

Mucus Thread Sign: A Case Report on Rare Radiological Findings in Mucin-Producing Gall Bladder Cancer

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Abstract: *The mucus thread sign is a rare and intriguing radiological feature, typically associated with mucin-producing pancreatic cysts like mucinous cystic neoplasms and intraductal papillary mucinous neoplasms. This case study highlights its occurrence in mucin-producing gall bladder cancer, an exceptionally rare phenomenon. The report underscores its diagnostic significance, clinical implications, and potential role in guiding the management of mucinous tumors.*

Keywords: mucus thread sign, mucin-producing tumors, gall bladder cancer, mucinous cystic neoplasms, radiological findings.

1. Definition of Mucus Thread Sign

The **mucus thread sign** refers to appearance of thin strands or filaments of mucin within fluid-filled pancreatic cysts. These mucin strands resemble **thread-like structures**, which can be visualized on imaging studies, especially on **MRI or MRCP (Magnetic Resonance Cholangiopancreatography)**. The sign is considered indicative of a **mucinous cystic neoplasm (MCN)** or **intraductal papillary mucinous neoplasm (IPMN)**.

Significance in Diagnosis

1) Mucinous Cystic Neoplasms (MCNs):

- MCNs are pancreatic cystic tumors that typically produce **mucin** (a gel-like substance). These tumors are often located in the **body or tail** of the pancreas and can be distinguished by the presence of **mucinous fluid** within the cysts.
- The **mucus thread sign** can be seen in MCNs, which are often characterized by their **well-defined cysts** filled with thick, mucinous material. These strands represent the suspended mucin, which can form **thread-like structures** in the cysts.
- MCNs are usually benign but have a **potential for malignant transformation**. Therefore, the presence of mucus threads can be a helpful diagnostic clue, guiding further investigation and management.

2) Intraductal Papillary Mucinous Neoplasms (IPMNs):

- IPMNs are cystic tumors arising from the pancreatic duct that also produce mucin. They can be classified as **main duct, branch duct, or mixed type**, depending on which part of the pancreatic duct system is involved.
- The mucus thread sign is more commonly seen in **branch duct IPMNs**, which are characterized by **dilated pancreatic ducts** and the production of thick, mucinous fluid that can form visible strands inside the cystic cavities or ducts.
- The mucus thread sign in IPMNs is significant because it can help differentiate these lesions from other cystic pancreatic tumors, such as serous cystadenomas and pseudocysts which do not produce mucin and typically do not show mucus threads.

Imaging Appearance:

- On **MRI or MRCP**, the mucus thread sign appears as **thin, linear strands** floating within the cystic spaces. These strands are often seen in the cystic areas of MCNs or IPMNs. They vary in length and resemble threads or ropes within the cyst
- The strands are typically **hyperintense** (bright) on **T2-weighted MRI images**, which is consistent with the presence of mucin.

Clinical Relevance:

- The presence of the mucus thread sign is an important diagnostic feature because it can:
- Help differentiate **mucinous cystic neoplasms** (which have a **potential for malignancy**) from **serous cystadenomas** (which are benign and do not contain mucin).
- Suggest the presence of an **intraductal papillary mucinous neoplasm (IPMN)**, which may require closer surveillance or surgical intervention depending on the type (main duct vs. branch duct).
- Influence management decisions, as mucinous cystic tumors often necessitate further evaluation, including **fine-needle aspiration (FNA)** to analyze cyst fluid for mucin content and cytology.

Differential Diagnosis:

- The mucus thread sign is typically associated with mucin-producing cystic tumors, but it can occasionally be seen in other conditions involving cystic changes in the pancreas.
- **Serous cystadenomas**, which are filled with a watery, non-mucinous fluid, do not show this sign.
- **Pseudocysts**, which result from inflammation or pancreatitis, may appear as fluid-filled cysts, but they usually lack the mucin threads.

Case Summary

- 71/male
- RUQ pain-15 days
- Intermittent fever with rigors
- Vitals stable
- Mild icterus
- Vague tender mass RUQ

Investigations

- HB 11.2, TC 11550
- LFT TB/DB 14.9/8.06
- SGOT/PT 133/588
- ALB 2.3
- GGT 522
- RFT 0.9 134/5.55/102
- RBS 127
- HbA1C- 6
- PT 13.2
- INR 1.08

CECT

- GB contracted.
- Multiple calculi are noted with sludge, largest measuring 1.3 cm. wall of the GB could not be clearly delineated.
- Large heterogenous collection measuring 8.2/6.2 cm seen in the peri gall bladder region communicating with the contracted GB.
- On colour doppler inflammatory changes noted.
- Multiple CBD calculi with dilated CBD and IHBR

MRCP**MRCP (MR CHOLANGIO PANCREATOGRAPHY)**

Clinical History: Abdomen pain and Fever

Sequences: Axial T1/T2 W1; MRCP; Axial, Coronal fat Suppression- T2W1

Findings

Intrahepatic biles ducts are dilated

Multiple calculi (largest 10mm) are seen within the common bile duct

Smooth Tapering at the distal end of the common bile

Gallbladder is over distended. Calculi (7mm) in the lumen

Disruption of the wall is seen in the fundus and along the right lateral wall of the neck, with associated cystic collection

