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Case report

Massive emphysema subcutis, pneumothorax, pneumomediastinum and pneumoperitoneum as uncommon complication of covid-19 pneumonia, a rare case ☆

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ABSTRACT

We should be aware of the uncommon presentation during the pandemic scenario of the Coronavirus disease 2019 (COVID-19). Pneumothorax, pneumomediastinum, pneumoperitoneum, and massive emphysema subcutis are uncommon complications of COVID-19 Pneumonia. The presence of pneumomediastinum and massive emphysema subcutis were rarely reported in the literature.

We present a 69-year-old man with COVID-19 Pneumonia with these complications who were managed conservatively and experienced spontaneous resolution of the complications two weeks later. He was admitted to the intensive care unit and was given a ventilator. Pneumonia, massive emphysema subcutis, pneumomediastinum, and pneumothorax are identified from chest X-ray. An Unenhanced thoraco-abdominal computed tomography Scan revealed the presence of a small pneumoperitoneum. However, a computed tomography scan of the abdomen and pelvis did not show any evidence of bowel perforation. It is necessary to detect these complications earlier, so the management can reduce the associated morbidity and mortality.

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Introduction

Coronavirus disease 2019 (COVID-19) is a highly infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and potentially causes fatal Pneumonia [13]. Chest X-Ray is a useful tool in identifying COVID-19 Pneumonia, although chest computed tomography (CT) is more sensitive [5,8,11]. CT is important in the follow-up for guiding management in patients with COVID-19 Pneumonia and worsening of the respiratory status [5,8,10,11].

The most common radiological features of COVID-19 Pneumonia are multifocal bilateral peripheral ground-glass areas and subsegmental patchy consolidation with subpleural location and predominant involvement of lower lung lobes, periphery, and posterior segments [3].

We performed a literature review of COVID-19 pneumonia cases that developed pneumothorax, pneumomediastinum, pneumoperitoneum with massive emphysema subcutis. Pneumothorax and pneumomediastinum are uncommon complications and represent high mortality (60%) [6]. Thus, it is necessary to detect these complications earlier, so the management can reduce the associated morbidity and mortality.

Case presentation

We herein present a case of pneumothorax, pneumomediastinum, massive emphysema subcutis, and pneumoperitoneum related to COVID-19 Pneumonia.

A 69-year-old man complained of fever (37.6°) and dyspnoea with wheezing sounds at auscultation.

Laboratory test showed normal leucocyte 7350 cells per μL , neutrophil 91.5%, decreased lymphocyte (5.7%) and thrombocyte (147000), C-reactive protein was elevated (217.2 mg/L). There was no history of diabetes mellitus, hypertension, COPD (Chronic Obstructive Pulmonary Disease) & cardiac problem.

The Chest x-ray on the first day shows bilateral Pneumonia (Fig. 1). Ten days later, the symptoms of the patient were worsening. The patient was admitted to the intensive care unit and was given a ventilator.

There were also abdominal distended and swelling of both scrota. The follow-up of chest X-ray showed a massive emphysema subcutis in bilateral supraclavicular & lateral chest walls, also a fine linear lucent in the mediastinum, supporting of pneumomediastinum (Fig. 2). Then the patient underwent CT Scan. Unenhanced thoraco-abdominal CT Scan revealed the presence of ground-glass opacities bilaterally on lung parenchyma, particularly in lower lobes, findings compatible with COVID-19 Pneumonia. Unfortunately, there were pneumomediastinum, pneumothorax, massive emphysema sub-

