LUNG TUMORS

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Bronchial carcinoma accounts for 95% of all primary tumors of the lung. Alveolar cell carcinoma accounts for 2% of lung tumors, and other less malignant or benign tumors account for the remaining 3%.

Bronchogenic Carcinoma:

It is the most common cause of death from cancer world-wide. There is strong association between cigarette smoking and bronchial carcinoma over other aetiological factors even the Passive smoking increases the risk of bronchial carcinoma . Occupational factors include exposure to asbestos, workers in contact with arsenic, chromium, iron oxide, petroleum products and oils, coal tar, products of coal combustion, and radiation. Tumors associated with occupational factors are mostly adenocarcinomas and appear to be less related to cigarette smoking.Tobacco use is the major preventable cause. The prognosis remains poor, Carcinomas of many other organs, as well as osteogenic and other sarcomas, may cause metastatic pulmonary deposits.

Classification of Bronchogenic Carcinoma: depending on

Cell types: **Squamous 40%**, **Adenocarcinoma 10% Small cell carcinoma 25% Large cell carcinoma-25%**

Based on the characteristic of the disease and its response to treatment bronchial carcinoma maybe divided into small -cell carcinoma and non-small- cell

Small-Cell Carcinoma:

This tumour, often called oat-cell carcinoma, accounts for 20-30% of all lung cancers. It arises from endocrine cells. Small-cell carcinoma spreads early and is almost always inoperable at presentation. The tumor is rapidly growing and highly malignant. It responds to chemotherapy but the prognosis remains poor.

Lymphatic spread to mediastinal and supraclavicular lymph nodes frequently occurs prior to diagnosis. Blood-borne metastases occur most commonly in liver, bone, brain, adrenals and skin. Even a small primary tumor may cause widespread metastatic deposits and this is a particular characteristic of small-cell lung cancers.

Non-Small-Cell Carcinoma:

Squamous Cells Carcinoma:

is the commonest type, accounting for approximately 40% of all carcinomas. Most present as obstructive lesions of the bronchus leading to infection. The cells are usually well differentiated but occasionally anaplastic. Local spread is common but widespread metastases occur relatively late. When the tumor occurs in a large bronchus, symptoms arise early, but tumors originating in a peripheral bronchus can grow very large without producing symptoms, resulting in delayed diagnosis. Peripheral squamous tumors may undergo central necrosis and cavitation, and may resemble a lung abscess on X-ray

Adenocarcinoma:arises from mucous cells in the bronchial epithelium. Invasion of the pleura and the mediastinal lymph nodes is common, as are metastases to the brain and bones.

Adenocarcinoma accounts for approximately 10% of all bronchial carcinomas. It is the most common bronchial carcinoma associ ated with asbestos and is proportionally more common in non - smokers, in women, in the elderly.

Large cell carcinomas: These account for about 25% of all lung cancers and metastasize early

Clinical features of CA lung : Lung cancer presents in many different ways, reflecting local, metastatic or paraneoplastic tumor effects .

Cough : This is the most common early symptom. It is often dry but secondary infection may cause purulent sputum.coughing & impair the drainage of secretions to cause pneumonia or lung abscess , Pneumonia that recurs at the same site or responds slowly to treatment, particularly in a smoker, should always suggest an underlying bronchial carcinoma.

Hemoptysis: common, especially with central bronchial tumors.

S.O.B: may be caused by : collapse or pneumonia , tumor causing a large pleural effusion or compressing a phrenic nerve and leading to diaphragmatic paralysis.

Pain and nerve entrapment:Pleural pain usually indicates malignant pleural invasion , Intercostal nerve involvement causes pain in the distribution of a thoracic dermatome.

Involvement of the left recurrent laryngeal nerve by tumors at the left hilum causes vocal cord paralysis, voice alteration and a 'bovine' cough (lacking the normal explosive character).

Supraclavicular lymph nodes may be palpably enlarged .

Stridor (a harsh inspiratory noise) occurs when the larynx, trachea or a main bronchus is narrowed by the primary tumor or by compression from malignant enlargement of the subcarinal and paratracheal lymph nodes.

Bronchial obstruction. causes collapse of a lobe or lung.mediastinal spread.metastatic spread And digital clubbing

Pancoast's syndrome:non-small cell cancer that account for less than 5 percent of all lung cancers.Comes with pain in the inner aspect of the arm, sometimes with small muscle wasting in the hand) indicates malignant destruction of the T1 and C8 roots in the lower part of the brachial plexus by an apical lung tumor.

