Case Report

Airleak Syndrome Like Spontaneous Subcutaneous Emphysema, Pneumomediastinum and Pneumothorax as Presenting Signs of Corona Virus Pneumonia - A Case Series

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Abstract

Spontaneous subcutaneous emphysema, pneumothorax, and pneumomediastinum are rare entities as the initial presentation of coronavirus infection in patients without positive pressure ventilation. This case series presents five cases of COVID-19 pneumonia who presented with alveolar air leak syndrome without prior invasive or noninvasive ventilation and high-flow nasal cannula oxygenation. Two patients presented with surgical emphysema, two with pneumothorax, and one with pneumomediastinum. This series included 30–50-year-old nonsmokers (three males and two females) with no previous history of any comorbidity and smoking who came to the emergency with symptoms such as cough, breathing difficulty, and respiratory distress. The COVID-19 infection was diagnosed by reverse transcriptase-polymerase chain reaction test for severe acute respiratory syndrome coronavirus 2. Chest X-ray and computed tomography showed diffuse multifocal ground-glass infiltrates, interlobular septal thickening, and infiltration in all patients. Three patients had subcutaneous emphysema, two had pneumothorax and pneumomediastinum, and one had pneumomediastinum. Three patients later on required invasive mechanical ventilation. Alveolar air leak syndrome including spontaneous pneumomediastinum, pneumothorax, and subcutaneous emphysema is rarely seen as the initial presentation of coronavirus pneumonia but may develop after positive pressure ventilation.

Keywords: COVID-19, pneumothorax, spontaneous pneumomediastinum, subcutaneous emphysema

Introduction

The first patient of COVID-19 in India was detected on January 30, 2020. As per the WHO, in India, current numbers stand at 43,236,695 cases and 524,777 deaths till June 14, 2022.[1] Subcutaneous emphysema and pneumomediastinum have been seen in patients with viral pneumonia as a result of mechanical ventilation; these conditions usually are not seen in nonventilated patients. Air leak syndrome like subcutaneous emphysema, pneumomediastinum, and pneumothorax can occur in COVID-19 patients who are mechanically ventilated due to volutrauma or barotraumas.

The symptoms of the infection are fever, dry cough, fatigue, and muscle pain. Few patients present with pulmonary complications and hypoxemia that can rapidly progress to acute respiratory distress syndrome, respiratory failure, and consequently multiple organ failure, leading to death.[2] This report presents five cases of air leak syndrome without prior invasive or noninvasive ventilation and high-flow nasal cannula oxygenation.

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Case Report

Patient 1

A female patient of 48 years had a history of cough for 2 days and difficulty in breathing for the last 1 day. Her heart rate was 90/min, arterial blood pressure noninvasive was 110/70 mmHg, and SpO_2 was 78% with air and increased to 90% with 10 L of oxygen by facemask. COVID-19 infection was detected by

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reverse transcriptase-polymerase chain reaction (RT-PCR). Chest film showed bilateral diffuse infiltrates and pneumothorax on the left side. Computed tomography (CT) scan of the chest showed multifocal ground-glass opacities (GGOs), interlobular septal thickening bilaterally, and large pneumothorax in the left side [Figure 1]. Immediately, intercostal drain was inserted in the left hemithorax to drain the air. CT severity index (CTSI) was 24/25. On day 2, her oxygen level started to decrease even on nonrebreathing mask and required positive pressure ventilation. On 6th day, she had fall in SpO_2 and blood pressure which required high inotropic support. She could not be revived with cardiopulmonary support.

Patient 2

A 50-year-old female with no comorbidities had a history of cough for 4 days, severe difficulty in breathing, and subcutaneous crepitations. Coronavirus infection was detected by RT-PCR. Chest X-ray showed right subcutaneous emphysema and peripheral opacities [Figure 2]. CT chest showed diffuse GGO, interlobular septal thickening bilaterally, and subcutaneous emphysema on the right side. CTSI was 20/25. Her heart rate was 120/min, arterial blood pressure noninvasive was 130/90 mmHg, and SpO_2 was 82% on nonrebreathing facemask. She was moved to intensive care unit (ICU) where she required mechanical ventilation. On day 10, tracheostomy was done and intermittent weaning was started. On day 18, she had sudden fall in SpO_2 level followed by bradycardia and asystole but could be revived with resuscitation.

Patient 3

A 30-year-old male had fever for the past 5 days and breathing difficulty for the past 1 day. He had hypoxia. He was positive for COVID-19 infection. He was received from outside center. Chest film showed bilateral opacities along with subcutaneous air on the left side [Figure 3]. CT chest showed infiltrates and atelectatic changes bilaterally with subcutaneous emphysema. CTSI was 20. He required ICU admission as he had severe hypoxia that needed high-flow oxygen inhalation and other supportive therapy. There was gradual improvement in his condition. He was discharged from hospital on day 15.

Patient 4

A 49-year-old male had fever for the past 3 days and breathing difficulty and cough for the past 2 days. COVID-19 infection was detected by RT-PCR. Chest film showed bilateral infiltrates, subcutaneous air, and pneumomediastinum. CT chest showed diffuse infiltrates bilaterally with a CTSI of 25, subcutaneous emphysema, and pneumomediastinum [Figure 4]. He had SpO_2 of 70% on high-flow nonrebreathing mask at 15 L oxygen along with retention of carbon dioxide. The patient required intubation and invasive ventilation. Bilateral intercostal drain was inserted prophylactically. On day 22, his condition worsened with desaturation followed by asystole and could not be revived after resuscitation.

