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Challenges in Advanced Lung Cancer Diagnosis During the COVID-19 Pandemic

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Abstract

A pandemic of coronavirus diseases 2019 (COVID-19) outbreak is a major public health emergency that has spread in the fastest speed, and caused the most extensive infection world widely. Transbronchial biopsy (TBB) and computed tomography guided percutaneous needle biopsy (CTPNB) is the most common and significant method for the diagnosis of lung cancer. During the COVID-19 pandemic, the indications of TBB and CTPNB must be managed strictly. Therefore, it is extremely indispensable to perform meticulous and individualized management for lung cancer patients to protect the patients from COVID-19.

Keywords

Coronavirus disease 2019 (COVID-19), lung cancer, diagnosis, transbronchial biopsy, percutaneous needle biopsy

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Introduction

Coronavirus disease 2019 (COVID-19) was caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which has rapidly caused a global pandemic and caused major public health emergencies.[1–3] As a result, hospital wards and clinical activities are being profoundly restructured around the world in response to the increasing number of new COVID-19-positive patients requiring hospitalization.[4] With the epidemic of COVID-19, most of the routine diagnoses and treatments of chronic diseases were affected, including lung cancer.

Lung cancer is the most common cancer as well as the leading cause of cancer-related deaths worldwide.[5] TBB and computed tomography guided percutaneous needle biopsy (CTPNB) is the most common and important method for the diagnosis of lung cancer.[6,7] During the outbreak of COVID-19, the indications of TBB and CTPNB are strictly controlled. Screening for COVID-19 should be performed in patients scheduled for a biopsy. For confirmed or suspected patients, three-level protective measures shall be taken during operation. Disinfection and isolation measures shall be strictly implemented during operation. Therefore, in this period of time, how to carry out meticulous and individualized clinical management of lung cancer patients still needs attention.

Relationship Between Cancer and COVID-19

As of February 11, 2020, 107 (0.5%) of the 72 314 patients with COVID-19 had a history of malignancy. The mortality of the general population is 2.3%, but the mortality of patients with a history of malignant tumors is 5.6%.[8] In another study involving 1590 patients with COVID-19, cancer patients had a higher incidence of COVID-19 than the general population (1.3% vs 0.3%). Lung cancer (28%) was the most common cancer in 18 patients with a history of malignancy. Patients with malignant tumors have a higher risk of serious events than patients with nonmalignant tumors.[9] Lee, *et al* analyzed 800 symptomatic patients diagnosed with cancer between March 18 and April 26, 2020. The 412 patients (52%) had a mild course of COVID-19. The 226 patients (28%) died, and the risk of death was associated with age, male, and the presence or absence of other comorbidities such as hypertension and cardiovascular disease.[10] Kurder, *et al* characterized a group of patients with cancer and COVID-19. The results showed that the most common malignancies were breast cancer (21%) and prostate cancer (16%). In patients with cancer and COVID-19, the 30-day all-cause mortality was high and was associated with general and cancer-specific risk factors.[11]

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The above research showed that cancer patients are susceptible to infection and poor prognosis during the COVID-19 pandemic. Analysis of the causes may be as follows: Firstly, cancer patients are relatively older, the understanding of the epidemic is relatively slower than that of young people, and the prevention ability of the epidemic is poor; Secondly, due to the low immune function, poor resistance and high risk of infection in tumor patients. Thirdly, patients are in relatively poor physical condition, often complicated with many basic diseases, especially lung cancer. They have many basic diseases and poor lung function. Once COVID-19 is complicated, the symptoms often become severe and their condition may deteriorate rapidly.[12]

Differential Diagnosis Between COVID-19 and Lung Diseases

The coronavirus is susceptible to the immune characteristics of lung cancer patients. After coronavirus infection in healthy individuals, most of the clinical manifestations were fever, fatigue, dry cough, and a few of them were mainly symptoms of gastrointestinal symptoms or muscle soreness.[13,14] The coronavirus infection is sometimes difficult to distinguish from lung cancer patients who may have cough, fever, fatigue, or even dyspnea. The symptoms and computed tomography (CT) manifestations are different from those of the new coronavirus. In laboratory examination, coronavirus infection in healthy individuals showed that the white blood cell counts were normal or low, and the proportion of lymphocytes was normal or decreased. In some patients, aminotransferase, myozyme, and myoglobin increased, while in lung cancer patients, due to the low white blood cell count of myelosuppression itself. It is difficult to distinguish from coronavirus infection.

For suspected coronavirus infection should be tested for nucleic acid in time, except for the epidemiology history. Nucleic acid detection is the gold standard, but there is also a possibility of false negatives. Based on the original nucleic acid detection and sequencing, serological tests are added as the basis for a new type of coronavirus specific IgM antibody and IgG or specific IgG antibody turned from negative to positive or 4 times higher than that in the acute phase can also be diagnosed, and epidemiological history is also important.

Most of the chest CT manifestations are bilateral lung lesions, and the imaging features are multiple ground glass opacity, which is mainly distributed outside the double lungs and under the pleura. At the same time, they can be accompanied by air bronchogram, interlobular septal thickening, and pleura thickening. There is rarely pleural effusion and lymphadenopathy.[15,16] In view of the complexity of clinical and imaging manifestations, thin-layer CT of the chest is recommended scanning combined with previous image data and dynamic observation of laboratory examination results for identification.

In order to identify the suspected lung cancer patients from COVID-19, in addition to inquiring about the patient's epidemiological history, the presence of respiratory symptoms, the results of routine blood tests, nucleic acid detection, or specific antibodies and chest CT scans, the differential diagnosis between COVID-19 and lung cancer may be considered on the basis of lesion biopsy.

