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Profile of patients undergoing palliative radiotherapy: A single-institute study from a tertiary care oncology center

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Abstract

Background: Palliative radiotherapy (PRT) plays a significant role in the palliation of symptoms in patients with cancer and constitutes nearly 50% of the workload in different settings. **Aims:** The aim is to study patient-, disease-, and treatment-related characteristics in locoregionally advanced and metastatic malignancies meriting palliative management. **Setting and Design:** This was a retrospective observational study in a tertiary care government institute with academic and research potential. **Methodology:** The electronic medical records, medical documents, and radiotherapy (RT) treatment charts were retrieved and studied. **Observations:** A total of 460 patients were included in the study over 2 years, forming 30% of the total number of patients treated during the study period. Three hundred and ninety-six patients received PRT to the metastatic sites, while 64 patients received extremely hypofractionated PRT to the primary for symptomatic relief. Totally 442 patients showed good symptomatic response to PRT. One hundred and thirty-eight patients underwent re-irradiation. Lung was the most common primary site seen in 155 cases. The most common indication for PRT was palliation of pain from painful metastases as seen in 240 cases, and the next common indication was palliative whole-brain RT for brain metastases as seen in 159 cases. **Conclusion:** PRT forms an integral and important aspect of palliative care to the vast number of patients harboring metastatic disease that warrants some form of treatment for symptomatic relief. Short course of PRT in outdoor setting is a preferred mode of treatment to improve the quality of life of these distressed patients.

Key words: Cancer, metastatic disease, palliative care, palliative radiotherapy, symptomatic relief

Introduction

Palliative care, as defined by the World Health Organization, is "the active total care of patient whose disease is not responsive to curative treatment." A patient with advanced incurable disease may tolerate the antineoplastic treatment poorly and may become further disabled. Thus, an oncologist should try to maintain an intricate balance between expected symptom relief and the possible toxicities of the treatment. Thus, palliative care represents not only the care of the dying, but also involves the extended care of patients with advanced cancer and metastatic disease.[1,2] Radiotherapy (RT) is a successful, time-efficient, well-tolerated, and cost-effective intervention that is crucial for the appropriate delivery of palliative oncology care.[3] Palliative radiotherapy (PRT) is required in 30%–50% of all cancer patients, and the primary aim of PRT is to provide adequate pain and symptom relief.[1,4,5] The main indications of PRT are pain relief, control of hemorrhage, fungation and ulceration, dyspnea, blockage of hollow viscera, and relief of pressure symptoms. Radiation oncologists often have an excellent opportunity to involve palliative care professionals, pain medicine providers, and hospice specialists in a patient's life when they are most in need.[6-8]

Methodology

It was a retrospective observational study where the electronic medical records, medical documents, RT treatment charts, and indoor files in case of hospitalized patients were retrieved and studied. The study was conducted from January 2015 to December 2016 in a tertiary care government institute with a dedicated oncology center and all allied specialties. All these patients had been registered in hospital's central registry as well as oncology department.

The study population consisted of patients with histopathological confirmation of malignancy, who were harboring metastatic disease and merited PRT for symptomatic relief, and also patients of locoregionally advanced disease who were unfit for curative management. These patients were deemed unfit for radical treatment in view of performance status or advanced metastatic nature of their disease. Written informed consent was obtained before PRT. The patient and the family members were explained the incurable nature of disease, need of PRT, likely outcome, and need of palliative care.

All these patients had histopathologic evidence of malignancy from primary or metastatic sites. The patients had undergone complete workup for primary and metastatic disease according to standard guidelines, except in patients where emergency RT or urgent PRT was clinically indicated. The patients were discussed in tumor board or other such multidisciplinary clinic as per institute's protocol prior to start of PRT.

A record was made of patient-, disease-, and treatment-related attributes. The patient-related parameters included age, sex, history of smoking, and details of imaging. The disease-related parameters charted were site of primary disease, locoregionally advanced versus metastatic status, number and sites of metastatic lesions, and final histopathology. The treatment-related characteristics noted were fresh irradiation versus re-irradiation, indication of PRT, outpatient department (OPD) versus indoor setting, anatomic site irradiated with PRT, fractionation schedule including dose and number of fractions, machine on which treated (telecobalt/linear accelerator), history of any chemotherapy administered, whether PRT was deferred or concluded, deaths during PRT, and the response of PRT on the first review.

