

## Evaluation of the effects of single dose hemi-body irradiation in treatment of osseous metastasis: A prospective study

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### Introduction

“Cancer” is a common term used for all kinds of malignant neoplasms. Bone is the preferred site of metastasis of a few malignant tumors namely from the breast, prostate, kidney, lung, gastrointestinal tract, thyroid, ovaries and some anaplastic tumors from occult primary sites. Bony metastasis are usually multiple in nature and results in severe pain thereby affecting quality of life. A major part of the practice of oncology is the palliation of pain.

### Aim

The aim of the study was to evaluate the efficacy of hemi-body irradiation for treating multiple painful skeletal neoplastic disease and also note the toxicity profile of hemi-body irradiation (HBI).

### Material and methods

The study was conducted from Aug. 2001 to Dec. 2003. Twenty five evaluable patients with proven multiple bony metastasis having KPS more than 40, with hematological and blood biochemical parameters within the normal range, were treated with prior premedication with dexamethasone, phenargan, intravenous fluids. Irradiation was given to skeletal related complications. Machine used for delivery of radiation : Phoenix Telecobalt

Beam energy : Cobalt 60, photon beam (Average 1.25 Mev)

Position of the patient: Lying supine on the floor  
Extended SSD: 190-200 cms (Average: separate at three places in the segment to be treated).

Treatment time: 30 - 45 mins

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Dose in single fractions: URBI: 500 - 600 cGy (Uncorrected for lung), MEI: 700 - 800 cGy and LHBI: 800 cGy delivered at midplane of body by anterior-posterior/ posterior-anterior portals.

### Observation and results

A total of 70 patients were enrolled for both the treatment arms. Thirty five (evaluable 25 cases) were planned for HBI treatment. Response rate was evaluated in terms of complete response (CR), partial response (PR), No response (NR) and minimal response (MR).

**Table 1:**

HBI (No of Sites)	PR*(n = 25)	CR** (n= 25)
Pathological fractures	10 (32 %)	2 (8 %)
Spinal cord compression	2 (8 %)	—
Vital tissue erosion	2 (8 %)	—
Hypercalcemia	—	—

\* Partial response, \*\* Complete response In HBI CR rate was 8% and PR rate was 48%

**Table 2: Pain relief duration**

Duration of relief	PR (n = 25)	CR (n = 25)
HBI Arm		
2-4 months	3(12%)	2(8%)
4-6 months	4(16%)	5(20%)
More than 6 months	5 (20 %)	6 (24%)

**Table 3: Results with respect to survival of patient**

Survival duration	PR(n = 25)	CR(n = 25)
HBI		
2-4 months	8(32%)	4(16%)
> 6 months	7(28%)	6 ( 24 %)
> 12 months		

### Discussion

None of the patients receiving HBI survived for more than 12 months. Metastatic bone disease is stage IV of the disease state. These patients require palliative treatment for pain relief with HBI or local radiotherapy for improving quality of the remainder of life. They also required treatment for reducing incidence of skeletal related complications namely fractures, spinal cord compression, hypercalcemia etc.

**Table 4: HBI: Response rate observed by other workers**

Investigate	No of Patients	Dosage Schedule	Response Rate(%)
Penn et al 1976	144	8-15 Gy x1, 3Gyx1	89, 94
Salazareta M978	40	6Gyx1, 8Gyx1, 10Gyx1	84
Rawland et al 1979	21	5-10 Gy x1	67
Epstein et al 1979	-	Single dose	73
Barterlink et al 1980	21	Dose not mentioerd	100
Keen et al 1980	51	Dose not mentioerd	72
Quasim et al 1981	91	6Gyx1, 7Gyx1, 8Gyx1, 9Gyx1, 10Gyx1	60
Lombardi et al 1983	18	6Gyx1	45
Jones et al 1984	47	6Gyx1, 8Gy x1	85
Tobis et al 1984	18	7.5Gyx1, 10 Gy x1	47
Duschens et al 1985	61	6Gyx1, 8Gyx1	79
Salazar et al 1986	129	6Gyx1, 10Gyx1	66
Quasim et al 1986	129	7Gyx1, 8Gyx1	76
Nag et al M 986	19	8Gyx2	100
Nair et al	28	6Gyx1, 8Gyx1	75
Reed et al 1998	50	5-10Gyx1	75
Zeleftsky et al 1889	-	Single dose	92,95
Kuban et al	-	Single dose	78,100
Quilty et al 1994	-	Single dose	64
Sharif et al M997	26	Single dose	58
Present Study	35	6Gyx1,8Gyx1	60

Present study was conducted to evaluate the efficacy of pain relief and also the toxicity of a single dose (6 Gy and 8 Gy URBI, LHBI) radiotherapy at multiple sites.

The results were evaluated in terms of complete response (CR), partial response (PR), and minimal response (MR). Since pain relief is subjective in nature it was difficult to measure with precision the amount of relief.

Earlier workers have reported 80% - 90% relief with some even achieving 100% results. The response rate in the present study is in conformity with workers who have endorsed between 60% -80% relief.

Workers quoting better relief rates could be due to the

following facts:

1. Better financial and literacy status than that of a rural Indian population (the vast majority of our cases), thereby leading to better compliance and understanding of FU.
2. Better reporting of statistics regarding deaths in contrast to poor reporting in our case.
3. Impracticability of obtaining questionnaire response by posi, in cases where patients were unable to keep in touch with our institution.

#### Advantages of HBI

HBI is very effective for palliation of pain and improvement of quality of life which can be ensured at very economical rates. It is also very convenient for the patient (single visit) and for the treating staff.

Treatment is well tolerated by patients with KPS above 60 and they show relief within 48 hours. Premedication used before UHBI / LHBI drastically reduces toxicity.

Only an occasional patient required blood transfusion and erythropoietin therapy. Some patients required to be treated for hypercalcemia..

#### The other advantages are:

1. Multiple painful skeletal lesions can be treated in a single visit on an out patient basis
2. It prolongs progress of metastatic lesions and delays overt and occult metastasis.
3. It is helpful in cases of multiple myeloma with complete remission
4. It is effective for impending cord compression
5. It has acceptable and manageable toxicity.
6. It provides dramatic pain relief and improves quality of life.

#### References

1. Mohanti, BK, Sharma DN, Biswal BM. Text book of radiation oncology, 1st Ed: Rath Churchill Livingstone, 2000: 754
2. Zetter BR. The cellular basis of site specific tumor metastasis, New Engl J Med, 1990; 322:605
3. Schocker JD, Brady LW, Radiation therapy for bone metastasis. Clinical orthopedics, 1982; 169: 39 - 43.
4. Patricia Lo Russo. Analysis of skeletal related events in breast cancer and response to therapy. Seminars in oncology, 2001; 28 (4): 22 - 24.
5. Park K. Text book of Preventive and Social Medicine, 16th Ed, Banarasidas Bhanot Publ; 2000; 284.
6. Neilson OS, Munro AJ, Bone metastasis. Pathophysiology and management policy. J Cl Oncol, 1991; 9 (3); 509-24.