A Critical Analysis of the Susceptibility of Lung Cancer Patients to Covid-19

Dr.Gloria Mundia[1], Bright Phiri [2]
[1,2]*Medical, Marwadi University*

Abstract - **The current COVID-19 pandemic is one of the worst health crisis the world is experiencing since human history, it has claimed 6,433,794 deaths worldwide as of August, 2022 , the World Health Organization declared on 20th March, 2020 that COVID-19 is a global pandemic, with much excess obscure about the original infection and no viable treatment accessible, the endemic keeps on claiming lives world over and hospitalizing millions if not billions of people, an estimated 2,500 to 11,100 confirmed hospital admissions COVID-19 hospitalized just in august 2022 alone in the United states, researchers have observed that patients with comorbidities were more vulnerable to show symptoms of COVID-19 contraction. Extreme cases were bound to have a danger (50.0%) than non-serious cases (15.6%). Truth be told, various clinically significant prognostic factors related with expanded 30-day all-cause mortality of COVID-19 were distinguished, including expanding age, male orientation, smoking status, malignant growth status.**

Cellular breakdown in the lungs in lung cancer (LC) patients address a focal test in clinical finding and treatment dynamic with regards to the profoundly infectious COVID-19 pandemic. Chemotherapy, radiation treatment (RT), medical procedure, and sub-atomic designated treatment are cornerstones in the therapy ahead of schedule and privately progressed LC with great guess. Chemotherapy in addition to designated treatment or immunotherapy has likewise brought significant prolonged suffering to repetitive/metastatic (R/M) high level LC patients leading to hospital admissions and even deaths which is putting a strain on our already overwhelmed medical facilities and workers resulting in dividing attention from major deceases like HIV/Aids, the paper seeks to explore the extent to which Covid 19 effects lung cancer patients in the long term, to achieve this the researcher will implore doctrinal research data from US and EU because of non availability of data from other parts of the world making it relevant to scholars and medical practitioners.

Index Terms - **COVID 19, LUNG CANCER, LONG TERM EFFECTS ON PATIENTS.**

1.INTRODUCTION

Studies from the recent Covid research findings conducted in Wuhan. China, lung cancer patients are more susceptible to COVID-19 related incidental effects as a result of underlying malignancy, about 32 Covid-19 cases in pre-diagnosed lung cancer patients, 186 Covid patients with cancer were examined and the findings are that the effects were more severe and took months leading to accelerated deaths .

Another study carried out by Imperial College London is following COVID-19-related results in individuals with disease across Europe. Starting outcomes were as of late introduced at the virtual meeting of the European Society for Medical Oncology. Men 65 and above established with at least two comorbidities and a background marked by smoking were likely to develop long term COVID-19 effects. Patients who were hospitalized for COVID-19 were found to have long term effects of COVID-19. Researchers took a gander at patients who were getting foundational hostile to disease treatment when they were determined to have COVID-19, around 13% needed to stop their malignant growth therapy for all time while almost 16% needed to change their disease treatment because of COVID. the lung cancer treatments and chemotherapy does weaken the body's capacity to fight diseases, the late impacts of malignant growth and its treatment are legitimate and may broaden a very long time past dynamic treatment.

Albeit substantially less is realized about the drawn-out impacts of COVID-19, the infection has been related with long term, post-intense sequelae known as "long COVID." Symptoms of long COVID might incorporate trouble breathing or dizziness, weakness, hack, chest or stomach torment, migraine, heart palpitations

These complications can happen in the vast majority body systems, including heart, lung, kidney, skin and cerebrum capabilities.

For survivors of Covid, who might encounter late impacts in these same body structures because of their malignant growth and its therapy, contamination with COVID-19 might leave them with strengthened, possibly unclear long haul side effects.