Inferences were drawn of these various attributes, and data from previously published similar studies were perused for comparison and discussion.

Observations and Results

A total of 460 patients were included in the study who received PRT for various reasons from 2015 to 2016 at a

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tertiary care government institute. A total of 1535 patients were treated with RT during the study period, so the number of patients receiving PRT was about 30% of the total number of patients getting treated at the RT center. Two hundred and sixty-three patients (231 males and 32 females) had a history of chronic smoking and 197 patients denied such history. A total of 610 PRT schedules were prescribed in these patients, some of whom received more than one field of RT or underwent re-irradiation. Majority of the patients (144, 31%) were in the sixth decade followed by patients in the seventh decade (124, 27%). Interventional radiologists were actively involved in the management of these cases. One hundred and forty-six patients underwent image-guided biopsies from metastatic/primary sites, 16 patients underwent embolization of the bleeding vessel to secure hemostasis, while 18 patients underwent tracheal/esophageal stenting for palliation of symptoms.

The patients who received PRT to various metastatic sites have primaries located in the lungs in the maximum number of cases (155 or 25%), followed by genitourinary and breast primaries in 84 and 47 cases, respectively. The site-wise distribution is summarized in Table 1. The most common histopathology was squamous cell carcinoma, followed closely by adenocarcinoma as seen in 144 (31%) and 126 (27%) cases, respectively. The metastases were detected mainly on imaging in the form of magnetic resonance imaging (MRI), positron emission tomography-computed tomography (PET-CT), and contrast-enhanced computed tomography (CECT) in 179, 178, and 102 cases, respectively. The RT portal was confirmed by simulation film and check X-rays. PRT was given in different settings, namely, upfront, relapsed, concurrently, sequential after palliative chemotherapy, emergency RT, and re-irradiation. Three hundred and ninety-six (86%) patients had metastatic disease and received PRT to the metastatic sites, while 64 (14%) patients, though nonmetastatic, were deemed unfit for radical treatment and received PRT to the primary for symptomatic relief. Out of these 396 patients with metastatic disease, 20 patients (5%) had solitary metastasis, 74 (19%) had oligometastases, and the remaining 302 (76%) had widespread disseminated metastasis.

A total of 433 patients (94%) were treated on telecobalt machine while the remaining 27 patients (6%) were treated on linear accelerator. Four hundred and forty-one patients (96%) could complete the prescribed schedule of PRT, while in 19 patients (4%), PRT was withheld/stopped due to various reasons. Three patients succumbed to advanced metastatic disease while on PRT. Three hundred and ten patients (67%) received RT on day-care basis while 150 patients (33%) were admitted for PRT either for complete course or a major part of treatment schedule. Three hundred and twenty-seven patients (71%) had received chemotherapy during some part of their disease course, while 133 patients (29%) were naïve to chemotherapy. Four hundred and forty-two patients (96%) showed good symptomatic response to PRT (more than 50% relief in distressing symptoms), while 16 and 2 patients had fair and no response to PRT, respectively. Three hundred and twenty-two patients (70%) received one prescribed schedule of PRT upfront, while 138 patients (30%) underwent re-irradiation, of whom 107 and 31 patients had re-irradiation after initial PRT and radical RT, respectively.

