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Spontaneous Pneumothorax Mimicking Perforated Viscus in Covid-19 patient

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ORIGINAL

Abstract

Introduction: Spontaneous pneumothorax is an uncommon complication of COVID-19 viral pneumonia. We reviewed a case of spontaneous pneumothorax mimicking perforated viscus in COVID-19, which was managed non-surgically.

Case presentation: A 65-year-old female diagnosed with COVID-19 developed worsening respiratory distress requiring invasive ventilation. Chest radiography post-intubation revealed air under the diaphragm, pneumomediastinum and subcutaneous emphysema. Case was referred to surgical team for emergency laparotomy for suspected perforated viscus. Clinically, her abdomen was distended but there was no sign of peritonism. In view of high risk of perioperative morbidity and absent of peritonism, CT scan was done to rule out cause of pneumoperitoneum. CT scan showed bilateral pneumothorax, presence of air in extra peritoneum and retroperitoneum. There was no air in the peritoneum and no evidence of perforated viscus. She was treated conservatively with bilateral chest tube insertion. Unfortunately, she developed multiorgan failure and succumbed to death.

Discussion: This case demonstrates that COVID-19 patient can develop a large pneumothorax which presented with subcutaneous emphysema, pneumomediastinum and pneumoperitoneum mimicking perforated viscus. Spontaneous pneumomediastinum is a rare condition that occurred when alveolar rupture, followed by air dissection through bronchovascular sheath into the mediastinum. The passage of air from the thorax to the abdomen can occur due to the presence of anatomical orifices, especially in the weak areas of the diaphragm such as the posterolateral and parasternal area.

Conclusion: The diagnostic suspicion of non-surgical pneumoperitoneum in a COVID-19 patient is essential as it may lead to unnecessary laparotomy. This entity required thorough clinical and radiological evaluation because wrong diagnosis can cause perioperative morbidity and mortality.

keywords: COVID-19, Pneumothorax, Subcutaneous emphysema, Pneumoperitoneum

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Introduction

The Coronavirus disease 2019 (COVID-19) was identified on January 6, 2020 and was term 2019-nCOV. It was originated in bats and was transmitted from human to human in Huanan Seafood Market, Wuhan in late December 2019 (1). It had since infected more than 175 million individuals globally and approximately more than 650,000 individuals in Malaysia (2). The clinical features of COVID-19 are varied, ranging from asymptomatic to acute respiratory distress and can lead to multiorgan failure. Spontaneous pneumothorax is an uncommon complication of COVID-19 viral pneumonia. The exact risk factors and incidence are still unknown (3). We described a case of spontaneous pneumothorax mimicking perforated viscus in COVID-19, which was managed non-surgically.

Case presentation

63 years old female with a history of hypertension and type 2 Diabetes Mellitus presented with a week history of a chesty cough, lethargy and fever. Upon presentation, she was febrile, tachypneic, tachycardic and hypoxic requiring oxygen supplement via nasal prongs 3L per minutes. Her pulmonary examination revealed bibasal crepitation more on the right side of her lungs. Her blood work was concerning for lymphopenia and increased inflammatory markers. Absolute Lymphocyte counts (ALC) showed low in value (0.36). Chest radiography (CXR) showed consolidation of the bilateral lower zone Figure 1. She was diagnosed with COVID-19 disease based on PCR nasopharyngeal swab. She was started on an antibiotic (Piperacillin/Tazobactam) and corticosteroids (Dexamethasone). The patient was noted to be more tachypneic and hypoxic three days later. Blood gases done showed Type I Respiratory failure. She was intubated due to worsening respiratory acidosis and connected to mechanical ventilation. Post intubation CXR revealed the presence of air under the diaphragm, subcutaneous emphysema and pneumomediastinum Figure 2. Her abdomen was soft, non-tender, non-distended with normoactive bowel sounds. Clinically there was no sign of peritonism. Our surgical team was consulted to rule out perforated viscus in view of massive pneumoperitoneum.

