



## Unusual Causes of Pneumoperitoneum

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### ABSTRACT

*Hollow viscous perforation leads on to pneumoperitoneum. It indicates a perforated abdominal viscus that requires an emergency surgical intervention. Here we report a series of cases which had unusual cause of pneumoperitoneum.*

**Keywords-** #Perforated Gastrointestinal stromal tumour, #Mucormycosis infection, #Peptic ulcer, #Gastric perforation, #Metastatic Gastric Cancer, #Ileal Perforation.

### INTRODUCTION

Pneumoperitoneum most commonly results from a perforated hollow viscus. It is a rare cause of acute abdominal pain representing less than 1 % of presentation to emergency<sup>1</sup>. Clinical signs and symptoms have low diagnostic accuracy and abdominal radiography is positive in 55–85 % of cases<sup>3,4</sup>. Computed tomography (CT) is considered the “gold standard” for the recognition of free intraperitoneal air<sup>5</sup>.

Gastrointestinal stromal tumor (GIST) is defined as mesenchymal neoplasm of the gastrointestinal tract which on immuno histochemical staining results KIT-positive. About

60% of GISTs occur in the stomach, 20% - 30% occur in the small intestine, and 10% occur in other parts of the GI tract<sup>4</sup>. Pathologic activation of KIT signal transduction appears to be a central event in GIST pathogenesis<sup>5,6</sup>.

Clinical features of GIST are abdominal pain, abdominal mass, gastrointestinal bleeding, partial or complete small bowel obstruction<sup>7</sup>. Spontaneous perforation of GIST is an extremely rare presentation<sup>8</sup>. 14% of all radiological confirmed pneumoperitoneum are due to malignancy<sup>7</sup>.

So far only two case of Gastric gastrointestinal stromal tumor perforation have been reported in the literature.

Mucormycosis is caused by a ubiquitous saprophytic filamentous fungus that belongs to the class Zygomycetes. The common pathogens in this class are Rhizopus, Absidia, and Mucor<sup>9</sup>. The spectrum of the disease ranges from localized cutaneous to disseminated systemic infection. Systemic mucormycosis is a rare and fatal fungal infection. It usually involves the nasopharynx and lungs followed by gastrointestinal (GI) tract<sup>10</sup>.

Mortality from GI mucormycosis is considered very high, though in a study in late 70s it was reported to have fatal outcome in 98% of patients of GI mucormycosis<sup>11</sup>.

Gastric malignancy is considered as fourth most common cancer and the second most frequent cause of cancer death in the world<sup>12,13</sup>. H. pylori infection, dietary factors, and smoking patterns also contributes to cause gastric malignancy<sup>14-17</sup>.

Two distinct histologic types of gastric cancer, the “intestinal type” and “diffuse type”, have been described<sup>18</sup>. The diffuse type of gastric cancer is undifferentiated and characterized by the loss of E-cadherin expression.

### CASE REPORT

**CASE I** A 61 year old male presented with complaints of breathlessness at rest which aggravated on exertion. Patient also gives history of pain abdomen which was insidious in onset at the region of epigastrium, non progressive, dragging type of pain, aggravated on food intake relieved on taking analgesic medications.

No history of radiation of pain elsewhere, except for loss of weight and appetite none other positive history noted. On examination abdomen was diffusely tender, not distended.

**USG abdomen** suggested Fatty Liver, left sided massive pleural effusion.

**CECT whole abdomen** showed Exophytic heterogenous mass lesion with cystic & solid component seen arising from greater curvature of stomach. Gastric luminal portion of stomach appears normal. Moderate left pleural effusion with passive atelectasis of posterior basal of left lung segment.

**CT Thorax** done showed massive pleural effusion in the posterior aspect of inferior lobe of left lung. ICD was placed to drain the pleural fluid. Patient was planned for laprotomy.

**Intra-Op Finding:** Tumour of size 6x7 cms was seen in the body of the stomach along the greater curvature, with perforation. Massive pleural loculated collection seen in the left thorax.

