Acute Oncology Group
Hull University Teaching Hospitals NHS Trust
Queen's Centre

Guidelines For The Management of Acute Oncology Presentations in Adults 2019

Malignant Ascites
Pleural Effusion
Pericardial Effusion
Lymphangitis Carcinomatosa
Superior Vena Cava Obstruction
Hypercalcaemia
Malignant Spinal Cord Compression
Cerebral Space Occupying Lesion
Radiation Induced Dermatitis
Radiation Induced Pneumonitis

Version Control

This is a controlled document please destroy all previous versions on receipt of a new version.

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These guidelines have been agreed by:		
Title	Name	Date Agreed
Chair of the Acute Oncology CEG	Dr Lorcan O'Toole	September 2013
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Acute Oncology Group Hull and East Yorkshire NHS Trust		January 2017
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1. Management of Malignant Ascites

1.1 Introduction

Most often ascites results from non-malignant causes. Cancer accounts for less than 10% of cases. Some patients have two causes for ascites formation (e.g. cirrhosis plus peritoneal carcinomatosis). Ascites typically develops in the setting of recurrent and/or advanced cancer. Metastatic ovarian, breast and colorectal cancers are the commonest malignant causes.

1.2 Symptoms and Signs

- Abdominal pain due to nerve invasion by the tumour, stretching of the liver capsule, or (in tense ascites) stretching of the abdominal wall
- Shortness of breath
- Early satiety
- Bulging flanks with dullness to percussion

1.3 Investigations

Patient with suspected ascites should undergo imaging to confirm the ascites and to mark the site for aspiration. In known cases of malignancy and where paracentesis is done to ease intra-abdominal pressure and relieve symptoms, there is no need for testing of the ascitic fluid. However if the clinical situation demands then ascitic fluid should be sent for cell count (including differential), protein analysis and serum-to-ascites albumin gradient.

1.4 Management

Therapeutic paracentesis is the mainstay of treatment. Frequency should be guided by the patient's symptoms (i.e. distension, shortness of breath, and early satiety). Large volumes of fluid (up to 21 litres) can be removed without fear of haemodynamic sequelae, including circulatory failure. Intravenous albumin infusion is generally not necessary, but 15-min monitoring of vital signs, and monitoring of electrolytes and albumin levels is recommended. In case of haemodynamic compromise, drainage should stop and resume at a more conservative rate when stability is achieved. If intensive monitoring is not feasible or practical, draining of two litres every 4-6 hours (using a pig-tail drain) is reasonable.

For recurrent ascites, a peritoneal port (PleurX™ drain) can be placed to facilitate repeated ascitic fluid drainage.

Diuretics are less likely to work in malignant ascites, but if considered appropriate, spirinolactone (50-100 mg) and/or furosemide (40 mg) can be tried.

NOTE: in HEY a relevant protocol for planning a non-urgent paracentisis exists and needs to be referred to.

1.5 Portal hypertension

Even though malignant ascites may be managed safely with large volume drainage without volume expansion, the same is not be true in cases where portal hypertension is present. This distinction is important in patients with co-existing cirrhosis but also patients with other causes of portal hypertension.

In general, malignancy classically causes an exudative ascites and cirrhosis causes a transudate. The serum ascites-albumin gradient (SA-AG) is the most accurate method for categorising ascites with 97% accuracy:

SA-AG = [serum albumin concentration] – [ascitic fluid albumin concentration].

In cases where the presence of portal hypertension is suggested by a SA-AG >11g/L, the British Society of Gastroenterology guidelines for ascites draining inpatient with cirrhosis is reasonable (8g of Albumin per litre of ascites drained.) In this manner studies have shown that drainage of 4-6L of ascites per day is feasible and safe. Simmilarly, the use of diuretics in these cases should follow the BSG guidelines for cirrhotic ascites. Gut 2006;55;1-12

Table 1 Serum ascites-albumin gradient (SA-AG)

SA-AG ≥11 g/l	SA-AG <11 g/l
Cirrhosis	Malignancy
Cardiac failure	Pancreatitis
Nephrotic syndrome	Tuberculosis

1.6 Outcome

Outcome depends upon the aetiology of the underlying cancer. Apart from ovarian cancer, outcome is generally poor with an average life expectancy around 3 to 6 months. Therefore in the majority of cases, the aim of treatment is symptom control.

2. Management of Malignant Pleural Effusion

2.1 Introduction

Malignant pleural effusions in patients with cancer are indicative of advanced disease with an associated short life expectancy. The commonest causes of effusion are lung cancer and breast cancer. It's important to determine the exact aetiology of each effusion as the best treatment options differ between tumour sites.

