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Case report

SOLID PSEUDOPAPILLARY TUMOR OF PANCREAS WITH ANOMALY OF HEPATIC PORTAL VEIN IN YOUNG FEMALE PATIENT: CASE REPORT

СОЛИДЕН ПСЕВДОПАПИЛАРЕН ТУМОР НА ПАНКРЕАС СО АНАТОМСКА ВАРИЈАЦИЈА НА ПОРТНА ВЕНА: ПРИКАЗ НА СЛУЧАЈ

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Abstract

Solid pseudopapillary tumors are rare tumors of the pancreas, with incidence of about 3% of all pancreatic neoplasms. They are usually found in young females, with nonspecific symptoms (abdominal discomfort, mild abdominal pain, palpable abdominal mass). One third of cases are asymptomatic and diagnosed incidentally. These tumors have a low malignant potential and favorable prognosis after surgical treatment. We present a 17-year-old female patient with abdominal pain during the last three months. Radiological investigations including US, EUS, CT revealed well-defined tumor of the pancreatic head with mixed, solid and cystic pattern. Surgery was recommended, during which an anatomical variation of the hepatic portal vein in the close vicinity of the pancreatic tumor was found. Surgical resection of the tumor was performed; pathohistological specimen defined it as a solid pseudopapillary tumor of pancreas.
Diagnosis of solid pancreatic pseudopapillary tumors might be difficult without histopathological evidence, however surgery should be recommended as a treatment of choice and definitive therapy.

Keywords: pancreatic tumors, solid pseudopapillary tumor, anatomical variations, portal vein, computed tomography, endoscopic ultrasound, ultrasound

Апстракт

Солиден псевдопапиларен тумор на панкреас претставува редок тумор, со инциденца од околу 3% од сите панкреатични неоплазми. Тие, најчесто, се среќаваат кај млади жени, меѓу втората и третата деценија од животот со неспецифични симптоми, најчесто со абдоминална болка или со палпабилна абдоминална маса. Овој тумор е со низок малиген потнцијал, но може да биде локално агресивен.
Трудот презентира случај на млада пациентка со симптом на абдоминална болка. Со радиолошките визуелни методи: ултрасонографија, ендоскопска ултрасонографија и компјутеризирана томографија се постави дијагнозата за постоење тумор на главата на панкреасот, со дел солидна и дел цистична компонента, добро ограничен, во однос на околината. Наодите и општата добра состојба на пациентката укажуваа на бенигна туморска формација и беше предложена оперативна интервенција. Се направи комплетна ресекција на туморот и патохистолошкиот наод беше во прилог на солиден псевдопапиларен панкреатичен тумор. Пациентката е во добра општа состојба, во тек на постоперативното следење. Поради можноста за малигна алтерација и локална инвазија на околните струкури, хирургшкиот третман е терапија на избор за пациентите со солиден псевдопапиларен панкреатичен тумор.

Клучни зборови: тумор на панкреас, солидно псевдопапиларна неоплазма, анатомска варијација на вена порте, компјутеризирана томографија (КТ), ендоскопски ултразвук (ЕУЗ)

Introduction

Solid pseudopapillary tumor (SPT) of the pancreas was described for the first time by Franz Virginia in 1959 as a separate entity, and in upcoming years changed several names such as: Franz' tumor, solid-cystic tumor, a solid and papillary epithelial neoplasm, until the World Health Organization (WHO) in 2010 finally defined it as a "pseudopapillary tumor". According to WHO and based on the criteria for malignant behavior (presence of angioinvasion, extrapancreatic invasion,

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perineural and pancreatic parenchymal invasion) it is a potentially malignant tumor.

SPT of the pancreas is a rare disease with 3% incidence of all pancreatic neoplasms. Tumor is composed of two histological components, papillary and solid, and has low malignant potential, usually demonstrated by local invasion of the surrounding tissues and organs [1]. Risk factors for malignancy are unknown [2].

The tumor is found mainly in young females between second and third decade of life, presented with non-specific symptoms such as abdominal discomfort or pain and palpable tumor mass [3]. Seventy percent of the patients have symptoms, predominantly abdominal pain while 30% are asymptomatic and incidentally diagnosed during imaging examinations undertaken for other reasons [4]. Diagnosis is made by radiologycal procedures such as abdominal ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI) and endoscopic ultrasound (EUS) [5]. Besides clear visualization, EUS allows precise guidance for targeted fine-needle aspiration biopsy (FNAB) of the tumor. Accurate diagnosis is defined by pathological examination, cytological, immunohistochemical and molecular analysis of the cystic fluid and/or tissue specimen. Surgical resection is recommended treatment for these patients, considering the malignant potential of the tumor. Multidisciplinary approach including gastroenterologist, radiologist and surgeon is necessary for proper differential diagnosis and treatment strategy [6]. After tumor resection, five- year survival is almost 97%.

