

Palliative radiotherapy in paediatric malignancies

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ABSTRACT

Introduction: Providing effective palliative treatment in childhood malignancies is a challenging task. This study evaluated the role of palliative radiotherapy in the management of incurable paediatric malignancies.

Methods: Records of 40 paediatric patients treated between January 2003 and November 2005 were reviewed and analysed retrospectively. All had received palliative external beam radiotherapy for symptom control either as a single modality or in addition to surgery, chemotherapy and drugs for symptomatic relief.

Results: Predominant symptoms noticed were swelling with or without pain, bleeding, and weakness of limbs. Median duration of symptoms was 90 days. Malignant round cell tumours were most common followed by retinoblastoma, neuroblastoma, Ewing's sarcoma and acute myeloid leukaemia with chloromas. 45 percent of children had disseminated disease at presentation. Nine underwent surgery, while 32 patients received chemotherapy, and all but two received drugs for symptomatic relief in addition to palliative radiotherapy. Dose schedules were either 5 Gy or 8 Gy in single fraction, while for fractionated radiotherapy, the range was 20 Gy in five fractions to 30 Gy in ten fractions. With regard to symptomatic relief, four patients had complete relief, 20 showed good relief, 15 had little and one did not have any relief. On completion of multimodality treatment, tumour response was complete in two patients, 18 had partial response, eight had stable disease, eight had progressive disease, and the disease status of four was unknown.

Conclusion: The role of radiotherapy as a palliative modality in children with locally-advanced lesions provides better symptomatic relief in combination with other treatment modalities.

Keywords: advanced malignancy, cancer treatment, childhood malignancy, paediatric

malignancy, palliative radiotherapy, radiotherapy

Singapore Med J 2008;49(12):998-1001

INTRODUCTION

Childhood cancers are rare, compared to adult cancers. Data published in the SEER study in the year 2002 showed that for every one million population, there were 16.1 new cases of paediatric malignancies per year throughout the world.⁽¹⁾ Parkin et al conducted a study on the incidence of childhood malignancies and found that the incidence of childhood malignancies was about 2% in developed countries and 3% in developing countries.⁽²⁾ Approximately 25% of childhood malignancy patients die from their disease. It is often impossible to detect the disease in the early stages and determine the curability of the disease. Cases with minimal chances of cure incur enormous medical and psychological challenges for the patient's family and the treatment team.⁽³⁾

The prognosis in children suffering from symptomatic metastasis is extremely poor. The fact that 40%–50% of the children with cancer require radiotherapy shows that radiation therapy is a key component in the treatment of childhood malignancies.⁽⁴⁾ However, the dearth of substantive data from large scale studies on the incidence and mortality of childhood cancers, except for a few exceptions, has hindered development of effective palliative intervention methodologies for these patients.⁽⁵⁾ The low incidence of cancer in children has inspired rare enthusiasm for studies that have investigated quality-of-life symptoms and their effective treatment, thus proving the task of providing effective palliative care for children suffering from cancer to be a difficult one.

Short courses of radiotherapy can be helpful for palliative treatment in these children. Metastases to the brain and bone are more efficaciously treatable for palliation with radiation therapy.⁽⁶⁾ It should be applied for a short time. In the case of bone tumours, it has been suggested that radiotherapy may be effective in palliative and in some curative situations, if a sufficient dose is given to an adequate volume of tissue. Repeat courses of radiotherapy can be given if the symptoms are intractable or recur.^(7,8) In spite of overall efficacy of radiotherapy for palliation of symptomatic metastatic disease, the information with respect to paediatric tumours is limited. Given this background, we decided to conduct a

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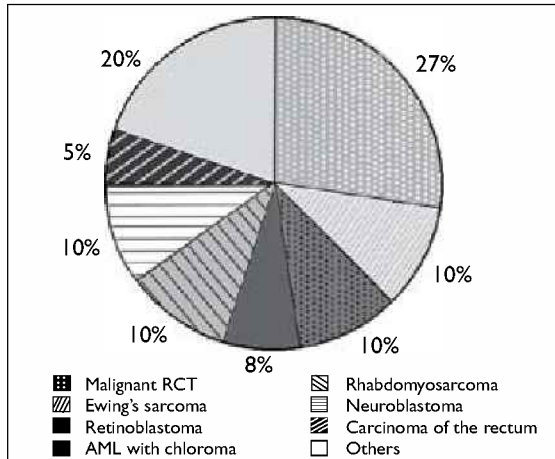


Fig. 1 Pie chart shows the distribution of the different types of tumours.