The median survival with an effusion secondary to lung cancer is around 3 months and compared with >12 months for breast cancer-associated effusions. These 2 sites make up at least 60% of all malignant effusions with an intermediate prognosis for other tumour sites.

Mesothelioma associated effusions generally have a better prognosis than other forms of lung cancer. Where possible management decisions should be made between Oncology and Chest Physicians with input from other specialities as required.
The guidelines of the British Thoracic society for the management of a malignant pleural effusion can be found here: http://thorax.bmj.com/content/65/Suppl_2/ii32.long
(Thorax. 2010 Aug;65 Suppl 2:ii32-40. doi: 10.1136/thx.2010.136994)

2.2 Symptoms and Signs

The majority of pleural effusions present with progressively increasing breathlessness over a period of weeks to months. Up to 25% can be asymptomatic. Cough and chest pain may be present but are not often found.

2.21 Signs of effusion

- Decreased respiratory excursion on the affected side
- Increase in respiratory rate
- Dullness to percussion
- Decreased breath sounds

The effusions may be of any size ranging from clinically undetectable to a complete whiteout. Generally the larger the effusion the more likely it is to be malignant. Increased respiratory rate, respiratory distress as demonstrated by respiratory failure and tracheal deviation away from the side of the effusion should be treated as a medical emergency.

2.3 Investigations

- Physical examination
- Chest x-ray
- Thoracic ultrasound
- CT scanning

2.4 Management

2.41 Emergency presentations

Patients presenting with signs suggestive of mediastinal shift or respiratory failure should be treated at the time of presentation. Ideally thoracic ultrasound should be performed prior to a therapeutic aspiration of 1 litre of fluid. This should reduce symptoms to allow a more considered approach.

2.42 Non-emergency presentations

In patients with known malignancy who have small, asymptomatic effusions intervention is not necessarily required other than radiological and clinical surveillance

In other cases wherever possible the malignant cause of the effusion should be confirmed through cytological examination of the pleural fluid. The treatment of choice depends on the likely prognosis for the patient.

If the outlook is relatively good, i.e. as with most patients with breast cancer, the ideal treatment would be to drain the effusion completely and then to instil an agent to induce a chemical pleurodesis to prevent re-accumulation of the fluid.

The method chosen to achieve this would depend upon local availability of services such as surgical approaches through a Video Assisted Thoracoscopic Surgery, medical thoracoscopy or small bore chest drain insertion. The ideal pleurodesing agent is TALC poudrage or TALC slurry depending upon local availability.

Before this is contemplated, ultrasound and / or cross sectional imaging should be performed to ensure that the lung is likely to re-inflate fully and is not trapped. This approach is most suitable for patients with breast cancer and mesothelioma.

In patients with a poor prognosis, i.e. <1 month, the best treatment is probably the simplest which would bea therapeutic aspiration.

For those people with an intermediate prognosis then a discussion needs to occur between the chest physician, Oncologists and patient as to the most appropriate form of treatment. In some, this will be chest fluid drainage with an attempt at the pleurodesis or simple aspiration.

An alternative choice would be to consider the placement of a long term pleural catheter. There are a number commercially available. This enables drainage to be performed in the community either by the patient or their carers. This is an increasingly popular choice.

3. Management of Pericardial Effusion

3.1 Introduction

Accumulation of fluid within the pericardial sac leading to effusion can be a presenting symptom in the acute oncology patient. Cardiac tamponade due to malignant pericardial effusion (MPCE) accounts for at least 50% of all reported cases that require intervention. MPCE is frequently indicative of advanced incurable malignancy with a median survival of less than 6 months.

Metastases from the lung or breast account for 75% of cases. MPCE is rarely the initial manifestation of extra cardiac malignancy with only a handful of such cases reported in the literature.

3.2 Symptoms and Signs

- Dyspnoea, cough
- Chest pain worse on inspiration or lying flat, relieved on sitting forward
- Fever
- Raised JVP with prominent x descent
- Bronchial breathing at left base
- Increased heart rate
- Decreased blood pressure
- Pulsus paradoxus
- Increased JVP (Kussmaul's sign: JVP rising with inspiration)
- Muffled heart sounds

Signs of tamponade

3.3 Investigations

- ECG
- CXR
- Echocardiography

3.4 Management

Symptomatic pericardial effusion and specifically cardiac tamponade needs urgent expert help. Refer to trust policies and refer to cardiology team or acute medical team to consider pericardiocentesis and further management as appropriate.

Questions as to the appropriateness of treatment can be discussed with the patient and family members and the patient's oncology consultant or on call oncologist.