2. UNDERSTANDING COVID-19

The researcher is quick to note that Covid-19 is still very much being studied , the world is still coming to terms with its severity but from what we know, Coronavirus is brought about by the SARS-CoV-2 virus. Coronavirus can have gentle to extreme respiratory sickness, including death. The best preventive measures incorporate getting immunization, wearing a mask during seasons of high transmission, remaining 1 meter apart from the next individual, washing hands frequently and staying away from symptomatic individuals. COVID-19 is an infection recognized as the reason for a flare-up of respiratory system .

Covid 19 are a group of viruses that can cause respiratory infections in humans. They are classified "crown" in light of crown-like spikes on the outer layer of the infection. Extreme intense respiratory condition (SARS), Middle East respiratory disorder (MERS) and the normal virus are instances of Covid-19 that cause sickness in people. The new kind of Covid was first revealed in Wuhan, China in December 2019. It has since spread to each country all over the world. Covid can be traced down to bats, felines and camels, the virus live in yet don't harm the animals, at times these viruses spread and start affecting other types of animals, the virus might transform as they move to different species, the infection can cross transfer from animals species and start to harm humans, in the case of Covid-19, the first victims got an infection at a food market that sold meat, fish and live animals.

3. CONTRACTING COVID-19

SARS-CoV-2, the infection that causes COVID-19, enters your body through your mouth, nose or eyes (directly from the airborne drops or from the exchange of the infection from your hands to your face). It then goes to the rear of your nasal sections and mucous layer toward the rear of your throat. It connects to cells there, starts to duplicate and moves into lung tissue. From that point, the infection can spread to other body tissues.

4. SYMPTOMS AND CAUSES

COVID-19 signs and symptoms fluctuate from individual to individual. In fact, some infected humans don't exhibit any signs (asymptomatic). In general, patients with COVID-19 reports some of the following symptoms:

- Fever or chills
- Cough.
- Shortness of breath or concern breathing
- Tiredness/ malaise
- Muscle or physique aches.
- Headaches.
- loss of sense of smell (anosmia)
- Sore throat.
- Congestion or runny nose.
- Nausea or vomiting.
- Diarrhea.

5. LUNG CANCER

Healthy cells naturally die after aging (senescence) at a positive stage in their cycle (apoptosis), thereby stopping a buildup of too many cells. In cancer, however, cells proceed to develop and multiply disregarding the aging process, as a result, tumors develop .

The two foremost sorts of lung carcinoma are small-cell lung carcinoma (SCLC) and non-small cell lung carcinoma (NSCLC), relying on how they show up beneath a microscope. NSCLC is extra frequent than SCLC.

Anyone can develop lung cancer, however cigarette smoking and having exposure to smoke, inhaled chemicals, or different toxins can increase the risk.

6. SYMPTOMS

People with lung cancers can also not show any signs and symptoms till a later stage. If lung cancers signs and symptoms do appear, they can resemble these of a respiratory infection.

Some feasible signs and symptoms include:

- changes to a person's voice, such as hoarseness

- frequent chest infections, such as bronchitis or pneumonia
- swelling in the lymph nodes in the center of the chest
- a lingering cough that may additionally begin to get worse
- chest pain
- shortness of breath and wheezing

Others can experience such as:

- severe chest pain
- bone ache and bone fractures (pathological fractures)
- headaches
- coughing up blood (hempotysis)
- blood clots
- appetite loss and weight loss(anorexia)
- Fatigue/malaise

Lung cancer stages

The staging of most cancers describes how some distance it has unfolded via the physique and how extreme it is . Staging helps healthcare specialists and researchers determine on an appropriate direction of treatment. The most simple shape of staging is as follows:

- Occult, or hidden: at this stage most cancers cannot be detected on imaging scans, however cancerous cells would possibly show up in the phlegm or mucus.
- Stage 0: There are unusual cells solely in the pinnacle layers of cells lining the airways.
- Stage 1: A tumor is existing in the lung, however it is four centimeters (cm) or below and has now not unfolded to different organs of the body.
- Stage 2: The tumor is 7 cm or less and may have metastised to nearby tissues and lymph nodes.
- Stage 3: The cancers has unfold to lymph nodes and reached different components of the lung and surrounding tissue.
- Stage 4: The cancer has metastised to distant organs, such as the bones or brain.