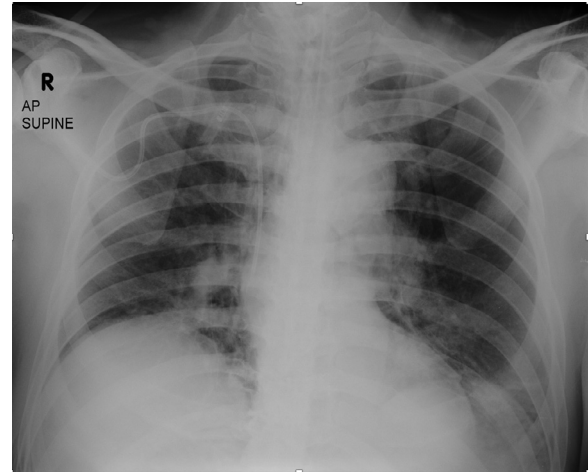


Fig. 1 – Chest X-Ray AP view on day 1 admission showing opacities at the right and left lower lobe region (blue arrow) of the lungs consistent with bilateral Pneumonia (color version of figure is available online.)

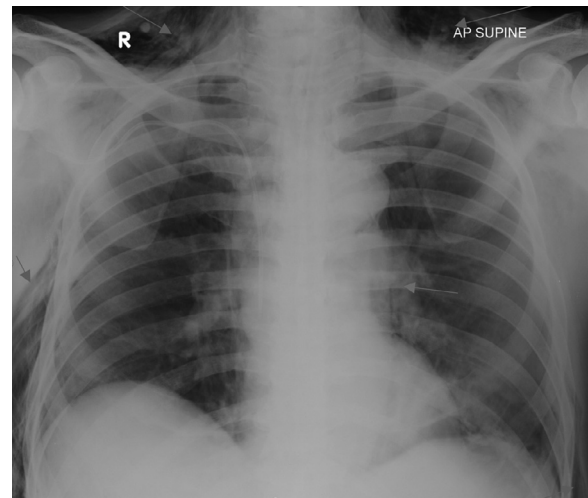


Fig. 2 – Chest X-Ray on day 10, showed a massive emphysema subcutis in bilateral supraclavicular & lateral chest walls (blue arrow), also a fine linear lucent area in the mediastinum, supporting pneumomediastinum (red arrow) (color version of figure is available online.)

cutis from supraclavicular region-lateral chest wall-anterior and lateral abdominal wall until the scrotal region. There was also a small pneumoperitoneum (Figs. 3 and 4). However, a CT scan of the abdomen and pelvis did not reveal any evidence of bowel perforation



Fig. 3 – On day 12, Thoraco-abdominal non-contrast CT scan was performed with 128 slices. A-J. On day 12, thoracoabdominal non-contrast CT Scan was performed with 128 slices, right upper pneumothorax (red arrow) pneumomediastinum (red arrow), pneumoperitoneum (green arrow), massive emphysema subcutis at the neck-supraclavicular region (red arrow), pneumomediastinum (red arrow), right hemithorax through the abdominal wall, and both scrotums were detected (red arrow) (color version of figure is available online.)

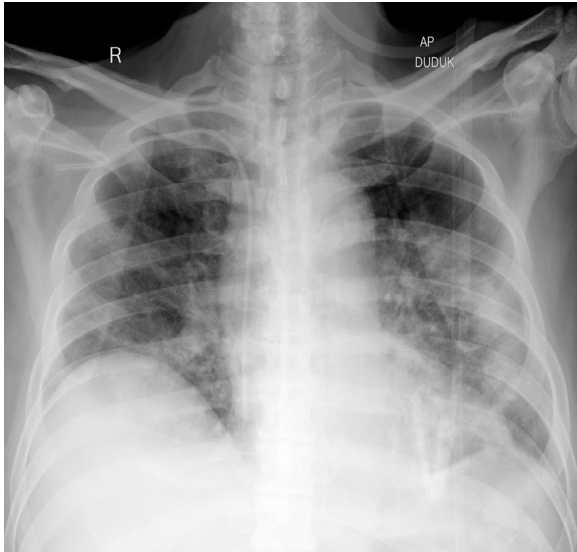


Fig. 4 – Chest X-ray on day 20 shows improvement, bilateral Pneumonia was still seen, and no more pneumothorax, pneumomediastinum, and emphysema subcutis were detected.