Case report

A 17-year-old female patient was presented at our department with a history of epigastric pain during the last 3 months, with no significant previous medical history. Physical examination revealed a palpable mass in the right upper abdominal quadrant. Abdominal US revealed a tumor mass localized between liver and pancreas, more likely "attached" to pancreatic head, 6.5 cm in diameter, well defined with globular shape, no visible capsule, and an solid- cystic pattern, with marked vascularity.

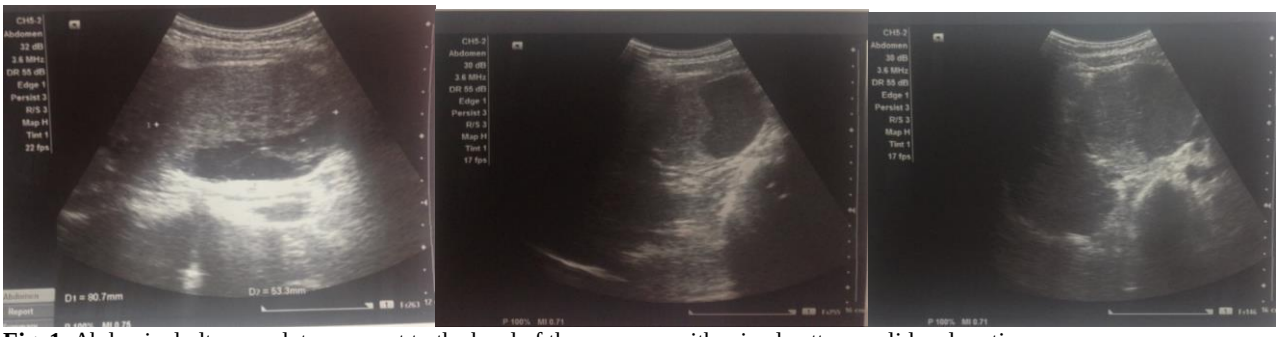

Fig. 1. Abdominal ultrasound: tumor next to the head of the pancreas with mixed pattern: solid and cystic

Esophagogastroduodenoscopy (EGDS) was performed in order to exclude any relation, or gastric origin of the tumor. Endoscopic ultrasound (EUS) demonstrated the presence of the tumor in the pancreatic head, reliably excluded the liver origin, and confirmed the close proximity to the stomach wall. EUS clearly defined morphological characteristics of the tumor with cystic and spongy part, and marked vascularity. Computed tomography (CT) revealed solid encapsulated heterogeneous tumor mass 7x7 cm in diameter, localized in the pancreatic head.

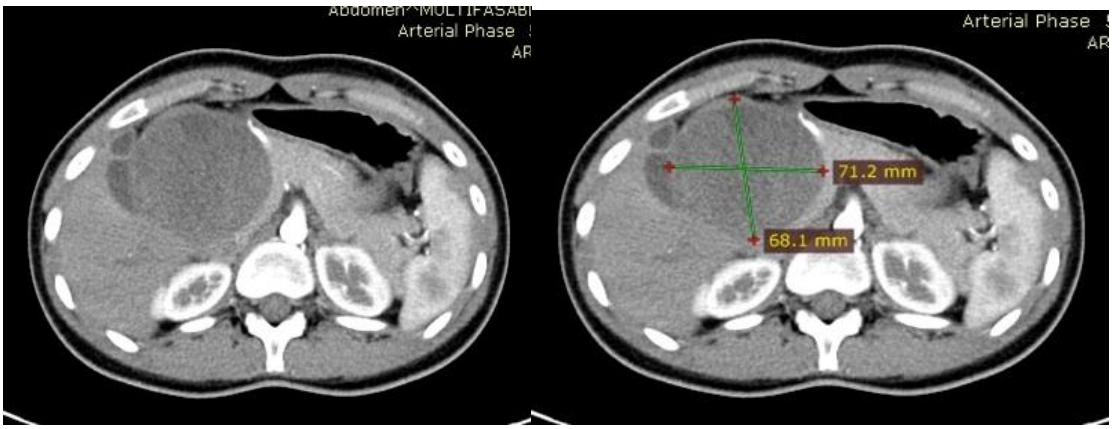

Fig. 2. CT findings: tumor localization in the pancreatic head

Serum biochemistry was normal, including tumor markers (CEA, CA 19-9, AFP). Surgical treatment was recommended and during the intervention, the presence of an anatomical variation of the portal vein, with the right posterior portal vein as the first branch of the main portal vein, was discovered. The significance of this anomaly was related to tumor localization. Namely, the large portal vein was in close vicinity to the posterior-lateral portion of the pancreatic tumor, crossing from the anterior side of the duodenum towards the hepatoduodenal ligament.

