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OPINION

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Non-Small Cell Lung Cancer

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Abstract

An increasingly common cancer diagnosis that results in death is lung cancer. Adenocarcinoma, squamous cell carcinoma, and large cell carcinoma are subtypes of non-small cell lung cancer. This exercise discusses non-small cell lung cancer evaluation and management and emphasizes the importance of the interprofessional team in the treatment of patients with this condition.

Keywords: Cancer; Carcinoma; Lung cancer; Evaluation

Introduction

In the United States, 230,000 people will be diagnosed with lung cancer each year. An estimated 135,000 patients every year pass away. More people are dying from lung cancer than from prostate, breast, brain, and colorectal cancers combined. It is now the second most common cause of cancer deaths in women and the first cause of cancer deaths in men. However, anti-smoking campaigns and a decline in tobacco consumption in the United States are mostly to blame for the current decline in this number. The 2015 World Health Organization (WHO) classification of lung cancers serves as the basis for lung tumor categorization. Immunohistochemistry and light microscopy are used in this classification method to better direct treatment and predict the prognosis trajectory. Adenocarcinoma, squamous cell carcinoma, and large cell carcinoma are the three lung malignancies that fall under the umbrella of Non-Small Cell Lung Cancer (NSCLC). One-half of all cases of lung cancer fall under this category's most prevalent kind of lung cancer, adenocarcinoma. Another NSCLC subtype, squamous cell carcinoma, was previously the most common kind of lung cancer to be diagnosed. Squamous Cell Carcinoma (SCC) typically develops near the tracheobronchial tree's base; however more cases are being seen at the lung's periphery.

A diagnosis of exclusion is made for the NSCLC subtype known as large cell carcinoma. Immunohistochemistry (IHC) and electron microscopy cannot further classify it because of its low differentiation. However, squamous, glandular, or neuroendocrine differentiation will be present in 90% of instances. Other subsets of lung cancer, with both diverse classifications and broad terminology, are also included in NSCLC. These include non-small cell neuroendocrine tumors, sarcomatoid carcinoma, and adenosquamous carcinoma.

Etiology

The etiology of NSCLC can also be divided into risk factors that can be avoided and those that cannot be. Inhaled tobacco smoking is the most well-known preventable risk factor for NSCLC. Alcohol consumption, environmental exposure to secondhand smoke, asbestos, radon, arsenic, chromium, nickel, exposure to ionizing radiation, and polycyclic aromatic hydrocarbons are other causes of lung cancer. When radiation therapy is used to treat other cancers including Hodgkin lymphoma and breast cancer, it can also result in primary lung cancer. Lung cancer risk has been observed to increase by almost seven times in people with pulmonary fibrosis, and this risk has been demonstrated to be unrelated to cigarette use. Human Immunodeficiency Virus (HIV) patients have a higher incidence of lung cancer than the general population, and this increase has been proven to be unrelated to smoking habits or antiretroviral medication use in the HIV community.

Epidemiology

Approximately 90% of lung cancer cases have been linked to tobacco smoking. Lung cancer is twenty times more likely to develop in patients who presently smoke and have smoked 40 packs per year than it is in non-smokers. This risk may rise if tobacco use is combined with other environmental or lifestyle factors, such as asbestos exposure. Although this has not been established, it is believed that the development of filter cigarettes in the 1960s contributed to the rise in adenocarcinoma in particular. Lung cancer ranks first among cancers that kill men globally and second among those that kill women. Based on the prevalence of tobacco smoking in various nations, there is a significant variance in the incidence of lung cancer among different populations. The rate of smoking in various groups has an immediate impact on the prevalence of lung cancer. For instance, the age-adjusted mortality rate in the United States is anticipated to drop by 79% between 2015 and 2065 as a result of anti-smoking initiatives and declining tobacco consumption.

Histopathology

An essential part of a cancer diagnosis is a histologic diagnosis. Evidence of neoplastic gland development, pneumocyte marker expression, such as TTF-1 with or without napsin, or intracytoplasmic mucin, are necessary for the diagnosis of adenocarcinoma. The most common development patterns for neoplastic glands are acinar, papillary, micropapillary, leptic, or solid. Squamous cell carcinoma is diagnosed based on the tumor cells' ability to produce keratin, which can also comprise intercellular desmosomes. P40, p63, CK5, or desmoglein expression in squamous cell carcinoma is seen using Immunohistochemistry (IHC). Large cell carcinoma, which can show squamous, glandular, or neuroendocrine differentiation in 90% of cases, is an exclusionary diagnosis. If a poorly differentiated carcinoma does not exhibit distinguishing IHC markers that would rule out another subtype of lung cancer, it is simply classified as a big cell carcinoma.

Physical and historical

There are two categories of clinical manifestations for non-small cell lung cancer: intrathoracic effects and extra thoracic consequences. On a history and physical exam, the presence of cough, hemoptysis, chest discomfort, dyspnea, or hoarseness can be noted as intrathoracic effects. Pancoast syndrome, which is characterized by shoulder pain

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(but may also involve the forearm, scapula, or fingers), Horner syndrome, atrophy of the hand muscles, or bone disintegration, can be brought on by squamous cell carcinoma. Since about 20% of NSCLC have bone metastases at initial presentation, bone metastasis can be suspected during the physical examination. The most common symptoms of brain metastases in adenocarcinoma include headache, vomiting, visual field deficiency, seizures, and focal neurologic abnormalities.