7. COMPLICATION

As lung cancer progresses, it exhibits various complications, this may come as a result of complications related to most cancers.

Some viable problems of lung cancers include:

Superior vena cava syndrome: Tumors on the apex of the healthy lung can block blood flow passing through the vena cava, a massive vein that contains blood from other body organs to the heart. This may additionally lead to most appropriate vena cava syndrome, a circumstance inflicting facial swelling, dizziness, and loss of consciousness .

- Metastasis: Lung cancers may additionally unfold to different organs of the body, which include the brain, bones, and adrenal glands. This is greater frequent with superior stages of lung cancer.
- Lung infections: People with lung most cancers have a greater threat of lung infections, such as pneumonia or bronchitis, due to reduced immune function, which may also be a end result of the most cancers itself or sure most cancers treatments, such as chemotherapy.
- Heart blockage: Although rare, lung cancers can unfold to the coronary heart and might also compress or occlude the veins and arteries. This can lead to complications such as fluid buildup (angioedema), coronary heart blockage, arrhythmias, or coronary heart attack.
- Hypercalcemia: Lung cancers can raise calcium levels in the blood, which fitness specialists name hypercalcemia. This might also lead to nausea, vomiting, immoderate thirst, and abdominal pain. According to estimates, hypercalcemia affects up to 30% of cancer patients .
- Blood clots: People with lung cancers have an increased chance of deep vein thrombosis, which occurs when a blood clot forms in a deep vein. If this blood clot travels to the lungs, it can stop blood glide and may want to purpose a pulmonary embolism, which may be fatal.
- Neuropathy: Pancoast tumors, which are a kind of tumor positioned at the pinnacle of the lungs, can have an effect on the nerves in the eyes, face, and shoulders. This can motive arm and shoulder ache and Horner’s syndrome, which is a condition that can end result in droopy eyelids and modifications in pupil size.
- Spinal cord compression: Cancer can unfold from the lungs to the spine, which can compress the vertebrae, inflicting lower back pain, weakness, and difficulties in walking. According to one

study, this situation may additionally have an effect on around 28% of patients with lung cancer.

8. CAUSES

Smoking tobacco is the most frequent risk factor of lung cancer. According to estimates, about 80% of lung cancer deaths stem from smoking .

However, not everybody who has lung cancers smokes, lung cancers can show up due to various factors, including:

- exposure to chemical compounds such as radon, diesel exhaust, or asbestos
- environmental factors, such as air pollution
- inherited or obtained genetic changes
- exposure to secondhand smoke

9. EXPOSURE OF CANCER PATIENT TO COVID -19

Patients with lung cancers and these with hematological malignancies show up to be at the perfect hazard of dying from Covid infection, in distinction to hematological malignancies, profoundly immunosuppression remedy is now not regular in lung cancer.

Lung cancers represent a medical condition characterised by an increased risk of pulmonary complications, extreme lung harm and increased mortality from COVID-19, due to pathophysiological, scientific and treatment-related threat factors .

A tremendous interaction of elements regularly related with lung cancer, such as smoking-related lung damage, massive cardiovascular and respiratory comorbidities, and older age, set off greater severity of Covid 19 infection. Patients with lung cancers share fragility associated with faulty pulmonary and alveolar structure due to preceding thoracic surgical operation or radiotherapy and/or malignant airway obstruction that may additionally predispose to extreme infections. The differences of alveolar epithelium and pulmonary vessels lead to tumor microenvironment modifications, such as an increase in immune cell and tissue-resident macrophages infiltration, crucial for innate immunity and inflammation.