The most common indication for PRT was palliation of pain from painful skeletal metastases or at the primary site as seen in 240 cases (39%), and the next common indication was palliative whole-brain radiotherapy (WBRT) for brain metastases as seen in 159 cases (26%). The indications of PRT are summarized in Table 2. The most common site of PRT was WBRT followed closely by pelvic RT as seen in 159 and 142 cases (26% and 23%), respectively. The various fraction sizes used ranged from 200 cGy to 800 cGy depending on the performance status of the patient, the severity of symptoms, the expected life span, and the area to be treated. Regarding the dosage schedule of PRT delivered, the common PRT schedules prescribed were 30 Gy/10 fractions (in 323 patients or 53%) and 20 Gy/5 fractions (in 139 patients or 23%); the most common single fraction schedule was 800 cGy per fraction given in 80 patients (13%). Regarding the dosage of PRT delivered, the majority of patients received 10–30 Gy of PRT; with 154 patients receiving 11–20 Gy and 323 patients receiving 21–30 Gy. Regarding the number of fractions of PRT delivered, the most commonly prescribed schedule consisted of 10 fractions, given in 329 patients (54%), while 159 patients (26%) received 2–9 fractions. Ninety-eight patients received single fraction each. Eighteen patients received 11–20 fractions while six patients received more than 20 fractions of PRT.

Discussion

RT can provide safe, cost-effective, efficient palliation of various symptoms of advanced cancer with minimal side effects.[6,9] One hundred and fifty-five patients in this study

Table 1: Site of primary cancer (*n*=460, the total number of patients receiving palliative radiotherapy)

Primary site	Number of patients with metastasis
Lung	155
Genitourinary	84
Breast	47
Hematolymphoid	43
Gastrointestinal	38
Head and neck	32
Bone and soft tissue	25
CUPS	27
Others	8
Brain	1

CUPS=Carcinoma of unknown primary site

Table 2: Indications of palliative radiotherapy (*n*=610, the total sessions of palliative radiotherapy)

Indication of PRT	Number of patients treated
Pain	240
Brain metastases	159
Bleeding	53
Dysphagia	38
SVCO	31
Hemoptysis	29
SC compression	21
LUTS	15
Pleural effusion	13
Dyspnea	10
Hyperspinism	1

PRT=Palliative radiotherapy, SVCO=Superior vena cava obstruction, LUTS=Lower urinary tract symptoms

had their primaries in the lung, which was the most common primary site of origin. In another similar study by Sharma *et al*. in 152 patients, most of the primaries were of head and neck region (60%) followed by gastrointestinal malignancies in 14% and lung cancer in 11% cases.[10] In another study by Singhal *et al*., 44% of patients had primary malignancy of head and neck, 14% of cervical, 17% of lung cancer, 6% of breast, and 5% of colon.[11] In our study, 32 patients of PRT had primaries in the head and neck region. The relatively low incidence of head and neck tumors in PRT population in this study can be partly explained by the fact that a large number of head and neck tumor patients, though locoregionally advanced, are started on radical chemoradiation in hospitalized settings with periodic reviews, assisted nutrition by gastrostomy/nasogastric feeds, and multimodal supportive care, thereby avoiding the need of hypofractionated PRT.

In the present study, 240 patients were offered PRT for pain relief at primary or metastatic sites. PRT is indicated in 30%–50% of all cancer patients, and patients receiving PRT should be adequately attended for pain and symptom relief.[10,12] In this study, a total of 442 patients (96%) showed good symptomatic relief for most of the symptoms for which they were treated, when first reviewed 2–4 weeks after PRT. This high percentage can be explained by the fact that the study was conducted in a multispecialty hospital where patients received multimodal palliative care along with PRT, such as palliative chemotherapy, steroids, regional nerve blocks, and assisted feeding. More than 80% of patients reported more than 50% of pain relief in this study. This is in accordance with the existing data which have documented partial pain relief of 60%–80% and complete pain relief of 30%–50% in patients 3–4 weeks after initiation of external beam PRT.[2] In a similar multicentric study by van Oorschot *et al*., PRT led to a significant improvement of well-being (35% of patients) and reduction of symptoms, especially with regard to pain (66%), dyspnea (61%), and neurological deficits (60%).[13] However, shortly after treatment, in approximately 40% of patients, a temporary pain flare occurs, which is thought to be caused by periosteal edema after RT. Dexamethasone reduces the incidence of a pain flare by 50%.[14]

