



## Case report

# Mucinous cystadenoma of the pancreas associated with pregnancy. Case report and review of the literature

Nicolae Berevoescu<sup>1,2</sup>, Răzvan Scăunașu<sup>1,2</sup>, Mihaela Berevoescu<sup>3</sup>, Alexandru Croitoru<sup>4</sup>

<sup>1</sup>Colțea Clinical Hospital, Department of General Surgery, Bucharest, Romania

<sup>2</sup>Carol Davila University of Medicine and Pharmacy, Bucharest, Romania

<sup>3</sup>Craiova University of Medicine and Pharmacy, Dolj, Romania

<sup>4</sup>Colentina Clinical Hospital, Department of General Surgery, Bucharest, Romania

### Abstract

**Objective.** We present a rare pathology with uncommon onset.

**Background.** Mucinous cystic pancreatic neoplasms (MCNs) are rare tumors, which generally occur in the fifth and sixth decades of women. Although some tumours are frankly malignant, all are in fact considered to be potentially malignant.

**Case report.** We present the case of a 30-year-old patient, with a 16/11 cm tumor located in the pancreas body, which was diagnosed 8 months after birth. The preoperative assessment of the pancreatic lesion suggested the diagnosis of mucosal cyst neoplasm, without being able to determine its benign or malignant nature. Central pancreatectomy was performed with a good postoperative evolution. Histopathologic result was represented by mucinous pancreatic chistadenoma. Two years after surgical intervention, the patient presented no signs of recurrence or pancreatic (exocrine or endocrine) secretion deficiency.

**Conclusions.** Preoperative imaging evaluation could be suggestive for mucinous cystic tumour, but this cannot specify however the nature of the tumor. The postpartum occurrence could establish a possible relationship between hormonal levels encountered during pregnancy and the development of this tumor, taking into considerations the ovarian-type stroma and the presence of hormone (estrogen and progesterone) receptors in this neoplasm. Central pancreatectomy without anastomosis preserves the functions of pancreas, and also decreases morbidity.

### Keywords

: pancreas, mucinous cystadenoma, central pancreatectomy, pregnancy

### Highlights

- ✓ Mucinous cystic neoplasms of pancreas are rare tumors, occur especially in women and raise problems in the diagnostic and therapeutic attitude, especially during pregnancy.
- ✓ Central pancreatectomy without anastomosis preserves the functions of the pancreas and decreases morbidity.

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## Introduction

Mucinous cystic neoplasms (MCNs) of pancreas are rare tumors, occurring especially in women. Histologically, MCNs exhibit specialized ovarian stroma (ovarian stroma-like), lined with a columnar epithelium, which produces mucus. They may be benign, borderline or malignant tumors (1).

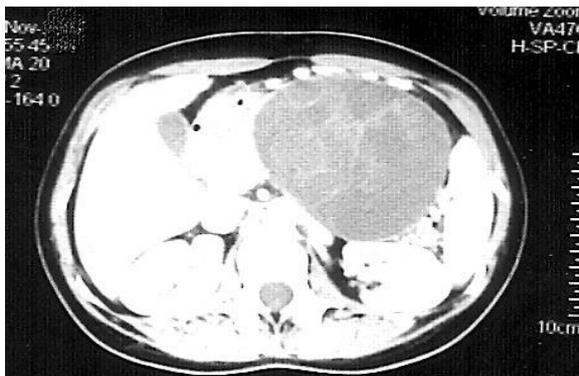
We describe one of these cystic pancreatic lesions, with uncommon onset, resolved through a particularly surgical intervention that conserved both exocrine and endocrine pancreatic functions. We also provide a review of the literature for presenting the state of knowledge on this type of tumors (2-4).

## Case Report

A 30-year-old woman, eight months postpartum, presented in Colentina clinical hospital, Department of General Surgery, for pain in the upper abdomen, nausea and vomiting, associated with abdominal distension. Laboratory tests showed normal values for all constants, including several tumour markers (like CEA and CA 19.9). Abdominal ultrasonography and also computer tomography revealed a 16 cm-sized multilocular cystic lesion in the body of the pancreas, which was suggestive of a cystic mucinous neoplasm (Figures 1a, 1b).