This great immune aspect inside alveolar epithelium poses a greater chance for cytokine release. In addition, the alveolar injury and fibrin deposits characterize threat elements for thrombosis of small and massive pulmonary vessels. These two pathogenic pillars have been postulated to be the main steps to development of extreme lung harm and acute respiratory distress syndrome (ARDS) at some stage in the SARS-CoV-2 infection .

Smokers are 5 times more likely to contract influenza than non-smokers, and in particular, people with a history of smoking have been associated to a greater incidence and severity of SARS-CoV-2. Structural and immunologic-induced changes are the two predominant sources of tobacco-related injury owing to susceptibility to infections. Changes in peribronchiolar homeostasis and irritation moreover impair the constructing of an environment friendly antiviral or bacterial immune response required for contamination clearance, Smokers confirmed excessive danger of COVID-19 extreme occasions in contrast with non-smokers.

Additionally, a cumulative hazard for extreme COVID-19 damage is associated to long-term tobacco-related lung damage, along with Chronic Obstructive Pulmonary Disease (COPD) and lung cancer. The pandemic has modified the way medical research is being conducted.

10. LUNG CANCER REMEDY AND COVID-19

The most important desires for the therapy of patients with lung cancers in the course of the COVID-19 pandemic are to limit movement of affected person as much as possible so as to lessen the chances of contracting COVID-19, whilst managing lung cancer, which has high instance of mortality. In subharan countries, when there had been shortages of personal protective equipment(PPE), and other parts of the world noticed overwhelmed healthcare systems, lung cancer surgical procedures had been delayed and systemic remedies had been canceled . Fortunately, the number of Covid -19 deaths and related illnesses have drastically decreased over the recent past.

10.1 Surgery

While surgical resection techniques for lung cancers continue to be the same, many logistical challenges occur in weighing the dangers and advantages to delaying resection primarily based on the severity of the COVID-19 pandemic. Limited assets consisting of health facility beds have led to delays of non-urgent

surgeries, especially non-oncological optionally available interventions. Perioperative COVID-19 has been related with mortality costs as excessive as 10%–24% in the usual surgical operation population. For patients present surgical procedure for lung cancer, the UK Lung Cancer Coalition's Clinical Advisory Group stated that the increased mortality rate ranging from 40%–50% were in patients who shriveled COVID-19 following surgical operation for lung cancer. To minimize the danger of operation at some stage in the incubation period for COVID-19, patients must get hold of COVID-19 test prior to surgery .

The American College of Surgeons has posted pointers on triaging non-compulsory instances for surgical care at some stage in the COVID-19 pandemic and consists of traits such as stable versus non-solid component, measurement of the presumed lung cancer, node positivity, and completion of induction chemotherapy, these facts can assist triage patients treatment, as properly to assist thoracic surgeons suggest for their patients in the context of COVID-19 .

10.2 Radiation therapy

Treatment hints are given for a range of scientific scenarios, from stage I–III NSCLC, prophylactic cranial irradiation for small cell lung cancers (SCLC), and palliative radiation for NSCLC. Recommendations are given for each an 'early pandemic scenario, the risk mitigation of every affected person and radiotherapy personnel are balanced with the cure of lung cancer, as nicely as a 'later pandemic scenario', the place assets are confined requiring affected person triage. Hypofractionated radiation schedules have been encouraged to limit the wide variety of visits to healthcare facilities. Additional guidelines have categorised warding off twice everyday radiation, the use of single fraction radiation in the palliative setting, and the omission of prophylactic cranial irradiation for patients with SCLC.