Hence proceeded with wedge resection of the tumour along with trans-diaphragmatic approach to clear loculated pleural collection in left thorax.



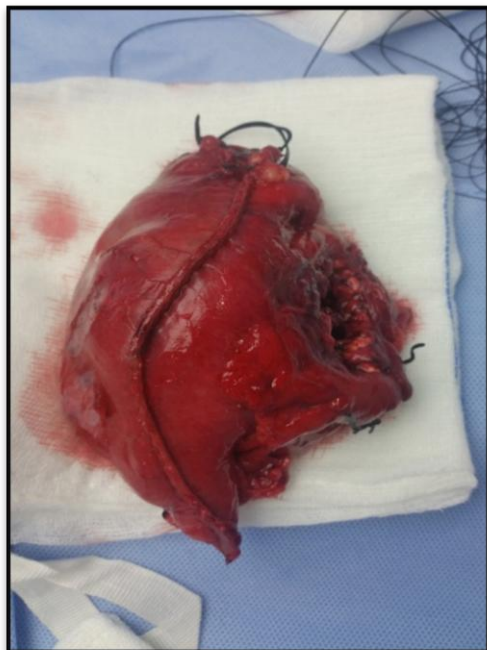
**Fig :1** CECT Showing Exophytic mass lesion



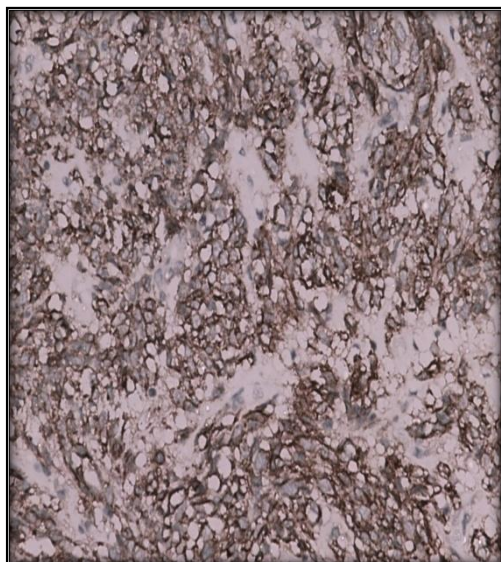
**Fig : 2** GIST arising from greater curvature



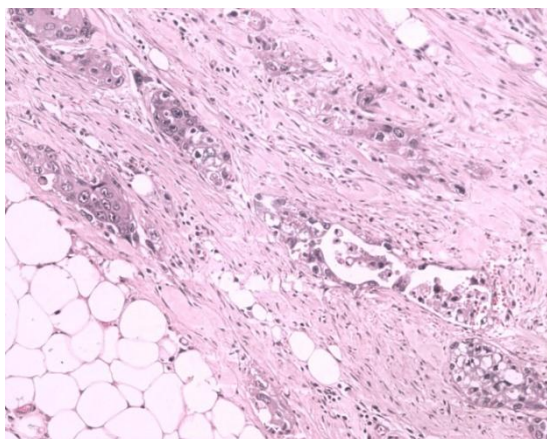
**Fig : 3** Perforated site



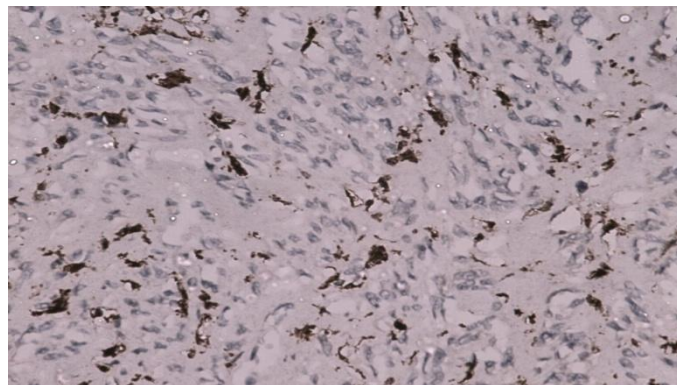
**Fig : 4** Resected specimen



**Fig: 5** Immunohistochemistry - DOG1



**Fig: 6** Immunohistochemistry – KIT



**Fig: 7** Immunohistochemistry - S100

**Histopathology report**

T3NXCMO Gastrointestinal stromal tumour of epitheloid type. With Mitosis >5/50HPF.High Ki indicates that this tumour is high grade GIST.

