

## Prolonged Air Leak After Pleurectomy/Decortication Surgery in Two Patients with COVID-19 Pneumonia

COVID-19 Pnömonili İki Hastada Plörektomi/Dekortikasyon Ameliyatı Sonrası Artan Uzamış Hava Kaçağı

 Merve Şatır Türk<sup>1</sup>

 İsmail Tombul<sup>2</sup>

 Muhammet Sayan<sup>2</sup>

 Ali Çelik<sup>2</sup>

 Abdullah İrfan Taştepe<sup>2</sup>

<sup>1</sup> Dr. Ersin Arslan Training and Research Hospital, Gaziantep, Türkiye

<sup>2</sup> Gazi University, School of Medicine, Department of Thoracic Surgery, Ankara, Türkiye

### ABSTRACT

Surgical treatment is a part of multimodal treatment in patients with malignant pleural mesothelioma in appropriate clinical stage and medical condition. The pleurectomy/decortication is a surgical technique for mesothelioma and its challenging morbidity is prolonged air leak. In case of prolonged air leakage, both the duration of tube thoracostomy and the risk of its complications increase. An increase in this complication is expected due to reasons such as pleural adhesions developing as a result of exaggerated inflammation in COVID-19 pneumonia and increased susceptibility to tearing in the alveoli. Here, we present the treatment of prolonged air leak after pleurectomy-decortication surgery in 2 cases of malignant pleural mesothelioma who were scheduled for surgery after induction therapy and who developed COVID-19 pneumonia during the preparation process.

### ÖZET

Malign plevral mezotelyomada uygun klinik evre ve medikal kondisyonlu hastalarda cerrahi tedavi, multimodal tedavinin bir parçasıdır. Plörektomi-dekortikasyon yöntemi, mezotelyoma için uygulanan cerrahilerden biridir ve bu yöntemdeki korkulan morbidite uzamış hava kaçağıdır. Uzamış hava kaçağında tüp torakostomi süresi de uzamakta ve buna bağlı komplikasyon riski de artmaktadır. COVID-19 pnömonisinde abartılı inflamasyon sonucu gelişen plevral yapışıklıklar ve alveollerdeki yırtılmaya yatkınlık artışı gibi sebeplerle bu komplikasyonda artış beklenen bir durumdur. Burada malign plevral mezotelyoma tanısıyla induksiyon tedavisi sonrası cerrahi planlanan ve hazırlık sürecinde COVID-19 pnömonisi gelişen 2 olguda, plörektomi-dekortikasyon ameliyatı sonrası uzamış hava kaçağı ve uzamış tüp torakostomi tedavisi sunulmuştur.

### Keywords:

COVID-19  
Malignant pleural mesothelioma  
Prolonged air leak

### Anahtar Kelimeler:

COVID-19  
Malign plevral mezotelioma  
Uzamış hava kaçağı

### INTRODUCTION

Malignant pleural mesothelioma (MPM) is a pleural malignancy with poor prognosis. Treatment of MPM is multimodal including surgery, chemotherapy and radiotherapy. Surgical therapy can be performed before or after induction chemotherapy in suitable patients. Primary aim of surgery is cytoreduction and it plays an important role in staging of MPM (1). There are two surgical option called pleurectomy/ decortication (P/D) and extrapleural pneumonectomy (EPP) for MPM (2). When the pericardium and/or diaphragm are included in P/D surgery, extended pleurectomy decortication is called EP/D. In surgery Mediastinal lymph node dissection or sampling is also important for staging of MPM (3). Prolonged air leakage due to alveolization after visceral pleurectomy in P/D procedure is a feared complication. Covid-19 pneumonia causes a strong inflammatory response with proinflammatory cytokine release, oxidant stress and damaging of alveolar epithelium so risk of alveolization is increased in P/D procedure due to dense pleural adhesions in patients (4). Cytokine storm is an uncontrolled release of cytokines leading to hyperinflation

in patients with COVID-19 pneumonia and it can be accompanied by further immune cell activation. The higher levels of inflammatory cytokines such as IL-6, IL-10, and TNF- $\alpha$ , in patients with COVID-19 pneumonia who developed pleural effusion is also indicate an intense cytokine storm (6,7). The developing cytokine storm induces extensive alveolar damage that makes the alveoli more vulnerable to rupture (8). Here, we presented two patients with prolonged air leak after P/D for MPM following induction chemotherapy and developed COVID-19 pneumonia during treatment.

### CASE 1

A 66-year-old male patient was referred to us with complaints of fatigue and dyspnea. Pleural thickening and nodulation were seen in the right hemithorax on thorax computed tomography (CT). PET-CT showed a pathological increased uptake of 18f-FDG at pleural thickening areas (Figure1, SUV max:10,2). We planned VATS pleural biopsy with MPM pre-diagnosis. Histopathologic evaluation revealed mix type mesothelioma and he referred to department of medical oncology for induction chemotherapy (ChT). After the

**Correspondence:** Merve Şatır Türk, Dr. Ersin Arslan Training and Research Hospital, Department of Thoracic Surgery, 27010, Gaziantep Türkiye. E-mail: mervesatir@hotmail.com

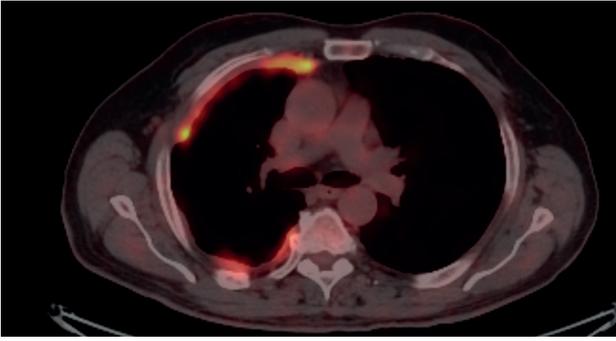
**Cite as:** Türk MŞ, Tombul İ, Sayan M, Çelik A, Taştepe Aİ. Prolonged Air Leak After Pleurectomy/Decortication Surgery in Two Patients with COVID-19 Pneumonia. Phnx Med J. 2024;6(1):37-39.