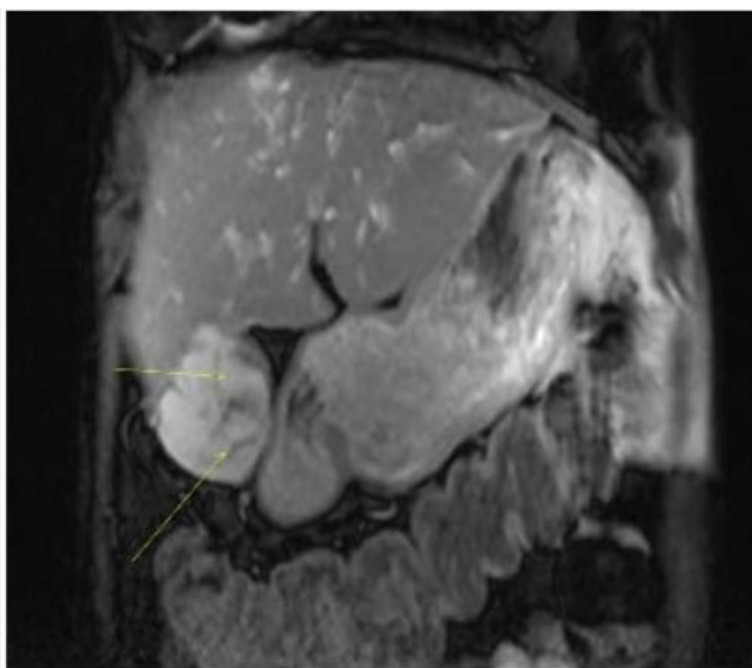
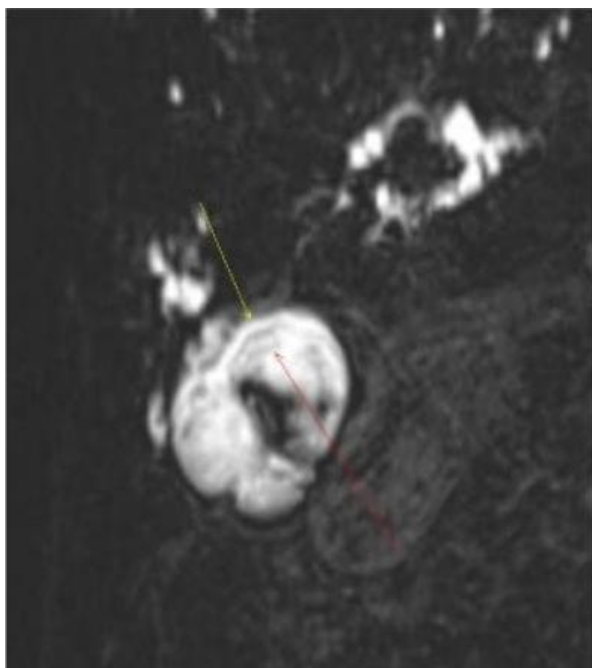
Impression

Cholelithiasis and Choledocholithiasis

Bile Duct Dilation

Gallbladder Rupture

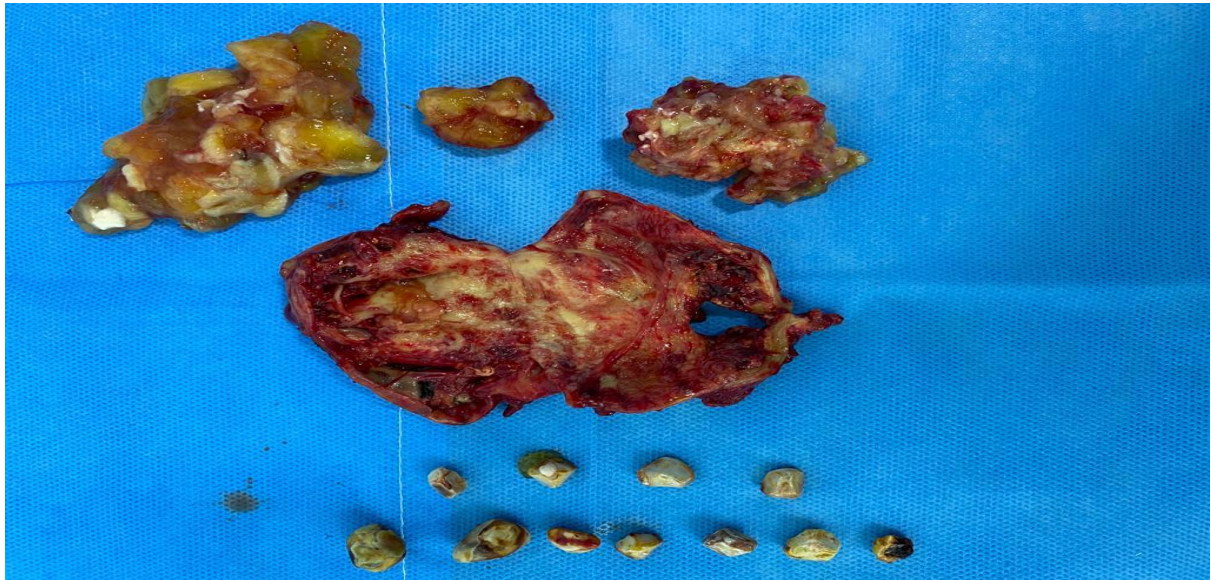
Multiseptated cystic lesion (28x 28mm) in segment 5 of the liver—DD: Abscess

