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Case Report
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Extra-Pulmonary Extravasation of Air, a Rare Complication of COVID-19 Pneumonia: A Case Report

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Abstract

Since it was first discovered in Wuhan China in November 2019, more complications have been associated with COVID-19 pneumonia. We report a case of an incidental X-ray finding of small spontaneous pneumothorax, pneumomediastinum and pneumoretroperitoneum in a patient with no significant risk factors and were managed conservatively.

Abbreviations

COVID-19: Coronavirus Disease-19; CPM: Cycles Per Minute; WBC: White Blood Cells; ARDS: Acute Respiratory Distress Syndrome

Introduction

The novel coronavirus, SARS-CoV-2, was declared a pandemic by the World Health Organization (WHO) on the 11th of March 2020 with over 5 million reported cases and 330,000 deaths to date [1]. There are a few reported cases of severe COVID-19 pneumonia complicated by spontaneous pneumothorax and spontaneous emphysema, though a concurrent pneumoretroperitoneum is rare [2,3]. We report a case of severe COVID-19 pneumonia complicated by spontaneous pneumothorax, pneumomediastinum, subcutaneous emphysema, free lateral abdominal wall gas and pneumoretroperitoneum.

Case Presentation

A 70-year old Asian woman with a medical history of uncontrolled diabetes, hyperlipidemia, right breast cancer and a remote surgical history of breast mass excision and cholecystectomy presented with subjective fever, chest pain, myalgias and dyspnea of week duration.

On admission, temperature was 98.5 F with a respiratory rate of 19 cpm and oxygen saturation, on 3 L of oxygen, was 91%. She had normal basic metabolic profile, her complete blood count revealed WBC: 3.2 k/mm^3 with a lymphocyte count of 0.6%, hemoglobin: 13.2 g/dl, platelets: 191 k/mm^3, lactate: 1.2 mmol/l. Her nasopharyngeal swab test was negative for *Influenza* A and B virus but positive for SARS-CoV-2. She had a chest CT scan which showed lateral ground glass opacities with consolidations. Patient was started on ceftriaxone (1 g, i.v., Q d) and azithromycin (500 mg i.v., Q d). Twenty-four hours after admission, she was in acute hypoxemic respiratory failure requiring intensive care. She was initially started on supplemental oxygen through high flow nasal cannula but was subsequently intubated and placed on a mechanical ventilator at a setting of 60% FiO_2 and a Peak End Expiratory Pressure (PEEP) of 10 mmHg. She developed Acute Respiratory Distress Syndrome (ARDS) requiring an increase in FiO_2 to 70%, PEEP to 15, and proning per protocol. She additionally received hydroxychloroquine (500 mg p.o Q d) and remdesivir (100 mg p.o Q d). About nine days post intubation, a routine follow-up chest radiograph showed small right pneumothorax, pneumomediastinum and extensive soft tissue emphysema of the neck (Figure 1a, 1b and 2). An abdominal radiograph was positive for air in the retroperitoneum and the lateral abdominal wall, without clinical evidence of trauma and organ perforation (Figure 1a). She appeared hemodynamically stable and a decision was made to manage conservatively with a close monitoring of her vital signs and daily radiographs with complete resolution of the extrapulmonary air collections seven days later. She however required tracheostomy prior to discharge (Figure 3a, 3b).

Discussion

The severity of COVID-19 acute respiratory disease ranges from mild to very severe [3]. Clinical presentation includes fever, cough, and shortness of breath and in severe cases can be complicated by

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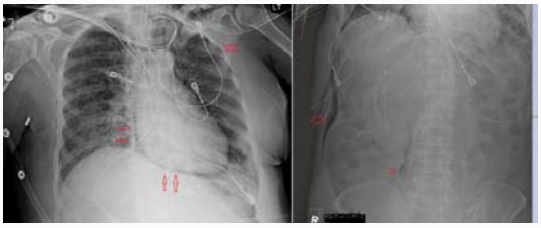

Figure 1: a) Chest X-ray showing an 8.5 mm left pneumothorax and pneumomediastinum. b) Abdominal X-ray showing gas tracking in the right lateral abdominal wall as well as gas in the right retroperitoneum presumably along the psoas muscle.

Figure 2: Chest X-ray showing subcutaneous emphysema overlying the left chest and neck, right sided pneumothorax and pneumomediastinum.

Figure 3: a) Chest X-ray on day 7 showing resolution of the pneumothorax, subcutaneous emphysema and pneumomediastinum. b) Abdominal X-ray showing resolution of the pneumo-retroperitoneum and free air in the lateral abdominal wall.

ARDS and coagulopathies. A chest CT is an important diagnostic tool with the most common finding being peripheral and basal ground glass opacities in the lower lobes [4]. Lymphopenia is also commonly seen in severely ill patients [5].

The incidence of pneumothorax among 52 COVID-19 patients in Wuhan China was 2% [5]. Concurrent pneumothorax, pneumoperitoneum and subcutaneous emphysema and pneumoretroperitoneum is rare [2,3]. Some of the risk factors include COPD, severe asthma, trauma to the esophagus or intra-abdominal organs and a history of smoking [2,6,7]. Our patient had no known risk factors. A possible mechanism for the collapsed lung is alveolar rupture resulting from diffuse alveolar injury and elevated intra-alveolar pressure, as well as the elevated peak expiratory pressures [2,6]. The free air in the thorax dissects along peribronchovascular interstitial sheaths, interlobular septa and the visceral pleura into the mediastinum (Macklin effect) and further pass through the aortic and esophageal hiatus of the diaphragm into the retroperitoneum and lateral abdominal wall [6,8].

Diagnosis is made both clinically and radiologically. Plain X-ray imaging is inexpensive and non-invasive, with need for CT scan mostly in cases where the airspaces are small and not detected on plain radiographs [9]. Conservative management is first line of treatment for otherwise hemodynamically stable patients [10]. This requires close monitoring of vital signs and serial radiographs in other to promptly pick up life-threatening complications such as tension pneumothorax and ischemic bowel, with a low threshold to convert to a more aggressive therapy. In severe cases, a tube thoracostomy or pleurodesis (medical and surgical) may be required [4]. Previous studies report resolution within 1-2 weeks, as seen in our patient at one week [11]. Recurrence rates after conservative management is minimal [12].

Conclusion

Extra-pulmonary extravasation of air is a rare occurrence in patients with COVID-19 pneumonia which can be safely managed conservatively in otherwise stable patients. Early diagnosis and prompt treatment of complications associated with severe COVID-19 is necessary to reduce mortality.

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