He was managed conservatively without chest tube insertion and had a spontaneous resolution of the complications two weeks later (Fig. 5)

Discussion

COVID-19 makes the alveoli more prone to rupture due to diffuse alveolar injury [1]. Rupture of the alveolar causes air leakage and interstitial emphysema. In the case of COVID-19 Pneumonia, a long-term increase in alveolar pressure will decrease alveolar-capillary blood supply, and impaired nutrition of lung tissue, especially those with a history of COPD, causes the elasticity and tolerance of the alveolar walls to weaken. Thus, patients with COVID-19 Pneumonia with a history of COPD are more prone to spontaneous pneumothorax [1,2,9,12] Recent case report, patients with COVID-19 pneumonia without ventilation were unable to show pneumomediastinum and pneumothorax [6].

The use of a mechanical ventilator causes complications of pneumothorax, mediastinal emphysema, and subcutaneous emphysema [2,9,12]. The pressure in the respiratory tract is very high, which can increase the pressure gradient between the alveoli and the surrounding tissue, leading to alveoli rupture, resulting in interstitial emphysema and leading to pneumothorax. At the same time, because the average pressure in the mediastinum is lower than that of the surrounding parenchyma, gas enters the mediastinum, causing a pneumomediastinum [9]. In chronic obstructive pulmonary disease patients, due to increased airway resistance, positive pressure from the ventilator sends gas to the lungs when inhaled

[2]. The internal transmural pressure of the pulmonary bullae increases with expiration, which can result in rupture and pneumothorax. Meanwhile, subcutaneous emphysema can be caused by an inaccurate endotracheal intubation process, which can cause damage to the tracheal wall [12]

Pneumoperitoneum has many causes, including hollow viscus rupture, abdominal trauma, abdominal procedures or surgery, bacterial peritonitis, intestinal pneumatosis, and malignancy [7]. Hollow viscus perforation accounts for more than 90% of pneumoperitoneum requiring immediate intervention, and the rest is due to non-surgery [4]. Among these causes are mechanical ventilation, cardiopulmonary resuscitation, and pneumothorax [7]. High barro pressure during mechanical ventilation is the most common cause of nonsurgical pneumoperitoneum [4]. The presence of an anatomical orifice, particularly in a weak area of the diaphragm, such as the posterolateral or parasternal, may explain air passage from the thorax to the abdomen [4,7]. With the correct diagnosis and precise imaging, these nonsurgical causes can be immediately carried out conservative management. Our patient was also found to have abdominal distended and swelling of both scrota so that a thoracoabdominal CT evaluation was performed, identified pneumoperitoneum as an additional finding. After placing the chest tube, the abdomen softened, gradually up to 2 weeks, and the pneumoperitoneum improved.

In our patient, there were no features were suggesting gastrointestinal perforation, such as nausea, vomiting, diarrhea, abdominal pain, or hemodynamic instability. This concludes that the immediate finding of complications of COVID-19, which include Pneumothorax, pneumomediastinum, massive emphysema subcutis, and pneumoperitoneum on X-ray or CT scan can help clinicians plan further therapeutic management, thus saving the patient.

Conclusion

Pneumothorax, pneumomediastinum, massive emphysema subcutis, and pneumoperitoneum are uncommon complications of COVID-19 Pneumonia, especially in patients treated on a ventilator or with a history of COPD. The immediate finding of these complications of COVID-19 on X-ray or CT scan can help clinicians plan further therapeutic management.

Patient consent

No consent was obtained for this case report as this is a retrospective study with no patient identifiers.

Formal consents are not required for the use of entirely anonymized images from which the individual cannot be identified, for example, x-rays, ultrasound images, pathology slides, or laparoscopic images, provided that these do not contain any identifying marks and are not accompanied by text that might identify the individual concerned.