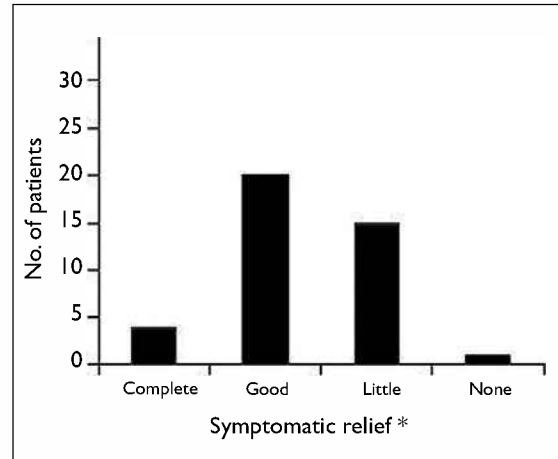


Fig. 2 Bar chart shows the symptomatic relief in the study patients.
*Assessment by family/doctors/self report in older patients.

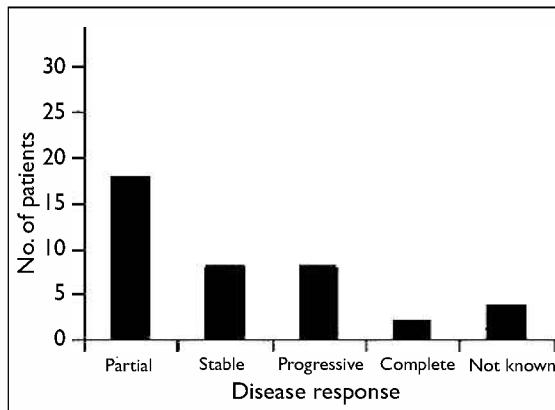


Fig. 3 Bar chart shows the disease response in patients.

retrospective analysis of cases of paediatric malignancies treated in our department.

METHODS

A retrospective analysis of data from the paediatric oncology clinic was performed. Records of 40 paediatric patients treated between January 2003 and November 2005 were reviewed and analysed. The distribution of different types of tumours among these 40 children was: malignant round cell tumours (11), Ewing's sarcoma (four), retinoblastoma (four), acute myeloid leukaemia (AML) with chloromas (three), rhabdomyosarcoma (four), neuroblastoma (four), carcinoma of the rectum (two), and others (eight) (Fig. 1). The children were aged between one year and 18 years, and the median age was 14 years. Of the 40 patients, 28 were boys and 12 were girls. 18 out of 40 patients (45%) had metastatic disease. Apart from radiotherapy, other treatments that the patients received were chemotherapy in 32 patients, surgery in nine patients, and 38 patients received drugs for symptomatic relief.

The predominant presenting symptoms of the patients and their distribution were swelling or mass in 28 patients, pain in 14 patients, bleeding in three patients, neurological

symptoms in four patients and breathlessness in one patient. The median duration of the symptoms was 90 days (range 4–50 days). The indications for radiotherapy were tumour mass (20), pain (7), cord compression (6), bleeding (3), superior vena cava obstruction (1), brain metastasis (1) and fracture of the humerus (1). All of these 40 children received palliative external beam radiotherapy for symptom control using a Co-60 teletherapy unit. Palliative radiotherapy was given either as a single modality or in addition to surgery, chemotherapy and drugs for symptomatic relief. The different radiotherapy dose schedules administered to the patients were 5 Gy or 8 Gy in a single fraction, 20 Gy in five fractions over one week, and 30 Gy in ten fractions over two weeks.

RESULTS

As assessed by family doctors or self-reported by older patients, the symptomatic relief was complete in four patients (10%), good in 20 patients (50%), little in 15 (37.5%), and none in one patient (2.5%) (Fig. 2). At the completion of the multimodality treatment, 18 patients (45%) had partial response, eight patients (20%) had progressive disease, eight (20%) had stable disease, and two patients (5%) had complete response. The disease status of four patients (10%) was not known (Fig. 3).

DISCUSSION

Radiotherapy has a proven efficacy in palliative treatment of various cancers, including paediatric cancers.^(9,10) It is therefore only natural that radiation oncologists are inalienable members of the medical team engaged in providing palliative care. Used diligently, radiotherapy is a modality of treatment which is both efficacious and the least inconvenient.⁽⁹⁾ Radiation is an effective palliative therapy in cases of metastasis to the brain and the bones.⁽⁶⁾ According to the findings of Chow et al, palliative

radiotherapy constitutes as much as half the workload in radiotherapy departments in Canada.⁽¹¹⁾