Carcinoma in the lung apex may cause Horner's syndrome (ipsilateral partial ptosis, enophthalmos, miosis and hypohidrosis of the face) due to involvement of the sympathetic chain at or above the stellate ganglion.

Superior vena cava obstruction by malignant nodes causes swelling of the neck and face, conjunctival oedema , headache , dilated veins on the chest wall.Dysphagia (Involvement of the oesophagus) .Arrhythmia or pericardial effusion (If the pericardium is invaded).

Appearance: ill looking, may be grossly emaciated , Anemia, Finger clubbing : Overgrowth of the soft tissue of the terminal phalanx , increased nail curvature ,nail bed fluctuation Hypertrophic pulmonary osteoarthropathy (HPOA).

Respiratory system examination: Evidence of pneumonia, pleural effusion, lung abscess.

Non-metastatic extrapulmonary manifestations of bronchial carcinoma

Syndrome of inappropriate antidiuretic hormone secretion (SIADH).

Ectopic adrenocorticotrophic hormone secretion are usually associated with small-cell lung cancer.
Hypercalcaemia is usually caused by squamous cell carcinoma.
neurological syndromes may occur with any type of bronchial carcinoma.

Endocrine :

SIADH Inappropriate antidiuretic hormone secretion causing hyponatraemia
Ectopic adrenocorticotrophic hormone secretion
Hypercalcaemia due to secretion of parathyroid hormone-related peptides
Carcinoid syndrome
Gynaecomastia.
Rarer: hypoglycaemia,thyrotoxicosis,
gynaecomastia

Others

-Nephrotic syndrome
-Polymyositis and dermatomyositis
-Eosinophilia
-Dermatomyositis
-Acanthosis nigricans

Neurology

Polyneuropathy
Myelopathy
Cerebellar degeneration
Myasthenia (Lambert-Eaton syndrome

Investigations:

Cytology

sputum samples for Malignant cells.Fluid cytology from pleural fluid.

Routine Laboratory Tests :

CBC with ESR

LFT: Elevated alkaline phosphatase, ALT, AST, aspartate aminotransferase ; GGT, γ- glutamyl transpeptidase.

Renal function test

Calcium

S. sodium

Plain X-rays:PA view: The features of bronchial carcinoma on plain X-rays are variable.

Common radiological presentations of bronchial carcinoma

1-Unilateral hilar enlargement
2-Peripheral pulmonary opacity
3-Lung, lobe or segmental collapse
4-Pleural effusion
5-Broadening of mediastinum,
6.Enlarged cardiac shadow,
7-elevation of a hemidiaphragm
8-Rib destruction.

CT chest: It is usually performed early, as , it may reveal mediastinal or metastatic spread, and , helps to direct histological sampling procedures. also indicates whether a tumour is likely to be accessible by bronchoscopy.

Bronchoscopy: to give histology and operability , Where facilities exist, to see the mass and take biopsy for tissue diagnosis this will guide further management.
If the carcinoma involves first 2 cm of either main bronchus it indicates that the tumor is inoperable.
IF carina is wide and there is loss of sharp angle of carina it indicate presence of enlarge mediastinal lymph nodes (may be malignant or reactive).
Biopsy can be taken by passing needle through the bronchial wall.
Vocal cord paralysis on the left indicates left recurrent laryngeal n. palsy , and indicates an inoperable case .
Percutaneous needle **biopsy** under CT or ultrasound guidance,pleural aspiration and **biopsy** as in pleural effusion is the preferred investigation.
Thoracoscopy increases yield by allowing targeted biopsies under direct vision.
Combined CT and PET imaging is used increasingly to detect metabolically active tumor metastases
Radioneuclide bone scanning: if suspected metastasis
Lung function tests:

Staging to guide treatment:

small-cell lung cancer to metastasize. early, so usually not suitable for surgical intervention. However other cell types need workup to prove its not has distal metastasis . Combined CT and PET imaging (is used increasingly to detect metabolically active tumor metastases.
Head CT, radionuclide bone scanning, liver ultrasound and bone marrow biopsy are generally reserved for patients with clinical, hematological or biochemical evidence of tumor spread to such sites.