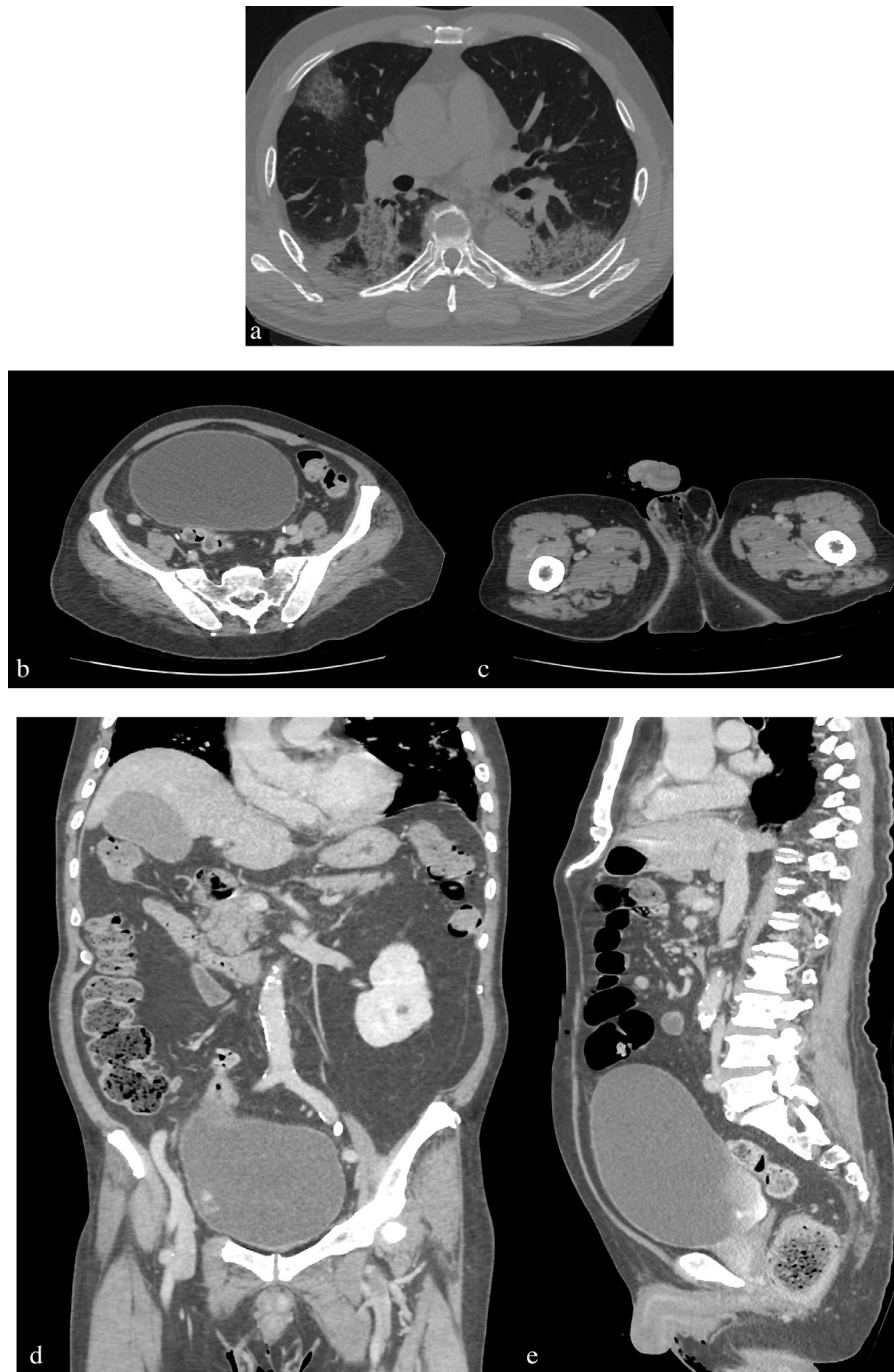


Fig. 5 – Thoraco-abdominal CT Scan on day 26. 5A-E Bilateral viral Pneumonia was still seen with improvement. No more emphysema subcutis at the thoracic wall nor abdominal wall were detected. Only minimal emphysema subcutis were still seen at both scrotal regions.

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