

A Comparative Study on the Radiation Tolerance Among Younger and Elderly Cancer Patients.



Medical Science

KEYWORDS : Elderly, Radiation, Tolerance, Young

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ABSTRACT

This study was conducted to assess the tolerance and acute side effects of radiation therapy in the elderly (>60 years) and compare it with patients ≤60 years of age.

Methods: Two hundred patients suffering from various types of cancer were selected for this study. The patients were grouped into elderly comprising of > 60 years and younger comprising of 30 – 60 years of age. All the patients were treated by External Radiation Therapy using Tele Cobalt-60. They were further classified into three sites according to the part irradiated, viz – head and neck, chest and pelvis.

Introduction

Persons with more than 65 years of age are at a higher risk for major cancers. Carcinogenesis is a time consuming process whose end product cancer becomes manifested several years from its initiation making age a risk factor for cancer. Due to the rapid expansion of the elderly segment of population, the incidence of cancer in the elderly is increasing. There is limited physical data on how elderly patients respond to cancer treatment. It is challenging for the clinicians to treat cancer in the presence of normal and pathological changes due to the process of ageing.

Cancer in the elderly has become an area of special concern since cancer in this age group are diagnosed late and they also receive less definitive treatment. 50% of cancer patients are above the age of 65 years making clinical trials of therapy important for this age group. The elderly are substantially underrepresented in many study protocols mainly due to the various exclusion criteria. Substantial variation is observed in the selection of cancer treatment between the elderly and younger age group¹.

The issue of under treatment and over treatment constantly challenges clinicians who treat cancer in the elderly. Caregivers often assume that life prolonging therapy is most important to younger patients, whereas symptoms relief is more important to elderly. But the elderly should not be compartmentalized simply on the basis of age alone^{2,3}.

Radiation therapy is of particular benefit to elderly and frail cancer patients as an alternative to surgery or chemotherapy. There is no report about age related difference in the ability of the patients to complete a radical course of radiation therapy in the literature. Information regarding effectiveness and tolerance to radiation therapy in elderly patients is very limited⁴.

Although there is obvious need to lay down guidelines for the use of radiation therapy in elderly patients, few books and publication have dealt with this aspect of oncology. The overall approach to the treatment of cancer in the old age tends to be dominated by quality of life consideration and minimization of side effects by lowering the dose of radiation therapy there by compromising cure. Information on relationship between age and normal tissue response in radiobiology is scanty but some trials show that radio sensitivity is unchanged.

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Materials & Method:-

A prospective study carried out in the department of Radiotherapy, Regional institute of medical sciences. Patients sampling- A total number 200 confirmed cases of malignancies were studied from 1st of Sept 2002 to 31 aug 2004. The patients included in this study were those who were undergoing radiation therapy alone as mode of treatment.

The patients were grouped into elderly comprising of > 60 years and younger comprising of 30 – 60 years of age. A total of 100 patients were categorized as the elderly group, comprising of patients 60 years or above and the other 100 as the younger group who were above 30 years and below the age 60 years. The patients were further subdivided into three groups according to the site of treatment, ie according to the part irradiated, viz – head and neck, chest and pelvis. An equal number of patients from both the elderly and younger age groups were taken in each sub group.

After selection of the cases, a detailed history of their illnesses were recorded. All the patients included in the study were subjected to a full clinical, haematological and biochemical investigations.

All the patients were treated by External Radiation Therapy using Tele Cobalt-60, Theratron 780 C with the dose ranging from 5000cGy to 7000cGy depending upon the site. They were further classified into three depending on the treatment sites ie Head and Neck, Chest and Pelvis. For the analysis of treatment results the following parameters were used – treatment sites, field sizes, total radiation dose, fraction size, defaulters, and toxicities. The tolerance to radiation therapy was assessed by the ability to complete the treatment in relation to age, sex, dose of radiation pre-treatment Karnofsky Performance Status (KPS). Statistical analysis of the result was done using the statistical software SPSS 7.5. Institutional ethical clearance will be sought. Written informed consent will be taken from all the patients. Confidentiality will be maintained by removing all the identifiers

Results & Observation:

A total of 200 patients suffering from various types of epithelial malignancies were accrued for this study. They were distributed into elderly group and younger age group consisting of 100 patients each. The side effects of radiation therapy were assessed in relation to radiation sites and dose. The field sizes were similar in both the groups for each site.

