

CASE REPORT

Cytological Features of the Cystic Fluid of Pancreatic Schwannoma with Cystic Degeneration. A Case Report

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ABSTRACT

Context Schwannomas are benign neoplasms arising from peripheral nerve tissue. Pancreatic schwannoma is a very rare condition. We present the histological and cytological features of a pancreatic schwannoma with cystic degeneration.

Case report A 51-year-old male was diagnosed with a cystic tumor measuring approximately 6 cm in the tail of the pancreas. Distal pancreatectomy and splenectomy were performed. Cystic fluid from the tumor was obtained intraoperatively by fine-needle aspiration, and it showed scattered spindle tumor cells against a background of hemosiderin-laden histiocytes. During the operation, we informed the surgeon that the tumor consisted of "atypical spindle cells". Histologically, the tumor was diagnosed as a schwannoma with cystic degeneration which had originated in the pancreas. The diagnosis was confirmed by positive immunostaining of the tumor cells in both histological and cytological materials for S-100 protein.

Conclusion Problems occasionally arise with the use of fine-needle aspiration in the diagnosis of cystic diseases of the pancreas because of the difficulty in obtaining adequate specimens. Nevertheless, it should be emphasized that intraoperative fine-needle aspiration is as informative as a frozen section diagnosis, when appropriately performed.

INTRODUCTION

Schwannomas, also known as neurinomas, are usually encapsulated, benign neoplasms arising from peripheral nerve tissue. Histologically, a typical schwannoma is composed of two areas: the Antoni A area is characterized by closely packed spindle cells with occasional nuclear palisading and Verocay bodies; the Antoni B area is occupied by loosely arranged tumor cells which are separated by abundant myxoid stroma. Immunohistochemically, schwannomas are usually positive for S-100 [1]. Leu-7 (CD57) [2] and glial fibrillary acidic protein (GFAP) [3] are also occasionally expressed. The extremities, neck, mediastinum, retroperitoneum, posterior spinal roots, and cerebellopontine angle are the common areas where schwannomas occur [4]. Although a schwannoma arising in the pancreas is rarely encountered, cystic degeneration of pancreatic schwannomas has been reported [5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20]. In this report, we present the histological and cytological features of a pancreatic schwannoma with cystic degeneration.

CASE REPORT

In a thorough medical check-up, a left upper abdominal mass was detected by trans-abdominal ultrasonography in a 51-year-old male. His medical history, symptoms, and

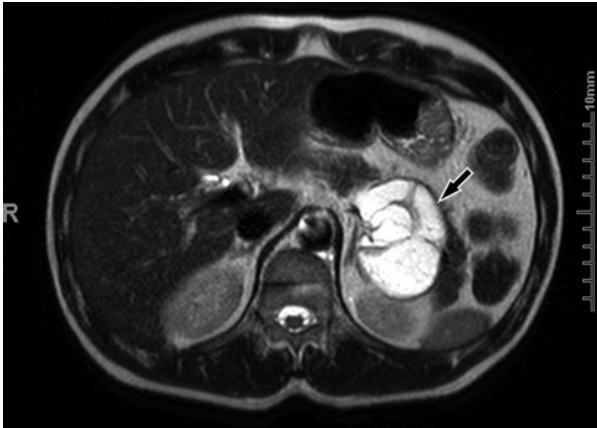


Figure 1. MRI T2-weighted image. A multicystic tumor is present in the pancreatic tail (arrow).

physical examination were unremarkable. Laboratory data revealed no significant abnormal findings, including the tumor markers carcinoembryonic antigen (CEA) and CA 19-9. Computed tomography (CT) and magnetic resonance imaging (MRI) (Figure 1) revealed a cystic mass with some septae in the tail of the pancreas. The tumor measured approximately 6 cm at its maximum diameter. No communication was detected between the cystic mass and the main pancreatic duct on endoscopic retrograde cholangiopancreatography (ERCP). Based on these findings, a mucinous

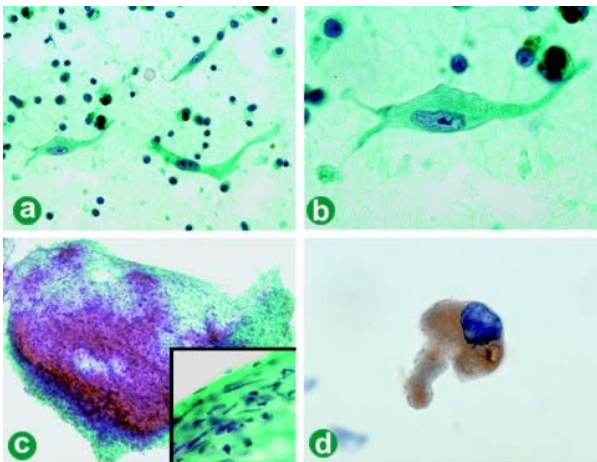


Figure 2. Cytological features of the cystic fluid obtained using fine-needle aspiration (FNA). **a.** Spindle tumor cells are scattered against a background of hemosiderin-laden histiocytes (Papanicolaou stain, x400). **b.** Tumor cells showing a fine granular chromatin pattern with a single prominent nucleolus (Papanicolaou stain, x1,000). **c.** Some tissue fragments composed of spindle cells are detected (Papanicolaou stain, x100; inset x400). **d.** Tumor cells are positive for S-100 (x1,000).

