Primary lung cancer

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- Lung cancer is one of the most common cancers throughout the world. In the UK, there are approximately 45 /uni00A0 000 new cases a year. From the time of diagnosis, 60% of patients are dead within 1 year and only 15% survive 5 years, making lung cancer the most common cause of cancer death. Survival is dependent on the stage that the patient presents with lung cancer. The number of lung cancer operations performed in the - UK has significantly increased over the last 10 years. The pro - portion of lung cancers in which resection is attempted varies ut, in most resource-rich countries, is over 30%. Most patients b o ff ered lung cancer surgery are in the early stages. The tho - king in a cancer team has a role in diagno - racic surgeon wor sis, staging and palliation, in addition to curative resection in appropriate cases. Cigarette smoking is undoubtedly the major risk factor for developing bronchial carcinoma and accounts for 85–95% of all cases. To a lesser extent, atmospheric pol - lution and certain occupations (mining of radioactive ore and chromium) contribute. For practical purposes, lung cancers are divided into small cell lung cancer and non-small cell lung cancer (NSCLC), which are seen in a ratio of about 1:4. /uni25CF The pattern of disease, the prognosis and the results of treatment for small cell (also known as oat cell) carcinoma di ff er from all other types su ffi ciently for these to be man aged di ff erently from the outset on the basis of the histo logical classification. /uni25CF Subdivisions of NSCLC according to histological charac teristics are much less important, but pathological staging is critical to treatment and outcome. Histological classification of lung cancer Small cell lung cancers were known as oat cell cancers because of the packed nature of small dense cells. They are a type of neuroendocrine tumour (NET) and represent about 20% of all lung cancers. They tend to metastasise early to lymph nodes and by blood-borne spread. The median survival is measured in months. The tumours are very responsive to chemotherapy such that median survival may be doubled (although it is still short) but they are rarely , if ever, cured. Surgery is rarely o ff ered unless in very limited stage disease. Non-small cell lung cancers : adenocarcinoma is now the most common of the NSCLC types, having overtaken squamous cancer. The increasing incidence is partly due to an increasing incidence in women and may be the result, in part, of a move towards lower tar cigarettes that are inhaled more deeply to get the same e ff ect. Squamous carcinoma typically appears as a cavitating tumour. Large cell undi ff erentiated is a discrete histological type of NSCLC and is included within NETs. NETs of the lung are a group of lung cancers that include small cell cancer and large cell undi ff erentiated lung cancer, but also include other less aggressive tumour types, including typical carcinoid and atypical carcinoid tumours. These occur in the major (cen tral) bronchi and 20% are found peripherally . They are char acteristically slow growing and highly vascular. Most behave in a benign way; however, approximately 15% metastasise. The patient often presents with a history of recur rent pneumonia or haemoptysis, but carcinoid syndrome is rare unless there are extensive pulmonary or

hepatic metastases. Surgical excision is preferred because the prognosis following complete resection is excellent (>90% 10-year survival). Accurate diagnosis and staging of the tumour are vital if surgery is to be considered. Clinical features Clinical features of lung carcinoma depend on: /uni25CF the site of the lesion; /uni25CF the invasion of neighbouring structures; /uni25CF the extent of metastases. Henry Khunrath Pancoast , 1875–1939, Professor of Radiology , University of Pennsylvania, Philadelphia, PA, USA, described this condition in 1932. Lee M Eaton , 1905–1958, neurologist who was a professor at the Mayo Clinic, Rochester, MN, USA. Edward H Lambert , 1915–2003, Professor of Physiology , University of Minnesota, MN, USA. Eaton and Lambert described this condition in a joint paper in 1956. loss, dyspnoea and non-specific chest pain. /uni25CF Haemoptysis occurs in fewer than 50% of patients pre - senting for the first time. /uni25CF Cough, or a changed cough, is a common presentation but non-specific in this population. /uni25CF Severe localised pain suggests chest wall invasion with the - infiltration of an intercostal nerve. Invasion of the apical - area may involve the brachial plexus, leading to Pancoast’s syndrome. - /uni25CF Dyspnoea or breathlessness may come from loss of func - tioning lung tissue, lymphatic invasion or the development of a large pleural e ff usion. /uni25CF Pleural fluid is an ominous feature and the presence of blood in a pleural e ff usion suggests that the pleura has been directly invaded. /uni25CF Clubbing and hypertrophic pulmonary osteoarthropathy occasionally accompany some lung cancers and may re - solve with excision of the primary lesion. /uni25CF Invasion of the mediastinum may result in hoarseness (because of recurrent laryngeal nerve involvement), dys - phagia (because of the involvement of, or extrinsic pres - sure on, the oesophagus) and superior vena caval obstruc - tion. /uni25CF Small cell carcinoma is associated with the development of myopathies, including the Eaton–Lambert syndrome, which is similar to myasthenia gravis. Treatment of lung cancer Careful investigation is required to determine which tumours are operable and will benefit from a major thoracic resection. The internationally agreed tumour–node–metastasis (TNM) staging system gives prognostic information on the natural history of the disease. Tumours graded up to T3, N1, M0 can be encompassed within an anatomical surgical resection and have a much improved prognosis when treated surgically so the - tumour must be staged accurately before resection. Increas - - ingly , for higher stage tumours a multi- or trimodality approach is being o ff ered where patients have chemotherapy , with or followed by radiotherapy follow ed by surgery . A number of non-tumour-related factors, including the general fitness of the patient and the results of lung function tests, help to determine the appropriate treatment. In patients with incurable disease, treatment is palliative to maximise quality of life. Survival Carcinoma of the bronchus generally has a low survival rate after diagnosis. Important factors in determining prognosis are the size of the tumour (T status), the spread or stage of the cancer as determined by the TNM classification, the histological type of the tumour and the general condition of the patient. Early detection and surgical resection o ff er the best hope for cure. Increasing emphasis in recent years has been on the early detection of lung cancer, with guidance on symptoms and signs of potential lung cancer that require urgent chest radiograph and referral to a lung cancer team. Non-invasive investigations Chest radiography A chest radiograph will detect most lung cancers but some, particularly early curable tumours, are hidden by other struc tures. Secondary e ff ects such as pleural e ff usion, distal collapse and raised hemidiaphragm may be evident (Figure 60.12 Computed tomography CT is the first

