

Subcutaneous Emphysema Complicated by COVID-19 Infection: Case Report and Literature Review

Dr. Mahmoud Sulub Alsomali
Emergency Consultant
Program Director of Emergency Medicine
Emergency Department
General Hospital , King Saud Medical City Riyadh,Saudi Arabia

Cisco:011-8371777 Ext :70015
Dr. Mazi Mohammed Alanazi
Emergency Resident
King Saud Medical City
Riyadh ,Saudi Arabia
Cisco:011-8371777 Ext:70012

Dr. Osama M Binbakheet
Emergency Resident
King Saud Medical City
Riyadh ,Saudi Arabia
Cisco:011-8371777 Ext:70012

Dr. Dina Hafeth Alauoti
Medical Intern
Dar Aluloom University
Riyadh , Saudi Arabia

Abstract

Background:

Subcutaneous emphysema is a complication that resulted in severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pneumonia that needs prompts and finds the causes of it.

Case presentation:

Herein, we describe a 47 years old male with COVID 19 who was admitted to the ICU and developed subcutaneous emphysema. His oxygen saturation (SaO₂) was 86% and required supplemental oxygen, where he was improved to 95%. The chest X-ray shows bilateral lung infiltrates and diffuses subcutaneous emphysema in the subcutaneous tissues of the chest, and he was recommended for intubation and thoracostomy tube for treatment. The subcutaneous emphysema was canulated and developed right plural effusion and drained almost 30 cm³ of blood complicated with pneumothorax. The pneumothorax resolved, but still, there is plural effusion, the big tail was removed, and a new chest tube was inserted posterior and anterior plural effusion, despite two chest tubes the patient did not resolve, chest X-ray was done and showed bilateral plural effusion and pneumothorax.

Keywords:- COVID-19, SARS-CoV-2, Complication, Subcutaneous Emphysema,

I. INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disorder reported firstly in Wuhan in December 2019. It is produced by the 2019 new coronavirus (severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]) and has been recently

declared a global pandemic by the World Health Organization [1].

At hospital admission, the most common symptoms of COVID-19 are fever, cough, and shortness of breath. Abdominal pain, myalgia, diarrhea, sore throat, fatigue, and loss of smell are other possible symptoms. The diagnosis depends mainly on real-time reverse transcription-polymerase chain reaction (rRT-PCR) from a nasopharyngeal swab. [2]

Subcutaneous emphysema (SE) happens when gas or air infiltrates the subcutaneous skin layer. The most common reasons include recent trauma, surgical methods, pneumothorax, barotrauma, and infections. On investigations, chest X-ray (CXR) and CT scan may provide identification of intermittent areas of radiolucency or dark pockets in the subcutaneous tissue indicating the presence of gas [3]. Herein we present a rare case of 47 years old male with a COVID-19 infection that complicated with subcutaneous emphysema.

II. CASE PRESENTATION

Forty-seven years old male, who was medically free and newly diagnosed with COVID- 19, went to another hospital as the second visit, where he was admitted with shortness of breath suddenly constant with productive cough without sputum,. During the hospital admission to the intensive care unit ICU, he was complicated by a subcutaneous emphysema. Then he was admitted to our hospital with developed concomitant pneumothorax.

Regarding his history; he denied fever, weight change, fatigue, chest pain, palpitations, oedema, syncope, orthopnoea, nausea, vomiting, dysphagia, abdominal pain, headaches, oliguria, polyuria visual changes, motor or sensory disturbance,

confusion, trauma, or rashes. He does not consume alcohol, smokes tobacco, or use recreational drugs. He doesn't have a history of co-morbidities, surgeries, allergies, medications, family, nor travel.

On examination, the blood pressure was 115/71, respiratory rate was 12 breaths per minute, the temperature was 37.1° c, and glucose concentration was 25.9. His oxygen saturation (SaO₂) was 86% and required supplemental oxygen. He was put on respiratory distress desating by nasal cannula at an oxygen flow of 6 L/minute and O₂ at 100% on a non-breather 8ISL mask, which improved to 95%. The lung examination revealed chest decrease air entry on right side bilateral crepitation, cardiac s1+s2+0. The abdominal X-ray showed Abdomen soft and lax, no tenderness, no pitting edema, neuro power and tone, and reflexes intact. The chest X-ray shows bilateral lung infiltrates and diffuses subcutaneous emphysema in the subcutaneous tissues of the chest (Figure 1). Depending on these examinations, the patient was diagnosed as subcutaneous emphysema complicated SARS-CoV-2 pneumonia case, and he was recommended for intubation and thoracostomy tube for treatment.

He was intubated in our hospital after two hours upon arrival, due to bilateral extensive surgical subcutaneous emphysema. Five days later, patient was canulated, and extracorporeal membrane oxygenation (ECMO) support hemodynamics stable on moderate ventilator setting developed right plural effusion for which big tail was inserted and drained almost 30 cm³ of blood, complicated with pneumothorax and chest tube was inserted. The pneumothorax resolved, but still, there is plural effusion, the big tail was removed, and a new chest tube was inserted posterior and anterior plural effusion (Figure 2); despite two chest tube the patient did not resolve, chest X-ray was done and showed Bilateral plural effusion and pneumothorax.



Fig 1: Chest X-ray shows bilateral lung infiltrates and diffuses subcutaneous emphysema in the subcutaneous tissues of the chest.



