

# **Lung Cancer Clinical Guidelines: Surgery**

## Scope of guidelines

All Trusts within Manchester Cancer are expected to follow this guideline.

This guideline is relevant to:

- Adults (18 years and older) with newly diagnosed non-small-cell lung cancer (NSCLC)
- Adults with newly diagnosed small-cell lung cancer (SCLC)
- Adults with relapsed NSCLC
- Adults with relapsed SCLC

This guideline does not cover:

- Adults with mesothelioma
- Adults with lung metastases arising from primary cancers originating outside the lung
- Children (younger than 18) with lung cancer.
- Rare lung tumours (for example, pulmonary blastoma)
- Benign lung tumours (for example, bronchial adenoma)
- Carcinoid (typical or atypical)

## 8. Treatment for lung cancer with surgery

The following guidelines are based on NICE Lung cancer: diagnosis and management guideline document published 21 April 2011 and the BTS/SCTS guidelines on the radical management of patients with lung cancer published October 2010.

### 1. Definitions

**Resectable:** Indicates that the tumour can be completely excised by surgery with clear pathological margins.

**Operable:** Indicates that the patient has an acceptable risk of death or morbidity.

**Radical treatment:** Treatment given with the intention to improve survival substantially, which may amount to a cure.

There are many factors for the patient and healthcare professionals to consider when deciding if treatment with radical (curative) intent is appropriate. The most important factors are the likelihood of treatment achieving cure and the fitness of the patient. Radical (curative) treatment is appropriate if the cancer is surgically resectable or can be potentially cleared with other modalities (chemo-radiotherapy). Patient fitness has two components; the extent of risk to the patient in terms of mortality and the degree of morbidity (principally post-operative dyspnea and quality of life). A patient whose fitness is borderline may not be able to tolerate a more extensive resection needed to achieve cure. Ultimately decisions about treatment are made by the patient following an informed discussion. Issues can be complex, especially in borderline situations.

**Palliative treatment:** Treatment given with the intention to improve quality of life and may include prolonging the length of life as a secondary benefit.

### 2. Patient assessment prior to offering treatment with curative intent

#### 2.1. Perioperative mortality

When evaluating surgery as an option for patients with NSCLC, consider using a global risk score such as Thoracoscore to estimate the risk of death. Ensure the patient is aware of the risk before giving consent for surgery.

#### 2.2. Cardiovascular function

Avoid surgery within 30 days of myocardial infarction.

Seek a cardiology review in patients with an active cardiac condition, or three or more risk factors, or poor cardiac functional capacity.

Offer surgery without further investigations to patients with two or fewer risk factors and good cardiac functional capacity.

Optimise any primary cardiac treatment and begin secondary prophylaxis for coronary disease as soon as possible.

Continue anti-ischaemic treatment in the perioperative period, including aspirin, statins and beta-blockers.

If a patient has a coronary stent, discuss perioperative anti-platelet treatment with a cardiologist.

Consider revascularisation (percutaneous intervention or coronary artery bypass grafting) before surgery for patients with chronic stable angina and conventional indications for revascularisation.

### **2.3. Lung function**

Offer surgical resection to patients with low risk of postoperative dyspnoea.

Offer surgical resection to patients at moderate to high risk of postoperative dyspnoea if they are aware of and accept the risks of dyspnoea and associated complications.

Perform spirometry in all patients being considered for treatment with curative intent. Measure TLCO if breathlessness is disproportionate or there is other lung pathology (e.g. lung fibrosis).

Offer patients surgery if they have an FEV1 and TLCO within normal limits and good exercise tolerance.

Expected FEV1 and TLCO of >60% post operatively are markers for a lower risk of perioperative death while those less than <30% indicate an increased risk of perioperative death and cardiac complications after surgery. Offer patients with predicted postoperative FEV1 or TLCO below the recommended limit of 30% the option of undergoing surgery if they accept the risks of dyspnoea and associated complications.

When considering surgery perform a segment count to predict postoperative lung function. In patients with a post procedure FEV1 and TLCO of >60% predicted, no further tests are required unless there is discordant breathlessness.

Consider using shuttle walk testing (using a distance walked of more than 400 m as a cut-off for good function) to assess fitness of patients with moderate to high risk of postoperative dyspnoea. Consider this test when post-operative predicted FEV1 and TLCO are <60%.

