A markedly high pancreatic cyst fluid of carcinoembryonic antigen and amylase in a postnatal woman

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SUMMARY

Many pancreatic cystic lesions (PCL) are accidentally found during abdominal imaging for unrelated procedures. This was a case report of a 32-year-old woman who had an uncomplicated spontaneous vaginal delivery presented with an abdominal mass 1 month postnatally. Her computed tomography (CT) abdomen showed a retroperitoneal cystic lesion with differential diagnoses include mucinous cystadenoma of the pancreas, pancreatic pseudocyst and cystic lymphangioma. The pancreatic cyst fluid levels for carcinoembryonic antigen (CEA) and amylase were markedly high, 4216 ng/ml and 3232 U/L, respectively. The patient subsequently underwent distal pancreatectomy with splenectomy. The histopathological examination (HPE) revealed a mucinous cystadenoma of the distal pancreas with no evidence of malignancy. A large spectrum of imaging and clinical characteristics render challenges in assessing PCL. Pancreatic cystic fluid CEA and amylase levels help in distinguishing mucinous cystic neoplasms (MCN), a malignant potential type of PCL from other non-mucinous, non-malignant type of PCL. Higher concentrations of CEA and amylase in pancreatic cyst fluid are suggestive of MCN. Nevertheless, the test results should be correlated with imaging studies and HPE.

INTRODUCTION

Pancreatic cystic lesions (PCL) are sometimes accidentally detected due to the extensive use of imaging investigations. The mucinous cystic neoplasms (MCN) are PCL with malignant potential and may necessitate surgical intervention.[1] MCN predominantly affects females, which suggests that sex hormones may be a factor for its development.[1] The diagnosis might be obscured by pregnancy's subtle symptoms and physical changes. The rapid postpartum growth of a benign MCN may be associated with hormonal levels during pregnancy, considering the ovarian-type stroma and the presence of hormonal (oestrogen and progesterone) receptors in this neoplasm.[2] Pre-operative biochemical investigations for example pancreatic cyst fluid carcinoembryonic antigen (CEA) and amylase analysis can act as supportive modalities in the differential diagnosis of PCL.[3]

CASE PRESENTATION

A 32-year-old Malay woman with no known medical illness presented with a 1-month history of an abdominal mass post uncomplicated spontaneous vaginal delivery. The mass was located at the left hypochondriac region and progressively increased in size. It was associated with chest discomfort and fatigue. She denied history of fever, trauma, nausea, vomiting and any abdominal pain. There was no past medical history of pancreatitis and no history of malignancy in the family. The general examination was unremarkable. Abdominal examination showed a mass at the left hypochondriac region, measured approximately 15 × 20 cm extending to the left lumbar region. It was mobile, non-tender, not pulsatile, not moving with respiration and not fixed to underlying muscle or skin.

She was subsequently referred to the hepatopancreaticobiliary (HPB) team in Hospital Universiti Sains Malaysia (Hospital USM) for further investigations. Computed tomography (CT) abdomen pelvis was performed and reported as a substantial well-defined non-enhancing retroperitoneal cystic lesion measuring 12.5 × 20.0 × 16.0 cm. The differential diagnoses were mucinous cystadenoma of the pancreas, pancreatic pseudocyst and cystic lymphangioma. Pre-operative blood investigations showed a full blood count of hypochromic microcytic most likely secondary to iron deficiency due to disease progression and postpartum period. The coagulation profile, electrolytes, liver and renal function tests, serum lactate dehydrogenase (LDH) and plasma glucose were within the reference range (Table I). The normal serum LDH indicates there was no significant tissue damage and the lesion could be benign. However, serum LDH is not a specific marker for malignancy. The patient is also non-diabetic as indicated by the normal plasma glucose. The serum amylase and CEA levels were normal, however, the pre-operative pancreatic cyst fluid CEA and amylase were markedly high at 4216 ng/ml, and 3232 U/L, respectively. Post-operative, the pancreatic cyst fluid CEA and amylase levels were markedly reduced by 84.5%, and 97.4%, respectively (Table II). Peritoneal fluid for cytology showed no malignant cells seen. Given the possible malignant cyst, the patient was scheduled for distal pancreatectomy with splenectomy. The splenic artery and

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Table I: Pre-operative blood investigations

