

PNEUMOPERITONEUM IN A COVID PATIENT; AN UNUSUAL CAUSE

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ABSTRACT

Free air under diaphragm in acute abdomen is pathognomonic of bowel perforation. Rarely, it may be present in an infection caused by gas forming organisms. Emphysematous cystitis (EC) is one of such infection of urinary bladder. In era of Covid pandemic, there seems to be increase in gas forming organism infection especially in Corona virus disease-19 (Covid-19) patients with diabetes. However, intact urinary bladder with pneumoperitonuem in a case of EC is rare. We present such a case of EC. A brief case report and review of literature is presented.

KEYWORDS: Pneumoperitonuem, Gas-forming organisms, COVID-19, Emphysematous cystitis.**INTRODUCTION**

A hollow viscus perforation is one of the most common causes of air under the diaphragm in a patient presenting with acute abdomen. In 10% of the cases, pneumoperitonuem can be attributed to infections by gas forming organisms.^[1] These are more common in diabetic patients. Emphysematous cystitis (EC) is a type of urinary bladder infection characterized by air within the bladder wall primarily seen in diabetics. It presents as urinary tract infections & rarely as subcutaneous emphysema due to rupture of bladder wall on extraperitoneal surface. Intraperitoneal rupture of bladder may present as perforative peritonitis with urinary peritonitis. However, partial wall rupture of bladder resulting in intact urothelium with pneumoperitoneum has not been reported. We present a case of pneumoperitoneum due to emphysematous cystitis.

CASE REPORT

A 70 years old male, presented with pain in abdomen and vomiting since 1 day. He had dull aching pain which was diffusely distributed, insidious in onset, with no-radiation or aggravating or relieving factors. He had 1-2 episodes of vomiting, which were bilious & non-projectile. He had obstipation since 1 day. There were no urinary complaints. Patient was tested corona virus disease -19 (COVID-19) positive 14 days back and was treated for the same and later advised home quarantine. Patient was a known case of diabetes mellitus and hypertension since 10 years for which he was on medications. Patient had history of right nephrectomy 5 years back, and right great toe amputation 4 years back.

On clinical examination, he was afebrile, with tachycardia of 112/min, blood pressure of 138/88 mmHg

and respiratory rate of 30/min with oxygen saturation 90% on room air. Blood glucose level on glucometer was 85mg/dl. He looked dehydrated with no pallor or icterus. His per abdomen examination revealed distended abdomen with tenderness and guarding in the lower abdomen. Patient had an umbilical hernia measuring 2x2 cm which was reducible. On percussion there was dull note over whole abdomen. His per rectal examination was unremarkable. Urethral catheterization revealed pyuria. Patient was resuscitated with intravenous (IV) fluids and antibiotics. His biochemical and hematological investigations revealed hemoglobin of 10.6 g/dl, white blood cell (WBC) counts of 7,800 /cmm, low platelet count -70,000/cmm. Serum creatinine levels were 7.8mg%. Liver enzymes were within normal limits, however INR was 1.8. Urine examination showed presence of bacteria, pus cells 70-80/hpf, red blood cells (RBCs) 70-80/hpf and 2-3 epithelial cells. Chest x-ray revealed free gas under the diaphragm (Fig.1) and abdomen radiograph revealed multiple air fluid levels. Ultrasonography revealed moderate ascites with internal echoes; and umbilical hernia of defect size 1.4 cm with herniation of omentum. In view of raised serum creatinine, non-contrast computed tomography (NCCT) abdomen was done. NCCT showed gas foci in the wall of urinary bladder with collection around bladder suggestive of emphysematous cystitis. Bladder wall was edematous. Pneumoperitoneum was present. Initial impression was rupture of bladder wall, however after instillation of contrast per urethrally, bladder wall was found to be intact with air foci in the intramural part of bladder (Fig.2a,b). There was no leak of intravesically administered contrast into peritoneum.

Patient was tested Covid-19 negative on repeat swab. He was started on IV antibiotics as per creatinine level. In view of pneumoperitoneum, free fluid with internal echoes and no obvious bladder rupture on imaging, decision was taken for an exploratory laparotomy. Intraoperative findings revealed severe contamination of all four quadrants with thick pus. The whole length of small and large bowel was explored to rule out perforation. There was no evidence of bowel perforation. However, urinary bladder showed multiple ruptured bullae over the dome of the bladder intraperitoneally (Fig 3). The wall of the bladder was intact and there was no extravasation of urine on intraoperative filling of bladder through per urethral catheter. The peritoneal fluid and pus samples were sent for culture sensitivity. Peritoneal lavages were given with normal saline to clean all the pus. Abdominal drains were placed in Morrison's pouch and in the pelvis in pouch of Douglas. Patient was not extubated and shifted to Critical care unit for post-operative care as he required inotropic support. He was given hemodialysis for renal failure in postoperative period. The bacterial culture report of the peritoneal fluid and pus flakes showed growth of *Klebsiella pneumonia* and *Enterococcus* species resistant to all antibiotics. In spite of all the resuscitative measures, he succumbed on post-operative day 2, due to fulminant sepsis.