3.5 Outcome

Immediate short term relief can occur with pericardiocentesis. In the longer term balloon pericardotomy may be required if there are no further systemic treatments available for the malignancy in question. Radiotherapy can rarely be used.

4. Management of Lymphangitis Carcinomatosa

4.1 Introduction

Lymphangitis carcinomatosa, more commonly abbreviated to lymphangitis, is characterised by the development of severe and constant breathlessness caused by the blockage of the lymphatic drainage of the lungs by hilar nodal involvement.

The lungs become congested and stiffened with increased interstitial fluid resulting in a reduced capacity for transferring oxygen.

Lymphangitis is common in patents with lung cancer but also occurs commonly in metastatic breast and gastrointestinal cancers.

4.2 Diagnosis

There are no specific clinical features of lymphangitis though an unproductive cough and basal crackles may be present. Radiological changes are common on CXR and may be similar to those seen in acute left ventricular failure. Characteristic changes are often seen on CT scan.

4.3 Management

The development of lymphangitis signals a poor prognosis in most cases and many patients are severely disabled by breathlessness. General, symptomatic measures are important.

4.4 Anti-cancer treatment

Patients with cancers which are sensitive to chemotherapy or hormone therapy such as small cell lung cancer or breast cancer may improve with treatment but in many cases, the breathlessness is resistant to treatment and is often progressive.

Radiotherapy to mediastinal or hilar nodes may occasionally be helpful.

4.5 Symptomatic treatment of breathlessness

Please refer to the document: A Guide to Symptom Management in Palliative Care by the Yorkshire and Humber Palliative and End of Life Care Groups

http://intranet/palliativecare/pdf/yhPalliativeCareSymptomGuide2016.pdf

4.6 Pharmacological treatment

All drugs for symptomatic relief of dyspnoea are respiratory sedatives. When prescribed, their use should be monitored carefully. In the context of distressing dyspnoea in the terminal stages of illness the benefits usually outweigh the risks.

4.61 Opioids

Oral morphine (immediate release) 2.5mg 4 hourly. Gradually titrate dose upward according to response or until unacceptable side-effects occur. This can be converted to a long acting morphine preparation if effective.

If already taking strong opioid for analgesia contact palliative care team for advice.

4.62 Benzodiazepines

Lorazepam 0.5mg-1mg SL may give rapid relief during panic attacks.
For longer-term management consider oral diazepam 2mg once at night or twice daily.

Midazolam 2.5mg SC may benefit patients that cannot tolerate oral/sublingual route. These drugs can be continued in the terminal phase as a continuous subcutaneous infusion.

4.63 Corticosteroids

Corticosteroids are often started in the hope of reducing pulmonary congestion but there is no evidence to support this practice. Steroids may give relief of breathlessness by a variety of mechanisms and a short trial is usually worthwhile, stopping after 7 days if there has been no benefit.

4.7 General symptomatic measures

- Dyspnoea is frightening to patient, family and staff. Reassurance and explanation are vital parts of the treatment whatever the cause.
- Modification of lifestyle, breathing retraining and relaxation may be beneficial if instituted early enough - consider referral to a physiotherapist.
- A table or hand-held fan directed onto the face often eases dyspnoea.
- Good oral care is important if there is persistent mouth breathing.
- Humidified oxygen may help acute dyspnoea but should be used alongside other measures and its use reviewed regularly.
- Long term oxygen therapy for chronic respiratory illness should only be instigated by respiratory physicians.
- Many patients requiring palliation for breathlessness will not benefit from oxygen therapy. Measurement of oxygen saturation levels using a pulse oximeter may aid decision making in assessing whether or not oxygen is of benefit.

5. Management of Superior Vena Cava Obstruction

5.1 Introduction

Most commonly seen in lung cancer.
Consider lymphoma, particularly in young patients.
Regard as an emergency as the patient's condition may deteriorate rapidly.

5.2 Symptoms and Signs

- Swelling of the face and neck
- Feeling of fullness in the head
- Dyspnoea, worse on lying flat
- Non-pusatile raised JVP
- Dilated anterior chest wall veins

5.3 Investigations

- Discuss with radiologist regarding local policy
- CXR
- Chest CT

5.4 Management

Vascular stenting is the usual treatment of choice for the acute relief of symptoms of SVCO in cancers which are not curable although without a stent, collateralisation usually occurs slowly giving some resolution of mild symptoms with time.

For limited stage mediastinal lung cancers or lymphomas with a radical treatment option, the placement of an intravascular stent can cause long term problems and discussion should take place between the oncology team and the vascular radiologists.