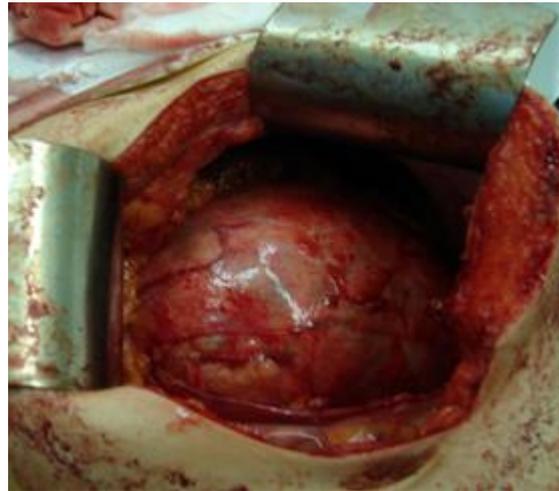


**Figure 1a.** Ultrasonography; multilocular pancreatic tumor formation.

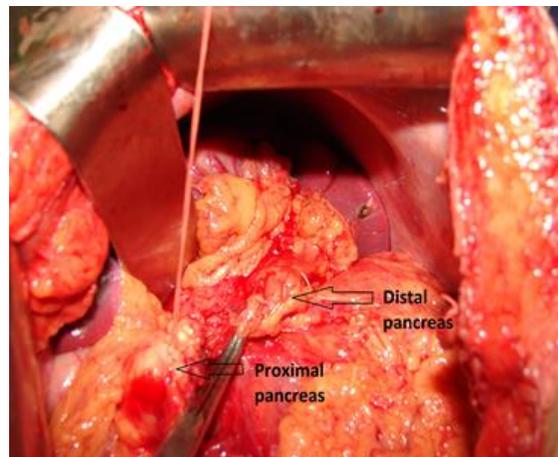


**Figure 1b.** Computer tomography with contrast substance. Cystic and multilocular tumor located to corporeocaudal pancreas level.

No retroperitoneal lymph nodes were identified and no involvement of other surrounding anatomic structures. Surgery was performed with central pancreatectomy without anastomosis (Figures 2a, 2b).



**Figure 2a.** Intraoperative imagery. Pancreatic corporeocaudal tumor.



**Figure 2b.** Intraoperative imagery. Central pancreatectomy.

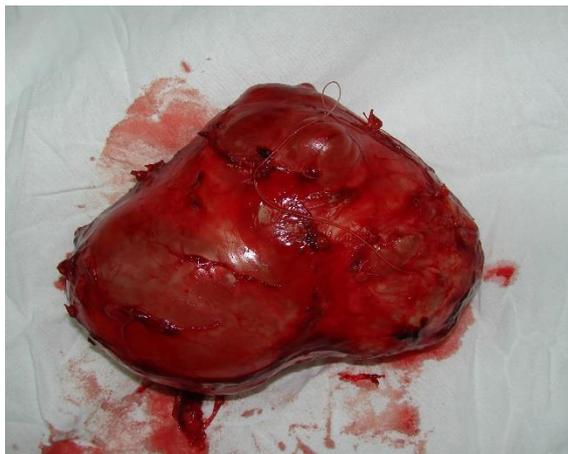
## Results

The tumor size was 18,5/14/8,5 cm (Figure 3), presented a smooth, congestive surface, with no communication with the pancreatic ductal system. Cystic compartments, varying in dimension (1.5-6 cm), and including thick mucus that were found within the tumor.

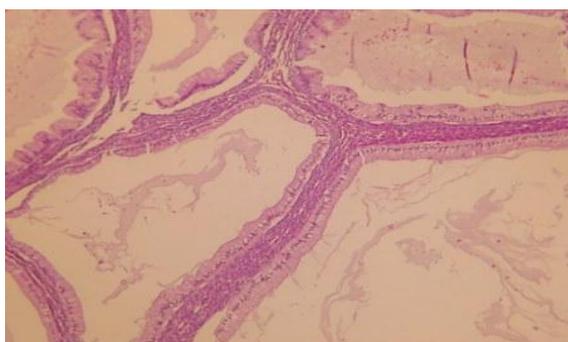
Histopathological examination evidenced a cystic mass with papillary mucinous cystadenoma appearance, having an inner columnar epithelial layer and outer densely cellular ovarian-type stromal layer (Figures 4a, 4b).

The post-surgery evolution of the patient was good, being discharged 8 days after the surgical intervention. After 2 years, the patient presented a good general

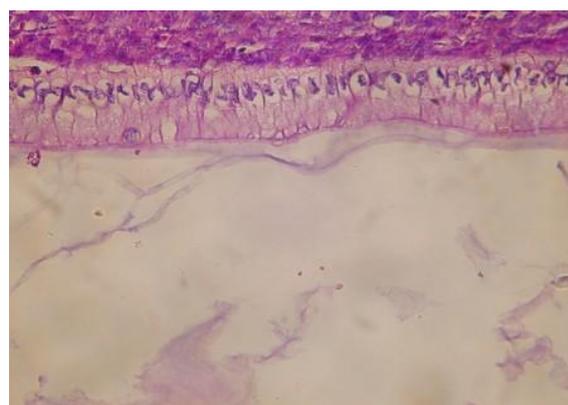
condition, without signs of tumour relapse or alteration of pancreatic functions.