**CASE II**

A 26 year old female post partum patient reffered from OBG dept for urgent surgery opinion in view of sudden episode of hemetemesis & abdominal distension with tachycardia and hypotension. Patient underwent emergency cesarian section 15 days back in view of fatty liver complicating pregnancy and fetal distress, following which she developed one episode of sudden massive hematemesis (500ml) with abdominal distension.

**On examination**

- Pulse – 115/min.
- Respiration rate – 28/min
- Blood pressure – 80/60mmhg
- Spo2 – 96% (room air )
- P/A- Distension noted  
Diffuse Tenderness present  
Guarding and Rigidity present  
Bowel sounds was sluggish

**LAB REPORTS**

- HB – Sudden drop noted from 12.5gm% to 8gm%.
- Total counts – Elevated to 35000
- Serum Electrolytes, LFT and RFT was Derranged .
- T.Bil – 11.5
- Creat – 2.4

- D.Bil – 6.12
- BUN - 30
- SGOT – 90
- SGPT – 65, Alk Phos- 724

**CT abdominal angiogram** – showed extravasation of contrast from left gastric artery.  
 (? left gastric artery bleed).  
 Patient was taken up for emergency laprotomy.

**Intra – op findings**

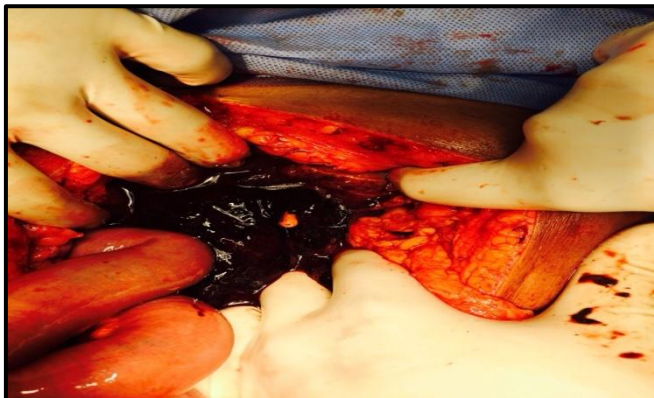
1.5 litres of blood clots evacuated.  
 10 x 15 cms gastric ulcer on the Anterior wall of the stomach, involving the greater curvature with perforation.  
 Active bleed from left gastric artery present with massive haemoperitoneum.  
 Hence proceeded with Subtotal Gastrectomy with GJ+JJ+FJ.



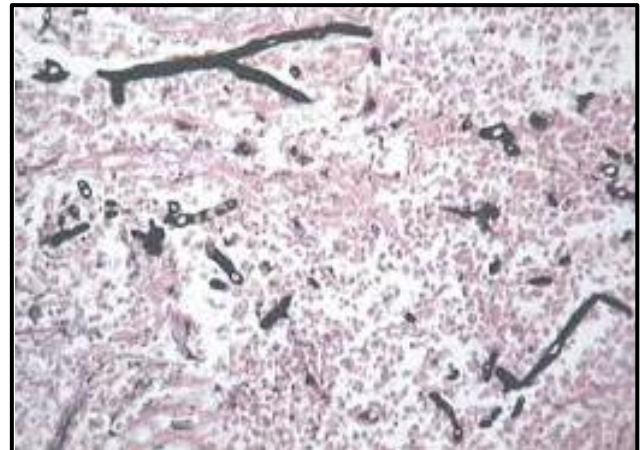
**Fig: 10** Resaected Specimen - Perforated site