Blood tests	Result	Unit	Reference range
Complete full blood count			
WBC	$4.30x10^9$	/L	3.4-10.1
RBC	$5.16x10^{12}$	/L	3.52-5.16
Hb	11.6	g/dL	11.6-15.1
Hct	35.5	%	31.8-42.4
MCV	68.8	fL	77.5-94.5
MCH	22.5	pg	24.8-31.2
MCHC	32.7	g/dL	29.4-34.4
Plt	179 x109	/L	158-410
Coagulation profile			
PT	13.90	s	12.6-15.7
INR	1.00		0.06-1.14
APTT	44.90	s	30-45.8
Liver function tests profile			
Total Protein	68.0	g/L	65-83
Albumin	40.0	g/L	38-44
Globulin	28.0	g/L	
AG ratio	1.43		
AST	14.0	U/L	5-34
ALP	42.6	U/L	42-98
ALT	9.0	U/L	<34
Total bilirubin	13.0	umol/L	3.4-17.1
Renal function tests profile			
Urea	3.3	mmol/L	1.7-8.3
Sodium	140	mmol/L	135-145
Potassium	3.7	mmol/L	3.5-5.0
Chloride	106	mmol/L	98-107
Creatinine	59	umol/L	70-130
Serum LDH	330	U/L	<480
Plasma glucose	4.1	mmol/L	3.5-7.7

WBC white blood cell, RBC red blood cell, Hb haemoglobin, Hct haematocrit, Plt platelet, MCV mean corpuscular volume, MCH mean corpuscular haemoglobin, MCHC mean corpuscular haemoglobin concentration, CEA carcinoembryonic antigen, PT prothrombin time, APTT activated partial thromboplastin time, INR international normalized ratio, AST aspartate aminotransferase, ALT alanine aminotransferase, LDH lactate dehydrogenase, ALP alkaline phosphatase, AG Albumin-Globulin.

Table II: Serum and pancreatic fluid cyst for amylase and carcinoembryonic antigen (CEA)

Date/parameters	April 2020	Pre-operation	Day 3 post-operation	Day 4 post-operation	Reference range
serum amylase (U/L)	43	50.1	89	46	28-100
pancreatic fluid cyst amylase (U/L)	3232	2830	83	38	-
serum CEA (ng/ml)	0.2	< 0.2	-	-	<5.2
pancreatic fluid cyst CEA (ng/ml)	4216	-	654.1	-	-

vein were ligated at the root to ensure no tumour dissemination, and the pancreas was transected at the neck and removed en bloc with the spleen (Figure 1). The surgical specimens were sent for HPE and reported as a cyst within the pancreas, lined by a single layer mucinous epithelium consistent with mucinous cystadenoma without evidence of malignancy (Figure 2). The patient was discharged well post-operatively and was scheduled for a follow-up to assess her symptom and repeat imaging study.

DISCUSSION

This case illustrated the increased pre-operative CEA and amylase levels in pancreatic cyst fluid compared to the serum levels. It has been hypothesised that utilising the pancreatic cysts fluid analysis as a supplementary marker is essential for managing PCL. Differentiating MCN from other types of PCL is important as MCN may necessitate surgical intervention.[1] A high level of cyst fluid CEA suggests a mucin-producing tumour or MCN3 and may differentiate MCN with other types of PCL.

The pancreatic cyst fluid in this case was collected by ultrasound guided abdominal fluid tapping using fine-needle aspiration. CEA was analysed on Roche Cobas e411 analyser whilst amylase on Abbott Architect analyser. Dilution of the sample was required and was done according to the manufacturer's recommendation. The levels post-dilution were within the analysers measuring ranges. The assays are however, not intended to be used for the pancreatic cyst fluid measurement and ideally, method validation should be performed for more accurate measurement. It is, however, laborious, time-consuming and expensive to the laboratory, especially if the test is not routinely requested.