**Figure 3.** Pancreatic tumor, 18.5/ 14 cm



**Figure 4a.** Cystic wall with cylindrical mono-striatal epithelium, secretory by mucus; specialized stroma, ovarian type. HE x 200.



**Figure 4b.** Cystic wall with cylindrical mono-striatal epithelium, secretory by mucus; specialized stroma, ovarian type. HE x 400.

## Discussions

Mucinous cystic neoplasms are rare pancreatic lesions, accounting for approximately 2-5% of all exocrine pancreatic tumors and 40-50% of primary cystic pancreatic neoplasms (5-7). It occurs almost exclusively in women (F: M = 9: 1), in the 5-th and 6-th decade of age (5-8 years) without a predisposition to a certain ethnic group (8). Associated with pregnancy, we

encountered 25 reported cases (9-13). They were diagnosed in women aged 21 to 41 years, with an average of 32 years.

Etiopathogenesis of MCNs is not fully elucidated (9-11). The possibility of stromal tissue provenance of MCNs in the ovary primordia is supported by the incidence of tumors, almost exclusively in women, of stromal tissue similar to ovarian cortex and the expression of estrogen and progesterone receptors detected in immuno-histochemistry (12, 13). It was hypothesized that, during pancreas embryogenesis, ectopic ovarian stromal tissue in the biliary or retroperitoneal stroma could release hormones and growth factors with the proliferation of neighboring epithelia and the formation of cystic tumors (14). In addition, the proximal relationship of the left gonadal primordial and dorsal pancreatic bud, from the 4-th and 5-th week of development, could explain the predilection for the pancreatic corporal-caudal region of MCNs (15).

MCNs are localized in the majority of cases at the corporeal-caudal level (14, 15), the head of the pancreas being very rarely interested, predominantly by mucinous cystadenocarcinomas (16, 17).

Macroscopically, MCNs are massive round-oval tumors, with a smooth surface, having a pseudo-capsule of variable thickness and with frequent calcification. The size of the tumors varies between 2 cm and 35 cm in the largest diameter, while those associated with pregnancy ranged from 5 cm to 22 cm, averaging 14.5 cm. The dimensions of MCN diagnosed during pregnancy or postpartum and their rapid increase, suggest a possible relationship between the hormonal status present during pregnancy and this type of tumor (18-20).

In addition, Shin-ichi Ikuta (11) found that MCNs may have a rapid growth rate during pregnancy. On a cross section, these cystic lesions are unilocular or multilocular, with cystic spaces that range from a few millimetres to a few centimetres in diameter, and the cystic content is a viscous, mucinous fluid, or a mucinous mixture of necrotic and hemorrhagic material (21-23). The internal surface of the unilocular tumors is usually smooth, glossy, while in the multilocular one, and often presents papillary protrusions and mural nodules. These latter features, multilocularity, intracystic papillary prominences, and mural nodules are commonly found in malignant cystic malignant neoplasms (14).

Although cases have been reported in the literature in which the tumor has been communicating with the pancreatic duct system (17), MCNs usually do not communicate with the pancreatic ducts (4).

Microscopically, MCNs have two distinct components: an internal epithelial layer and a peripheral, compact compartment formed of ovarian-like stroma cells (24).

The clinical manifestations of patients with MCNs is nonspecific. Small tumors (<3 cm) are asymptomatic, being incidentally discovered, while large cystic lesions manifest symptoms of tumor compression on neighboring anatomical structures, and are often accompanied by palpable abdominal tumor mass. Due to the MCNs topography of the pancreas, predominantly in the body and tail of the pancreas, obstructive jaundice is rarely encountered (3), but these tumors commonly associate diabetes mellitus (2).

Our patient noticed 5 months after birth that the abdomen did not diminish, and after 7-8 months postpartum it became clinically manifest, associating bloating, nausea, moderate pain and vomiting, symptoms caused by the rapid growth in size of the tumor formation.

Laboratory tests usually show elevated CEA and CA 19-9, and blood sugar levels. In our case, CEA and CA 19-9 values were within normal limits.