**Microbiology report**

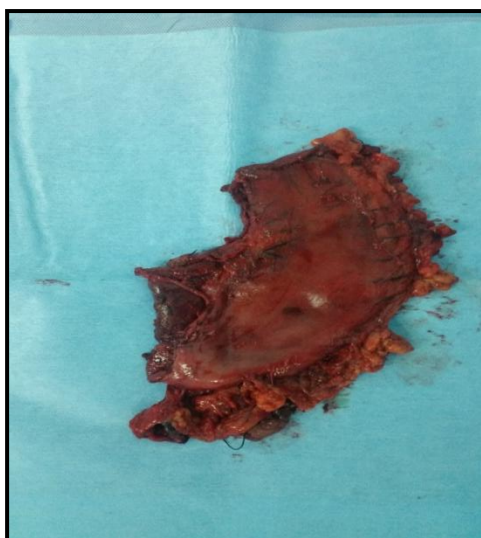
Gastric aspirate sent for fungal stains suggested broad aseptate hyphae seen, morphologically resembling Mucormycosis.



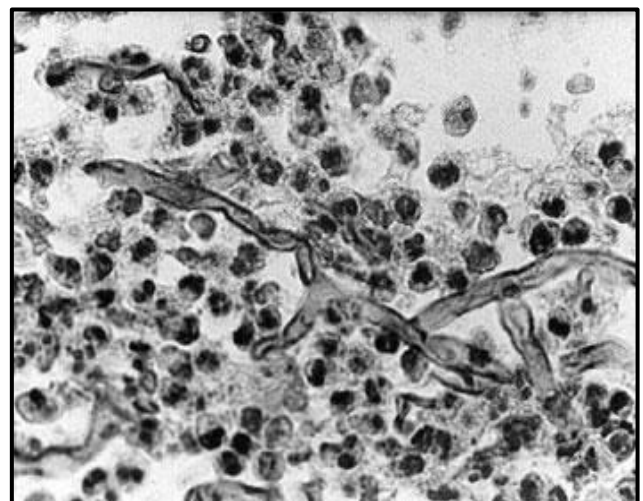
**Fig: 8** Extravesation of blood



**Fig: 11** Fungal stains



**Fig: 9** Resaected Specimen

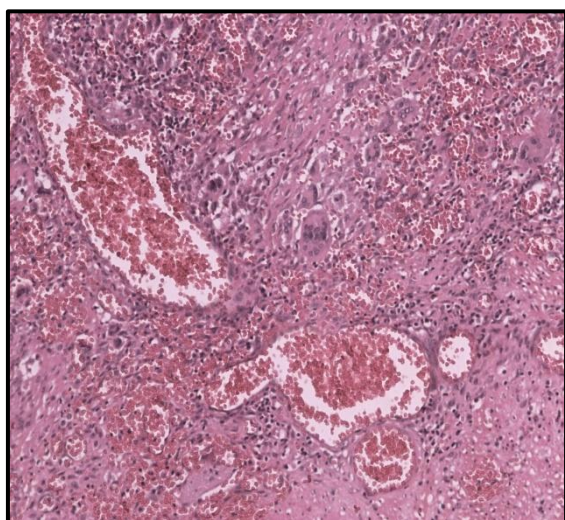


**Fig: 12** Fungal stains

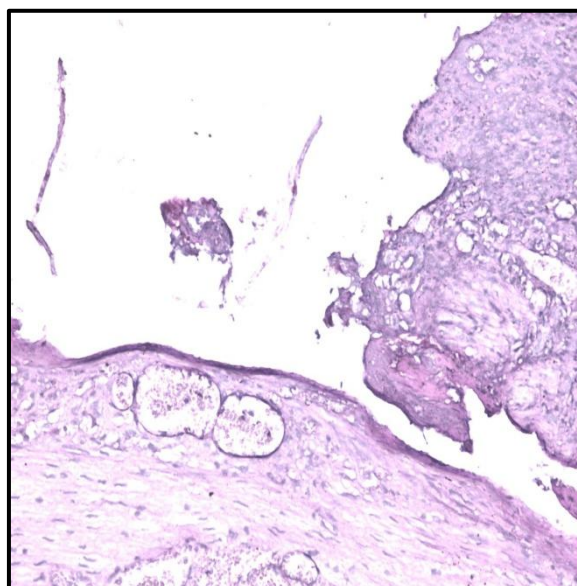
**Histopath – Report**

1. Microscopy – sections showing gastric mucosa with features of ulceration, gaint cell formation, transmural inflammatory cell infiltrate with exudate formation.
2. Final impression: Histochemical stains suggests possibility of Fungal infection. ? Mucormycosis, microbiological correlation advised.