The common PRT schedules prescribed in our study were 30 Gy/10 fractions (in 323 patients). Multiple prospective randomized trials have evaluated fractionation schemes for bone metastases, with pain relief equivalency for schedules including 30 Gy in 10 fractions, 24 Gy in 6 fractions, 20 Gy in 5 fractions, and a single 8 Gy fraction. A single 8 Gy fraction has not shown any obvious deleterious effects, even when assessing late spinal cord tolerance in those who received treatment to bones of the spine.[2] Different therapeutic goals (pain relief, local tumor control, prevention or improvement of motor deficits, stabilization of the spine or other bones) require complex approaches considering individual factors (i.e., life expectancy, tumor progression at other sites). Best results are achieved by close interdisciplinary cooperation, minimizing the interval between diagnosis and onset of treatment.[15]

In this study, 159 patients received WBRT for brain metastasis. Given that no differences in overall survival or symptom control have been proven between a course of 30 Gy in 10 fractions and 20 Gy in 5 fractions, the shorter course seems more reasonable for optimizing convenience in patients with limited life expectancy. For some patients with poor prognosis, supportive care, including dexamethasone and use of pain medication, is sensible.[2] Akhtar *et al*. compared the quality of life and symptomatic improvement after PRT to brain metastasis using two different treatment protocols. More controlled and better quality of life was observed in patients given 30 Gys in 15 fractions followed by a boost of 20 fractions to primary metastatic site versus WBRT with 30 Gys in 10 fractions and in patients with metastatic sites <3 and having difference not more than 2 cm apart between two metastatic sites.[16]

In our study, 107 and 31 patients had re-irradiation after initial PRT and radical RT, respectively. In a systematic review of re-irradiation for painful metastases, Wong *et al*. reported complete, partial, and overall response rates to be 20%, 50%, and 68%, respectively; the authors concluded that the efficacy of re-irradiation is comparable to initial radiation treatment.[17] Data suggest that an 8 Gy treatment in a single fraction for re-RT is noninferior and less toxic than 20 Gy in multiple fractions.[18] However, in a systematic review and meta-analysis by Huisman *et al*. to quantify the effectiveness of re-irradiation for achieving pain control in patients with painful bone metastases, it was observed that re-irradiation was effective for a small majority of patients. Approximately, 40% of patients did not benefit from re-irradiation.[19]

In this study, 74 patients received spinal RT and 21 patients had cord compression. The special circumstance of spinal cord compression caused by extraosseous extension of tumor from bones of the spine is an oncologic emergency that deserves special attention and management. Radiation therapy is effective and regarded as the treatment of choice for metastatic spinal cord compression with or without motor deficits and/or bone metastases, which do not need immediate surgical intervention. It may be used either postoperatively or as primary treatment in case of inoperability.[20] Patients treated with primary RT generally respond to multitreatment regimens such as 30 Gy in 10 fractions, although patients with short life expectancy might fare well with a single 8 Gy dose.

In this study, the presence of metastatic disease and its burden was confirmed and mapped by exhaustive imaging techniques such as CECT, MRI, and PET-CT and guided biopsies of the representative sites. This was made easy as there exist a facility of in-house PET-CT center and a dedicated interventional radiology department. However, we recommend that, in smaller centers catering to patients of lower socioeconomic strata, with greater proportion of locoregionally advanced/metastatic disease, patients with one histopathological proof of primary and clinicoradiological evidence of metastatic disease should be promptly started on PRT if debilitating and distressing symptoms are present. Three hundred and ten patients received RT on OPD setting while 150 as indoor patients. There was no significant difference in the tolerance of PRT in these two settings and it is generally logistically feasible to come for PRT on day-care basis. This is convenient to the patients, and also allows optimum utilization of already constrained infrastructure resources for the patients who genuinely warrant hospitalization for other indications.

Conclusion

RT is commonly employed to address symptoms in patients with cancer. Hypofractionated treatment delivers palliation that is time-efficient, cost-effective, and minimally toxic. With regard to different therapeutic goals, different dose concepts, and fractionation schedules, single- versus multi-fraction PRT should be adapted individually. Evidence suggests that the reluctance of radiation oncologists to provide single fraction treatment acts as a barrier to referrals from palliative care professionals. In the absence of well-defined national guidelines for use of PRT, every institute should formulate its own protocol best suited to the patients' requirements.

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Conflicts of interest

There are no conflicts of interest.

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