CHEMOTHERAPY CARE PLAN

Standard care plan for radical radiotherapy for limited-disease small-cell lung cancer

References


**Patient group**

- LD-SCLC
Indications

- T1-4 N1-3 M0 disease which is judged by a clinical oncologist to be encompassible within a tolerable RT field
- Lesion not within a previous radical radiotherapy field
- Histological or cytological diagnosis of SCLC with confirmatory immunostaining where possible
- ECOG PS 0-2
- Co-morbidity preventing safe concurrent administration of chemotherapy. Sequential use of radical radiotherapy as consolidation treatment in patients not deemed fit for up-front concurrent approach or use of radical radiotherapy as single modality treatment in patients deemed unfit for any chemotherapy

Cautions

- Adequate lung function (FEV1 >40% predicted and KCO >40% predicted). However, the evidence for correlation of lung function with respiratory toxicity is poor, hence these parameters serve only as a guide. Therefore, radical treatment is not precluded with lung function below these arbitrary levels with careful patient consent and consideration of anticipated PTV and V20.

Evidence

There is a range of different radiation dose fractionations used across the UK ranging from 40Gy in 15 fractions to 45-55Gy in 20 fractions with the latter being the more commonly used regimen for radical treatment of LD SCLC.

Outcome

The addition of radiotherapy to combination chemotherapy significantly reduces the risk of intrathoracic failure, and two meta-analyses have shown an absolute long term survival gain of 5%. Early concurrent thoracic radiotherapy can achieve a 5-year survival rate in the order of 20%. Several meta-analyses evaluating the timing of thoracic radiation in combined modality therapy have been published with a 2-year overall survival benefit for early thoracic radiotherapy compared to late thoracic radiotherapy of the order of 5%. A Cochrane review defined early radiotherapy as starting within 30 days of initiation of chemotherapy and late radiotherapy as starting chest irradiation 30 days or more after initiation of chemotherapy; there was a 5-year survival benefit in favour of early thoracic radiotherapy and cisplatin based chemotherapy (OR 0.64, 95% CI 0.44 to 0.92, test for overall effect: z=2.40, p=0.02). De Ruyscher suggested that time from start of chemotherapy to completion of radiotherapy (SER) may be a key variable in predicting outcome. With an SER less than 30 days, 5 year overall survival rate was more than 20% and significantly higher than with a longer SER (RR = 0.62; 95% CI, 0.49 to 0.80; P = 0.0003).

Toxicity

This will depend on the dose/fractionation used and the prior use of chemotherapy. Grade 2/3 rates of oesophagitis of 11% and pneumonitis of 14% were
1. Initial investigations and work up prior to start of treatment

1.1. Diagnostic review and work up should usually include:
- Pathology/Cytology confirmed diagnosis of SCLC ideally using immunohistochemistry
- Stage of disease determined and documented
  - CT Thorax/Abdomen (with contrast). If patient has had prior chemotherapy a re-staging CT scan demonstrating response to treatment is required
  - Bronchoscopy or CT-guided biopsy
  - EBUS/mediastinoscopy of radiologically suspicious mediastinal lymph nodes only appropriate if tissue diagnosis still not made
  - Biopsy of supraclavicular lymph node if radiologically suspicious of malignancy and tissue diagnosis still not made
- Clinical assessment and documentation of current disease related symptoms
- Performance status recorded
- Co-morbidities recorded
- Smoking status recorded
- FH recorded
- Concomitant medications recorded and stopped if necessary
- Full Lung function test (spirometry plus transfer factor) compulsory
- Patient consented for aims, practicalities and toxicity of radical external-beam radiotherapy
- Plan confirmed with consultant oncologist if 1st seen by junior college
- Consideration given to use of prophylactic cranial irradiation (PCI)

1.2. MDT meeting
Case must have been through the relevant diagnostic MDT prior to commencing treatment.


Treatment will be 3-D conformal radiotherapy (or intensity modulated radiotherapy (IMRT) if dose contraints cannot be met with conventional treatment planning).