If a patient is able to walk <25 shuttles or <400m consider formal performance testing with CPEX.

Consider cardiopulmonary exercise testing to measure VO2 max and assess lung function in patients with moderate to high risk of postoperative dyspnoea, using more than 15 ml/kg/minute as a cut-off for good function.

Perfusion scans can be used, particularly where pneumonectomy is contemplated.

Avoid taking pulmonary function and exercise tests as sole surrogates for quality of life evaluation.

### 3. Surgery

Surgery should be offered for patients with NSCLC who are medically fit and suitable for treatment with curative intent. This includes (based on the 7<sup>th</sup> edition of TNM staging)

- Stage Ia (T1aN0M0 and T1bN0M0)
- Stage Ib (T2aN0M0)
- Stage IIa (T2bN0M0 and T1–2aN1M0)
- Stage IIb (T3N0M0 and T2bN1M0)
- Stage IIIa (T3N1M0).

Consider surgery in selected patients with:

- Stage IIIa (T4N0-N1M0)

Consider surgery as part of radical multimodality management in selected patients with:

- Stage IIIa (T1–3N2M0 where N2 is single zone, non-fixed and non-bulky)

Adenocarcinoma in-situ (formerly bronchioloalveolar carcinoma): Anatomical lung resection should be offered to suitable patients with single-site bronchoalveolar carcinoma. Multiple wedge resections may be considered in patients with a limited number of sites of bronchoalveolar carcinoma.

Patients unwilling to undergo surgery should be informed of other treatment options if applicable (e.g. SABR).

Offer lobectomy (either open or thoracoscopic) as the treatment of first choice (if applicable).

For patients with borderline fitness and smaller tumours (T1a–bN0,M0), consider lung parenchymal-sparing operations (segmentectomy or wedge resection) if a complete resection can be achieved.

Offer more extensive surgery (bronchoangioplastic surgery, bilobectomy, pneumonectomy) only when needed to obtain clear margins.

Perform hilar and mediastinal lymph node sampling or en bloc resection for all patients undergoing surgery with curative intent.

For patients with T3 NSCLC with chest wall involvement who are undergoing surgery, complete resection of the tumour should be the aim by either extrapleural or en bloc chest wall resection.

Consider clinical trials of radical treatment for patients with T1-4N3M0 disease.

### **3.1. Surgical techniques**

Consider patients with moderate to high risk of postoperative dyspnoea for lung parenchymal sparing surgery.

Consider bronchoangioplastic procedures in suitable patients to preserve pulmonary function.

Consider patients with limited pulmonary reserve for sublobar resection as an acceptable alternative to lobectomy (given that the patient is aware that this procedure is likely to be associated with an increased risk of local recurrence). Sublobar and broncho-angioplastic resections allow fewer segments to be removed and therefore can extend the boundaries of surgery.

Careful pre-operative assessment should keep the open and close thoracotomy to around 5%. PET scans and VATs assessment may assist with this.

Patients with pleural effusions which contain positive cytology should be deemed inoperable, but a full assessment of the effusion by VATs may obtain better samples for analysis and nodal assessment, as well as an assessment of pleural disease.

Consider patients with concomitant lung cancer within severe heterogeneous emphysema for lung resection based on lung volume reduction surgery criteria.

Lobectomy: Indicated for tumours confined to one lobe (or two in the case of middle and lower right).

Pneumonectomy: Includes removal of carinal, paratracheal, pretracheal and paraoesophageal lymph nodes if they appear to be involved. Mortality is high for patients over 80, when a more limited resection could be considered.

The following indicate that a tumour is not resectable:

- Inability to separate the tumour from the aorta or SVC.
- Inability to separate the tumour from the lower end of the trachea.
- Spread of growth along the pulmonary veins and to the left atrium so that the vein cannot be divided.
- Inability to separate the tumour from the vertebral bodies.
- Tumour involving the oesophageal mucosa.

Extended (intrapericardial) resection: This involves the opening of the whole pericardium around the lung root with division of the pulmonary vessels within the mediastinum. It may be considered for very central tumours or those with mediastinal extension without N2 disease.

