



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Clinical Course of Three Postoperative Symptomatic COVID-19 Cases in Patients After Lung Lobectomy



Mircea Gabriel Stoleriu, MD, Michael Gerckens, Justin Hetrodt, MD, Marion Heiß-Neumann, MD, Ina Koch, PhD, Elvira Stacher-Priehse, MD, Julien Dinkel, MD, Jürgen Behr, MD, Uwe Grützner, MD, and Rudolf Hatz, MD PhD

Asklepios Lung Clinic Munich-Gauting, Gauting, Germany; and Comprehensive Pneumology Center, Helmholtz Center Munich, Member of the German Center for Lung Research (DZL), Munich, Germany

The novel coronavirus disease 2019 is a highly contagious viral infection caused by the severe acute respiratory syndrome coronavirus 2 virus. Its rapid spread and severe clinical presentation influence patient management in all specialties including thoracic surgery. We report 3 cases of coronavirus disease 2019 occurring in patients shortly after thoracotomy and thoracoscopy procedures, illustrating the imminent threat of severe acute respiratory syndrome coronavirus 2 infection for thoracic surgery patients.

(Ann Thorac Surg 2020;110:e461-3)

© 2020 by The Society of Thoracic Surgeons

The novel coronavirus disease 2019 (COVID-19) is a newly emerging disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus,¹ which became a pandemic in the first quartile of 2020.² The recent rapid, ubiquitous spread of COVID-19-associated pneumonia enforced quick changes in patient management across all medical specialties and subspecialties. We report the clinical course of 3 patients with COVID-19 after thoracic surgery.

Case Reports

Patient 1

A 77-year-old man was admitted for the resection of an 8-cm positron emission tomography–positive pulmonary mass in the right lower lobe. Preexisting conditions included a bullous lung emphysema, chronic heart failure with combined severe mitral and tricuspid valve insufficiency, and atrial fibrillation. The patient's medication included phenprocoumon, a beta-blocker, and eplerenone. Anterolateral thoracotomy with resection of the right lower lobe was performed. Histopathologic analysis showed a completely resected, moderately differentiated squamous cell carcinoma (G2pT4N0MxL1V1). A computed tomography (CT) on the third postoperative

day showed unilateral homogenous ground glass opacities in the right lower zone, residual pleural effusion, and subcutaneous emphysema, suggestive for postoperative pneumonia. The unilateral distribution of the pneumonic process was not considered typical for pulmonary SARS-CoV-2 infection. Treatment with azithromycin and levofloxacin was initiated. Increased chest tube drainage volume required prolonged therapy. The patient was discharged without long-term oxygen therapy on the 19th postoperative day with a blood leucocyte count of 10.6/nL, a serum C-reactive protein (CRP) of 98.8 mg/L, and a blood hemoglobin level of 10.2 g/dL.

Four days after discharge the patient was admitted to the stroke unit for aphasia and a latent paresis of the left upper extremity. On CT and magnetic resonance imaging no intracerebral lesions were seen. The elevated temperature and CRP levels after readmission, combined with a remarkable high-resolution CT showing lung mosaic attenuation with focal areas of spared parenchyma in the upper zones and peripheral bilateral ground glass opacities with small subpleural consolidations, raised the suspicion for COVID-19, with potentially virus-related neurologic symptoms. The patient was diagnosed with COVID-19 by SARS-CoV-2 polymerase chain reaction (PCR) from oro-/nasopharyngeal swab. Because of severe clinical presentation, compassionate use of hydroxychloroquine and azithromycin was commenced. Under noninvasive ventilation and high-flow oxygen therapy the patient developed severe respiratory insufficiency. The patient denied intubation and further intensive care treatment. Therapy was deescalated, and the patient died 9 days after admission in palliative care.

Patient 2

The second patient was a 50-year-old woman admitted for a 2.2-cm lobulated, part-solid, positron emission tomography–negative pulmonary nodule localized in the right lower lobe. The patient used a continuous positive airflow pressure device for the treatment of severe obstructive sleep apnea syndrome. Video-assisted thoracoscopic surgical lobectomy for a moderately differentiated pulmonary adenocarcinoma (pT1cN0L0V0MX) was performed. After prolonged chest tube therapy, the patient was discharged without long-term oxygen therapy on the 10th postoperative day.

Four days after discharge the patient was readmitted for subfebrile temperatures, progressive dry cough, dyspnea on exertion, and reduced general condition. The high-resolution CT showed a typical appearance of COVID-19 pneumonia with peripheral bilateral ground glass opacities. COVID-19 diagnosis was confirmed by SARS-CoV-2 PCR from oro-/nasopharyngeal swab. The patient received noninvasive ventilation therapy, symptomatic treatment with antipyretics, and volume supplementation and was discharged after 9 days.