DISCUSSION

Pneumoperitoneum in an acute abdomen is commonly seen due to perforative peritonitis. However other rare causes of pneumoperitoneum are pneumatosis coli, post laparotomy, vaginal insufflation for tubal patency test, Chiladati syndrome, gall stone ileus, ruptured liver abscess and intra-abdominal sepsis by gas forming organisms.^[2] Emphysematous cystitis (EC) is a rare infection affecting the bladder characterized by air formation within the bladder wall by gas forming organisms. *E coli* is the most prevalent organism isolated, others include *K pneumonia*, *P. aeruginosa*, *Proteus mirabilis*, *Candida albicans* and *C. tropicalis*, *Aspergillus fumigatus*, *Staphylococcus aureus*, *Group D Streptococcus*, *Enterococcus faecalis*, *Enterobacter aerogenes* and *Clostridium perfringens* and *Cl. welchii*. It was elaborated in detail in 1961 as "emphysematous cystitis" by Bailey H.^[3] The exact mechanism of air formation is not known however theories have been proposed which include fermentation of glucose by bacteria in urine. This is most commonly seen in diabetics.^[4] Present case was a known case of diabetes since 10 years. These patients present with fever with chills, hematuria, pyuria, pneumaturia or sometimes with non specific complaints of weakness. Present case though diabetic, did not have fever and his pyuria was noticed after per urethral catheterization. EC may present as subcutaneous emphysema in the pubic region following rupture of extraperitoneal wall of the bladder.^[5] However, intraperitoneal partial wall rupture of the bladder resulting in pneumoperitoneum has not been described as was seen in present case.

Pneumoperitoneum in a case of emphysematous cystitis has been described due to clostridial infection.^[6] In present case it was due to *klebsiella* and *enterococcus* infection. The presence of leukocytosis, pyuria and bacteriuria is seen in EC. The infection is usually confined within the walls which can be detected by an abdominal x-ray and can be confirmed by computed topography (CT) and urine cultures. In the present case CT was diagnostic. There was no extravasation of contrast after injection of dye through per urethral catheter. If bladder wall is intact, it is most commonly treated conservatively with IV antibiotics, bladder drainages and glycemic control. Only few cases (10%) require surgical management.^[3] In present case the bladder wall was intact which was demonstrated in the CT cystogram and there was free fluid in peritoneum with internal echoes. This resulted in clinical dilemma whether to opt for conservative management or operative treatment. Patient had been treated for Covid 19 infection 14 days back with antipyretics and antivirals which was another confounding factor for decision making.

In view of intact bladder with pus in the peritoneum, sepsis with altered immunity due to Covid 19 infection, decision was taken in favour of exploratory laparotomy.

Surgery confirmed that pneumoperitoneum had been caused by rupture of the emphysematous bullae of the bladder wall intraperitoneally and ruled out bowel pathology. It helped in drainage of thick purulent collection and giving peritoneal lavage to clear septic foci.

The present case raises the suspicion that this clinical presentation may be attributed to the COVID 19 infection affecting immunity, thereby, rendering these patients susceptible to infections by gas forming organisms. However, further studies are required to support this fact.

Legends of figures

- Figure 1: Chest x-ray showing free air under diaphragm
- Figure 2a: Computed Tomography abdomen showing air foci in the intramural part of bladder
- Figure 2b: CT cystogram showing no leak of the contrast dye injected via per urethral catheter
- Figure 3: Intraoperative photo showing a ruptured bulla on the intraperitoneal wall of bladder with intact bladder.

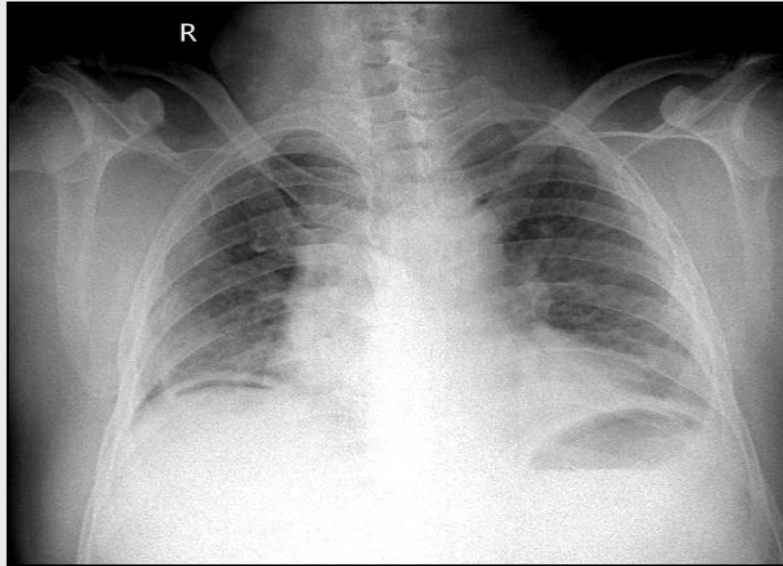


Fig 1: Chest x-ray showing free air under diaphragm



Figure 2a: Computed Topography abdomen showing air foci in the intramural part of the bladder