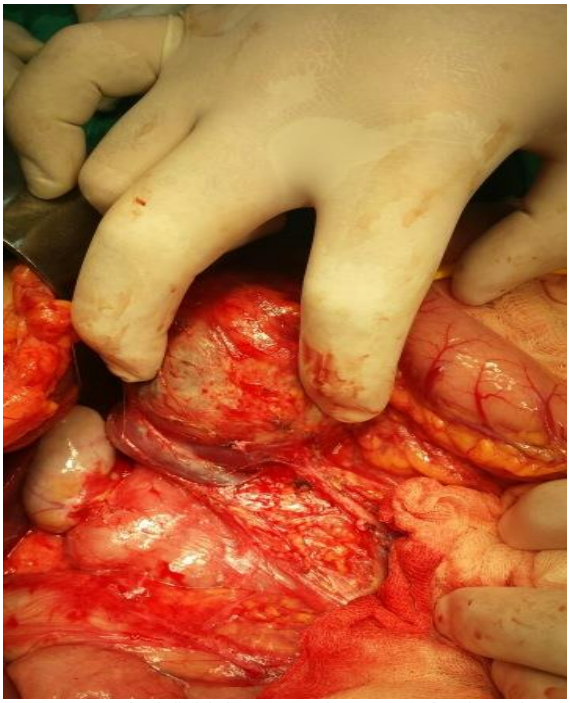

Fig. 3. Surgical field demonstrating "posterior-lateral" localization of the portal vein

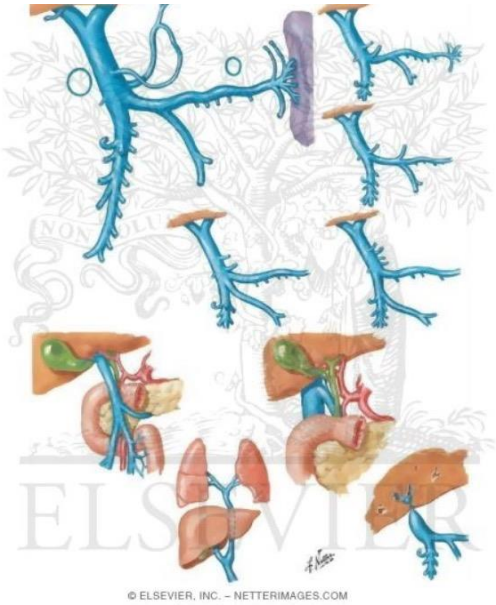

Fig. 4. Anomaly of portal vein (taken from: Netter Frank. Atlas of human anatomy)

Surgery consisted of tumor resection; tumorectomy disclosed encapsulated mass, 9 x 8 x 6.5 cm, weighted 203 grams. The serial sections of the macroscopic specimen showed parts of solid and cystic components, tumor tissue was colored yellowish to gray, with areas of hemorrhage.