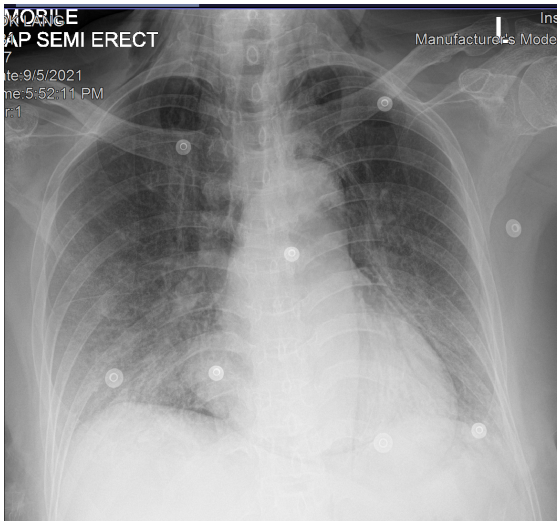

Figure 1. CXR on admission revealed consolidation of bilateral lower zone

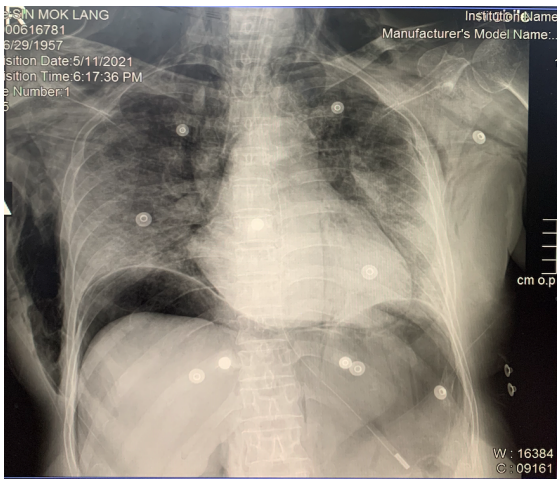

Figure 2. CXR post intubation showed presence of air under diaphragm,subcutaneous emphysema and consolidation of bilateral lung field.

In view of high risk for laparotomy and absent of peritonism, CT scan was done to rule out non-

surgical cause of pneumoperitoneum. CT scan of thorax, abdomen and pelvis showed extensive subcutaneous emphysema over the chest extending to the anterior abdomen, shoulder, neck and back. Presence of bilateral pneumothorax and pneumomediastinum with diffuse glass densities and patchy consolidation in both lungs. Air was seen extending into the extra-peritoneum and retroperitoneum. However, no free fluid was seen in the abdomen, pelvis and no leak of contrast was seen Figure 3 Figure 4. A decision was made to treat the patient conservatively due to the absence of evidence of viscus perforation clinically and radiologically.

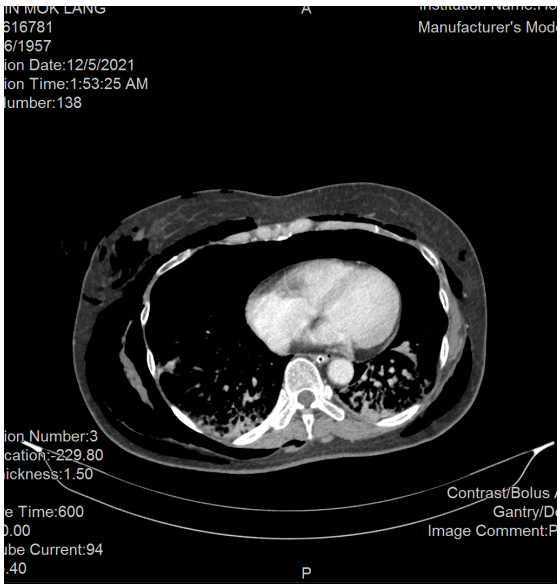

Figure 3. Extensive subcutaneous emphysema over the chest (more on right sided) extending into extra-peritoneum and retroperitoneum.

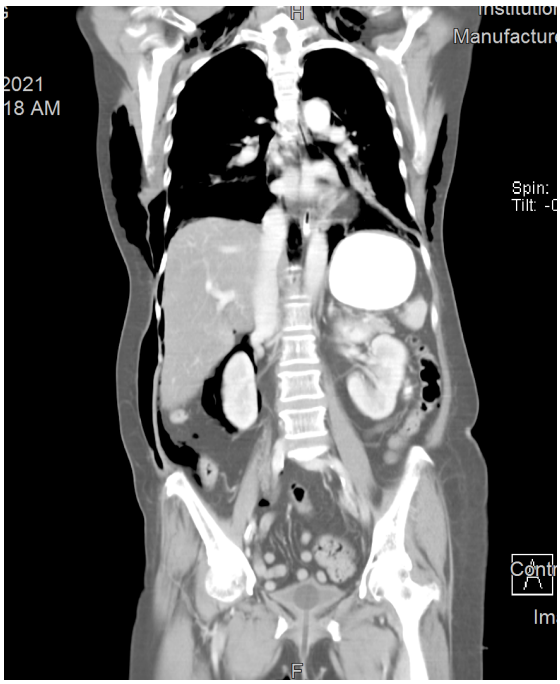

Figure 4. Extensive subcutaneous emphysema over the chest (more on right sided) extending into extra-peritoneum and retroperitoneum.

A bilateral chest tube was inserted via an open approach and connected to the underwater seal in a usual manner. CXR post chest tube insertion showed resolved air under the diaphragmFigure 5.

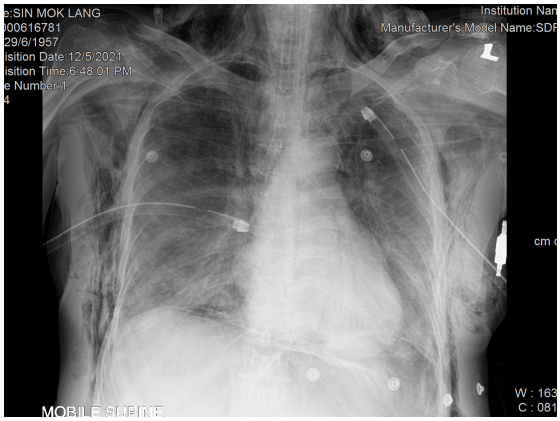

Figure 5. CXR post bilateral chest tube showed resolved air under diaphragm and resolving subcutaneous emphysema.