Radical chemotherapy or chemo-radiotherapy may be the treatment of choice for very chemosensitive malignancies eg. lymphoma, small cell lung cancer and germ cell tumours and should be discussed with the appropriate teams before considering the insertion of a stent.

Palliative radiotherapy or chemotherapy may be indicated to reduce tumour mass, improve the SVCO and deal with other symptoms.

The evidence for the use of glucocorticoids as a holding measure before definitive treatment is lacking and is not generally recommended for most tumours High dose steroids should not be started 'blind' in undiagnosed SVCO. High grade mediastinal lymphomas can respond very rapidly with the potential for tumour lysis syndrome and loss of the opportunity for a histological diagnosis. If lymphoma is suspected, expert haematological advice should be sought.
Case reports suggest benefit of steroids in patients with SVCO syndrome undergoing radiotherapy to reduce oedema, especially when laryngeal oedema is present. Where used, this should be of limited duration.

Discussion with the local respiratory team and / or oncologist is recommended.

5.5 Recurrent superior vena cava obstruction

Radiotherapy may be considered if tolerance doses have not already been reached. Vascular stents can usually not be replaced though further stenting or thrombolysis might be possible if there has been tumour progression or thrombosis and the case and imaging should be discussed with the vascular radiology team

5.6 Outcome

Treatment often gives useful symptomatic relief.
In untreatable SVCO, end of life measures are required.

6. Management of Hypercalcaemia of Malignancy

6.1 Introduction

Hypercalcaemia affects approximately 10-20% of patients with advanced cancer.
It's most commonly seen in multiple myeloma, breast, renal and squamous carcinomas and does not require the presence of bone metastases.
Consider in unexplained nausea, vomiting or confusion.

More commonly due to tumour secretion of parathyroid hormone related protein than to bone metastases.

May develop insidiously.

6.2 Symptoms and signs

- Severity of symptoms is more related to the speed of rise of serum calcium rather than to absolute level.
- Non-specific early symptoms: lethargy, malaise, anorexia.
- Common symptoms: nausea and confusion.
- Other symptoms: constipation, thirst and dehydration.
- Late features: drowsiness, fits and coma.

6.3 Investigations

- Corrected serum calcium
- Urea and electrolytes

6.4 Management

Severe hypercalcaemia (>3.5mmol/L) requires aggressive therapy. Patients with moderate (3.0-3.5mmol/L) hypercalcaemia require prompt treatment, especially if symptomatic or if the elevation is relatively rapid. If moderate hypercalcaemia is chronic and asymptomatic, it may not require aggressive or immediate treatment. Mild hypercalcaemia (2.8-3.0mmol/L) usually does not require immediate treatment and could be managed with hydration, avoidance of exacerbating factors (such as thiazide diuretics and lithium carbonate therapy, volume depletion, prolonged bed rest or inactivity, and a high calcium diet (>1000 mg/day).

The principles of the management of hypercalcaemia are the following:

A) Volume expansion with isotonic saline at a rate governed by the age and cardiac status of the patient
B) Intravenous bisphosphonates -zoledronic acid IV infusion over 15 min dose according to renal function – see BNF. In patients with poor renal function, ibandronate is an alternative. In all cases, the risk of worsening renal function is less if the patient is well hydrated
C) Salmon calcitonin can be useful in cases which do not respond to bisphosphonates. Denosumab (not licenced for this indication) could be considered in selected cases.
D) Glucocorticoids (dexamethasone/prednisolone) can be useful to treat extrarenal 1,25(OH)2D and multiple myeloma / lymphoma related hypercalcemia
E) Dialysis may be useful as last resort

6.5 Outcome

Initial episodes usually successfully treated as above. Patients may need regular bisphosphonates under oncology care to prevent recurrent episodes. Best treatment is that of the underlying malignancy.

7. Malignant Spinal Cord Compression

For ALL cases of MSCC please refer to the full Guidance documents available in:

https://www.hey.nhs.uk/queens/services/mscc/

http://intranet.hey.nhs.uk/mscc/

(NLAG: documents are available in the intranet in the Acute Oncology page)

7.1 Introduction

Metastatic spinal cord compression (MSCC) is seen in 15% of all cancer patients and in up to half of these, it is the first presentation of their cancer.

Breast, lung and prostate cancer account for more than 50% of all cases. MSCC is also seen in renal cell cancer, myeloma and in lymphoma amongst others.

MSCC requires early recognition and prompt referral as restoration of neurological function is rarely possible for those who have lost it by the time they start treatment.