Sub-lobar resections: Sub-lobar resections comprise wedge resections and segmental resections. Wedge resection involves resection of the tumour with a surrounding margin of normal lung tissue, and does not follow anatomical boundaries, whereas segmental resection involves the division of vessels and bronchi to a distinct anatomical segment(s). Segmental resection removes draining lymphatics and veins and intuitively might be expected to result in lower recurrence rates, although there is no evidence for this. Segmental resection may not always be technically feasible, and is best suited to the left upper lobe (lingula, apicoposterior and anterior segments) and the apical segment of both lower lobes.

Broncho-angioplastic resections: Bronchoplastic resections involve removing a portion of either the main bronchus or bronchus intermedius with a complete ring of airway followed by the re-anastomosis of proximal and distal airway. Angioplastic resections involve removing part of the main pulmonary artery followed by end-to-end anastomosis or reconstruction.

Lung volume reduction surgery (LVRS): In patients who have a lung cancer within an area of severe emphysema, case series have shown that surgical resection is possible with improvement in quality of life. However, there are no randomised trials and outcome measures are not as rigorous as for the trials of lung volume reduction in emphysema. Patient selection for this approach needs to be individualised, bearing in mind the separate, but overlapping indications for LVRS and cancer surgery.

Treat Pancoast tumours in the same way as other types of NSCLC. Offer multimodality therapy (induction chemoradiotherapy followed by surgical resection if possible) according to resectability, stage of the tumour and performance status of the patient.

### **3.2. Intraoperative nodal sampling**

Systematic nodal dissection should be performed in all patients undergoing curative resection for lung cancer.

The international association for study of lung cancer recommend removal or sampling a minimum of six lymph nodes or stations, 3 of which should be mediastinal including the subcarinal station.

### **4. Pre-operative chemotherapy**

Patients with resectable lung cancer should not routinely be offered pre-operative chemotherapy outside clinical trials.

### **5. Post-operative chemotherapy**

Offer a cisplatin-based postoperative chemotherapy (in the absence of contraindications) to patients with good performance status (WHO 0 or 1) and T1–3 N1–2 M0 NSCLC.

Consider postoperative chemotherapy in patients with good performance status (WHO 0 or 1) and T2–3 N0 M0 NSCLC with tumours greater than 4 cm in diameter.

Ensure eligible patients should have the benefit of detailed discussion of the risks and benefits of adjuvant chemotherapy.

## **6. Post-operative radiotherapy (PORT)**

PORT is not indicated after complete resection (R0).

Consider PORT for patients with residual macroscopic or microscopic disease at the resection margin where the benefit of reduction in local recurrence outweighs the risk of mortality and morbidity related to PORT.

PORT should be timed after completion of adjuvant chemotherapy.

Do not routinely offer PORT, outside clinical trials, in patients with complete resection and pathological N2 lymph nodes.

After surgical resection of lung cancer, when delivering PORT it is crucial to keep the dose to the normal lung tissue to a minimum.

The optimal dose/fractionation for PORT is not known, but modern studies suggest that a dose in the range of 50-55 Gy using conventional-fractionation.

## **7. Small cell lung cancer**

Patients with T1–3N0M0 small cell lung cancer may be considered for surgery as part of multimodality management.

Surgical management of patients with T1–3N1–2M0 small cell lung cancer should only be considered in the context of a clinical trial.

## **8. Post-operative follow-up**

The aims of follow-up are to detect treatment-related complications, early recurrence and/or second cancer.

There is no conclusive evidence that follow-up of patients after resection to detect early, asymptomatic recurrence alters outcome.

Offer all patients an initial specialist follow-up appointment within 6 weeks of completing treatment to discuss on-going care.

Offer regular appointments thereafter, rather than relying on patients requesting appointments when they experience symptoms.

Patients should be evaluated clinically and radiologically with CXR at first instance. CT scan can be considered annually, or if there are symptoms or signs of recurrence.

Ensure that patients know how to contact the lung cancer clinical nurse specialist involved in their care between their scheduled hospital visits.

Consider 3-monthly appointments during the first 12 months following surgery followed by 6 monthly appointments thereafter to a total of 3 years in the referring unit. Extending this follow-up to 5 years, through annual appointments, could be organised via the GP and should be influenced by patient choice. Smoking cessation is recommended.