However, patient's condition did not improve, twenty days into her hospitalization, she was complicated with pneumonia, uncontrolled Diabetes Mellitus, liver transaminitis and lower gastrointestinal bleeding. Subsequently, she developed multiorgan failure and succumbed to death due to the worsening of respiratory distress syndrome and septic shock.

Discussion

The incidence of spontaneous pneumothorax in COVID-19 patient is not yet exactly known. Spontaneous pneumothorax is defined as the presence of air in the pleural space that is not caused by traumatic events or any precipitating factors (iatrogenic procedure or trauma), while secondary pneumothorax is a complication of pre-existing lung disease (4). Structural changes such as cystic and fibrotic changes that occurred in the lungs parenchyma that lead to alveolar tear were proposed to be the mechanism of spontaneous pneumothorax in COVID-19 patients (3). Increase intrathoracic pressure due to prolonged cough and mechanical ventilation also can precipitate spontaneous pneumothorax development (5).

Patients with COVID-19 infection can progress into acute respiratory distress syndrome (ARDS), characterized radiographically by ground glass appearance, evolving into consolidation changes and fibrotic changes later in stage (3). Gattini et al reported the incidence of pneumothorax is higher in patients with ARDS who are on mechanical ventilation for more than 2 weeks (6). Zantah et al identified 6 out of 902 (0.66%) patients who developed spontaneous pneumothorax in COVID-19 patients (3). Yang and colleague found that only one (1.1%) out of 92 deceased COVID-19 patients developed pneumothorax (7).

Pneumothorax is sometimes associated with pneumomediastinum, subcutaneous emphysema and pneumoperitoneum in COVID-19 patients. The passage of air from the thorax to the abdomen can occur due to the presence of anatomical orifices, especially in the weak areas of the diaphragm such as the posterolateral and parasternal area (8). Spontaneous pneumomediastinum is a rare condition that occurred when alveolar rupture, followed by air dissection through bronchovascular sheath into the mediastinum. Subcutaneous emphysema occurred when air gets into the tissue under the skin (6). In this case, the patient developed pneumothorax, subcutaneous emphysema and pneumomediastinum after intubation due to respiratory distress.

Pneumoperitoneum is a surgical emergency and is usually related to perforated viscus. More than 90% of the cases are surgical-related and the balance 10% is of nonsurgical etiology(7). Perforated viscus is usually diagnosed by the presence of air under the diaphragm on erect CXR. Laparotomy is usually considered when there is a presence of pneumoperitoneum because it is one of the signs of perforated viscus. In our patient, CXR post-intubation revealed air under the diaphragm, but clinically the abdomen was soft and there was no sign of peritonism. There are a few reported cases of bowel perforation in COVID-19 patients (9)(10)(11). Patient with COVID-19

is predispose to develop venous and arterial thromboembolic event and can lead to bowel ischemia and perforation (9). Thorough investigation such as CT scan thorax and abdomen is necessary to rule out non-surgical causes of spontaneous pneumoperitoneum to avoid unnecessary laparotomy and perioperative morbidity.

Treatment for spontaneous pneumothorax in COVID-19 patients associated with pneumomediastinum and pneumoperitoneum remains controversial due to the lack of clinical data. Wang et al managed their patient with a similar condition with a high flow nasal cannula and steroid therapy without chest tube insertion. The patient clinically improved with resolved pneumothorax, subcutaneous emphysema and pneumomediastinum (12). Gemio et al treated their patient conservatively due to the absence of abdominal signs. He was clinically stable and discharged home 42 days after admission (13). Munish sharma et al inserted a bilateral chest tube for their COVID-19 patient that develops non-surgical pneumoperitoneum. However, their patient succumbed to death due to the progression of the disease. They concluded that incidental findings of pneumoperitoneum on X-ray or CT may not be much of significance and such cases can be managed conservatively (14). Sun et al reported a case of a COVID-19 patient who developed mediastinal emphysema, giant bullae and pneumothorax which was also treated conservatively with a high flow nasal cannula and mechanical ventilation. Repeated CT scan on day 15 of conservative treatment showed disappearance of mediastinal emphysema and improvement in the pulmonary lesion (15).

In our case, the patient was treated conservatively by the insertion of a bilateral chest tube. Pneumoperitoneum on CXR resolved after chest tube insertion, however, subcutaneous emphysema remained. Serial x-ray done showed no improvement with increasing requirement of oxygenation. The patient finally succumbed to death due to multiorgan failure and septic shock.

Conclusion

Spontaneous pneumothorax in COVID-19 patients can lead to development of subcutaneous emphysema, pneumomediastinum and pneumoperitoneum. The diagnostic suspicion of non-surgical pneumoperitoneum in a COVID-19 patients is essential as it may lead to unnecessary laparotomy. This entity required adequate clinical, radiological and clinical evaluation because wrong diagnosis might lead to perioperative morbidity to patients and unnecessary COVID-19 exposure to operating team healthcare workers.

Conflict of interest

Authors declare no conflict of interest.

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