2.1. Patient treatment position and set-up
Supine, breathing normally using an external immobilisation device with arms immobilised above the head in most cases. Exceptionally, for patients with limited arm movement or apical...
cancer, arms may be positioned by the patients’ side and consideration should be given to a 5 pt shell fixation to aid stability. Set up should be by reference to anterior and lateral tattoos on stable areas of skin and bony anatomical landmarks.

2.2. Patient data acquisition

A planning CT scan should be performed in the treatment position, whilst the patient undertakes normal respiration. The whole lung (cricoid to L2) should be imaged using 0.3 cm slices to allow dose-volume histograms to be calculated. IV contrast is used if the patient has either nodal or central disease invading the mediastinum.

4D CT

2.3. Target volume delineation

Treatment will be planned based on information from bronchoscopy, PET-CT scan if available in addition to CT findings. In cases where there has been preceding chemotherapy, the pre-chemotherapy RT planning CT scan is fused to the post-chemotherapy RT CT scan to aid volume delineation. Target volume delineation will be done using both the mediastinal and lung windows.

Gross Tumour Volume (GTV) is only defined in chemo-naïve patients and is the identifiable tumour and involved nodes (nodal involvement on CT scan is defined as nodes ≥ 1 cm in short axis). GTV is not defined for patients treated with prior chemotherapy. Elective nodal irradiation should not be employed.

Clinical target volume (CTV) comprises the GTV with a 0.5 cm margin of radiologically normal tissue in all directions in chemo-naïve patients. In patients treated with prior chemotherapy the CTV will comprise a reduced volume based on the original gross tumour volume on the pre-chemotherapy scan. It will take into account microscopic spread. Manual adjustment of CTV is permitted to reduce dose to the spinal cord for example, when disease is adjacent to a structure such as a vertebra but is not thought to invade the structure.

The planning target volume (PTV) comprises the CTV with a 1.3 cm margin superiorly and inferiorly, and 1.0 cm margin laterally. Reduction of the CTV to PTV expansion is not permitted.

2.4. Organs at risk (delineation and dose constraints)

Critical normal structures are the spinal cord, lung, heart and oesophagus. Dose volume histograms (DVH) for the normal lung tissue and spinal cord and will be calculated. The oesophagus and heart should also be contoured if using intensity-modulated radiotherapy.

Lungs: contour all inflated right and left lung as one structure using lung windows. The V20 should be <35% in conventional fractionation (i.e. <35% of the volume of “normal” lung, excluding PTV, should receive a dose of ≥20Gy)

Spinal cord: contour based on the bony limits of the spinal canal. Delineation of the spinal cord should extend at least 10cm beyond the superior and inferior extent of the PTV. Maximum radiation dose to (spinal cord plus 0.5cm margin) should not exceed 42Gy.
Care Plan Template

Oesophagus: contoured using mediastinal windows from cricoid cartilage to the gastro-oesophageal junction. Planning should aim (not mandatory) to limit the length of treated oesophagus to 120 mm within the PTV. Due to lack of clear evidence regarding toxicity correlation with oesophageal dose volume histogram data, if this parameter is exceeded the clinician may proceed with radiotherapy at their discretion.

Heart: contour along with the pericardial sac. The superior aspect (or base) for purposes of contouring will begin at the level of the superior aspect of the left atrium and extend inferiorly to the apex of the heart. The heart can receive the total dose (TD) to < 30% of its volume. For > 50% of cardiac volume, dose < 50% of TD is recommended.

If dose constraints cannot be met using 3D-conformal radiotherapy, intensity-modulated radiotherapy (IMRT) should be considered to optimise the dose distribution.

2.5. Dose prescription

The dose will be specified at the ICRU reference point according to ICRU 50 and 62 and fully corrected for inhomogeneity. A DVH for the PTV should be calculated. The dose distribution within the PTV should ideally be within ± 5% of the prescribed dose, and no more than ± 7% of the prescribed dose. Wedges, tissue compensators or multi-leaf collimators may be used to achieve homogeneity of dose.