7.2 Symptoms and signs

- Pain is the presenting symptom in 90 to 95%; this can be localised or radicular.
- Limb weakness.
- Sensory disturbances.
- Autonomic dysfunction.
- Weakness / paraparesis / paraplegia.
- Change in sensation below level of lesion (not always complete loss of sensation).
- Reflexes – absent at level of lesion – increased below it.
- Clonus.
- Painless bladder distension.
- Loss of anal tone.

7.3 Investigations

- The absence of signs does not exclude early spinal cord compression.
- Investigations should be considered on the basis of history alone in at risk patients.

7.31 Urgent whole spine MRI

Arranged by the admitting team and performed within 24 hours if MSCC is suspected.

7.4 Management

7.41 Analgesia

As per the WHO analgesic ladder.

7.42 Steroids

Dexamethasone 16mg stat, orally or intravenously, then 8mg orally (PO) twice a day (if no contraindications). It should be accompanied with a proton pump inhibitor (PPI) cover. Steroids should be started as soon as MSCC suspected.
Patients on high dose steroids should be observed for the development of glycosuria.

7.43 Referral to MSCC Coordinating Team

All cases to be referred following HEY MSCC pathway. Contact MSCC coordinator bleep 500 in CHH. (Hospital external line: 01482875875). Refer to specific MSCC guideline.

It is the responsibility of the admitting team to urgently refer cases of MRI diagnosed MSCC with the aim of definitive treatment (if indicated) within 24 hours of diagnosis.

7.44 Surgery

All cases of confirmed MSCC should be discussed with the neurosurgical team on call at HRI, spine stability has to confirmed in all cases by neurosurgical team. (The HEY neurosurgical team accepts referrals via referapatient.org: https://www.referapatient.org/Home/UnitDetail)

7.45 Venous thrombosis risk evaluation and prophylaxis

As per institutional guidelines

7.45 Radiotherapy

If surgery is not recommended then urgent referral to oncology is indicated. Radiotherapy is useful for pain control as well as MSCC management.

7.46 Chemotherapy

In selected cases such as haematological malignancies, small cell lung cancer and germ cell tumours, chemotherapy could be the preferred first line of management.

7.47 Best supportive care (BSC)

BSC should be considered for patients with poor performance status and / or for those who have been totally paraplegic for more than 24 hours.

7.48 Rehabilitation

Physiotherapist and occupational therapist will start the rehabilitation program at an early stage as indicated.

7.5 Outcome

- Early diagnosis, referral and treatment are the major determining factors for a successful outcome in the management of MSCC.
- Patients whose mobility has been affected will require a prolonged period of rehabilitation and home adaptations prior to discharge.
- Prognosis is greatly affected by performance status, ambulatory status and the background malignant condition treatment options available.

7.6 Diagnostic investigations

Even though outside the scope of the present document, it needs to be noted that for patients with Malignant Spinal Cord Compression as a first manifestation of their malignancy, incorporation of staging and diagnostic procedures as appropriate will need to be considered by the senior managing physician.

8. Management of Cerebral Space Occupying Lesion (Brain metastases)

8.1 Introduction

Metastases to the brain are a common problem in oncology, affecting 17–25% of the cancer population. They are common in lung cancer affecting 26% of patients with this disease, breast cancer (16%), renal cancer (13%), colorectal carcinoma (5%) and in melanoma (4%). In the majority of patients, the diagnosis of cerebral metastases carries a poor prognosis.

8.2 Diagnosis and early suspicion

Brain metastases frequently masquerade as a stroke or less commonly as seizures in patients not previously known to have a diagnosis of cancer, the correct diagnosis being made at CT or MRI scan. Brain metastases should be considered in all those known to have cancer presenting with any of the symptoms listed.

- Headache
- Nausea / Vomiting
- Focal weakness / hemiparesis
- Confusion
- Unsteadiness
- Seizures
- Visual disturbance
- Dysphasia

8.3 Management

In many patients, the presence of cerebral metastases is a component of widely disseminated disease and is often associated with a poor performance status and prognosis. The focus of management for this group is general symptomatic care and consideration of psychosocial needs. For a selected group of patients with a better prognosis, active treatment may be appropriate.

8.4 General symptomatic measures

8.41 Cerebral oedema and raised intracranial pressure

Acute treatment is with steroids: dexamethasone 8mg initially which should only be given parenterally when there is concern about absorption e.g. in the presence of vomiting. This should be followed by dexamethasone 16mg daily in two divided doses.

Ideally the second dose should not be given after 2pm to avoid night time wakefulness and agitation though this should not preclude emergency administration of the first day's dose. Intravenous mannitol may rarely be needed to reduce the intracranial pressure in a patient whose condition is worsening rapidly.