investigation in suspected lung cancer. The surgeon needs to know whether the primary is resectable (T /uni00A0 stage) and which, if any , lymph nodes are involved (N stage). Lymph nodes more than 2 /uni00A0 cm in diameter are likely to be involved in the disease (70%) (Figure 60.13) and those less than 10 /uni00A0 mm in the shorter axis are unlikely to be involved. Remote metastases to the liver, adrenal glands or elsewhere may be detected. Positron emission tomography The patient is given radiolabelled fluorodeoxyglucose (FDG), which is taken up by all metabolising cells but more avidly by cancer cells. The FDG enters the Krebs cycle but cannot complete it and accumulates in proportion to the glucose avidity of the cells. High accumulation is associated with lung cancers and secondaries. Infection or other inflammation, and lymphadenopathy secondary to it, are also FDG avid. Sputum cytology Sputum cytology may reveal malignant cells but the false- negative rate is high. Invasive investigations Once lung cancer is suspected, diagnosis and further staging are sought. The choice of investigation depends on the position of the primary tumour in the lung (peripheral or central) and the clinical stage of the cancer (presence of enlarged lymph nodes or metastasis). Bronchoscopy Flexible bronchoscopy is usually performed under sedation, particularly in patients with more centrally placed lung cancers. It allows assessment of the segmental airway , cytological testing through brushing and washing of the concerned segmental bronchi and transbronchial needle aspiration (TBNA). Endobronchial ultrasound EBUS allows bronchoscopic assessment of suspicious medi astinal lymph nodes with an ultrasound probe incorporated into the tip of the bronchoscope to aid TBNA (Figure 60.14 Johann Friedrich Horner , 1831–1886, Professor of Ophthalmology , Zurich, Switzerland, described this syndrome in 1869. Sir Hans Adolf Krebs , 1900–1981, Professor of Biochemistry , University of Oxford, Oxford, UK. -). Endoscopic ultrasound (EUS) is a similar technique that, by passing the probe down the oesophagus, allows fine-needle aspiration (FNA) of less approachable mediastinal lymph nodes. Navigational bronchoscopy Navigational bronchoscopy provides a virtual three- dimensional map of the lung using radiological guidance during a flexible bronchoscopy , which can guide the physician to target, locate and perform an anatomically precise lung biopsy , place markers for radiation therapy and/or facilitate - surgical removal of a small peripheral lung lesion or use thermal ablative techniques for peripheral lung lesions.).

Figure 60.12 Chest radiograph of carcinoma of the lung. This patient has a large mass in the right upper lobe, causing Horner’s syndrome, a Pancoast tumour. Figure 60.13 Paratracheal lymphadenopathy shown on a computed tomography scan.

Computed tomography-guided biopsy Percutaneous CT-guided FNA may give a good yield of cells for cytological examination. Alternatively , a core of tissue can be obtained for formal histology . These techniques are best for larger and more peripheral lesions. Pneumothorax is common (10%) but rarely requires intercostal tube drainage. The contraindications include poor respiratory reserve, when even a small pneumothorax would be hazardous. Surgical diagnosis and staging Mediastinoscopy , mediastinotomy , V ATS or thoracotomy lymph node/lung biopsy are aimed at establishing a tissue diagnosis and assessing the degree of spread (staging), which determines resectability . Histological proof of the status of mediastinal nodes may be important to avoid unnecessary thoracotomy for incurable cancers and, conversely , to avoid denying surgery to patients whose lymph nodes are enlarged but benign. Mediastinoscopy Following an incision in the

neck and careful blunt dissection in front of the trachea, access to the paratracheal and subcarinal nodes via mediastinoscopy is achieved and biopsies taken (Figure 60.15). These techniques may also be used in the diagnosis of other mediastinal conditions, including: /uni25CF lymphoma; /uni25CF anterior mediastinal tumours; /uni25CF thymoma; /uni25CF sarcoid, tuberculosis or any other cause of lymphadenop athy . VATS mediastinal lymph node and lung biopsy For inaccessible mediastinal lymph nodes, or when diagnosis of the lung tumour has not been possible through radiological or bronchoscopic techniques, V ATS allows diagnosis of the tumour and staging of the mediastinum and gives the oppor tunity to assess the likely operability of the lung cancer.

Figure 60.14 Endobronchial ultrasound allows accurate detection of enlarged mediastinal lymph nodes for diagnosis and staging of lung cancer. Figure 60.15 Mediastinoscopy. The mediastinoscope slides down immediately in front of the trachea, behind the aortic arch, and behind and between the great vessels of the head and neck.

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