10.3 Chemotherapy

In the Thoracic Cancers International Covid-19 Collaboration registry (TERAVOLT) evaluation of 200 patients, chemotherapy was found to be related to accelerated danger of dying. In an up-to-date evaluation of 1012 patients carried out by the European Society Medical Oncology (ESMO), patients previously receiving chemotherapy and now not receiving cure had worse effects in contrast with patients receiving immunotherapy, chemoimmunotherapy, or centered remedy . In the Covid 19 and Cancer Consortium Registry (CCC-19 registry), which consists of patients of a couple of tumor types, the very best 30-day mortality by using remedy kind used to be chemoimmunotherapy at 30% 30-day mortality. Patients receiving chemotherapy or chemoradiation had a 30-day mortality of 18%. However, it is challenging to comprehend how to interpret this information given the inclusion of a couple of tumor sorts and the broad range of systemic remedies protected in the research .

In addition to the threat of COVID-19 infection for patients with cancer, delays in most cancers care can negatively have an effect on patients' cancers course. The common extension of oncologic remedy for patients in the TERAVOLT registry used to be 21 days. The Center for Disease Control and Prevention (CDC) recommends immunocompetent humans with COVID-19 quarantine for 10 days, whilst these viewed immunocompromised quarantine for 20 days, It remains to be seen how remedy delays will have an effect on patient's cancers outcomes.

10.4 Immunotherapy

Early in the pandemic, there used to be problem that immune checkpoint inhibitors (ICIs) can also irritate the problems of COVID-19. The challenge was once that ICIs can also expand the cytokine storm inflicting ARDS of COVID-19, as properly as the opportunity of overlapping pneumonitis from ICIs and COVID-19. However, the consequences of a couple of registries consisting of TERAVOLT and the CCC19, all tested that patient handled with ICIs alone, besides chemotherapy, had effects equal or higher to these receiving different cancers treatments. Given this information, for patients who have excessive Programmed Death Ligand 1(PDL1) expression ≥50%, cure with immunotherapy have to be strongly viewed over chemoimmunotherapy .

Alternative dosing of immunotherapy regimens, which are administered less frequently, can and need to be considered. This can restrict each affected person and company exposures, whilst maintaining efficacy, thereby optimizing the risk–benefit ratio. Pembrolizumab 400 mg given each 6 weeks has been

authorized through the European Medicines Agency (EMA) as equally as the US Food and Drug Administration (FDA). Nivolumab can be dosed 480 mg each and every four weeks as opposed to each and every other week. Atezolizumab is capable to be dosed each four weeks at 1680 mg. Durvalumab dosing of 1500 mg each 4 weeks was once at the beginning accepted and has validated efficacy in the small cell population. The each and every 4-week dosing can be regarded for the stage III NSCLC consolidation placing as well .

Pneumonitis currently on CT scans for patients with lung cancers has historically had a differential of immunotherapy pneumonitis, radiation pneumonitis, or revolutionary lung cancers relying on the scientific context. COVID-19 pneumonitis has additionally been suggested on imaging and can be hard to differentiate primarily based on imaging alone. CT findings suggestive of COVID-19 ought to lead to a terrific infectious workup for COVID-19 whilst taking into account the final differential.

10.5 Targeted therapy

The cure of NSCLC with tyrosine kinase inhibitors (TKIs) has emerged frequently over the final decade and has led to giant upgrades in the 5-year usual survival of patients with lung cancer. In the preliminary TERAVOLT evaluation of 200 patients with thoracic malignancies, patients had been on TKI alone. These patients are not likely hospitalized. In extended evaluation introduced at the American Society of Clinical Oncology (ASCO) and ESMO, patients receiving centered healing procedures no longer have accelerated danger of dying in a multivariate analysis. The degree to which this surprisingly favorable effect is associated to the mechanisms of these treatment options as opposed to the exclusive demographics of the patients who use them (younger, non-smokers) is now not fully understood.

Similar to immunotherapy, TKIs are regarded to motive interstitial-like pneumonitis at various stages and can be difficult to distinguish from COVID-19 prompted pneumonia. The scientific image of new or revolutionary cough, dyspnea, and/or fever can be similar. Patients must acquire COVID-19 primarily based on testing if there is both radiographic or scientific concern.