Patients on high dose steroids should be observed for the development of glycosuria.

8.42 Headache

Headache usually responds to steroids but regular paracetamol with the addition of codeine phosphate may be helpful and occasionally strong opioids may be required.

8.43 Seizures

Once intracranial pressure is reduced, seizures may subside but some patients require regular anticonvulsant medication. The terminally ill patient with cerebral metastases and uncontrolled fitting may require parenteral benzodiazepines e.g. midazolam by continuous subcutaneous infusion.

8.44 Nausea and vomiting

This usually responds to measures which reduce intracranial pressure, but antiemetics e.g. cyclizine or haloperidol may be required and may need to be given parenterally at first.

8.45 Confusion, agitation or psychosis

The introduction of steroids may reverse acute problems but occasionally sedation may be required until the steroids take effect or as part of the management of terminal agitation.

8.5 Specific treatment options

8.51 Small volume disease in patients with a good prognosis

Surgical resection may be appropriate for a patient with an MRI-proven solitary metastasis (occasionally more than one metastasis) and who has limited extra-cranial disease and both a good prognosis and performance status. Stereotactic radiosurgery (SRS) is an alternative when surgical resection is not appropriate and can be used to treat more than one metastasis as long as the total volume to be treated remains low (current recommendation is <20ml). . SRS uses finely focused beams of radiation and image guidance to treat the metastasis with a small margin to a high dose and is available in the UK in several larger radiotherapy centres.

There has been no head-to-head comparison of surgery and SRS so the choice depends on local expertise, fitness for surgery, the size and site of the metastatic disease and patient choice. The addition of whole brain radiotherapy to either of these local treatments seems to decrease the risk of relapse in the brain but does not impact on overall survival.

Surgical resection may be more appropriate than SRS where there is no known primary cancer and the differential diagnosis lies between a primary brain tumour and a solitary metastasis or when the metastasis is too large for SRS. Surgery also has a role when raised intracranial pressure causes severe symptoms, especially with posterior fossa lesions.

The multidisciplinary team is vital in the management of solitary brain metastases and cases which may be appropriate for surgery should be discussed at the neuro-oncology multidisciplinary team meeting.

The Neurosurgical team in HEY accepts referrals via referapatient.org :
https://www.referapatient.org/Home/UnitDetails

MDT Lead	CNSs	MDT Coordinator
Mr S Achawal Sec: Lesley Hart Tel HRI: 01482 607877	Louise Baker Lynne Gill Tel HRI: 01482 607831	Joanne Ward Tel: 01482 607841 Fax: 01482 607892 Urgent referral / 2WW fax number: 01482 675505

8.52 Chemotherapy

Systemic chemotherapy is useful for cancers which are chemosensitive, such as small-cell lung cancer and germ cell tumours and may also be useful in patients with breast cancer. Chemotherapy is usually followed by radiotherapy.

8.53 Whole brain radiotherapy

Radiotherapy to the whole brain is commonly used for brain metastases which are not amenable to surgery or SRS and is usually given over 5-10 days. Steroids are continued throughout the treatment but are tailed off once it is complete, at a rate determined by symptoms though it is often not possible to stop steroids completely.

Good response rates have often been quoted but studies of patients with brain metastases from several primary sites using patient-rated scales have suggested that benefit may often be outweighed by side effects (Box 1)
Patients with non-small cell lung cancer (NSCLC) metastatic to the brain seem to fare particularly poorly with a median survival of about 9 weeks. A large randomised study of patients with metastases to the brain from NSCLC deemed untreatable by surgical resection or stereotactic radiosurgery has recently reported). There was no statistically significant difference between those treated with whole brain radiotherapy and steroids compared to those treated with steroids alone in terms of quality of life and overall survival. The small group of patients with favourable factors: age <60; KPS ≥70; primary disease controlled showed a small survival advantage for the addition of whole brain RT to steroids. For the patient with brain metastases from NSCLC, a poor performance status and poor prognosis, treatment with steroids and general supportive measures may be the best option.

Box 1 Side effects of whole brain radiotherapy	
Acute	**Late (>6 months after completion of treatment)**
Temporary alopecia	Difficulties with memory and concentration
Headache	Deterioration on neurocognitive testing
Nausea	Persistent alopecia
Redness and soreness of the skin	
Tiredness and sleepiness	

8.6 Rehabilitation & Discharge Planning

Many patients with brain metastases have a dramatic change in their functional ability, independence and personality. Many of their rehabilitation needs are similar to those outlined for patients with MSCC. In addition, some patients may need speech therapy and where appropriate, route of nutrition

will need to be considered in those who have difficulty swallowing. There is a need for psychological support for both patient and carers.