**Microscopic slid: Gaint cells & Fungal hyphae stains**



**Fig: 13** Gaint cells



**Fig: 14** Fungal hyphae stains

**Post – op**

Post operatively patient was conservatively managed in icu. Mucor mycosis infection was treated with Amphotericin B.

**CASE III**

A 63 year od male came to the ER presenting with severe pain abdomen since 1 day, asociated with obstipation x 1 day.

Known case of Ca Stomach disseminated, underwent 1 cycle of chemotherapy one week back. Pain was sudden in onset, progressive in nature, asociated with vomiting.

**On examination**

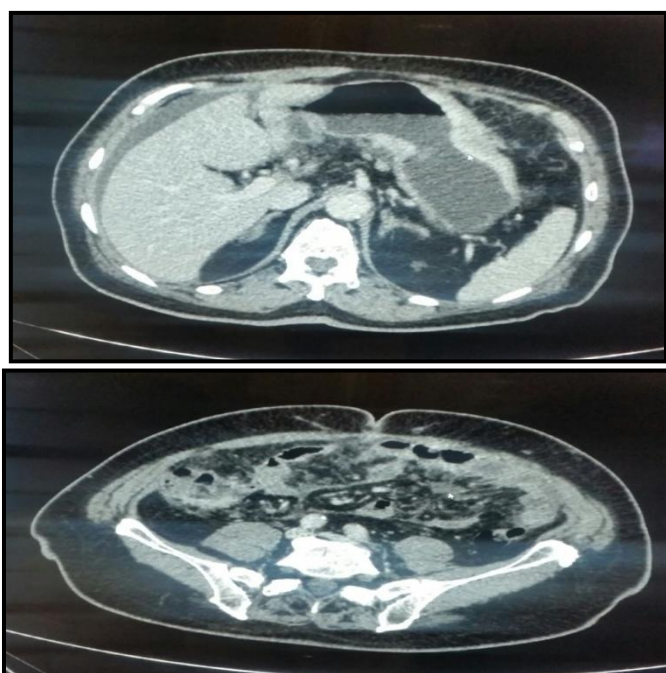
- A febrile, concious, oriented.
- Pulse -120/min
- Bp -80/60 mmhg hence noradrenaline infusion was started in ER.
- Rr – 26/min
- Pallor +, icterus+ , no cyanosis, clubbing & lymphadenopathy, pedal edema present

**P/A** – Distension present Tenderness present. Guarding and Rigidity present .

**X ray abdomen** – showed air under diaphragm – hollow viscous perforation ?Gastric.

**CECT DONE**

Diffuse thickening of the distal body of stomach and antrum of stomach – S/O Carcinoma Stomach. Perigastric lymphadenopathy Peritoneal carcinomatosis.



**Fig: 15** metastatic deposits in ileum causing perforation

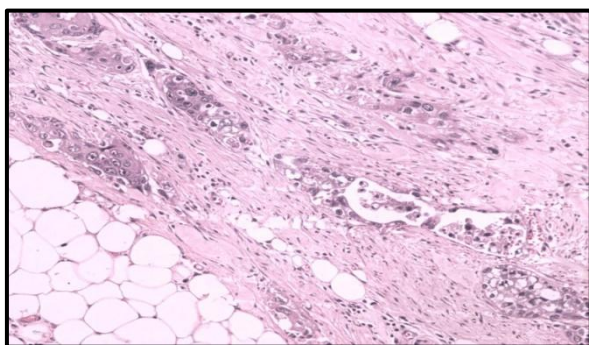
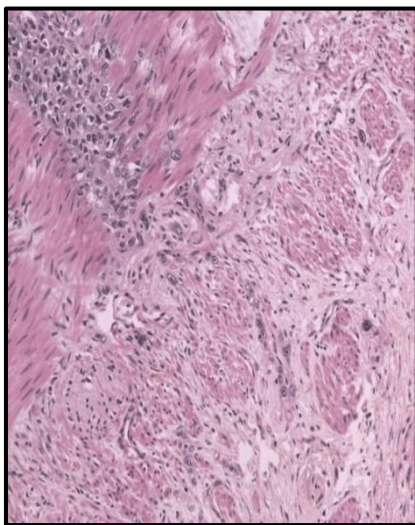
**INTRA – OP**