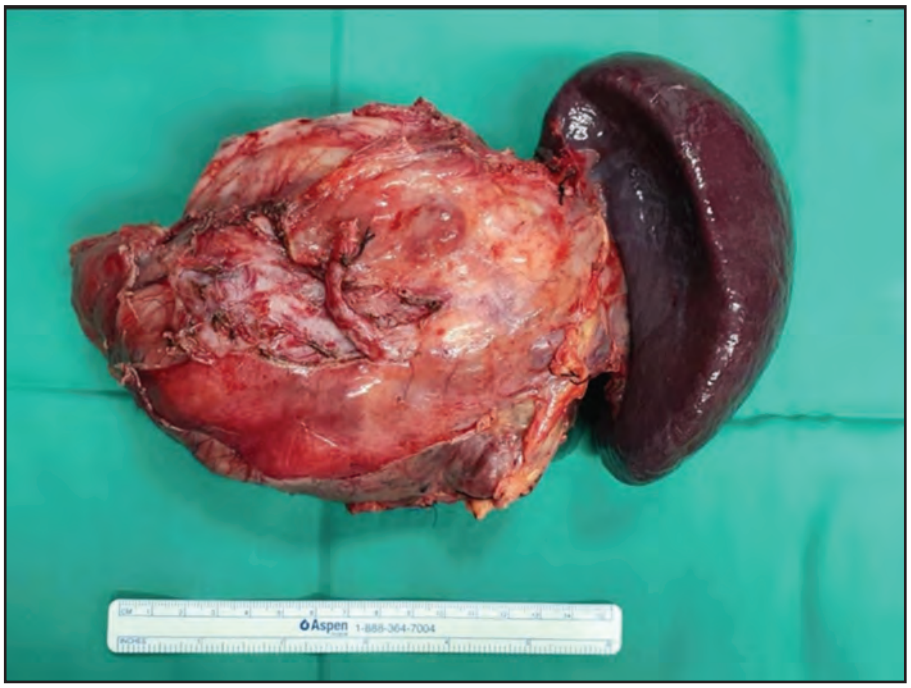

Fig. 1: Pancreatic tissue with cyst formation.

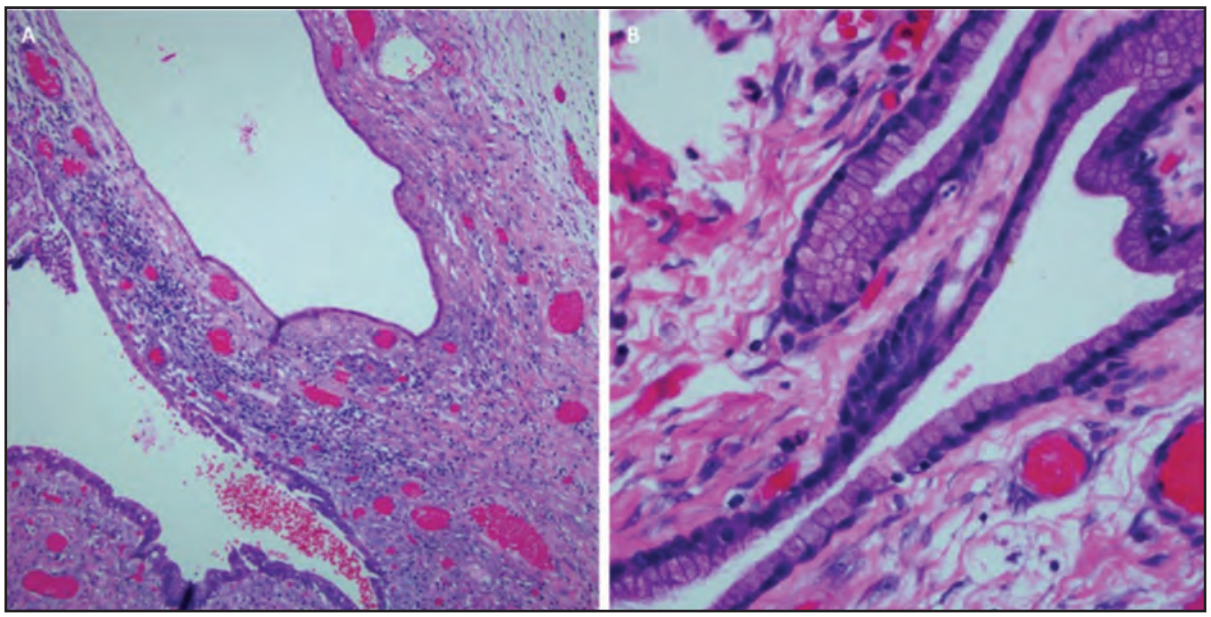

Fig. 2: Pancreatic tissue with cyst formation.

There were various cut-off levels for cyst fluid CEA used in pancreatic cyst disease. A cystic fluid CEA of 192 ng/mL distinguished mucinous and non-mucinous cystic lesions with a diagnostic accuracy of 79%.4 Another study showed different results with CEA levels ranging from 30 ng/mL to 480 ng/mL for optimum mucinous cyst detection.[5] The cut-offs differ from one study to another because of differences in sample size and analyser used. In this patient, the pancreatic cyst fluid CEA level was markedly elevated above all the cut-offs mentioned thus, highly suggestive of MCN. The cyst fluid in this patient also demonstrated a higher level of amylase, which suggested a pseudocyst rather than other pancreatic cysts. A pooled review studies showed that a cyst fluid amylase level of < 250 IU/L exhibited a 98% specificity for eliminating pseudocysts.5 Nonetheless, high levels of cyst fluid amylase also are often seen in MCN.[5]

CONCLUSIONS

Pancreatic cystic fluid carcinoembryonic antigen (CEA) and amylase levels help in distinguishing mucinous cystic neoplasms (MCN), a malignant potential type of pancreatic cystic lesions (PCLs) from other non-mucinous, non-malignant type of PCL. Higher concentrations of CEA and

amylase in pancreatic cyst fluid are suggestive of MCN. Nevertheless, the test results should be correlated with imaging studies and histopathological examination.

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