Patient 3

The third patient was a 63-year-old man without comorbidities, admitted for surgical resection of a

Accepted for publication Jun 1, 2020.

Address correspondence to Dr Stoleriu, Asklepios Lung Clinic Munich-Gauting, Robert-Koch-Allee 2, 82131, Gauting, Germany; email: stoleriu@helmholtz-muenchen.de.

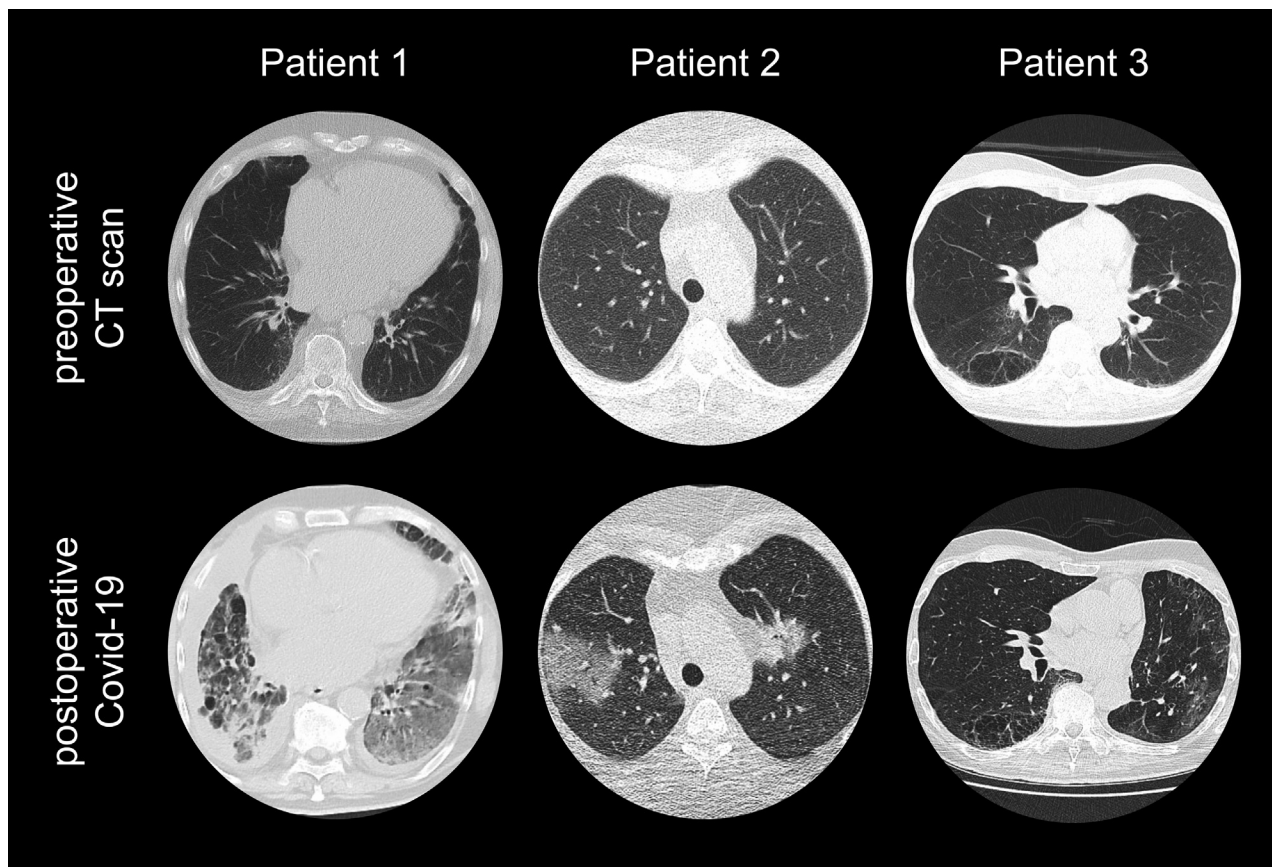


Figure 1. Computer tomography (CT) thorax scans preoperatively and postoperatively on emergency readmission with positive severe acute respiratory syndrome coronavirus 2 testing.

7-cm poorly differentiated squamous cell carcinoma (G3pT3N0MxL1V0R0) of the left upper lobe. The patient was discharged on the seventh postoperative day. A SARS-CoV-2 PCR from oro-/nasopharyngeal swab performed on the day of discharge was negative.