CONCLUSION

The SARS-CoV-2 pandemic has severely affected patients with lung cancers and impaired the growth of lung cancers research. Patients with lung cancers are at a greater risk of contraction of the virus leading to greater morbidity and mortality than the conventional population. In the earlier stages of the pandemic, patients with lung cancers had been deprioritized for the ICU admission or mechanical ventilation, leading to an increased chances of death. To date, based totally on the received information on the influence of COVID-19 in patients with cancer, this method seems outdated, confirming that patients with lung cancers no longer need to be excluded from ICU beds and ought to be prioritized to obtain an instant and complete care, as other patients .

Despite challenges posed through the pandemic, there has been an exceptional global effort to recognize the effect of COVID-19 on the affected population. Cancer societies, which includes ESMO and ASCO, have launched statements and indicators to assist clinicians manage patients with lung cancers throughout this pandemic. Studies such as the TERAVOLT evaluation and CCC19 have furnished necessary facts on the impact of unique remedy modalities on patients with lung cancers in the context of COVID-19. These analyses supply specific practise on the danger of exceptional remedy strategies, with a purpose to enhance effects in patients with lung cancers infected with the virus. Regarding the continuation of scientific research, the FDA and EMA have additionally launched guidelines for persevering with medical research at some stage in the pandemic. They have entreated sponsors to expand their flexibility and permit telemedicine and far off monitoring for affected persons and follow-up of patients enrolled in medical trials.

As the cases of COVID-19 continue to decline around the world, it is more evident that the incidence of COVID-19 in patients with lung cancers is reducing , at least till populations are efficiently vaccinated. Further research is required to comprehend the mechanisms that lead to elevated susceptibility and mortality in patients with lung cancers and are infected with Covid-19. To date, as supported by means of the predominant worldwide international oncology societies, together with American Association for Cancer Research (AACR), ASCO, National

Comprehensive Cancer Network (NCCN) and Society for Immunotherapy of Cancer (SITC), patients with most cancers and in precise lung cancers must get hold of a approved COVID-19 vaccination, additionally for these undergoing treatments, such as chemotherapy, goal dealers and immunotherapy. Furthermore, as the improvement of new treatment options to deal with or forestall COVID-19 infections increases, evaluating the efficacy and aspect results of these therapies, and their interplay with anticancer sellers together with results of the vaccines will be necessary for persevering with care for patients with lung cancer.

In this paper, we analyzed statistics from the most important registries and collection about the influence of particular most cancers remedy for lung most cancers at some stage in the pandemic. During these trying times, one-of-a-kind evidence-based guidelines, European Society for Medical Oncology (ESMO) and International Association for the Study of Lung Cancer (IASLC) were developed to enhance the administration of patients with lung most cancers and to mitigate the pandemic affect on our patients.

However, further research is required to be conducted as to what is causing cancer patients to be more vulnerable to covid19 and if Covid19 may cause lung cancer in the long run.

REFERENCE

[1] 1670O prospective data of first 1,797 hospitalised patients with cancer and COVID-19 derived from the COVID-19 clinical information network and international severe acute respiratory and emerging infections Consortium, who coronavirus clinical characterisation Consortium.

[2] SARS-CoV-2 transmission in patients with cancer at a tertiary care hospital in Wuhan, China. JAMA Oncol 2020;6:1108.

[3] Pulmonary vascular Endothelialitis, thrombosis, and angiogenesis in Covid-19. N Engl J Med 2020;383:120–8.doi:10.1056/NEJMoa2015432pmid:http://www.ncbi.nlm.nih.gov/pubmed/3243759

[4] COVID-19 and smoking: a systematic review of the evidence. Tob Induc Dis 2020;18:20. doi:10.18332/tid/119324pmid:http://www.ncbi.nlm.nih.gov/pubmed/32206052

[5] COVID-19 prevalence and mortality in patients with cancer and the effect of primary tumour subtype and patient demographics: a prospective cohort study.