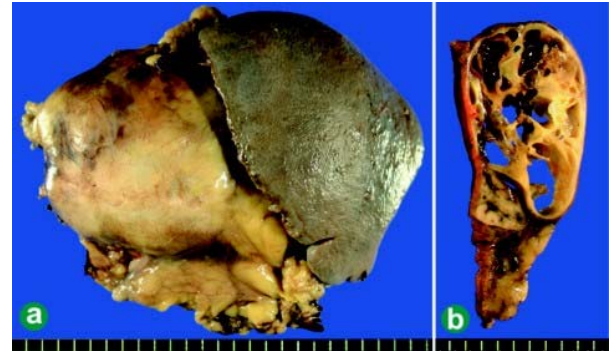


Figure 3. Macroscopic findings. **a.** The tumor is located in the pancreatic tail. **b.** On cross-section, the tumor shows cystic spaces with focal hemorrhage and contains serous fluid. Tumor size: 65x65x40 mm.

cystic neoplasm was considered to be the most probable preoperative diagnosis, even though it was a male patient. Distal pancreatectomy and splenectomy were performed.

Cystic fluid from the pancreatic tumor was obtained intraoperatively by fine-needle aspiration (FNA). Scattered spindle tumor cells against a background of hemosiderin-laden histiocytes were identified on Papanicolaou staining (Figure 2a and 2b). The nuclei were ovoid or spindle-shaped and arranged in a fine granular chromatin pattern. A single prominent nucleolus was seen. Some tissue fragments were composed of spindle cells (Figure 2c). A few binucleated spindle cells were observed. Intranuclear inclusions were also present. During the operation, we informed the surgeon that the tumor consisted of “atypical spindle cells”. After the operation, positive immunohistochemical reaction to antibodies against S-100 protein (polyclonal, dilution 1:400; Dako, Glostrup, Denmark) was observed in the cytological material taken from the tumor cells (Figure 2d).

The resected pancreas showed an encapsulated tumor measuring 65x65x40 mm at the anterior side of the pancreatic tail (Figure 3a). On cross-section, multilocular cystic spaces with yellowish appearance were found, separated by thin septae and containing serous fluid (Figure 3b). Hemorrhagic foci were present. Microscopically, the tumor was composed of spindle-shaped cells with

alternating areas of compact, elongated cells (Antoni A area) (Figure 4a and 4b) and less cellular, loosely cohesive areas (Antoni B area) (Figure 4a and 4c). The infiltration of hemosiderin-laden histiocytes was marked in the Antoni B area. Small-to-large blood vessels were embedded in the tumor. There were transitional regions between the peripheral nerves and the tumor cells. No epithelial lining in the wall of the cystic spaces was identified. The cystic spaces contained serous exudates containing hemosiderin-laden histiocytes, erythrocytes, lymphocytes, and neutrophils (Figure 4a). Some clusters of spindle-shaped tumor cells were found in the cystic spaces. Abundant pancreatic tissues were attached to the tumor at the posterior side, and a small amount of atrophic pancreatic tissue was observed at the anterior side. The tumor was clearly separated from the pancreatic parenchyma by a dense fibrous capsule without infiltrative growth. The mitotic count was less than 1% per 10 high-power fields. Immunohistochemically, the tumor cells were diffusely positive for S-100 (Figure 4d), vimentin (clone V9, dilution 1:100; Dako, Glostrup, Denmark) and Leu7 (clone HNK-1, dilution 1:50; Becton Dickinson, Franklin Lakes, NJ, USA) but

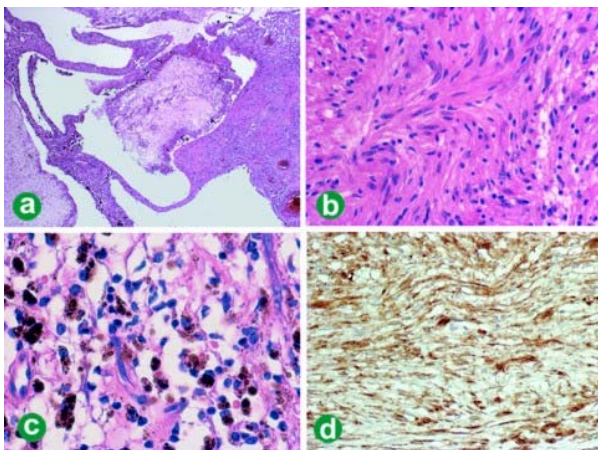


Figure 4. Histological findings. **a.** Cystic spaces with hemorrhage are found in the tumor (hematoxylin-eosin stain, x5). **b.** The tumor shows closely packed spindle-tumor cells corresponding with Antoni A area (hematoxylin and eosin x50). **c.** Fewer cellular areas (Antoni B area) with many hemosiderin-laden histiocytes are also observed (hematoxylin and eosin x100). **d.** Tumor cells are strongly positive for S-100 protein (x50).

