new cases diagnosed by fine-needle aspiration cytology and a review of the literature. Diagn Cytopathol. 1995;13:233–246.

[37] Petrakis I, Vrachassotakis N, Kogerakis N, Hatzidakis A, Zoras O, Chalkiadakis G. Solid pseudopapillary neoplasm of the pancreas: report of a case after a 10-year follow-up and review of the literature. Pancreatology. 2001;1:123–128.

[38] Panieri E, Krige JE, Bornman PC, Graham SM, Terblanche J, Cruse JP. Operative management of papillary cystic neoplasm of the pancreas. J Am Coll Surg. 1998;186:319–324.

[39] Jeng LB, Chen MF, Tang RP. Solid and papillary neoplasm of the pancreas. Emphasis on surgical treatment. Arch Surg. 1993;128:433–436.

[40] Wünsch LP, Flemming P, Werner U, Gluer S, Bürger D. Diagnosis and treatment of papillary cystic tumor of the pancreas in children. Eur J Pediatr Surg. 1997;7:45–47.

[41] Reddy S, Cameron JL, Scudiere J, Hruban RH, Fishman EK, Ahuja N, et al. Surgical management of solid-pseudopapillary neoplasms of the pancreas (Franz or Hamoudi tumors): a large single-institutional series. J Am Coll Surg. 2009;208:950–957.

[42] Fais PO, Carricaburu E, Sarnacki S, Berrebi D, Orbach D, Baudoin V, et al. Is laparoscopic management suitable for solid pseudo-papillary tumors of the pancreas? Pediatr Surg Int. 2009;25:617–621.

[43] Cavallini A, Butturini G, Daskalaki D, Salvia R, Melotti G, Piccoli M, et al. Laparoscopic pancreatectomy for solid pseudo-papillary tumors of the pancreas is a suitable technique; our experience with long-term follow-up and review of the literature. Ann Surg Oncol. 2011;18:352–357.

[44] Rebhandl W, Felberbauer FX, Puig S, Paya K, Hochschorner S, Barlan M, et al. Solid-pseudopapillary tumor of the pancreas (Frantz tumor) in children: report of four cases and review of the literature. J Surg Oncol. 2001;76:289–296.

[45] Matsunou H, Konishi F. Papillary-cystic neoplasm of the pancreas: a clinicopathologic study concerning the tumor aging and malignancy of nine cases. Cancer. 1990;65:283–291.

[46] Mao C, Guvendi M, Domenico DR, Kim K, Thomford NR, Howard JM. Papillary cystic and solid tumors of the pancreas: a pancreatic embryonic tumor? Studies of three cases and cumulative review of the world's literature. Surgery. 1995;118:821–828.