The male: female ratio was 23:27; 17:33 for both the groups > 60 years and ≤ 60 years age groups respectively. The disease site distribution was 60 each in the head & neck, chest and 80 in the pelvis(table -1).

The head and neck group consisted of larynx and pharynx; chest radiation consisted of lungs and breasts, while pelvic group consisted of cervix, urinary bladder and rectal cancers. Four patients in the younger age group and six patients in the elderly group left the treatment midway(table-2). The majority (16 pts) of the treatment drop outs were in the head and neck group. The pelvic area did not have any major side effects and all the patients could complete the planned treatment without much problem. In the chest two male and another two female could not complete the treatment; while six patients in the younger age group had to discontinue the treatment for the same reason(table-3).

The radiation tolerance (completion of planned dose) was found more in the younger age group but not statistically significant(table- 4). Sex does not have any influence when analysed by the disease site. Head and neck region is better tolerated by the younger age group whereas chest is better tolerated by the elderly group. There is not much change in pelvic radiation tolerance when stratified by the dose of radiation.

The tolerance to the radiation dose of > and ≤ 60 Gray does not differ much in the two groups. However, KPS showed some significance. KPS > 70% before the start of treatment had a better tolerance, 95.5% of the patients could complete the planned dose(table – 5).

The radiation toxicity was measured by ECOG criteria. The haematological toxicity was seen slightly more in the elderly group. Grade 3 & 4 toxicity was seen in 8% as compare to 4%. The gastrointestinal toxicity was slightly more in the younger age group showing 76% vs 68% in grade 1 and 2 toxicity whereas grade 3 & 4 showed 16% in both the groups. The genitor urinary toxicity was seen more in the elderly groups, grade 1 & 2 was seen in 26% vs 8%. There was no grade 3, 4 toxicity.

The cutaneous toxicity and cardiac toxicity was seen almost equal in both the groups. Weight loss was seen more in the elderly age group.

Discussion:

Radiation therapy plays an important role in the management of elderly cancer patients. Due to their increase age, decreased physiological function and associated medical conditions this segment of population has been assumed to be intolerance to aggressive treatment for their disease. Moreover treatment protocols for elderly patients are scanty due to few trials being undertaken in this age group¹.

The slight increase in the head and neck cancer in the male population is due to the higher male: female ratio of this cancer in the study. In the thoracic region because of the

inclusion of female breasts cancer the incidence was slightly more in the females. Similarly in the pelvic region due to the inclusion of the malignancies of female genital tract the incidence is slightly more in the females.

The tolerance to radiation therapy was assessed by the ability to complete the planned radiation treatment and it has been compared between the two groups. The younger age group seems to be more tolerant but when analysed it is found to be statistically insignificant. In the elderly group, majority of the treatment drop outs were due to progressive deterioration of the general condition due to diseases and also due to the higher grade of oral mucositis. When analysed according to the age and the treatment site, the younger age group showed a better result in the head ns neck area specially in the elderly group, may be due to increased in the head and neck area. The elderly group favoured less. The poor tolerance in the head and neck area especially in the elderly group, may be due to increased incidence of radiation induced mucositis in the oral cavity which may be because of the prolonged use of tobacco and its various forms and also poor oro-dental hygiene. In the chest area the result was slightly better in the thorax but pelvic region showed similar results².

Similar results were also seen in the study done Zachariah B et al, where the study was done in patients older than 80 year of age³. They did not find any age related difference in the ability to complete radical course of radiation therapy. They also found thoracic area more tolerant than pelvic and head and neck areas. The Intergroup Trail 0096 of chemo radiation in Small Cell Lung Cancer showed that the tumour response rate, survival ad non-hematologic toxicities were similar in both younger and elderly age groups. However, the hematologic toxicity was more in the elderly age group. It had been suggested

Those patients with good performance status could be considered for optimum treatment approaches⁵. Zietman et al in a study on Hodgkin's disease found that elderly age group fared equally well as the younger age group when treated with radical radiation therapy to the involved areas. The elderly tolerated the treatment well and the chance of cure was similar to that obtained in the younger patients⁶, Chin R et al also reported no significant difference in the outcome when the same treatment was delivered to both the age groups⁷.