**Received:** 10.01.2023

**Accepted:** 02.11.2023

**Online Published:** 12.01.2024

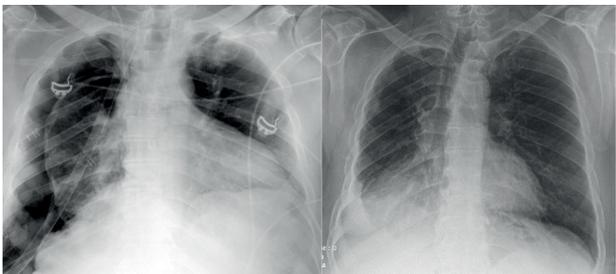




**Figure 1:** PET CT image.



**Figure 2:** EP/D operation material.

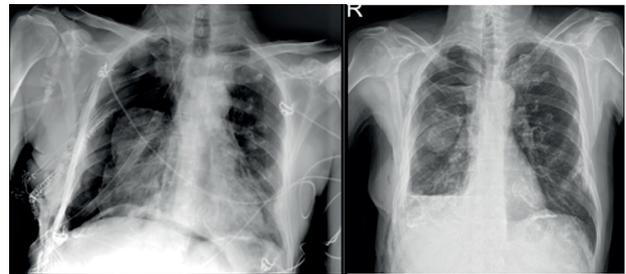


**Figure 3:** Postoperative 0<sup>th</sup> day chest X-ray and chest X-ray after chest tube removal.

four cycles induction ChT, we re-evaluated the patient and planned the P/D surgery. During the surgical preparations the SARS-Cov2 qRT-PCR test of patients was positive. Appropriate treatment was started to him and the operation was postponed for 28 days. We performed EP/D procedure to patient after the medical treatment for covid-19 pneumonia (Figure 2). The patient was discharged on the 10<sup>th</sup> postoperative day with heimlich valve but he was hospitalized again due to empyema detected 5<sup>th</sup> day after discharging. A second tube thoracostomy was inserted at junction of 7<sup>th</sup> intercostal space with posterior axillary line for empyema drainage. Antibiotherapy with wide spectrum was started. The first chest tube was removed 7<sup>th</sup> day of antibiotic therapy. During the treatment period, consecutive pleural cultures became negative and air leak stopped on the 55<sup>th</sup> postoperative day and the other chest tube was removed and, patient was discharged (Figure 3).

## CASE 2

A 65-year-old farmer male referred to us for right pleural effusion and pleural thickening on thorax CT. The pathological increased uptake of 18f-FDG was detected at the pleural thickening areas on PET-CT (SUV-max: 9,4). Results of histopathologic examination of pleural specimen taken by VATS was epitheloid type mesothelioma. Similarly, we planned surgery after induction ChT, we re-evaluated the patient and planned the P/D surgery. Histopathological report indicated epitheloid type mesothelioma, and the patient received 4 cycles of chemotherapy. The SARS-Cov2 qRT-PCR test given by the patient for preoperative preparation after KT was positive. Appropriate treatment was applied and the operation was postponed for 28 days. EP/D was performed to him and he was discharged with a chest tube removed on postoperative 22<sup>nd</sup> day (Figure 4).



**Figure 4:** Postoperative 0<sup>th</sup> day chest X-ray and chest X-ray after chest tube removal.

## DISCUSSION

Here, we aimed presenting the prolonged air leak that developed after EP/D surgery for MPM in a patient with intense pleural inflammation caused by Covid-19 pneumonia. The most common surgical morbidity associated with P/D is prolonged air leak and duration of tube thoracostomy. The known reason of that situation is the absence of a surgical dissection plan between the visceral pleura and the alveoli. The air leak problem is generally managed by conservatively such as suction, pleurodesis etc., until the air leak stops and lungs expand. The mean hospital duration was reported as 18.3 days in a case series including 90 cases of EP/D (9). Hashimoto et al. reported median duration of hospital stay was 21 days in patients with MPM treated by P/D and EP/D (10). P/D and EP/D were performed to total of 41 patients between March 2010 and May 2021 in our department and the median duration of hospitalization was 19 days. However, prolonged hospitalization occurred in these two patients with COVID-19. Hameed et al. reported that an exaggerated inflammatory response, increased pleural adhesion and increased tendency of alveoli to tearing occurred in COVID-19 pneumonia and they claimed there was a prolonged air leak for these reasons (8). Prolonged air leak leads to both prolongation of tube thoracostomy and hospital stay and increases complication rates. The most important complication is pleural empyema, and mortality and morbidity increase significantly in this case (11). In Case-1, a pleural empyema due to prolonged TT occurred and a second TT was required for loculated empyema.

**CONCLUSION**

Prolonged air leak and empyema complications should be kept in mind in patients with COVID-19 pneumonia when required P/D or EP/D surgeries for MPM. Multicenter

studies including larger numbers of patients are needed to define measures such as timing of surgery, necessary immunosuppression, etc. to prevent these complications.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Ethics:** The patient informed consent form was obtained.

**Funding:** There is no financial support of any person or institution in this research.

**Approval of final manuscript:** All authors.

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