The patient was readmitted 9 days after discharge with persistent cough and reduced general condition with a temperature of 36.7°C, blood pressure of 85/62 mm Hg, heart rate of 180 bpm with atrioventricular nodal reentrant tachycardia, 32 breaths/min, and SpO₂ of 93%. COVID-19 pneumonia was confirmed by high-resolution CT and SARS-CoV-2 PCR from oro-/nasopharyngeal swab. Initial laboratory values were positive for leukopenia and 88.9 mg/L serum CRP. The patient received adenosine, oxygen supplementation, and piperacillin/tazobactam for 7 days; azithromycin for 3 days; and analgesic and antipyretic medication and was discharged after 8 days.

Comment

With the pandemic spread of the novel SARS-CoV-2, it is assumed that the incidence of the COVID-19 will further increase, negatively influencing morbidity and mortality by exhibiting both organ-specific and systemic effects.³ In high-risk individuals admitted with chronic

cardiorespiratory conditions, in particular in patients with thoracic malignancies undergoing urgent surgery, we suspect that ubiquitous SARS-CoV-2 infections may increase the rate of postoperative complications.⁴ Here we report the postoperative course of 3 of 65 patients undergoing thoracic surgery from March 1 to April 15, 2020 in our department who were diagnosed with COVID-19 after hospital discharge.

After the declaration of pandemic emergency status in Bavaria, Germany on March 16, 2020, our unit continued to perform semiurgent and urgent oncologic surgical procedures according to the in-house Tumor Review Board recommendations and the recently published COVID-19 Elective Case Triage Guidelines for Surgical care. Before admission a household survey was performed to rule out signs of infection. On admission medical history was surveyed again to exclude potentially infected or symptomatic patients from surgery. However at that time routine SARS-CoV-2 PCR screening had not been implemented yet into surgical admission standard operating procedure.

All patients were admitted for surgery with unremarkable body temperatures and serum CRP levels, denied any signs of infection or contact with potentially infected persons, and reported no travel history. Patients were discharged without any clinical signs of respiratory

infections to home isolation with declining inflammation markers and no long-term oxygen therapy. COVID-19 symptoms commenced 2, 4, and 9 days after discharge, respectively. Of note no initial fever on readmission was seen in all 3 patients under postoperative nonsteroidal anti-inflammatory drug treatment. The clinical manifestation of COVID-19 was more severe in patients 1 and 2 compared with patient 3. Therefore an off-label pharmacotherapy was initiated in patient 1 only. Although all patients had a smoking history, only patients 1 and 2 had cardiopulmonary comorbidities potentially associated with more severe clinical course and a predisposition to develop lobar pneumonic processes (Figure 1) in the context of SARS-CoV-2 infection.

Regarding the disease transmission route, no potentially infected relatives of patients at home were reported. Surgical procedures were performed by different surgeons. For patients 2 and 3 surgery was performed on the same day, 2 weeks after the first patient's surgery. However patient in-hospital stays overlapped. Several patients and healthcare workers from different departments retrospectively testing positive renders it difficult to depict the potential transmission routes of the SARS-CoV-2 infections. For surgical patients contacts outside the hospital and healthcare workers and fellow patients are potential sources of SARS-CoV-2 infection. After these cases strict screening measures for medical staff and patients based on a preadmission call program, SARS-CoV-2 PCR from oro-/nasopharyngeal swab on admission day, and strict postoperative home isolation combined with a follow-up call program were

implemented for all patients admitted to our thoracic surgery department.

Cases of postlobectomy COVID-19 are still rare and only sporadically described in the literature. However their incidence is likely to increase during the COVID-19 pandemic and therefore should be taken into consideration in surgical patient management. Thus the postoperative mortality in patients undergoing surgical procedures could be influenced by COVID-19 during the pandemic. In conclusion the reported cases underline the vigilance required in thoracic surgery patients regarding SARS-CoV-2 infection in the perioperative setting.

The authors wish to thank C. Ketscher, K. Ströh, F. Damirov, N. Samm, and J. Kovács for their excellent clinical patient care and expertise in thoracic surgery and all colleagues of the Asklepios Lung Clinic Munich-Gauting.

References

1. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020;395:507-513.
2. Velavan TP, Meyer CG. The COVID-19 epidemic. *Trop Med Int Heal*. 2020;25:278-280.
3. Liang W, Guan W, Chen R, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. *Lancet Oncol*. 2020;21:335-337.
4. Li Y-K, Peng S, Li L-Q, et al. Clinical and transmission characteristics of Covid-19—a retrospective study of 25 cases from a single thoracic surgery department. *Curr Med Sci*. 2020;40:295-300.