Evaluation

A Complete Blood Count (CBC) and a Complete Metabolic Panel (CMP) should be part of the initial evaluation following a history and physical examination since they will help identify any potential hematologic or electrolyte sequelae from NSCLC. In the presence of bony metastases, this may involve hypercalcemia or increased alkaline phosphatase. A chest radiograph should be the first imaging procedure performed because NSCLC presentations might be vague. Further analysis using Computed Tomography (CT) imaging would probably be required if lung cancer was detected in order to better describe the pathology seen on the chest radiograph. To diagnose NSCLC, a tissue specimen will be required for histopathologic and immunohistochemically analysis. A CT scan of the chest and upper abdomen, including the adrenals, should be requested after a diagnosis has been made in order to check for metastatic disease. A Positron Emission Tomography (PET) scan can then be used to further stage the patient for the severity of the disease and the appropriate course of treatment. Additionally, brain MRI is required to evaluate for brain metastases in order to complete the disease stage.

Treatment / Management

The patient's functional condition, comorbidities, tumor stage, and the disease's molecular characteristics all influence the course of treatment. The goal of treatment for patients with stage 1st, stage 2nd, or stage 3rd NSCLC is to cure them. This can be accomplished through surgery, chemotherapy, Radiation Treatment (RT), or a multimodal strategy. Systemic therapy is advised for patients with stage 4th cancer and distant metastases, as well as if they relapse after initial treatment. The lobectomy method of surgical surgery for early-stage NSCLC is widely approved. Patients who are surgical candidates for NSCLC with clinical stages 1st or 2nd are initially treated with resection followed by pathologic staging. In cases where a patient is in pathologic stage 1stA, surveillance may be advised. If the patient has pathologic stage 1stB or stage 2nd/3rd, adjuvant chemotherapy may be given. The patient would then need surgical radiation therapy or resection, followed with adjuvant chemotherapy, if the margins were discovered to be positive. Stereotactic Body Radiation Therapy (SBRT) or definitive Radiation Therapy (RT) would be the primary forms of treatment for patients who are in clinical stages 1st or 2nd and are not considered surgical candidates. Clinical stage 3rd would suggest a multidisciplinary approach to treatment, involving consultation with thoracic surgery, radiation oncology, and medical oncology to determine the best combined approach to the disease process. Targetable mutations must be looked for in tissue biopsies in order to help treat patients with stage 4th NSCLC.

For instance, tyrosine kinase inhibitors like osimertinib, erlotinib, gefitinib, or afatinib can be used as a treatment if the patient has an Epidermal Growth Factor Receptor (EGFR) positive status. Treatment with an ALK tyrosine kinase inhibitor, such as alectinib, ceritinib, or brigatinib, is preferable if the tumor has the Anaplastic Lymphoma Kinase (ALK) fusion oncogene. Inhibitors tailored to each of the additional mutations, such as ROS1, BRAF, RET, TRK, MET, and KRAS, should be included in the therapeutic strategy. Programmed cell death ligand 1 (PD-L1) expression should be measured in the absence or absence of a driver mutation; if it is greater than 50%, pembrolizumab or atezolizumab may be used in the therapy regimen.

Prognosis

The Tumor, Node, and Metastasis (TNM) stage, the patient's performance level, and any concomitant conditions all affect the prognosis of NSCLC. Patients with low performance status had shorter survival times. Loss of weight and a weak appetite are other bad indications. The prognosis is adversely affected by lymphatic vessel invasion and concealed lymph node metastases. It has been demonstrated that patients with treatable mutations have a better prognosis. For instance, adenocarcinoma associated with Asian ancestry, women, and/or never smokers has activating EGFR mutations and typically has a considerably better prognosis. Recurrence after total resection has been reported to occur in 41% of cases, with a median time to recurrence of 11.5 months and a median survival of 8.1 months. Metabolic activity on PET scan has been demonstrated to have a poor prognosis in stages 1st to 4th NSCLC. Shorter survival was correlated with performance status, disease-free interval, presence of distant metastases, and history of adjuvant RT or neoadjuvant treatment.

Complications

The local scope of the disease process and the presence of probable cancer metastases influence the complications from NSCLC. Malignant pleural effusion is one type of intra-thoracic complication that, depending on the severity of the pathology and co-existing disorders, may cause dyspnea or respiratory failure. The majority of cases of Superior Vena Cava (SVC) syndrome are caused by non-small cell lung cancer, which accounts for about 50% of all cases. This typically manifests as a slow-onset swelling of the face and neck, along with dilated neck veins and swollen upper extremities brought on by a blockage of blood flow through the superior vena cava.

Deterrence and Patient Education

Patients should receive education on quitting smoking and avoiding secondhand smoke. The "5 A's" strategy is advised by the US Preventative Services Task Force to help clinicians start a conversation that goes beyond smoke cessation. This include enquiring about tobacco usage, offering advice on quitting, determining whether the patient is ready to quit, assisting with tobacco cessation, and setting up a follow-up appointment with the patient. Considerations for treatment include pharmacological and behavioral therapy. This includes using nicotine patches, gum, or lozenges in addition to behavioral therapy. Other pharmacological treatments for quitting smoking include bupropion and varenicline.

Enhancing Healthcare Team Outcomes

For the patient's care, the therapy of NSCLC depends on an interdisciplinary approach. Starting with prevention, the primary clinician's involvement in providing smoking cessation therapy is crucial. The main clinician also plays a crucial part in the possibility

of an early diagnosis of this condition through lung cancer screening before it progresses to an advanced stage at which the prognosis becomes worse. In order to optimize the patient's treatment plan based on their TNM staging at the time of diagnosis, an interdisciplinary approach with medical oncology, radiation oncology, thoracic surgery, and pathology should be used after the diagnosis.

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