negative for c-kit (clone 9.7, dilution 1:1; Ventana, Tucson, AZ, USA), alpha-smooth muscle actin (clone 1A4, dilution 1:800; Sigma, St. Louis, MO, USA), CD34 (clone QBEnd/10, dilution 1:10; Novocastra, Newcastle-Upon-Tyne, UK), desmin (clone D33, dilution 1:200; Dako, Glostrup, Denmark) and GFAP (clone 6F2, dilution 1:50; Dako, Glostrup, Denmark). The Ki-67 (clone MIB-1, dilution 1:50; Dako, Glostrup, Denmark) labeling index was 2.5%. The tumor was diagnosed as a pancreatic schwannoma with cystic degeneration.

DISCUSSION

In the English literature, 31 cases of pancreatic schwannomas, excluding malignant schwannomas and malignant peripheral nerve sheath tumors, have been reported including our present case [5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29]. There was no apparent gender predilection (male: 15; female: 16). The patients' ages ranged from 40 to 87 years (average 59.9 years). The tumor size ranged from 1.0 to 20.0 cm in diameter (average 5.6 cm). The major location was the head or the uncinate process of the pancreas. Interestingly, more than half of the reported pancreatic schwannomas showed cystic degeneration (68%).

Intraductal papillary mucinous neoplasm (IPMN), mucinous cystic neoplasm, serous cystic neoplasm, solid pseudopapillary neoplasm, and pseudocyst are representative diseases which need to be differentiated from pancreatic schwannomas with cystic degeneration. A preoperative diagnosis of pancreatic cystic lesions is usually made using serum tumor markers, endoscopic ultrasonography (EUS), and CT- or EUS-guided FNA. Cytological features of IPMNs and mucinous cystic neoplasms include mucus-producing columnar cells arranged in sheets or a papillary structure within a prominent mucinous background [30]. Serous cystic neoplasms yield hypocellular materials with non-mucinous cuboidal cells possessing bland nuclei and pale cytoplasm [31, 32]. The characteristic cytological feature of a solid

pseudopapillary neoplasm is branching fragments with central capillaries and myxoid stroma [33]. Pseudocysts show little or no epithelial cells and a predominance of histiocytes and inflammatory cells [32].

Cytologically, a schwannoma is characteristically composed of spindle-shaped cells which possess indistinct cytoplasmic borders and wavy nuclei embedded in a fibrillary and occasionally myxoid or collagenous matrix. An Antoni A area (cohesive cellular clusters) and an Antoni B area (loosely cohesive or poorly cellular sheets) are occasionally found [34]. According to Domanski *et al.* [34], cystic degeneration was detected in 22 of 116 cases of schwannoma diagnosed by aspiration cytology. Smears from schwannomas with cystic degeneration showed scattered round-to-oval cells, accompanied by occasional histiocytes [34].

In general, the diagnosis of schwannoma by FNA cannot be satisfactorily made because it is difficult to obtain adequate specimens [34]. The majority of pancreatic schwannomas are diagnosed after laparotomy. Only in one case described by Bui *et al.* was there a compatible diagnosis of pancreatic schwannoma achieved using preoperative EUS-guided FNA [6]. The cytological features of the tumor in Bui's case included a "whorling" appearance of spindle cells which strongly stained for S-100 protein. Domanski *et al.* [34] have reported that cell blocks in the fluid aspirated from cystic schwannomas show strong positivity for S-100 protein. In the present case, a schwannoma could not be definitively diagnosed based on the cystic fluid materials obtained intraoperatively, mainly because of a paucity of tumor cells. However, positive immunohistochemical staining of the cytological and histological materials for S-100 protein led to the final diagnosis of pancreatic schwannoma. The utility of S-100 protein staining of cytological materials obtained by FNA for the diagnosis of schwannoma was demonstrated. Correct preoperative or intraoperative diagnosis of schwannoma by using FNA is expected to influence its treatment, including the surgical procedure.

In conclusion, we present a pancreatic schwannoma characterized by cystic degeneration for which intraoperative FNA was performed. Although pancreatic schwannoma is a rare benign disease, it should be included in the list of differential diagnoses of pancreatic diseases with cystic degeneration because cystic changes accompany various pancreatic diseases.

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Keywords Biopsy, Fine-Needle; Cytology; Neurilemmoma; Pancreas

Abbreviations GFAP: glial fibrillary acidic protein

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