Abdominal X-ray may reveal the presence of calcifications arranged in a curved like fashion on the wall of the tumor, but they are far better highlighted on a CT. Barium examination show unspecific changes, when the cysts are large enough to produce extrinsic compression of the stomach or duodenum (7, 25). US and CT imaging usually identifies the unilocular or multilocular cystic tumor, sometimes heterogeneous, with presence of calcifications in the wall (26, 27).

Cytological and biochemical examination of the cyst content obtained by needle aspiration guided via US, CT or intraoperatively may orient the diagnosis towards MCNs. Suggestive for MCNs are elevated CEA, CA 19-9, TAG-72, CA 15-3 and low amylase values for cystic fluid analysis. Some reports show that CA 19-9 values greater than 50,000 U/ mL have a sensitivity of 75% and a specificity of 90% for MCNs (28). Also, CEA values in cystic fluid higher than 800 ng/ mL have a sensitivity of 42.9% and a 95.2% specificity for the diagnosis of MCNs (29).

In addition, very high levels of these tumor markers have been observed in the case of mucinosis of cystadenocarcinomas (30-32). These changes are useful

in diagnosis, especially in cases of tumors that develop during pregnancy.

The presence of varying dysplastic changes in some MCNs suggests that these tumors are in a continuous process of progression of neoplastic changes. Thus, mucinous cystadenomas, borderline tumors may evolve to invasive mucinous cystadenocarcinomas (33-35). For this reason, oligolocular MCNs must be clearly distinguished from pancreatic pseudo-cysts because cystic drainage is the optimal solution for patients with pseudocysts but is inadequate in the case of a mucosal cystadenoma (36-38).

In addition, genetic data support this MCNs progression model: the more advanced the mucinous tumor, the more genetic changes are encountered. For example, Bartsch et al. (39) reported that mutations in the K-ras gene are much more common in mucinous cystadenocarcinomas than in benign mucous cystic neoplasms. These data were also confirmed by Jimenez et al. (40), which has also shown that changes in p53 protein immunoreactivity occur early in the in-situ carcinoma stage. Based on these data, we believe that when an MCN is diagnosed during a pregnancy, we must take into account the malignant potential, the mass effects on the fetus and the risks arising from a resection intervention.

Neoplastic dissemination pathways in the case of mucinous cystadenocarcinomas are similar to those found in ductal adenocarcinomas. The first metastases are found in peripancreatic lymph nodes and in the liver (2), and the staging of MCNs is the same as in ductal adenocarcinomas. Regarding MCNs complications, these are mainly due to compression of tumors on neighboring anatomical structures.

Main treatment is surgical resection for all MCNs due to their malignant potential. In most cases, distal pancreatectomy is required with or without splenectomy. Central pancreatectomy is an option for mucinous cystadenomas and is advantageous because this procedure preserves the exocrine and endocrine functions of the pancreas. When the tumour is located cephalad, cephalic duodenopancreatectomy is required (41-43). A more limited resection such as enucleation, is not indicated because of the risk of pancreatic fistula formation and the possibility of remaining marginal tissue, neoplastic infiltration (44).

If the tumor is completely resected, the prognosis of MCNs is very good regardless of the degree of cellular atypia (45, 46). In the case of mucosal cystadenocarcinomas, the prognosis depends on the

degree of tumor invasion. Tumor recurrence correlates with tumor outgrowth of tumor walls and tumor infiltration of neighboring tissues (14).

The location, dimensions, macroscopic appearance of the tumor and immunoreactivity of the p53 protein are of no prognostic importance. However, aneuploidy that is rarely encountered in MCNs, in some mucous cystadenocarcinomas, gives a poor prognosis (47, 48).

The 5-year survival rate for patients with MCNs is excellent: >95% for benign or borderline MCNs, 50-75% for invasive mucinous cystadenocarcinomas, totally resected (49). Some studies have also shown that the 10-year survival rate of patients with invasive mucinous cystadenocarcinomas, is approximately 50% (50, 51).

## Conclusions

MCNs raise problems in the diagnostic and therapeutic attitude, especially when they are discovered during pregnancy or postpartum. Its onset in the postpartum period can indicate the relationship between hormone levels during pregnancy and the development of this tumor. Central pancreatectomy without anastomosis preserves the functions of the pancreas and decreases morbidity.

## Conflict of interest disclosure

There are no known conflicts of interest in the publication of this article, and there was no financial support that could have influenced the outcomes. The manuscript was read and approved by all authors.

## Compliance with ethical standards

Any aspect of the work covered in this manuscript that has involved human patients has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

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