Radical Radiotherapy doses: 50-55Gy in 20 daily fractions over 28 days

2.6. Verification:

Standard departmental policy dictates consecutive portal imaging on days 1-3 of radiotherapy to confirm set-up accuracy and once weekly thereafter. If a discrepancy of ≥ 5 mm is found then set-up should be corrected and re-imaged as above. Alternatively, patients may be verified using cone-beam imaging with the same frequency and tolerance.

2.7. Treatment Delays:

Every effort should be made to deliver the prescribed dose of radiotherapy within the standard timeframe. If unavoidable delays occur, that could increase the overall treatment time beyond the specified period, e.g. due to machine breakdown, compensation should if possible be made by one of the following mechanisms:

- giving two fractions on a subsequent day, with a minimum interval of six hours between fractions, or
- treating on a weekend day, or
- if conventional fractionation – adjustment of fraction size (ensuring remains < 2.5Gy) to deliver the total prescribed dose within 33 days. Not applicable to hypofractionated regimens

3. On treatment assessments

3.1. Weekly clinical assessment by medical team including

- Graded documentation of toxicity
- Assessment of disease related symptoms
- Performance status recorded
### 3.2. Management of treatment related toxicity

CTCAE v4.0 Skin and Subcutaneous Tissue Disorders

<table>
<thead>
<tr>
<th>Grade</th>
<th>Adverse Event</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oesophagitis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Death</td>
</tr>
<tr>
<td></td>
<td>Asymptomatic; clinical or diagnostic observations only; intervention not indicated</td>
<td>Symptomatic; altered eating/swallowing; oral supplements indicated</td>
<td>Severely altered eating/swallowing; tube feeding, TPN or hospitalization indicated</td>
<td>Life-threatening consequences; urgent operative intervention indicated</td>
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<tr>
<td></td>
<td>Faint erythema or dry desquamation</td>
<td>Moderate to brisk erythema; patchy moist desquamation, mostly confined to skin folds and creases; moderate oedema</td>
<td>Moist desquamation other than skin folds and creases; bleeding induced by minor trauma or abrasion</td>
<td>Skin necrosis or ulceration of full thickness dermis; spontaneous bleeding from involved site; skin graft indicated</td>
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### 3.2.1 Radiation oesophagitis

- Grade 2 oesophagitis – optimise analgesia (consider sucralfate suspension, paracetamol mucilage, codeine phosphate liquid, oromorph, fentanyl patch). Advise soft diet/oral dietary supplements if required.
- Grade 3 oesophagitis - treat as for grade 2 oesophagitis but also consider admission to The Christie/dietician input/parenteral nutrition if required. Every effort should be made to continue radiotherapy. Avoid placement of nasogastric tubes.
- Grade 4 oesophagitis – As for grade 3 oesophagitis but radiotherapy should be stopped.

### 3.2.2 Radiation Pneumonitis

- Grade 2 pneumonitis - Consider oral steroids/antibiotics/antifungals
- Grade 3 pneumonitis – consider admission to The Christie for high dose IV steroids/oxygen/antibiotics/antifungals. Alert critical care team. Consider stopping radiotherapy.
- Grade 4 pneumonitis – as for grade 3 but will require admission to critical care and consider ventilatory support if appropriate. Stop radiotherapy.
3.2.3  **Radiation dermatitis**

- Topical treatment with aqueous cream/1% hydrocortisone cream if required

**Post treatment follow-up**

- 6 week post-treatment review with clinical assessment for residual treatment related toxicity and appropriate investigations at discretion of clinician.
- Further follow-up with medical oncologist as appropriate.
### Appendices

**ECOG PERFORMANCE STATUS**

<table>
<thead>
<tr>
<th>Grade</th>
<th>ECOG</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Fully active, able to carry on all pre-disease performance without restriction</td>
</tr>
<tr>
<td>1</td>
<td>Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work</td>
</tr>
<tr>
<td>2</td>
<td>Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours</td>
</tr>
<tr>
<td>3</td>
<td>Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours</td>
</tr>
<tr>
<td>4</td>
<td>Completely disabled. Cannot carry on any selfcare. Totally confined to bed or chair</td>
</tr>
<tr>
<td>5</td>
<td>Dead</td>
</tr>
</tbody>
</table>