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Short Communication

Third-body irradiation as an effective palliative treatment for painful multiple bone metastases resistant to chemo- or hormonal treatment

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Abstract

Fifty-three patients had 54 third-body areas irradiated for breast and prostate bone metastases using the third-body irradiation technique during a period of 6 years. These patients were previously treated with chemotherapy, hormonal therapy and limited field irradiation. Seventy percent responded completely and 24% partially. This modality is safe and effective for pain relief.

Key words: Third-body irradiation (ThBI); Magna field irradiation: Palliation

1. Introduction

Pain resulting from bone metastases is frequently encountered in daily oncological practice. Radiotherapy is effective in the treatment of painful bone metastases resulting in about 80% relief in patients [2,7]. Some patients have painful multiple metastatic lesions and cannot be efficiently irradiated by multiple small fields. For these patients extensive fields such as a half-body irradiation have been shown to be successful [3–5, 10–14]. Sometimes there are limitations in giving a half-body irradiation due to technical problems, such as limited field size with certain Cobalt machines, or medical contra-indications as is the case with bone marrow depletion. In these instances third-body irradiation seems to offer a workable compromise. We report here the results of third-body irradiation, a variant of magna field irradiation, in the treatment of generalized painful bone metastases.

2. Materials and methods

This is a retrospective analysis of 53 patients who had 54 third-body areas (ThBI) treated for painful bone metastases from breast and prostatic primaries during a period of 6 years. These patients were refractory to previous treatment, namely, chemotherapy, hormonal therapy and previous limited volume fractionated radiotherapy. Doses ranged from 6 Gy, for the upper third-body when lungs were included, to 10 Gy. This dose limitation to the upper third-body is in accordance with the published data of Fryer concerning radiation pneumonitis [6]. Field margins are illustrated in Fig. 1. After having treated the first third-body area, if it was necessary to treat another third-body area, we waited for a minimum period of 3–4 weeks in order to allow for bone marrow recovery. Technical details of this modality are described elsewhere [3].

All patients were followed up 2 weeks after treatment in our department and at least monthly thereafter by the radiation oncologist or by the patient's private physician.

3. Results

In our overall experience 38 out of 154 (70%) of the areas treated had a complete response, defined as a decrease in pain leading to elimination of analgesics. An additional 13 out of

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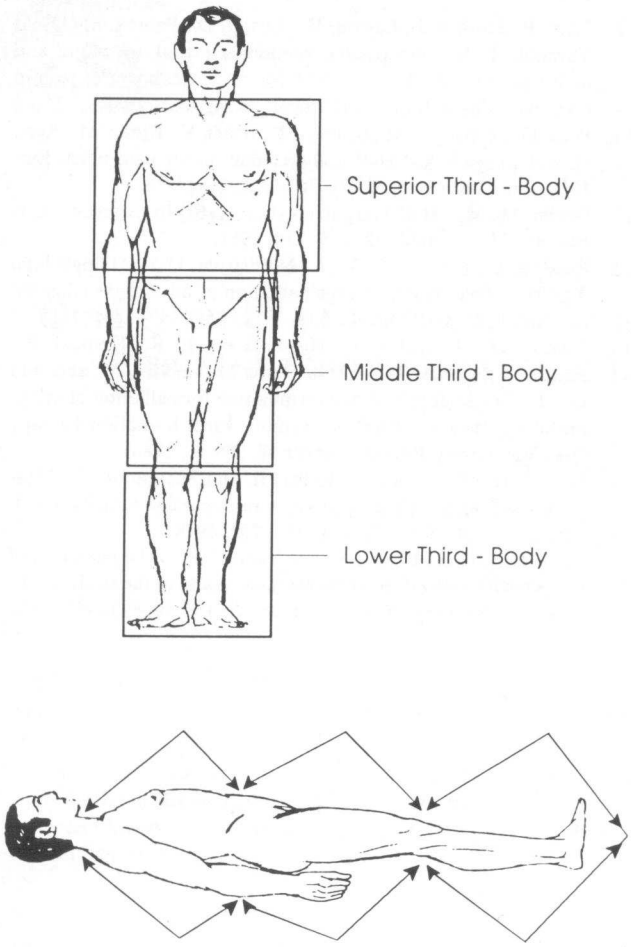

Fig. 1. Field margins for third-body irradiation.

