

CASE REPORT

CASE OF PNEUMOMEDIASTINUM AND SURGICAL EMPHYSEMA IN A PATIENT WITH COVID-19 PNEUMONIA, ON CPAP

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An unusual case of a 35-year-old woman with COVID-19 pneumonia who suddenly desaturated while on continuous positive airway pressure leading to pneumomediastinum and surgical emphysema thereby requiring ventilatory support in intensive therapy unit. It is unclear from history and clinical assessment; whether this complication was directly related to COVID-19 pneumonia and it worsened with the initiation of CPAP, OR it was a direct complication of CPAP.

Keywords: Pneumomediastinum; Surgical Emphysema; COVID-19 Pneumonia; CPAP

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INTRODUCTION

Pneumomediastinum and subcutaneous emphysema are usually self-limiting and managed conservatively with close clinical and radiological monitoring.¹ In severe cases of pneumomediastinum, patients may require high flow oxygen or surgical intervention like VATS or decompression thoracotomy² while in subcutaneous emphysema, skin incision and drainage can be performed.

CASE REPORT

A 35-year-old woman with background history of well controlled asthma on inhalers (Beclometasone with formeterol, and salbutamol), initially presented to A&E with cough, fever and mild shortness of breath on exertion. After clinical assessment and baseline investigations including COVID-19 swab (result awaited), She was deemed stable to be discharged with advice to self-isolate. She re-presented four days later to A&E with worsening symptoms and severe shortness of breath. Physical examination revealed oxygen saturations of 89% on room air, improving to 97% on 3L/min oxygen, respiratory rate was -16/min, pulse 92/min and blood pressure-118/78 mmHg. Chest exam demonstrated fine bi-basal crackles.

Her initial investigations showed, raised white cell count at $11.1 \times 10^9/L$ with neutrophil count of $9.57 \times 10^9/L$, normal lymphocytes of $1.14 \times 10^9/L$ and markedly elevated CRP of 179 mg/L. COVID-19 swab (sent on initial presentation) had now returned as positive. Arterial blood gas on admission (on air) revealed type 1 respiratory failure with pO_2 6.3kPa. Chest X-ray showed right basal infiltrates (Figure-1). She was admitted for observation and oxygen therapy. Her overnight oxygen requirement increased to 15L/min. She was commenced on oral Clarithromycin and IV Ceftriaxone (Penicillin allergy) as per Trust guidance to treat a diagnosis of COVID19 with presumed bacterial superadded infection. On day two of admission, her SaO_2 further dropped while she was on

15L of O_2 and was commenced on Continuous positive airway pressure (CPAP). She was started on positive end expiratory pressure (PEEP) of 7.5cm H20 with an inspired oxygen.

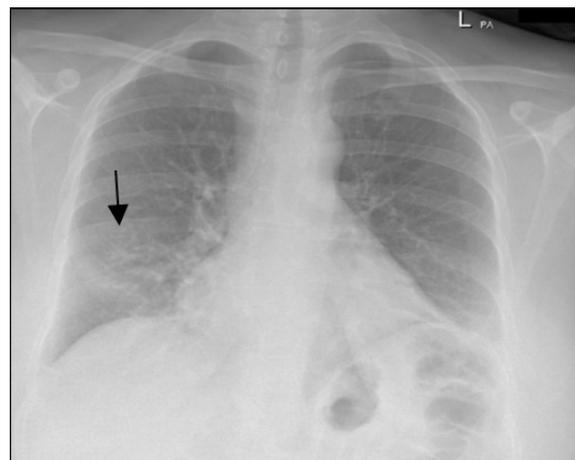


Figure-1: X-ray chest on first day of admission, showing right basal infiltrates

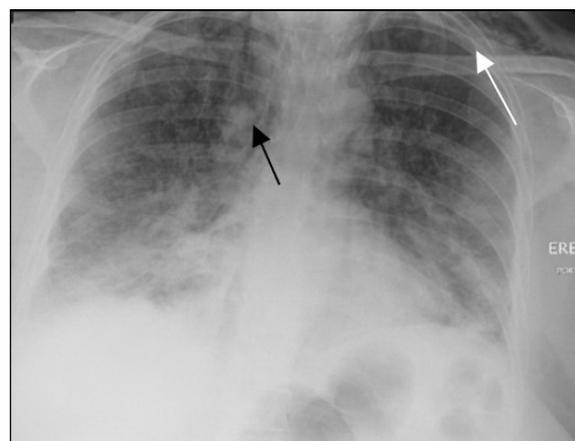


Figure-2. X-ray chest Showing pneumomediastinum (black arrow) and surgical emphysema (white arrow) on Day 6.