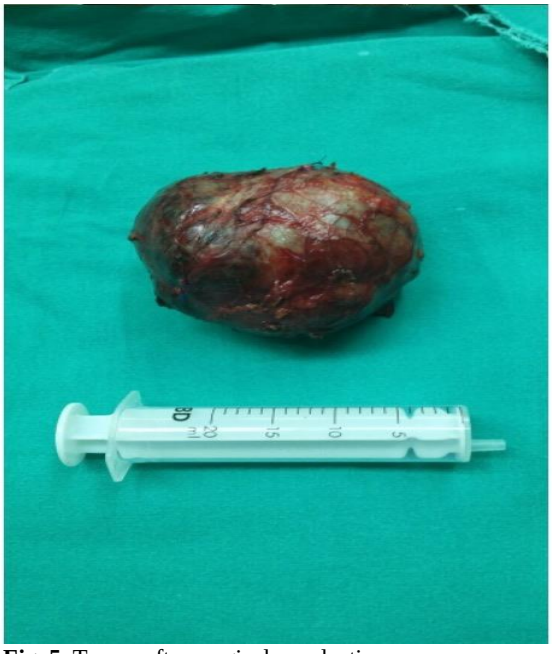

Fig. 5. Tumor after surgical enucleation

Microscopic examination of the resected tumor demonstrated a well-differentiated pseudopapillary tumor with typical uniform polygonal cells with hyalinized fibrovascular cores, wrapped with thin hyaline loops containing small vessels without vascular invasion. Histopathology revealed low mitotic rate, one to two mitoses out of 10 in the field, without capsular and surrounding blood vessels invasion. Resection was classified as R0. Histochemically, intracytoplasmic PAS positive staining hyaline globules in few cells were present, while Alcian blue was inconclusive (showed punctuate cytoplasm signal in few cells). Immunohistochemically tumor cells were diffusely positive to neuron specific enolase (NSE), variable positive to Vimentin, beta-katenin, slightly positive to Chromogranin (CgA) and nonspecifically positive for Synaptophysin. Staining for CD68 marked clusters of histiocytes in the tumor stroma and in certain vascular spaces. These findings were conclusive for the diagnosis of solid pseudopapillary pancreatic tumor.

Discussion

Patients with solid pseudopapillary tumors of the pancreas have different clinical presentation mainly depending on tumor location. Chronic abdominal pain is the most frequent symptom; jaundice and recurrent pancreatitis are present if biliary obstruction occurs along-

side nonspecific symptoms such as weight loss and anorexia. Dyspepsia, nausea and rarely vomiting are symptoms caused by tumor compression of the stomach [7]. Physical examination frequently reveals palpable abdominal mass, due to large tumor size.

Radiological examinations such as abdominal US, EUS, CT or MRI are useful diagnostic techniques, presenting tumor morphology and vascularity, localization, relation with the surrounding organs and tissues. Abdominal US shows well-defined tumor, usually with solid and cystic parts, some calcifications may be visible at the tumor margin and within the tumor areas of hemorrhage. Cystic portion of the tumor lacks enhancement on contrast CT, while solid parts have slight enhancement in the arterial phase, and marked enhancement in the portal phase [8]. Based on these radiological techniques, the accuracy of distinguishing the tumor nature is great. Results of the South Korean study which analyzed more than 100 pancreatic tumors revealed existence of six characteristic CT findings, with specificity of 100% and accuracy of 87.5 to 92%. The findings specific for "solid tumors with cystic components" included wall thickness more than 2 mm which was uneven, high ratio of wall thickness to tumor size, heterogenicity inside the tumor, as well as hypo- or hyper- attenuation in the arterial and portal phase. Mentioned specificity and accuracy is achieved when at least three or more of above characteristics are present [9].

MRI is a superior method compared to US and CT due to better demonstration of tumor capsule and intratumoral hemorrhage. MRI findings of well-defined, encapsulated, solid and cystic tumor with areas of hemorrhagic degeneration, and peripheral or heterogeneous contrast enhancement, are conclusive for SPT of the pancreas.

The higher percentage of SPN has a benign nature, and the potential for malignant alteration is unfrequently seen after surgical resection [10]. In asymptomatic patients where radiological examinations are not conclusive for SPT, particularly in small size tumors (less than 3 cm), EUS with fine-needle biopsy for achieving diagnosis is recommended. Histopathological findings will confirm or rule out the presence of malignancy, and may differentiate mucinous from non-mucinous lesions. Cystic fluid viscosity analysis, liquid CEA, amylase content, as well as cytology of the cystic wall or solid tissue part, can contribute to the final diagnosis. EUS with fine-needle biopsy is a recommended procedure for unresectable tumors, except in patients with suspected pancreatic lymphoma or colon metastasis [11].

We present a case of a young female patient with abdominal pain lasting for several months as a main complaint, with lack of other symptoms; presenting with palpable tumor in the right upper quadrant in good physical condition. Initially, abdominal US revealed a well-defined tumor next to the pancreas, while EUS confirmed the pancreatic origin and disclosed more detailed characteristics of the tumor. Contrast CT scan demonstrated heterogeneous enhancement of the solid part and confirmed tumor localization related to the pancreatic head, and delineated tumor from the surrounding organs. Considering the radiological findings and good patient's overall health performance, benign nature of the tumor was suspected, including SPT as one of the possible answers regarding differential diagnosis. Tumor resection was performed; histological specimen confirmed initial diagnosis, and postoperative course was favorable.

In general, pancreatic cysts are classified as neoplastic and non-neoplastic. Subtypes of neoplastic cysts include: intraductal papillary neoplasm, mucinous cystic neoplasms, serous cystic neoplasms and pseudopapillary neoplasms. Neoplastic cysts have malignant potential and require surgical resection with exception of the serous type. Non-neoplastic cysts include: pseudocysts, retention cysts, benign epithelial cysts, lymphoepithelial cysts, squamous wrap cysts (dermoid cyst, epidermal cyst in intrapancreatic accessory spleen), mucinous non-neoplastic cyst and lymphangiomas. The incidence of non-neoplastic, non-inflammatory cysts is 6.3% of all pancreatic cysts. The use of high resolution imaging techniques and cytological examination of tissue obtained during EUS guided biopsy may differentiate neoplastic from non-neoplastic cysts. However, particular characteristics of the cysts are diagnosed postoperatively [12].