**ERCP**

- Failed to clear the CBD
- Stent placed
- Referred to surgical gastro department

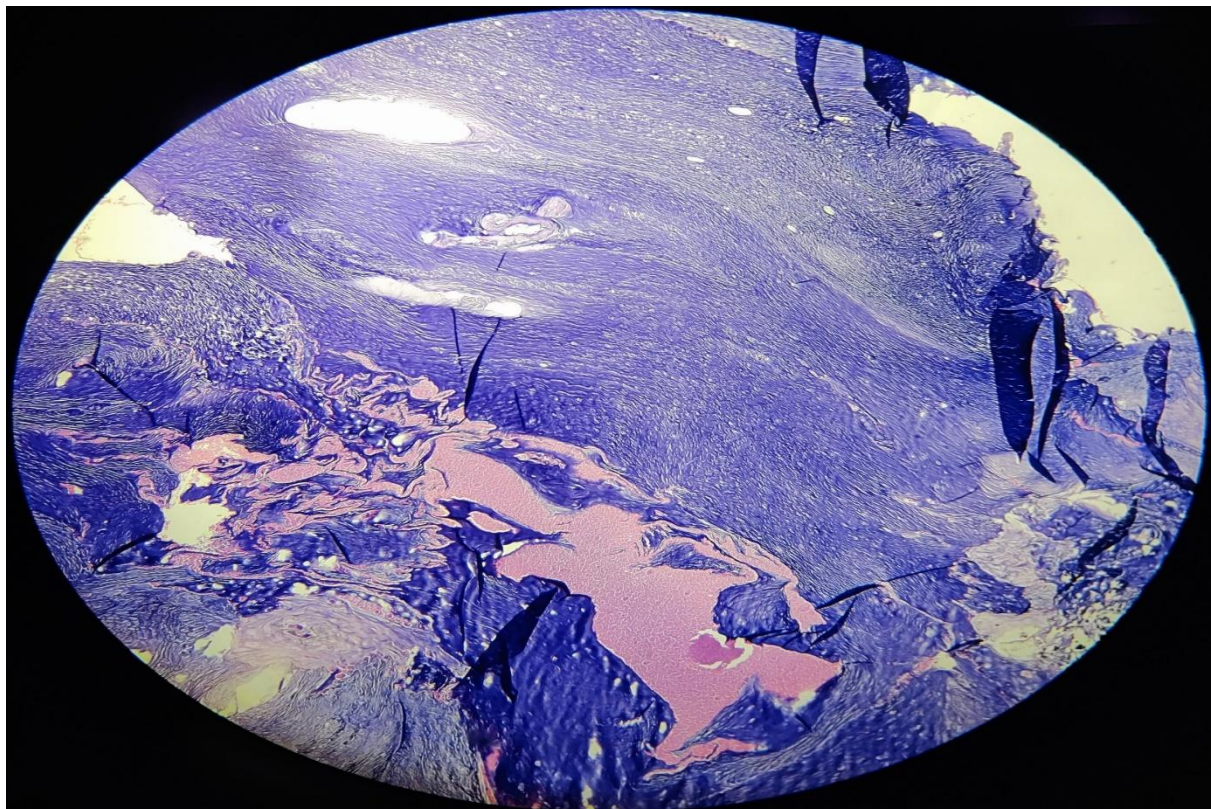
Operative findings

- GB massively distended
- No pus or bile in the RUQ
- Mucinous material extruding from the rent in the GB
- GB filled with jelly
- Multiple CBD stones
- Cholecystectomy with CBD exploration done



Histopathology

Mucin producing gall bladder cancer (MPGBC)



2. Discussion

- GB carcinoma might show scattered mucinous cells on histological examination but it extremely rare to see tumors producing significant amount of clinically detectable mucin.
- These tumors are referred to as MUCIN PRODUCING GALL BLADDER CANCER {MPGBC}
- Despite being rare typical radiological MUCUS THREAD SIGN have been documented in literature.

3. Conclusion

The mucus thread sign is a critical radiological marker for diagnosing mucin-producing tumors, predominantly in the pancreas and rarely in the gall bladder. This case emphasizes its role in differentiating mucinous neoplasms and guiding therapeutic decisions."

This case report aims to elucidate the diagnostic and clinical significance of the mucus thread sign, particularly in the context of mucin-producing gall bladder cancer."

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