- Turbid fluid with plaques all over the bowel, with thick walled stomach, multiple nodules all over small and large bowel.
- Ileal perforation of size 1 x 2 cm present near mesenteric border 20 cms proximal to IC junction.
- Pus plaques found allover peritoneal cavity & intestine.
- Inter-loop adhesions and fluid collection present in the small intestine.
- Mesnteric lymph nodes present.

Hence proceeded with resection and ileostomy done. Biopsy taken from perforated site. Peritoneal lavage and peritoneal biopsy sent

**HISTO-PATH REPORT**

pT4NxcM0- Grade 2, Moderately differentiated adenocarcinoma (NOS).



**Fig: 16** Serosal deposits secondary to metastatic Gastric Ca

**DISCUSSION**

The majority of reports described perforated small intestinal GIST whereas, we report the only case of a perforated gastric GIST, despite a higher overall incidence of GISTs at this anatomical site<sup>19-21</sup>. Malignant GISTs are more likely to have metastasised, the effect of malignant potential on symptom profile is not well described and it remains unclear whether they are more likely to present with perforation<sup>19</sup>. Treatment options are based on prognostic factors including tumour size and mitotic rate, and include adjuvant chemotherapy in the form of imatinib, a tyrosine kinase inhibitor, which results in prolonged survival rates in advanced or metastatic disease when used as a primary treatment<sup>22,23</sup>. In cases of disease progression on imatinib, a second-line tyrosine kinase inhibitor, sunitinib, may also be used<sup>24</sup>.

Mucormycosis is an opportunistic infection, usually involving immunocompromised individuals. Almost all the reported cases are associated with some predisposing factors. Bauer et al<sup>25</sup>. had successfully established the relationship between corticosteroid and mucormycosis by their experimental study long back in 1957. Stratsma et al<sup>26</sup>. had shown that malignancy is a risk factor for mucormycosis in their clinicopathological study of 51 cases. Boelaert et al<sup>27</sup>. found two cases of dialysis-associated mucormycosis who were treated with desferrioxamine and inferred that iron overload may be a risk factor of mucormycosis. Mooney et al<sup>28</sup>. reported a case of GI mucormycosis in a malnourished child. Singh et al<sup>29</sup>. reported a case of invasive GI mucormycosis in a liver transplant recipient. Kamat et al<sup>30</sup>. and Verma et al<sup>31</sup>. reported disseminated mucormycosis in healthy adults.

This is the first documented case of Ileal perforation secondary to metastatic gastric cancer. Earlier in the literature metastatic deposits in the small bowel secondary to terminal Lung Cancer<sup>33</sup> and Breast Cancer<sup>34</sup>.

**CONCLUSION**

Although the gastric GIST is rare but one should definitely keep perforated GIST in mind while dealing with unusual pneumoperitoneum cases.

Mucormycosis is a deadly infection that is caused by fungal stains. Its early diagnosis would help us to initiate treatment at appropriate time before it shuts down other organ systems. Rare diagnosis should be kept in mind when common causes have been ruled out, fungal infection should be thought in differential diagnosis when repeated blood culture sensitivity report shows negative results .

Gastric cancer metastatic deposits have been seen in liver, peritoneum, mesenteric nodal involvement.

Deposits in the ileum causing perforation is a rare entity which is reported in this case.

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