Taylor, in his review of literature regarding radiotherapeutic approaches in the treatment of cancers in children, has observed that radiotherapy is an important treatment modality that may be used in 40%–50% of children with cancer.⁽¹²⁾ Besides its role in malignancies, such as acute lymphocytic leukaemia and tumours of the brain, radiation therapy plays an important role in the treatment of cancers like Hodgkin's lymphoma, Ewing's sarcoma, and rhabdomyosarcoma, in combination with chemotherapy and palliative care in metastatic tumours.⁽¹⁰⁾ In spite of insufficient experience in palliative care of childhood malignancies, palliative radiotherapy is used in many paediatric cancers. The common indications for palliative radiotherapy in the paediatric age group are:

- Pain relief from bony or pulmonary metastases and tumours causing nerve root and soft tissue infiltration.⁽¹³⁻¹⁵⁾
- Control of bleeding.
- Control of fungation and ulceration.
- Relief of impending or actual obstruction (e.g. of the large airways).
- Shrinkage of tumour masses causing symptoms (e.g. brain metastasis, skin lesions, and other sites).
- Oncology emergencies like spinal cord compression and obstruction of the superior vena cava.^(9,13,16)

Studies done to explore the efficacy of radiotherapy for palliation in childhood cancers have shown promising results, with respect to tumours of the central nervous system and bony metastasis. A study was carried out by Paulino on the evaluation of the efficacy of palliative radiotherapy in children with neuroblastoma. Children suffering from primary neuroblastoma with metastasis to as many as 53 sites were reviewed over a long period of 40 years from 1960 to 2000. Assessment of the response to treatment of the metastatic sites by radiotherapy, as per the criteria laid down for complete, partial or no response, showed that radiotherapy has a promising role in the palliative management of children with metastasis from neuroblastoma.⁽¹⁵⁾ Apart from central nervous system (CNS) tumours, considerable benefit is obtained by radiotherapy in the palliation of bone tumours. Osteosarcoma, Ewing's sarcoma, chondrosarcoma, fibrosarcoma, malignant fibrous histiocytoma of the bone, giant cell tumour, aneurysmal bone cyst and chordoma constitute the most common bone tumours. Even though these tumours are considered to be radioresistant entities, with the exception of Ewing's sarcoma, studies have shown that radiotherapy may be effective for palliation, and in some cases, even cure, if the radiotherapy dose and treatment volume are optimised.⁽⁷⁾

Fractionation of radiotherapy regimens has been

a matter of study in optimising the results of palliative radiotherapy in the treatment of bony metastasis. It has been found that the maximal benefit is obtained by the use of single fractions.⁽¹⁷⁾ An evaluation of two short fractionated schedules of 8 Gy as a single dose and 20 Gy in five fractions in relieving pain in patients with multiple uncomplicated bony metastases was carried out by Amichetti et al. Both fractionation schedules had a similar impact on pain relief and use of analgesics. Approximately two-thirds of patients with either schedule felt similar relief in their pain.⁽¹⁸⁾ Thus, clinical evidence provides for larger doses of radiation in smaller number of fractions for effective palliation of pain, justifying a recommendation for the use of a more simple and convenient 8 Gy single fraction for the palliation of uncomplicated bone metastasis.⁽¹⁷⁾ Our own experience of obtaining maximum relief from painful symptoms due to bony metastasis by giving larger doses in a single fraction or over five fractions to patients was thus in conformity with the observations made in other studies.

Palliative radiotherapy for bony metastasis for all ages has been shown to produce partial or complete relief from pain in an overwhelming number of patients, sustainable over a period of few months. The relief obtained is irrespective of the dosage schedule, and the number of complications like chord compression and pathological fractures at the site of treatment is considerably reduced in the patients receiving palliative radiotherapy for pain relief. With regard to metastasis to the spine, palliative radiotherapy at earlier stages of cord compression are generally known to bear favourable results.⁽¹⁹⁾ There remain justifiable concerns regarding the late adverse effects on the CNS and bone of palliative radiotherapy. To ensure that such effects are kept to the minimum, it is of cardinal importance that the patients be treated with skillful radiotherapy planning using three-dimensional and conformal radiotherapeutic techniques to ensure maximal dose to the local tumour site, with minimal irradiation of the surrounding normal tissue.⁽¹²⁾

The results of various studies, including ours, have clearly demonstrated that radiotherapy has a definite role in the palliative treatment of children with locally advanced and metastatic lesions, especially in the case of bony metastasis and metastasis affecting the CNS tumours. It provides good symptomatic relief in combination with other modalities of treatment. High-dose single fraction radiotherapy or a limited number of fractions have been found to be suitable for palliation. However, small numbers of patients in most of the studies on the role of palliative radiotherapy in paediatric cancers have been a road block in formulating a definitive opinion regarding the appropriate dose fractionation schedule.

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