Patient 5

A 40-year-old male had a history of fever for the past 3 days and breathing difficulty and dry cough for the past 2 days. RT-PCR confirmed the COVID-19 infection. Chest X-ray showed pneumomediastinum [Figure 5]. CT scan of the chest showed

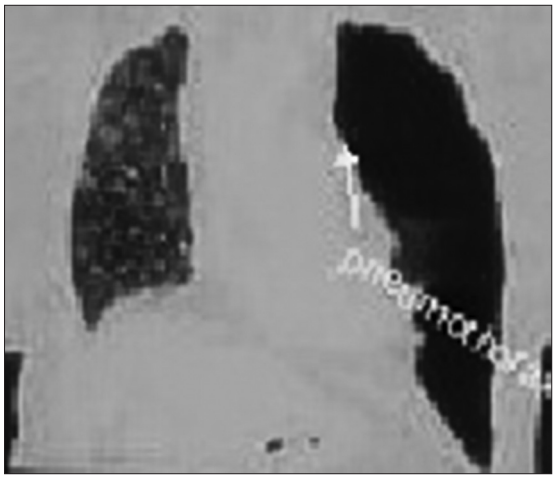

Figure 1: High-resolution computed tomography chest - white arrows showing large pneumothorax on the left side

Figure 2: Chest X-ray posteroanterior view - white arrow indicating subcutaneous emphysema on the right side

Figure 3: Chest film posteroanterior view - white arrow showing subcutaneous emphysema on the left side

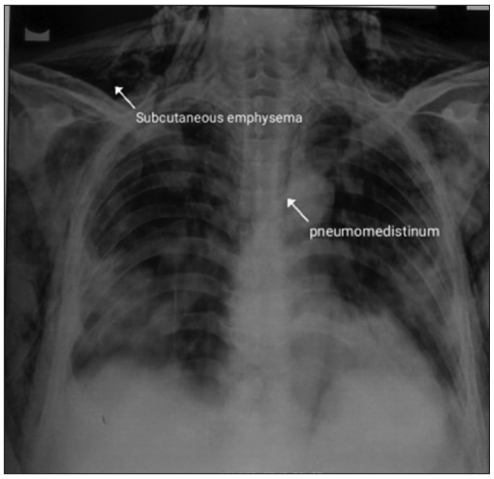

Figure 4: Chest X-ray posteroanterior view - white arrows showing subcutaneous emphysema (above) and pneumomediastinum (below)

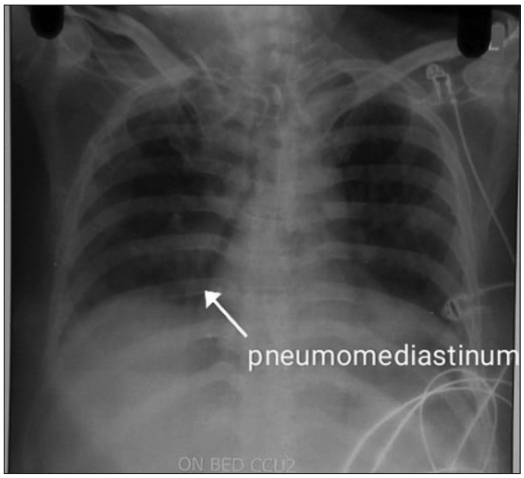

Figure 5: Chest X-ray posteroanterior view white arrow showing pneumomediastinum

diffuse areas of infiltrates, interlobular septal thickening bilaterally with CTSI of 17, and mild pneumomediastinum. He had SpO_2 of 90% on high-flow nonrebreathing mask at 10 L oxygen. On day 12, he was discharged in stable condition and no oxygen requirement.

Discussion

This article describes a case series on presentation of COVID-19 infection in the form of spontaneous surgical emphysema, pneumothorax, and pneumomediastinum, with no previous history of smoking and mechanical ventilation. These complications commonly occur due to increased intrathoracic pressure due to mechanical ventilation or obstruction of the airway, Valsalva maneuver, strenuous activity, traumatic injury to thorax, esophageal tear, tracheobronchial injury, etc.[3] None of our patients had above conditions and the air leak syndrome was diagnosed radiologically before any intervention; we believe these are a sequelae of COVID-19 infection rather than due to barotrauma. The possible mechanisms in these cases may be diffuse alveolar membrane damage due to severe COVID-19 infection, and this may lead to alveoli rupture.[4] Patients in this series had a history of cough that can lead to barotrauma and alveolar rupture. This can cause pneumomediastinum due to dissection of air along bronchovascular sheath. The air in the interstitial space dissects into the subcutaneous tissues, pleural space, and mediastinum.[5] Spontaneous alveolar air leakage is a rare phenomenon seen after viral pneumonia. Previous studies reported this phenomenon in 11.6% of patients with severe acute respiratory syndrome outbreak;[6] recent study has reported an incidence of 0.72% in cases of COVID-19 infection.[7] Subcutaneous emphysema most commonly occurs in tracheal lacerations along with other signs such as pneumomediastinum, pneumothorax, dyspnea, dysphonia, cough, and hemoptysis.[8] Chest X-ray is used as a standard to diagnose air leak syndrome such as pneumomediastinum; a lateral film is must to diagnose, otherwise one may miss this condition.[9] CT is the investigation of choice to detect subcutaneous air, pneumothorax, pneumomediastinum, pneumopericardium, tracheobronchial injuries, and pulmonary parenchymal changes of COVID-19.[10]

Conclusion

Air leak syndromes are not common finding in COVID-19 pneumonia, which can be a sign of poor prognosis for the patient. These can increase morbidity, mortality, and duration of hospitalization. Pneumomediastinum, pneumothorax, and subcutaneous emphysema may be seen as initial presentation of COVID-19 infection if other causes of air leak syndrome are excluded.

Declaration of patient consent

The authors certify that they have obtained appropriate consent from patients. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be taken to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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