54 (24%) areas had a partial reduction in pain, while 3 out of 54 (6%) areas did not respond.

Thirty-seven out of 54 (69%) areas responded within 48 h of treatment. The 70% third-body areas which responded completely lasted until death. The mean time interval between ThBI and death was 9 months. For the subgroup of breast metastases, the mean interval between ThBI and death was 9.4 months, whereas for the prostate metastatic subgroup it was 10.4 months. The mean time interval between first limited volume fractionated irradiation and ThBI was 6.4 months. The mean dose previously given to the limited volume was 39.3 Gy. Previous irradiation did not preclude the use of ThBI if the initial volume was limited. Patients receiving a dose of 7 Gy and more had a better chance of obtaining a complete response and they also responded more rapidly ($p = 0.01$).

The treatment was well tolerated with mild gastro-intestinal and hematological side-effects. Gastro-intestinal side-effects were most common when the middle third-body area was treated and these were manifested by nausea and vomiting in 28% of the patients. Our patients were premedicated about 0.5 h before treatment with 50 mg chlorpromazine i.m. Hematological side-effects were thrombocytopenia and leucopenia and these occurred 2 weeks after treatment (mean nadir for leucopenia 1.7); recovery was rapid. There were no deaths related to third-body irradiation, all deaths were due to progression of disease.

4. Discussion

The efficacy of pain relief in bone metastases when treated with radiation is well documented [2,7].

Given a mean survival time of about 10 months after application of ThBI, we are of the opinion that a high single dose is justified in some patients. Our group of patients was selected on the basis of painful multiple bone metastases refractory to previous treatment and their short life expectancy. In addition, the cost/benefit ratio was also considered in the decision to use one single high dose instead of small fractionated doses.

Price et al. using low single doses to treat painful bone metastases obtained partial relief in 43% of patients, with only 5% responding completely 3 weeks following treatment, with response lasting for 3 months [8]. The modest effect with a low single dose of 4 Gy obtained by Price et al. and the symptomatic improvement of 70–90% shown by other authors when doses of 6–10 Gy were applied, suggest that there is a dose-response relationship [1,14]. In our series, 83% of areas receiving doses between 7 and 10 Gy had a complete response, compared with 44% of areas receiving doses between 4 and 6 Gy ($p = 0.01$).

The Royal Marsden Hospital compared, in a randomized study, a single fraction of 8 Gy with 30 Gy in ten daily fractions and found no difference in survival, pain relief, or duration of response between the two treatment arms [9]. There was no increase in acute morbidity due to the high dose single fraction. Furthermore, in 20% of the patients who survived more than 2 years there seemed to have been no increase in late morbidity.

The Toronto study along with other studies demonstrated that the main dose-limiting toxicity for upper half-body irradiation was pulmonary fibrosis [5,6,12,14]. For this reason, the dose to the superior third-body area in our patients was 6 Gy. According to Fryer et al, pulmonary toxicity did not exceed 12.5% when the upper half-body was treated with a dose of 6 Gy, whereas in patients where 8 and 10 Gy were administered, the incidence of toxicity was as high as 19–52% [6].

Single dose half-body irradiation has been shown by the Radiation Therapy Oncology Group (RTOG) to be rapidly effective with 50% of patients responding within 48 h and 80% within 1 week [15]. In our study, 69% of the irradiated third-body areas treated responded within 48 h, while 24% responded within 1 week.

5. Conclusion

We conclude that third-body irradiation is a good alternative for half-body irradiation or multiple small field irradiation, with a good palliative effect and very low toxicity.

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