TNM classification of lung cancer (it is for non-small-cell carcinoma)—

- T: Extent of primary tumour.
- N: Involvement of lymph node.
- M: Presence of distant metastasis.

***Stages for T*:**

- Tx: Positive cytology only.
- T1: <3 cm in diameter.
- T2: >3 cm in diameter or extends to hilar region or invades visceral pleura or partial atelectasis or extends into main bronchus, but remains 2 cm or more distal to carina.
- T3: Involvement of chest wall, diaphragm, pericardium, mediastinum, pleura, total atelectasis, main bronchus <2 cm distal to carina.
- T4: Involvement of heart, great vessels, trachea, oesophagus, malignant effusion, vertebral body, carina. Separate tumour nodules.

Stages for N

- N0: No nodal involvement.
- N1: Peribronchial, ipsilateral hilar or intra-pulmonary lymph node involvement.
- N2: Ipsilateral, mediastinal or subcarinal.
- N3: Contralateral mediastinal, scalene or supra-clavicular.

Stages for M

- M0: No distant metastasis.
- M1: Distant metastasis.

Management:

Surgical treatment:
carries the best hope of long-term survival, Unfortunately, in over 75% of cases, treatment with curative intent is not possible, Accurate pre-operative staging, coupled with improvements in surgical and post-operative care, now offers 5-year survival rates of over 75% in stage I disease (N0, tumor confined within visceral pleura) and 55% in stage II disease, which includes resection in patients with ipsilateral peribronchial or hilar node involvement.

Radiotherapy:less effective than surgery, radical radiotherapy can offer long-term survival in selected patients with localized disease**.** Radiotherapy can be used in conjunction with chemotherapy in the treatment of small-cell carcinoma,

Chemotherapy:

small-cell carcinoma with combinations of cytotoxic drugs, sometimes in combination with radiotherapy, can increase the median survival from 3 months to well over a year. including combinations of i.v. cyclophosphamide, doxorubicin and vincristine or i.v. cisplatin and etoposide, are commonly used. Nausea and vomiting are common side-effects and are best treated with 5-HT3 receptor antagonists(ondansetron).

Neoadjuvant and adjuvant chemotherapy:

In non-small-cell carcinoma, there is some evidence that chemotherapy given before surgery may increase survival

Laser Therapy and Stenting :

Palliation of symptoms caused by major airway obstruction can be achieved in selected patients using bronchoscopic laser treatment to clear tumor tissue and allow re-aeration of collapsed lun. Endobronchial stents can be used to maintain airway patency in the face of extrinsic compression by malignant nodes.

Prognosis:

The overall prognosis in bronchial carcinoma is very poor, 70% of patients dying within a year of diagnosis and only 6-8% of patients surviving 5 years after diagnosis. The best prognosis is with well-differentiated squamous cell tumors that have not metastasized and are amenable to surgical resection.

Secondary Tumors of the Lung:

Metastases in the lung are very common and usually present as round shadows (1.5-3.0 cm diameter). They may be detected on chest X-ray in patients already diagnosed as having carcinoma. Typical sites for the primary tumor include the kidney, prostate, breast, bone, gastrointestinal tract, cervix or ovary.

Metastases are relatively asymptomatic even when the chest X-ray shows extensive pulmonary metastases. Rarely metastases may develop in the bronchi, when they may present with hemoptysis. The secondary deposits are usually multiple and bilateral. Breathlessness may occur if a considerable amount of lung tissue has been replaced by metastatic tumor.

Benign Tumor:

Pulmonary hamartoma. This is the most common benign tumor of the lung and is usually seen on the X-ray as a very well-defined round lesion 1-2 cm in diameter in the periphery of the lung. Growth is extremely slow, but the tumor may reach several centimetres in diameter. Rarely causes obstruction.

Bronchial Carcinoid:

This rare tumor resembles intestinal carcinoid tumor and is locally invasive, eventually spreading to mediastinal lymph nodes and finally to distant organs. It is a highly vascular tumor that projects into the lumen of a major bronchus causing recurrent hemoptysis. It grows slowly and eventually blocks

the bronchus, leading to lobar collapse. As foregut derivatives, bronchial carcinoids may produce ACTH but do not usually produce the 5- hydroxytryptamine that is seen GIT carcinoid tumours.

Tracheal Tumors: benign tumors include squamous papilloma, leiomyoma, haemangiomas and tumors of neurogenic origin.