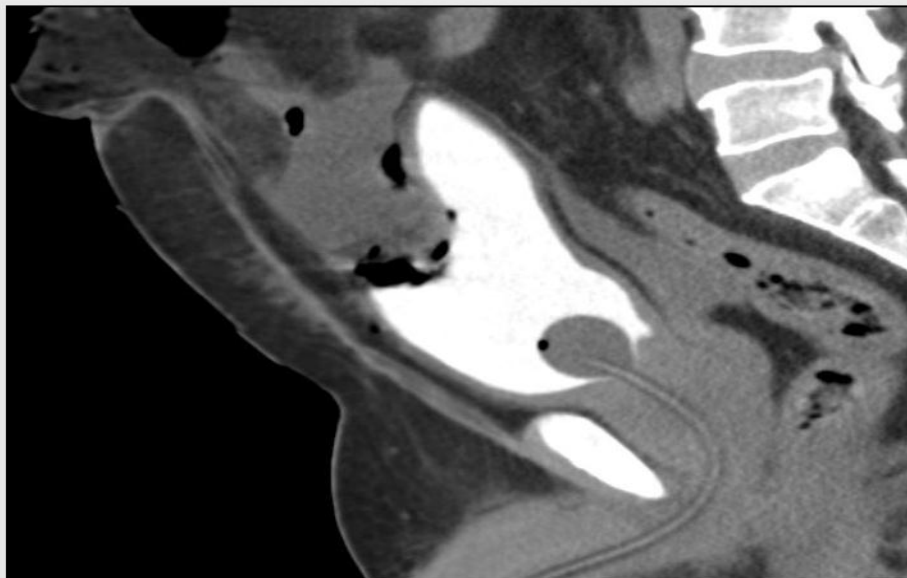


Figure 2b: Computed Topography cystogram showing no leak of the contrast dye injected via per urethral catheter

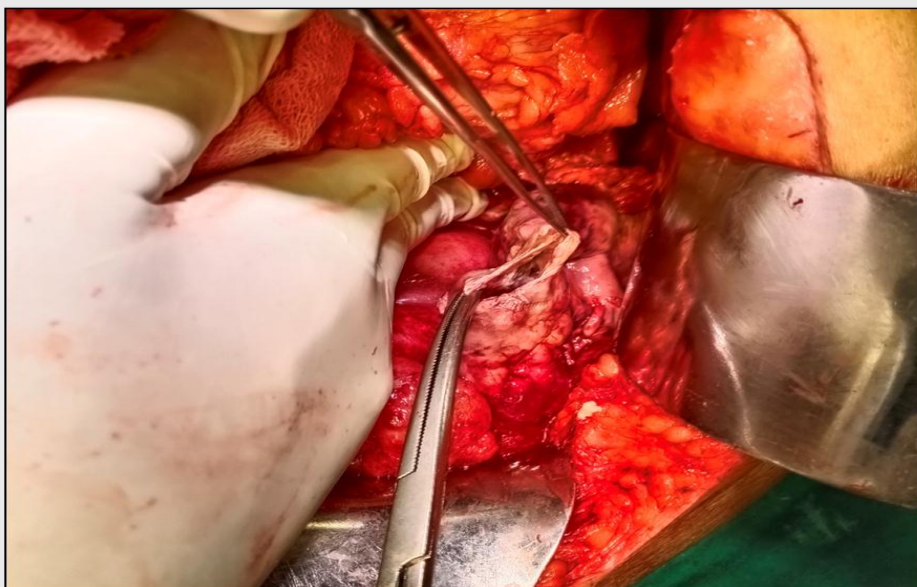


Figure 3: Intraoperative photo showing a ruptured bulla on the intraperitoneal wall of bladder with intact bladder

CONCLUSION

Emphysematous Cystitis is an extremely rare condition to present itself as air under the diaphragm with an intact bladder wall. This needs careful and detailed evaluation in the pre-operative phase after ruling out other likelier causes for the same to justify the need for a major operative intervention. In the scenario of the current pandemic, COVID-19 infections can be additional confounding factors requiring further detailed studies.

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