The result between dose ≤60Gray (p-value=1)and >60 Gray (p-Value=0.13) does not seem to have any impact on the tolerance/treatment completion. Hayakawa et al also published almost similar result with dose >60 Gy, in elderly patient more than 70 years of age. The tolerance of radiation therapy and survival was found to be similar in both the age groups – 70 years, and >70 years⁸.

KPS seems to be a better tool for assaying the tolerance. Those patients who had a pre-treatment KPS of 70% or less had lower tolerance than those with a higher score. The difference was found to be statistically significant(pValue<0.001). Yamazaki et al also found the performance status to be a predisposing factor for treatment interruptions⁹. Yuen AR also suggested KPS as good criteria for patient selection for the elderly age group⁵.

The difference in haematological toxicity was not very significant between the two groups in all the three sites of radiation treatment. The radiation induced haematological toxicities is not the reason for the treatment interruption or failure to complete the planned course. However in another

study haematological toxicity was found to be more in the elderly age group¹⁰.

The grade 3 and 4 gastrointestinal toxicities is almost equal in the two groups while there was slightly increase in the grade 1 and 2 toxicities in the younger age group which is not statistically significant.

The Genito-urinary toxicities of grade 1 and 2 was the only grade seen and the elderly group had a slightly higher incidence which may be due to the reduced fluid intake and poor genital hygiene specially in those who had pelvic radiation therapy. In the treatment of urinary bladder cancer by chemoradiation no severe toxicity was observed in the elderly age group. So age has been suggested to be excluded from the exclusion criteria¹¹.

Weight loss was not significant when analysed. Only grade 1 and 2 weight loss was seen in only a few elderly groups. In a study on Non small cell lung cancer on patients of >70 years of age, patients with weight loss >10% experienced 14% overall survival at 24 months as compared to 58% without weight less loss¹², so weight loss during treatment can be a significant parameter on the survival of the elderly patients¹².

Conclusion:

The study does not show any significant difference in the radiation tolerance level when analysed as per the age of the patient. The only significant parameter was the pre treatment status (p-value of 0.001). Only patient with poor performance status fared the treatment poorly. Elderly patients should not be denied a curative treatment depending upon the age of the patients.

Table No.1. Clinical characteristics of the patients.

Treat- ment Site	Number of Patients	Dose range (Gy)	Mean dose (Gy)	Fraction Size (Gy)	Field size in cms ²
Head and Neck	60	60-70	65	2	14 X 10 18 X 10
Chest	60	50-70	60	2-2.5	10 X 10 18 X 11
Pelvis	80	50-70	60	2	15 X 15 15 X 18

Table No.2. Treatment completion with respect to age.

Age in years	Completion of treatment	
	Complete (%)	Incomplete (%)
>60	92 (46%)	8 (4%)
≤ 60	88(44%)	12(6%)

Table No. 3. Treatment completion with respect to site

Site	Age in years	Completion of treatment	
		Complete (%)	Incom- plete(%)
Head & Neck	>60	24(12%)	6(3%)
	≤60	20(10%)	10(5%)
Thorax	>60	28(14%)	2(1%)
	≤60	28(14%)	2(1%)
Pelvis	>60	40(20%)	-
	≤60	40(20%)	-

Table No. 4. Treatment completion with respect to radiation dose.

Radiation Dose in Gray	Age in years	Completion of treatment	
		Complete(%)	Incom- plete(%)
≤ 60	>60	40(20%)	4(2%)
	≤ 60	56(28%)	4(2%)
>60	>60	44(22%)	4(2%)
	≤ 60	40(20%)	8(4%)

Table No.5. Treatment completion with respect to KPS

KPS	Completion of treatment	
	Complete(%)	Incomplete(%)
≤ 70%	10(5%)	12(6%)
>70%	170(85%)	8(4%)

p- Value <0.001

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