8.7 Outcome

8.71 Symptoms and quality of life

Both brain metastases and their treatment cause neurological symptoms and impair quality of life. A prospective study found that one month following whole brain radiotherapy, one fifth of 75 patients with brain metastases from a variety of primary cancers reported an improvement or resolution of their neurological symptoms and a similar number were stable. The rest had progressive symptoms or had died.

The challenge is to identify patients who are likely to benefit from treatment, concentrating on end of life care and symptom control for those who are unlikely to gain from intervention.

8.72 Survival

The survival of patients with cerebral metastases is usually short. Performance status is the strongest predictor of survival although patients with non-small cell lung cancer have a particularly poor prognosis with a median survival of 2-3 months. Box 2 summarises the factors influencing survival.

Box 2 Factors affecting survival in patients with brain metastases

Factors that improve survival	**Factors that reduce survival**
Solitary metastasis	Poor performance status
Long disease-free interval prior to relapse	Extracranial sites of metastatic disease
Primary site breast	Primary site non-small cell lung cancer
	Meningeal disease

8.73 Place of care

Many patients will be unable to be cared for at home because of loss of independence in activities of daily living, nursing needs and cognitive impairment. Changes in cognitive function in particular make care at home problematic and distressing to relatives.

8.8 Follow-up

Symptomatic progression of brain metastases is common and is often accompanied by progressive extracranial disease. Close follow-up should be arranged in the community where care is usually centred for those without further anticancer treatment options.

9. Management of Radiation Induced Dermatitis

9.1 Introduction

Radiation dermatitis is a side effect of external beam radiation. It occurs on the skin within radiation portals. It is a complex process of direct tissue injury and inflammatory cell recruitment, involving damage to epidermal basal cells, endothelial cells and vascular components and a reduction in Langerhans cells.

The risk of developing this complication depends on the dose of the radiation deposited on the surface of the skin. Radiation induced acute dermatitis usually begins in the 3rd or 4th week of radiotherapy, when standard fractionation is used, it aggravates towards the end of the treatment and gradually subsides once irradiation finishes. In most patients, the severity of radiation dermatitis is mild to moderate.

The more severe skin reaction is usually present when radiotherapy is used to treat head and neck, anal or skin carcinomas. The use of concurrent chemotherapy or anti EGFR antibodies with RT shortens the onset, exacerbates the severity and prolongs the duration of the radiation dermatitis.

9.11 Grading system and symptoms and signs on clinical examination

Common Terminology Criteria for Adverse Events (CTCAE v3.0)

Adverse Event	1	2	3	4	5
Rash: Dermatitis associated with radiation	Faint erythema or dry desquamation	Moderate to brisk erythema; patchy moist desquamation, mostly confined to skin folds and creases; moderate edema	Moist desquamation Other than skin folds and creases; bleeding induced by minor trauma or abrasion	Skin necrosis or ulceration of full thickness dermis; spontaneous bleeding from involved site	Death

Radiation dermatitis generally manifests within a few weeks after the start of radiotherapy. Its onset varies depending on the radiation dose intensity and the normal tissue sensitivity of individuals. As the cumulative dose of radiation increases, the transient erythema occurring during the first weeks of radiotherapy may evolve into the more persistent erythema to dry or even moist desquamation.

9.2 Investigations

Usually there is no need for further investigations unless very severe skin reaction when swab for bacteriology may be of value.

9.3 Management

The treatment strategy for the management of radiation dermatitis is based on symptom control as there is no treatment proven to be effective. Topical treatment is the mainstay of therapy for radiation dermatitis.

Patients should be encouraged to maintain good standards of skin hygiene. The irradiated area should be kept clean to minimise the risk of infection.

Patients should

- Be provided with written and verbal information detailing skin care instructions.
- Wash the area daily with a gentle cleanser, the use of a pH-neutral synthetic detergent or mild soap is recommended.
- Avoid rubbing the area and use a soft clean towel.
- Avoid sun exposure wherever possible (soft clothing to cover the area and/or the use of mineral sun blocks).
- Avoid the use of skin irritants, such as perfumes or alcohol-based lotions. Deodorants may continue to be used unless these are found to irritate the skin.
- Avoid the use of paraffin or petroleum based creams and use aqueous cream.

In Grade 1 radiation dermatitis, topical moisturisers should be used (e.g. aqueous cream) which should not be applied shortly before radiation treatment as they can cause a bolus effect, thereby artificially increasing the radiation dose to the epidermis. It is important to instruct patients to gently clean and dry the skin in the radiation field before each radiation session.

