Lung Cancer

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1 Introduction

Lung cancer or bronchogenic carcinoma refers to tumors originating in the lung parenchyma or within the bronchi. Lung cancer is the most commonly diagnosed cancer worldwide, accounting for approximately 12.4% of all cancers diagnosed worldwide, and is the leading cause of cancer-related deaths. It is one of the leading causes of cancer-related deaths in the United States. Lung cancer has been responsible for more deaths in women than breast cancer. It is estimated that there are 225,000 new cases of lung cancer in the United States annually, and approximately 160,000 people die because of lung cancer. It is interesting to note that lung cancer was a relatively rare disease at the beginning of the 20th century. Its dramatic rise in later decades is mostly attributable to the increase in smoking among both males and females.

2 Etiology

Smoking is the most common cause of lung cancer. It is estimated that 90% of lung cancer cases are attributable to smoking. The risk is highest in males who smoke. The risk is further compounded with exposure to other carcinogens, such as asbestos. There is no correlation between lung cancer and the number of packs smoked per year due to the complex interplay between smoking and environmental and genetic factors. The risk of lung cancer secondary to passive smoking increases by 20 to 30%. Other factors include radiation for non-lung cancer treatment, especially non-Hodgkins lymphoma and breast cancer. Exposure to metals such as chromium, nickel, arsenic, and polycyclic aromatic hydrocarbons is also associated with lung cancer.

Asbestos and radon are established risk factors for lung cancer as well. Asbestos exposure, particularly occupational exposure, increases the risk for lung cancer in a dose-dependent manner. Radon exposure in uranium miners was associated with a small but significant risk of lung cancer.

3 Pathophysiology

The pathophysiology of lung cancer is very complex, but it is hypothesized that repeated exposure to carcinogens, such as cigarette smoke leads to dysplasia of lung epithelium. If the exposure continues, it leads to genetic mutations and affects protein synthesis. This, in turn, disrupts the cell cycle and promotes carcinogenesis. The most common genetic mutations responsible for lung cancer development are MYC, BCL2, and p53 for small cell lung cancer (SCLC) and EGFR, KRAS, and p16 for non-small cell lung cancer (NSCLC).

Histopathological classification of lung cancers is based on cellular and molecular subtypes, which is an essential part of diagnosing and managing lung cancers. The more extended classification divides the lung cancers as follows:

1. **Small Cell Lung Cancer (SCLC)**. SCLC accounts for approximately 15% of bronchogenic carcinomas. At the time of diagnosis, approximately 30% of patients with SCLC have tumors confined to the hemithorax of origin. SCLC is more responsive to chemotherapy and radiation therapy than other cell types of lung cancer; however, a cure is difficult to achieve because SCLC has a greater tendency to be widely disseminated by the time of diagnosis. SCLC is early methastasic.

2. **Non-Small Cell Lung Cancer (NSCLC)**. NSCLC is any type of epithelial lung cancer other than small cell lung cancer (SCLC). The most common types of NSCLC are squamous cell carcinoma, large cell carcinoma, and adenocarcinoma, but there are several other types that occur less frequently. NSCLCs are associated with cigarette smoke, but adenocarcinomas may be found in patients who never smoked. NSCLC accounts for more than 80% of all lung cancers. There are three main types of NSCLC (adenocarcinoma, squamous cell carcinoma, and large cell carcinoma). Adenocarcinomas (the most common in non-smokers), and squamous (epidermoid) cell carcinomas are the most common in Spain.

4 Clinical presentation

Persistent cough with or without haemoptysis and weight loss in a smoker over the age of 50 are key features that should alert the clinician to the possibility of lung cancer. However, lung cancer can present without symptoms as an incidental mass on chest x-ray or computed tomography (CT). Symptoms of a primary tumour include cough, haemoptysis, chest pain, shoulder pain, and/or dyspnoea. Some patients may present with hoarseness secondary to recurrent laryngeal nerve paralysis. Patients may also present with non-specific symptoms such as weight loss or fatigue.

Most patients develop distant metastasis during the course of their disease. The most frequent sites of distant metastasis are the lungs, liver, brain, bone and adrenal glands. Other findings are:

- Pleural effusion

- Facial and upper extremity swelling, distended neck veins, and dilated collateral vessels on the chest or abdominal wall may indicate compression of the superior vena cava

- If the brachial plexus is invaded, the tumour can cause weakness and/or atrophy of the intrinsic muscles of the hand, and paraesthesias and pain in the arm, and affects the sympathetic chain, causing Horner's syndrome.

5 Diagnosis

Investigations of patients with suspected NSCLC focus on confirming the diagnosis and determining the extent of the disease.

- History and physical examination.
- Routine laboratory evaluations.
- Chest x-ray.
- Chest CT scan with infusion of contrast material.
- Biopsy (nronchoscopy, sputum cytology, transthoracic needle biopsy).

6 Treatment

Treatment options are determined by histology, stage, and general health and comorbidities of the patient. Surgery is indicated for non-metastatic, early stages. Chemotherapy is indicated in all types.