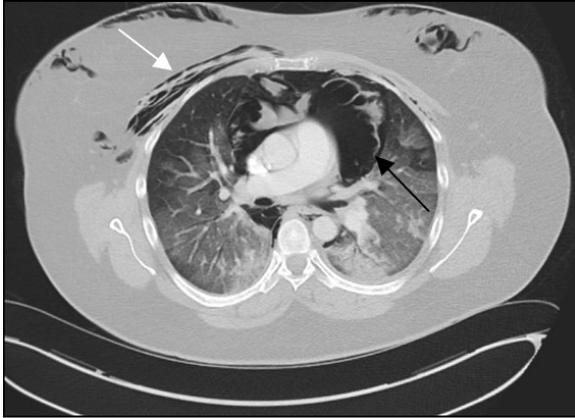


Figure-3: CT chest showing pneumomediastinum (black arrow) and surgical emphysema (white arrow)

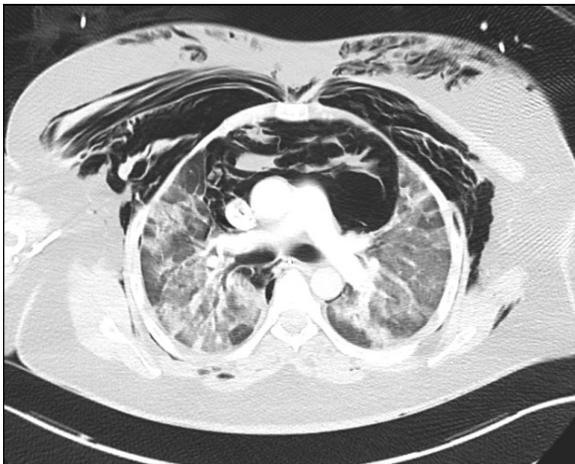


Figure-4: Worsening pneumo-mediastinum and surgical emphysema.

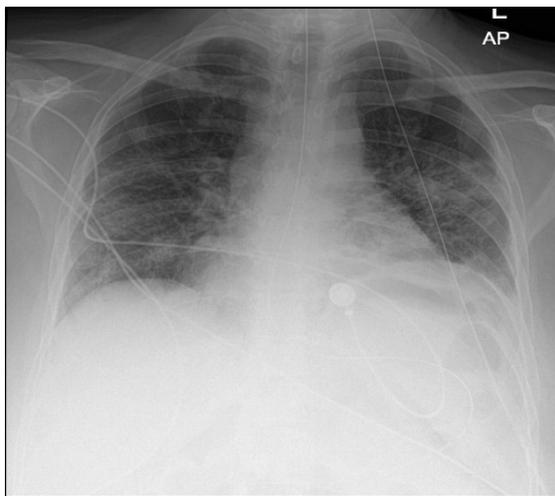


Figure-5: X-ray chest after extubation, showing resolution of surgical emphysema and pneumomediastinum

Concentration (FiO_2) of 60% which was increased to 10cmH₂O and 90% O_2 by day four of admission. Patient continued to maintain O_2 saturation of >92%, until day 6 when she suddenly dropped SaO_2 to 80%. A repeat CXR (Figure-2) showed changes suggestive of surgical emphysema and pneumomediastinum. CT chest (Figure-3) confirmed the diagnosis. This was discussed with Thoracic surgical team who recommended conservative management. PEEP was reduced to 5cm with 90% of oxygen.

By day 9 of admission, the patient was unable to maintain oxygen saturation despite receiving high flow oxygen and the decision was made to intubate and ventilate her on intensive care. Antibiotics were changed to Meropenem and she was also started on IV hydrocortisone. While on ventilation in ITU, she further deteriorated with increasing oxygen requirements which prompted a CT pulmonary angiogram (CTPA) to investigate for pulmonary embolism. The CTPA was negative for emboli but did show worsening surgical emphysema and pneumomediastinum (Figure-4). Management was continued by optimising ventilation setting and supportive care with judicious use of proning. Her peak inspiratory pressures were maintained between 26 and 34, while positive end expiratory pressure (PEEP) was optimized between 4 and 12. The patient was managed in ITU for a total of 21 days following which, she was successfully extubated, stepped down to HDU and subsequently transferred to ward while maintaining oxygen saturation of 96% on 2L via nasal cannula.

She was successfully weaned off oxygen and a repeat CXR (Figure-5) showed complete resolution of pneumomediastinum and surgical emphysema. She was discharged to community Rehab hospital.

DISCUSSION

Pneumomediastinum is the presence of air in the mediastinum as a result of alveolar rupture thought to be caused by an increase in intrathoracic pressure, followed by air dissection through the broncho-vascular sheath into the mediastinum.³ Surgical emphysema is the presence of air in the subcutaneous layer of skin. Both of these conditions have similar risk factors including underlying primary pulmonary disease such as asthma, chronic obstructive pulmonary disease (COPD), interstitial lung disease (ILD), lung cancer and lower respiratory tract infection.⁴

Presentation varies from asymptomatic to severe respiratory distress which can lead to haemodynamic collapse and may result in death. Physical signs in pneumomediastinum include tachypnoea, hypoxia, tachycardia, hypotension and

occasionally crunching sound during cardiac auscultation (also known as Hamman's sign) whereas in surgical emphysema skin swelling and crepitus while palpating the chest wall can be felt. First line investigation is CXR which would show air in mediastinum and subcutaneous tissue. CT chest would confirm the diagnosis of these conditions if small or not obvious on the xray.⁵

We have presented a rare case of pneumomediastinum with surgical emphysema in a patient presenting with COVID-19 requiring CPAP. This case highlights that, rapid deterioration in a patient with COVID 19 should warrant urgent imaging to look for such complication. Sharing experience about management of this case will contribute to further discussions about best management options including intubation versus consideration for ECMO. In this case, joint decision was to intubate and ventilate the patient, which proved successful. It is unclear from history and

clinical assessment; whether this complication was directly related to COVID-19 pneumonia and it worsened with initiation of CPAP, OR it was a direct complication of CPAP. To elaborate this further, we need similar case reports and case series to reach a consensus on patho-physiology and the best line of management.

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