In Grade 2 and 3 radiation dermatitis the following topical treatments are used

- Hydrogel application (e.g. Intrasite Gel) or hydrophilic dressing
- Topical steroids (e.g. hydrocortisone 1% cream)
- Silver Sulfadiazine 1% Cream (should be applied after radiotherapy)

The choice of these topical treatments is based on patient preference and compliance with regular use. Where skin infection is suspected topical antibiotics should be considered based on culture and sensitivity evaluation to provide patient with targeted evidence-based antimicrobial therapy.

In Grade 4 dermatitis, irradiation should be discontinued but this decision should be only taken by the clinical oncology consultant.

Wound specialist consultation is mandatory to select the appropriate dressing.

Suprainfection should be treated with empirical systemic antimicrobial therapy usually with broad spectrum penicillin derivates or tetracycline. Culture and sensitivity evaluation is recommended when feasible to provide patient with targeted evidence-based antibiotic therapy.

Adequate pain management according to the WHO ladder is necessary in all grades of radiation dermatitis.

9.4 Outcome

Radiation dermatitis in the vast majority of cases is a reversible process and usually resolves with appropriate treatment following completion of the irradiation even when it was Grade 4.

10. Management of Radiation Induced Pneumonitis

10.1 Introduction

Radiation pneumonitis is an inflammation of the lung tissue due to irradiation. This treatment toxicity occurs in 5-15% of patients having radiotherapy for lung cancer with radical intent. It can also result from radiation to the chest for other cancers; oesophageal, breast, lymphomas etc usually with lower incidence and severity compared to treatment for a primary lung cancer.

Radiation pneumonitis typically occurs between 1 and 3 months after completing radiation therapy with range of 2 weeks to 6 months. The risk of developing this complication depends on the dose of the radiation used and the volume of the lung tissue where high dose was delivered. It is more common if chemotherapy is given at the same time as radiotherapy, and is more likely to occur when there are pre-existing lung diseases, such as COPD.

10.11 Grading system and symptoms and signs on clinical examination

Acute toxicity Common Terminology Criteria for Adverse Events (CTCAE v4.0).

Adverse Event	1	2	3	4	5
Pneumonitis	Asymptomatic; clinical or diagnostic observations only; intervention not indicated	Symptomatic; medical intervention indicated; limiting instrumental ADL	Severe symptoms; limiting self care ADL; oxygen indicated	Life-threatening respiratory compromise; urgent intervention indicated (e.g., tracheotomy or intubation)	Death

Activities of Daily Living (ADL).
*Instrumental ADL refer to preparing meals, shopping for groceries or clothes, using the telephone, managing money, etc.
**Self care ADL refer to bathing, dressing and undressing, feeding self, using the toilet, taking medications, and not bedridden.

10.2 Symptoms include

- Shortness of breath especially on exertion
- Persistent non productive cough
- Chest pain especially that which worsens with breathing and low-grade fever

10.3 Investigations

- FBC, BCP
- Oxygen saturation
- Chest X-ray

- High resolution Chest CT
- DLCO

10.4 Management

Pulmonary embolism, infection, COPD exacerbation and tumour progression must be ruled out as these conditions can present with the same symptoms or coexist with radiation pneumonitis.
For G1 symptoms, observation only is recommended.

The main treatment in grade 2 or higher radiation pneumonitis is high dose corticosteroids; 60 mg/day of prednisolone orally. Other corticosteroids (e.g. dexamethasone) can be used in equivalent doses.

The initial IV administration of corticosteroids is recommended when severe respiratory distress precludes oral administration. The high dose should be maintained until symptoms improve with slow tapering afterwards. Prophylactic PPI (e.g. lansoprazole 30 mg OD) should be used to avoid gastrointestinal complications.

Cough suppressants: Codeine 15-30 mg every 4-6 hours or oral morphine solution 5-10mg.
Analgesia and antipyrexials: Paracetamol 500-1000mg QDS.

For G3 or higher radiation pneumonitis, the administration of oxygen is indicated and should be used according to local hospital guidelines.

Respiratory failure in G4 should be treated according to local hospital guidelines.

Coexisting pulmonary embolism, infection, COPD exacerbation or other cardiopulmonary illnesses should be treated according to local hospital guidelines.

10.5 Outcome

Radiation induced pneumonitis in the majority of cases is a reversible process and usually resolves with time. If radiation pneumonitis persists, it can lead to post-radiotherapy lung fibrosis.