Fig 2: X-ray with two chest tube

III. DISCUSSION

SARS-CoV-2 is a positive RNA strands virus with a crown-like shape [4]. It participates 89% of the nucleotide sequence located in the bat SARS-like isolate CoVZXC21 and 82% with the human SARS-CoV [5]. Delivery is from human to human, with droplet transmission representing the most common form, although aerosol transmission has also been suggested [6]. Contact with contaminated objects is another source of transmission [7]. The incubation duration ranges from two to fourteen days. Symptoms can include fever, malaise, dry cough, dyspnoea, sore throat, nasal congestion, headache, muscle pain, loss of taste, and/or smell, diarrhea, and vomiting [7]. Our case was Covid-19 complicated with pneumonia. The patient was first admitted to the hospital with shortness of breathing and productive cough without sputum with no history of fever, headache, muscle pain, and diarrhea; he was controlled with azithromycin ceftriaxone.

In severe SARS-CoV-2 pneumonia, the pronounced cough may have promoted alveolar rupture due to diffuse alveolar injury. Alveolar damage may have predisposed the patient's lung to rupture and generating complications such as pneumothorax and Subcutaneous emphysema (SE), conditions also described in patients with ARDS from other etiologies during mechanical ventilation [8]. Regarding our case, he was complicated by a concomitant pneumothorax and SE during his admission to ICU.

Imaging, such as radiographic (X-ray) and computed tomography (CT), can help recognize subcutaneous emphysema. On a radiograph, there are irregular areas of radiolucency, often representing a fluffy look on the exterior borders of the thoracic and abdominal surfaces. On chest radiograph, a ginkgo leaf sign may be present, showing striations of gas along with the pectoralis major, resembling that of a ginkgo leaf [9]. Concerning our case, the chest X-ray shows bilateral lung infiltrates and diffuses subcutaneous emphysema in the subcutaneous tissues of the chest, CT chest with contrast

was done to follow treatment and showed right plural effusion and pneumothorax.

When SE is due to pneumothorax, a chest tube is frequently used to control the latter; this eliminates the air's source entering the subcutaneous space [10]. If the subcutaneous volume air is rising, it may be that the chest tube is not eliminating air quickly enough, so it may be returned with a larger one [10]. Suction may also be utilized to the tube to remove air faster [10]. The disease progress can be monitored by marking the boundaries with a special pencil to mark the skin [11]. Regarding our case, the subcutaneous emphysema was canulated, and ECMO support hemodynamics stable on moderate ventilator setting developed right plural effusion for which big tail was inserted and drained almost 30 cm³ of blood, complicated with pneumothorax and chest tube was inserted. The pneumothorax resolved, but still, there is plural effusion, the big tail was removed, and the new chest tube was inserted posterior and, despite two chest tubes, the patient did not resolve.

Since treatment includes dealing with the underlying condition, patients of spontaneous SE may need nothing more than bed rest, medication to manage pain, and possibly supplemental oxygen [12]. Breathing oxygen may assist the body to absorb the subcutaneous air more quickly [12]. Our case was admitted to ICU in our hospital with 86% SaO₂, and he was supplemented with an oxygen flow of 6 L/minute and O₂ at 100%, where it improved to 95%.

IV. CONCLUSION

Subcutaneous Emphysema is a rare complication of COVID 19. Its diagnosis depended mainly on X-ray and CT scans. Chest tube and oxygen supplies are frequently used to control the SE. The need for studies on the clinical characteristics with still many unknown features and a wide clinical spectrum is still being defined.

REFERENCES

- [1]. Centers for Disease Control and Prevention. Centers for Disease Control and Prevention Coronavirus disease 2019 (COVID-19) 2020.
- [2]. "About Novel Coronavirus (2019-nCoV)". United States Centers for Disease Control and Prevention (CDC). 11 February 2020. Archived from the original on 10 April 2020.
- [3]. Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Di Napoli RS. StatPearls Publishing; Treasure Island (FL): 2020. Evaluation and Treatment Coronavirus (COVID-19), Updated. 2020.
- [4]. Almeida JD, Berry DM, Cunningham CH, Hamre D, Hofstad MS, Mallucci L, McIntosh K, Tyrrell DA. Coronaviruses.

- [5]. Chan JF, Kok KH, Zhu Z, Chu H, To KK, Yuan S, Yuen KY. Genomic characterization of the 2019 novel human-pathogenic coronavirus isolated from a patient with atypical pneumonia after visiting Wuhan. *Emerging microbes & infections*. 2020 Jan 1;9(1):221-36.
- [6]. Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Di Napoli R. Features, evaluation and treatment coronavirus (COVID-19). InStatpearls [internet] 2020 Mar 8. StatPearls Publishing.
- [7]. Van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, Tamin A, Harcourt JL, Thornburg NJ, Gerber SI, Lloyd-Smith JO. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *New England Journal of Medicine*. 2020 Apr 16;382(16):1564-7.
- [8]. Hsu CW, Sun SF. Iatrogenic pneumothorax related to mechanical ventilation. *World journal of critical care medicine*. 2014 Feb 4;3(1):8.
- [9]. Medeiros BJ. Subcutaneous emphysema, a different way to diagnose. *Revista da Associação Médica Brasileira*. 2018 Feb;64(2):159-63.
- [10]. Long BC, Phipps WJ, Cassmeyer VL, editors. *Adult Nursing: A nursing process approach*. Elsevier Health Sciences; 1995.
- [11]. Carpenito-Moyet LJ. *Nursing care plans & documentation: nursing diagnoses and collaborative problems*. Lippincott Williams & Wilkins; 2009.
- [12]. Parker GS, Mosborg DA, Foley RW, Stienberg CM. Spontaneous cervical and mediastinal emphysema. *The Laryngoscope*. 1990 Sep;100(9):938-40.