[6] The impact of the COVID-19 pandemic on cancer deaths due to delays in diagnosis in England, UK: a national, population-based, modelling study.

[7] Impact of PD-1 blockade on severity of COVID-19 in patients with lung cancers. Cancer Discov 2020;10:1121–8.doi:10.1158/2159-8290.CD-20-0596pmid:http://www.ncbi.nlm.nih.gov/pubmed/32398243

[8] Cancer patients and risk of mortality for COVID-19. Cancer Cell 2020;38:161–3.doi:10.1016/j.ccell.2020.07.006pmid:http://www.ncbi.nlm.nih.gov/pubmed

[9] Clinical characteristics and risk factors associated with COVID-19 disease severity in patients with cancer in Wuhan, China: a multicentre, retrospective, cohort study. Lancet Oncol 2020;21:893–903.pmid:http://www.ncbi.nlm.nih.gov

[10] Patients with cancer appear more vulnerable to SARS-CoV-2: a multicenter study during the COVID-19 outbreak. Cancer Discov 2020;10:783–91.doi:10.1158/2159-8290.CD-20-0422pmid:http://www.ncbi.nlm.nih.gov/pubmed

[11] SARS-CoV-2 infection in the Italian Veneto region: adverse outcomes in patients with cancer. Nat Cancer 2020;1:784–8.

[12] Sex difference and smoking predisposition in patients with COVID-19. Lancet Respir Med 2020;8:e20. doi:10.1016/S2213-2600(20)30117-Xpmid:http://www.ncbi.nlm.nih.gov/pubmed/32171

[13] Dutch oncology COVID-19 Consortium: outcome of COVID-19 in patients with cancer in a nationwide cohort study. Eur J Cancer 2020;141:e184.

[14] COVID-19 prevalence and mortality in patients with cancer and the effect of primary tumour subtype and patient demographics: a prospective cohort study. Lancet Oncol 2020;21:1309–16.pmid:http://www.ncbi.nlm.nih.gov/pubmed/32853557

[15] Rini BI, on behalf of the CCC-19 Consortium

[16] Understanding the impact of COVID in cancer patients through the COVID-19 and Cancer (CCC-19) and other COVID consortiums.

[17] Clinical impact of COVID-19 on patients with cancer: data from the COVID-19 and cancer

Consortium (CCC19). J Clin Oncol 2020;38:LBA110.
[18] LBA72 assessment of clinical and laboratory prognostic factors in patients with cancer and SARS-CoV-2 infection: the COVID-19 and cancer Consortium (CCC19). Ann Oncol 2020;31:S1202–3.doi:10.1016/j.annonc.2020.08.2313
[19] COVID-19 in patients with lung cancer. Ann Oncol 2020;31:S0923-7534(20)39894-X.doi: 10.1016/j.annonc.2020.06.007pmid:http://www. ncbi.nlm.nih.gov/pubmed
[20] COVID-19 in patients with thoracic malignancies (TERAVOLT): first results of an international, registry-based, cohort study. Lancet Oncol 2020;21:914–22.doi:10.1016/S1470-2045(20) 30 3144pmid:http://www.ncbi.nlm.nih.gov/pubmed/ 32539942
[21] LBA75 defining COVID-19 outcomes in thoracic cancer patients: TERAVOLT (thoracic cancERs international coVid 19 collaboration). Annals of Oncology 2020;31:S1204–5.doi:10.1016/j.ann onc.2020.08.2316
[22] Thoracic cancers international COVID-19 collaboration (TERAVOLT): impact of type of cancer therapy and COVID therapy on survival. Journal of Clinical Oncology;
[23] Outcomes of COVID-19 in patients with lung cancer treated in a tertiary hospital in Madrid. Front Oncol 2020;10:1777. pmid: http:// www. ncbi.nlm.nih.gov