Optimisation of palliative radiotherapy

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Introduction

The aim of palliative radiotherapy is to achieve durable control of local symptoms to enable effective symptom control for the remainder of that patient's life. In the setting of advanced cancer this will typically be a matter of months although it is important to be aware of selected patients who may have a longer life expectancy despite advanced metastatic disease. This includes those with widespread bone metastases from breast cancer and patients with small volume liver metastases from colorectal cancer whose median survival will be well beyond 1 year. There is then an important equation relating the investment a patient may have to make in terms of time taken up by treatment and associated side effects compared with benefit and treatment efficacy. This concept of opportunity cost is particularly important when considering optimal radiotherapy fractionation to minimise the proportion of expected survival which is taken up delivering treatment. Here the fundamental principle is to use the least treatment consistent with efficacy which in the ideal situation will be a single exposure and visit to the radiotherapy department.

Optimisation of palliative radiotherapy will be dependent upon two factors: patient selection and treatment delivery.

Patient selection

There are a number of well established indications for palliative radiotherapy in advanced disease [1]. These include those shown in Table 1.

However, not all patients will benefit from palliative radiotherapy and it is important to consider the underlying condition and performance status of the patient before making a final decision that referral for radiotherapy is appropriate. A number of examples may be considered.

Table 1
Indications for palliative radiotherapy

Site	Symptom
Bone metastases:	Local pain Neuropathic pain Spinal cord compression Nerve root compression
Brain metastases:	Weakness Headache Cranial nerve involvement Confusion
Hepatic metastases:	Pain due to massive hepatomegaly
Choroidal metastases:	Visual loss
Lung Cancer:	Haemoptyis Chest pain Dysphagia Dyspnoea due to lung collapse
Rectal cancer:	Haemorrhage, pain or discharge
Bladder cancer:	Haematuria
Prostate cancer:	Haematuria
Cervical cancer:	Bleeding, pain
Ovary cancer:	Bleeding, pain

Bone metastasis

Whilst local radiotherapy or systemic isotope therapy for painful bone metastasis is highly effective [2], for the patient with poor performance status who is bed-bound and may have to travel for some distance to the radiotherapy department, the benefit gained may be overwhelmed by the negative impact of the procedure. Adjustment to lifestyle, mobility and appropriate analgesia may be more appropriate and beneficial.

Spinal cord compression

Patients diagnosed with established paraplegia after more than 48 h rarely regain neurological function. It is therefore inappropriate to consider such patients for urgent radiotherapy and the only indication is for pain relief.

Table 2
Examples of evidence based hypofractionation in palliative radiotherapy

Treatment indication	Radiotherapy schedule
Bone pain	Single fraction better than multifraction
Neuropathic bone pain	Single fraction not inferior to multifraction
Brain metastasis	Two fractions equivalent to 30 fractions
Bladder cancer	Three fractions equivalent to ten fractions
Non-small cell lung cancer	Single fraction equivalent to two or more fractions

Brain metastasis

There is evidence that patients with poor performance status, particularly those with primary lung cancers, have little benefit from palliative whole brain radiotherapy for multiple brain metastasis and are best managed with appropriate supportive care, steroids and analgesics [3].

In the selection of patients for palliative radiotherapy, the relative role of radiotherapy alongside other treatment modalities must also be considered. Examples of this include the relative advantages of radiotherapy and chemotherapy in non-small cell lung cancer which has not been tested in a head-to-head randomised trial. Evaluation of individual trials suggests both may achieve symptom control and both may achieve a modest prolongation of survival by 2 months [4]. There may therefore be little advantage at the outset of choosing one over the other but it is important to consider that both modalities are likely to have a role in the overall management of a patient. Synergism may also be employed in other tumours to achieve optimal symptom control. For example, palliative chemotherapy for small cell lung cancer combined with cranial irradiation for brain metastases or local radiotherapy for bone metastases. A further example would be the use of local radiotherapy to control rectal bleeding in combination with chemotherapy for liver metastases.

The use of bisphosphonates for metastatic bone pain is another area where both radiotherapy and a systemic agent are used. Again, no head-to-head phase III trial has been completed although one is currently underway for localised bone pain comparing radiotherapy with ibandronate [5]. Comparison of the published data suggests bisphosphonates are less effective at pain relief than radiotherapy [6]. However, undoubtedly some patients respond and the choice of initial treatment may be based upon logistics as much as treatment efficacy, bisphosphonates generally being more readily available and easier to administer as an intital therapeutic trial.

Treatment delivery

As already stated where radiotherapy is to be given for palliation, the least number of treatment fractions using the simplest technique consistent with efficacy and low toxicity should be chosen. This is in contrast to radical radiotherapy where prolonged treatments can be justified in order to achieve high biological doses and low incidence of late toxicity. In the palliative setting, acute toxicity should be the major arbiter of the side effect profile, most patients not surviving into the phase of late toxicity seen with high dose radiotherapy.

Palliative radiotherapy has been subject to a number of randomised controlled trials which demonstrate efficacy for hypofractionated treatment schedules. These are illustrated in Table 2 below.

It is however important to realise that the optimal palliative schedule for one patient may not be the same as for another and that there are indications to consider a modest investment in a slightly more prolonged higher dose schedule. Examples of this include selection of good performance status patients with brain metastases for a ten fraction schedule [7] and non-small cell lung cancer for a more prolonged schedule which may range from five to 13 fractions [4]. In both of these scenarios, randomised controlled trials have demonstrated a modest survival advantage in addition to effective and equivalent symptom control for the more prolonged fractionation schedule.

In summary, optimisation of palliative radiotherapy demands careful patient selection and individualisation of treatment based upon the indication for radiotherapy, the underlying primary site and the patient's performance status. It is also important that palliative radiotherapy is not seen in isolation but as part of a multidisciplinary approach to symptom control. This will incorporate radiotherapy with the optimal use of analgesics and adjuvant analgesic drugs, systemic anti-cancer therapy including hormone therapy and chemotherapy and community and social support.

Conflict of interest statement

None declared.

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