Screening Before TBB and CTPNB

As is well known, TBB and CTPNB are the most valuable diagnostic methods for lung cancer. In principle, operations should be reduced or avoided to the greatest extent during the COVID-19 epidemic. If the patient meets the indications of relevant operations and has no contraindications, COVID-19 should be screened before operation. The screening of COVID-19 includes epidemiological history, body temperature, chest CT, blood routine, C-reactive protein (CRP), procalcitonin, D-dimer, liver enzyme, lactate dehydrogenase, muscle enzyme, and detection of respiratory tract pathogens, including influenza virus, adenovirus, etc When chest CT shows multiple plaques and interstitial lesions, SARS-CoV-2 nucleic acid detection should be carried out to confirm the diagnosis. Since the nucleic acid detection of COVID-19 is a false negative, caution should be exercised even if the first nucleic acid detection is negative.[17]

Disinfection and Isolation Measures for Biopsy Operation

Preparation

Suspected or confirmed patients must be in the negative pressure diagnosis room or isolation ward, prohibited from entering the ordinary bronchoscope room for operation. Meanwhile, biopsy should be arranged in an independent negative pressure operating room. Since bronchoscope can be extended into the human channel and contact with lumen mucosa, these devices need to pass biological tests regularly to ensure a high level of disinfection. After an operation, the operators should press the suction button, suck out the residual mucus in the biopsy tube with clean water, wipe the surface of the bronchoscope with 75% alcohol gauze, and attract 75% alcohol to disinfect the operation channel of the bronchoscope, then place the bronchoscope in a sealed transfer vehicle and send it to the cleaning room for purification and disinfection.

For suspected patients, biopsy should be performed after COVID-19 is excluded. For confirmed COVID-19 patients, normal body temperature was required, respiratory symptoms improved and two nucleic acid tests were negative after biopsy. For patients who are not infected with SARS-CoV-2, the procedure is performed in a separate room and the operator is protected in accordance with the level-2 protection requirements. Follow the routine bronchoscopy procedure.

Operation

To avoid cross-infection is to minimize the number of people involved in the operation. It is recommended to have an

operating doctor and a cooperating nurse. Meanwhile, participating medical staff needs to execute biosafety level-3 protective measures, including disposable medical protective caps, medical protective masks (N95 masks), disposable protective clothing, goggles (or full-face protective screens), disposable shoe covers, disposable latex gloves, and antiinfiltration isolation gown. Strictly abide by the rules of wearing and taking off. Attention should be paid to selecting the appropriate N95 mask to ensure a good fit with the face shape. After wearing the mask, tightness test should be done. Necessarily, patients should wear masks to prevent secretions from splashing during surgery.

According to the patient's respiratory support, appropriate protection should be done before the operation. Atomization inhalation anesthesia is prohibited for sober patients. It is suggested that cricothyroid membrane puncture anesthesia combined with intravenous moderate sedation can reduce severe cough as much as possible. Bronchoscopy is recommended for patients with invasive ventilation after deep sedation.

The use of personal protective equipment (PPE) includes gloves, medical masks, goggles or masks, robes, and N95/FFP2 or equivalent respirators for personnel performing aerosol generation procedures. Surgeons need to properly don and doff airborne PPE to ensure the best safety during surgical procedures. The impact of these measures on surgical performance and execution of nontechnical skills during the pandemic deserves attention. A study showed that there was impediment for visibility and communication and other nontechnical skills when using PPE in emergency operation in COVID-19 patients. Surgeons feel a lack of protection and comfort and increased fatigue, which may inhibit their best surgical performance.[18] When operators use PPE during emergency tracheoscopy, it may also affect the visibility and flexibility of operation and inhibit their best surgical performance. Therefore, more convenient protective equipment should be designed.

Postoperative Management

All specimens are stored in a biological safety box in a sealed manner, and the outer surface of the biological safety box is disinfected and then put into a specimen transfer box to be sent to an auxiliary department for inspection. Operators should wear double gloves during inspection. After operation, the operating room shall be sprayed and disinfected with standard peroxide first, and then wiped with 1000 ppm or 2000 ppm chlorine-containing disinfectant. The operating room must be thoroughly disinfected and reused only after passing the examination by the infection management department. Precision instruments can be wiped with 75% alcohol and sprayed with peroxide disinfectant again.

Telemedicine for Lung Cancer

The diagnosis of lung cancer patients is limited during the COVID-19 pandemic. Telemedicine optimizes the diagnosis, treatment, and management of lung cancer. Telemedicine is the use of computers, communications, medical technology, and equipment for medical activities to realize the contact between patients and medical personnel, medical institutions, and medical equipment, so as to assist in diagnosis, treatment, monitoring, nursing, and follow-up, so that patients can get diagnosis, treatment, and management without going to the hospital. Telemedicine for diagnosis and follow-up in hospitals is similar to recommendations for antibiotic follow-up in conservative treatment of appendicitis during the COVID-19 −19 pandemic.[19]

Conclusion

As an oncologist, under the epidemic situation of COVID-19, do a good job in differential diagnosis between COVID-19 and other lung diseases. TBB and CTPNB are the most significant diagnostic procedures in lung cancer. During the COVID-19 epidemic, in order to protect the patients and medical personnel safety, a series of appropriate measures need to be taken. Besides, if lung cancer patients are be infected with COVID-19, which can result in severe and death cases more likely occurred. Therefore, we should give priority to the treatment of cancer patients infected with COVID-19.

Authors' Note

Chunhua Xu wrote this manuscript; Chunhua Xu and Wei Wang helped the design and all through the research. Li Li proofread this manuscript. All authors read and approved the final manuscript.

Declaration of Conflicting Interests

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