DNA analysis contributes for mucinous cysts diagnosis when previous investigations are insufficient [13]. The genetic profile of solid papillary neoplasms may be different from pancreatic adenocarcinoma. Unlike pancreatic adenocarcinoma, solid pseudopapillary neoplasms (SPN) do not have KRAS gene mutation or reduced expression of DPC4 gene. SPN are characterized by activation of the β-catenin gene mutation that interferes with phosphorylation of the protein part where transcript regulation is proceeded during the construction of DNA regulatory elements [14]. The presented case showed positivity of β-catenin after histopathological and immunohistochemical staining, which confirmed the diagnosis of a solid pseudopapillary tumor.

Many factors are responsible for different histology and behavior of pancreatic cystic neoplasms. Solid pseudopapillary pancreatic tumor is usually macroscopically presented as a solitary encapsulated tumor, with cystic and solid components. Macroscopic tumor section shows large grayish-white spongyous area and areas of hemorrhage in both, solid and cystic parts. Microscopically, tumor contains solid, cystic and pseudopapillary parts and has a fibrous capsule that sometimes is calcified. The tumor contains small uniform tumor cells with circular core (nuclei) in both components. Typical features for these tumors are pseudopapillary part with kind of fibrovascular thread neackless, formed of several layers of tumor cells coated with vessels. The solid parts are constructed of

sheets of tumor cells with extensive microcytic formations and hyaline degeneration in the stroma. Blood ponds appear on the periphery of the neoplasm. Tumor cell nuclei are uniform and oval-round with many mitotic divisions. Invasive neoplastic components and metastasis in the lymph nodes are not identified in any known (published) case of these tumors [15].

These typical macroscopic and microscopic characteristics of solid pseudopapillary tumor of the pancreas were found in the presented case, which clearly confirmed the diagnosis.

We present this case because of the rare combination of SVP with portal vein anomaly, discovered during the surgical procedure. The main portal vein lied in front of the duodenal wall, causing no compression or obstruction of the small intestine. The pre-duodenal position of the portal vein is of great surgical significance due to possible complications involving the duodenal wall and the biliary tract. If not recognized, this anomaly might cause great complications during surgery. Congenital malformations of the portal venous system are rare and may be responsible not only for difficulties in radiological interpretation, but as previously mentioned for duodenal obstruction, and surgically provoked dangerous bleeding.

Tumor resection is recommended therapy for SPT, and surgical approach depends on tumor localization: pylorus preservation pancreatoduodenectomy or spleen preservation distal pancreatectomy are procedures of choice for all patients with "excellent postoperative results" [16].

Chemotherapy, radiotherapy, adjuvant and neoadjuvant therapy are still not recommended in treatment protocols for these tumors. Five-year survival rate is nearly 97% in patients with surgical resection of the tumor. Death caused by the tumor is rare, and long-term survival is described in asymptomatic patients even with locally advanced disease [17].

The presented case underwent only tumor enucleation as a definitive treatment. During more than 3-year follow-up, the patient's general condition is excellent with normal radiological findings.

Conclusion

Solid pseudopapillary neoplasm (SPN) of the pancreas is a rare tumor that typically occurs in young women without significant clinical symptoms. This type of tumor of the pancreas is almost always of benign character and in very rare cases can metastasize after complete surgical resection. Diagnosis is confirmed by radiological techniques (CT) with contrast that presents clearly limited heterogeneous solid-cystic neoplasm. Many studies suggest that MRI is superior to CT, because it better illustrates the capsule of the neoplasm and intratumor hemorrhage associated with solid pseudopapillary neoplasms (SPN). Magnetic resonance imaging (MRI) and computed tomography (CT) is conclusive, so fine-needle biopsy is not necessary before treatment, but surgical resection is indicated in these patients [18]. Postoperatively SPN have an excellent prognosis, therefore short follow-up after surgical treatment is recommended. Metastatic and recurrent tumors require aggressive surgical treatment for better survival [19]. Surgical treatment with complete enucleation of pancreatic tumor in our case allowed complete recovery. The patient is in good general condition with normal findings of controlled clinical and radiological examinations a year after surgery.

Conflict of interest statement. None declared.

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