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Original Research Article

Management Complexity of Elderly Cancer Patients: the Potential of Radiation Oncology

Harihar Nath Tiwari[1], Subhadra Choubey[2], Ravi Byahut[3], Rajesh Kumar Singh[4], Seema Devi[5]

[1]Senior Resident, Department of Radiotherapy, Patna Medical College & Hospital, Patna, Bihar, India

[2]Senior Resident, Department of Radiotherapy, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

[3]Professor & HOD, Department of Radiotherapy, Patna Medical College & Hospital, Patna, Bihar, India

[4]Professor & HOD, Department of Radiotherapy, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

[5]Professor, Department of Radiotherapy, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

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Corresponding author: Subhadra Choubey
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Abstract:

Background: Age-related physiological changes, various comorbidities, and higher treatment toxicity make elderly cancer patients distinctive. Radiation therapy is important in curative and palliative contexts, although its effects on clinical outcomes need greater study.

Methods: This retrospective analysis examined 160 elderly cancer patients (≥60 years) who received radiation therapy at PMCH from April 2022 to March 2024. Assessments included patient demographics, cancer kind, disease stage, treatment intent, radiation procedures, toxicity profiles, and clinical results. OS and PFS were analyzed by illness stage, performance status, and radiation modality.

Results: Patients had a mean age of 68.4 ± 5.7 years, with 58.7% men and 41.3% females. The most prevalent cancers were head and neck (30%), lung (20%), and gastrointestinal (17.5%). In 61.3% of instances, radiation therapy was curative and in 38.7% palliative. Advanced methods like IMRT and SBRT enhanced response rates and reduced toxicity. Curative cases had an ORR of 81.6%, a median OS of 24.8 months, and a median PFS of 15.2 months. Acute toxicity (Grade 3–4) was 30% and late toxicity was 16.3%. Advanced-stage illness and many comorbidities were linked to poor prognosis ($p < 0.05$).

Conclusion: Radiation therapy is an effective treatment modality in elderly cancer patients, providing significant survival benefits and symptom relief. Advanced radiation techniques improve outcomes while minimizing toxicity. A personalized, multidisciplinary approach is essential for optimizing treatment in this vulnerable population.

Keywords: Elderly cancer patients, radiation therapy, survival outcomes, treatment toxicity

Introduction

Due to ageing demographics, cancer is becoming more common among the elderly, making it a serious health concern. Because of age-related physiological changes, comorbidities, decreased organ reserve, and possible treatment-related toxicities, managing cancer in older persons poses special problems. A thorough and customised approach to treatment planning is required due to these complications. With its non-invasive therapy options that can be used for either curative or palliative purposes, radiation oncology is essential to the management of elderly cancer patients.

Modern radiation treatments include image-guided radiotherapy (IGRT), stereotactic body radiotherapy (SBRT), and intensity-modulated radiotherapy (IMRT) have increased therapeutic results, decreased toxicity, and improved precision. To maximise benefits and minimise hazards, treatment options must consider variables such as patient preferences, life expectancy, performance status, and frailty.

There is still a knowledge vacuum regarding the most effective radiation therapy approaches for senior patients, even with the expanding corpus of research on geriatric oncology.

One of the main areas of concern is still striking a balance between patient quality of life and therapeutic effectiveness. To get the best results, a multidisciplinary strategy including supportive care specialists, oncologists, and geriatric assessments is necessary. With an emphasis on the function of radiation oncology in treatment planning, this study attempts to assess the challenges of caring for older cancer patients. By evaluating radiation therapy's effectiveness, safety, and effects on survival and quality of life in this patient population, it aims to offer insights into individualized, scientifically supported treatment plans.

Materials and Methods

Study Design

This study is a retrospective observational study analyzing the management complexity of elderly cancer patients with a specific focus on the role of radiation oncology.

Study Setting

The study is conducted at **Patna Medical College and Hospital (PMCH)**.

Study Duration

The study covers a period from **April 2022 to March 2024**.

Study Population

Approximately **160 elderly cancer patients** who underwent radiation therapy at PMCH during the study period were included.

Inclusion Criteria

- Patients aged ≥ **60 years** diagnosed with any type of cancer.
- Patients who received radiation therapy, either as curative or palliative treatment.
- Availability of complete medical records, including treatment details and follow-up data.

Exclusion Criteria

1. Patients with incomplete medical records.
2. Patients who received radiation therapy outside of PMCH.
3. Patients lost to follow-up before treatment completion.

Data Collection

Data was collected retrospectively from hospital records and included:

- **Demographic details** (age, gender, comorbidities).
- **Cancer characteristics** (type, stage, histopathology).

- **Treatment details** (radiation dose, technique, fractionation schedule).
- **Toxicity and side effects** (acute and late toxicities as per RTOG criteria).
- **Clinical outcomes** (treatment response, overall survival, disease progression).
- **Quality of life assessment** (based on available patient records and follow-ups).

Statistical Analysis

- Data was analyzed using descriptive statistics (mean, standard deviation, percentage).
- Survival analysis was conducted using Kaplan-Meier curves.
- The association between treatment parameters and outcomes was assessed using Chi-square tests and regression analysis.
- Statistical significance was set at $p < 0.05$.

Results

The study comprised 160 older cancer patients (≥60 years), whose mean age was 68.4 ± 5.7 years. The study population was composed of 41.3% (66) females and 58.7% (94) males. Hypertension (32.5%), diabetes mellitus (29.3%), cardiovascular disease (15%), and chronic renal disease (11.2%) were the most prevalent comorbidities found. Head and neck cancers accounted for 30 percent of all malignancies, with lung (20 percent), gastrointestinal (17.5%), genitourinary (13.7 percent), and breast cancers (11.2 percent) following closely behind. Regarding disease staging, 31.3% of patients had metastatic disease (IV), 45% had locally progressed disease (III), and 23.7% had early-stage cancer (I–II).

38.7% (62) of patients received radiation therapy for palliative reasons, whereas 61.3% (98) had it with the intention of curing their condition. Conventional radiotherapy (7.5%), IMRT (33.8%), SBRT (13.7%), and 3D-CRT (45%) were the most often utilised radiation modalities. For curative treatment, the average radiation dose was between 50 and 70 Gy, while for palliative patients, it was between 20 and 40 Gy. Seventy percent of patients experienced acute radiation-related toxicities, which were mostly shown as mucositis, skin responses, and Grade 1-2 tiredness. 23.7% experienced Grade 3 toxicity, and 6.3% experienced severe Grade 4 toxicity that necessitated hospitalisation. Follow-up evaluations revealed late toxicities include lymphoedema (5.6%), radiation pneumonitis (8.7%), and fibrosis (16.3%). The ORR for curative purpose patients was 81.6%, with 44.9% responding completely and 36.7% partially. Curative cases had a median OS of 24.8 months and 1-year and 2-year OS rates of 78.2% and 58.6%, respectively. The median PFS was 15.2 months. 74.2% of palliative patients experienced symptom alleviation, with a median duration of 8.4 months. Patients with early-stage illness, good performance status (ECOG 0–1), and advanced treatments like IMRT or SBRT had higher survival results ($p < 0.05$). In contrast, advanced disease, comorbidities, and radiation toxicity were linked to worse prognosis ($p < 0.001$). Radiation therapy works in curative and palliative settings for older cancer patients, according to the study. Advanced radiation techniques reduced toxicity and increased treatment outcomes. A well-planned, individualised radiation therapy method increased survival rates and quality of life in many elderly cancer patients, despite the challenges.

Table 1: Patient Demographics

Characteristic	Number of Patients (n=160)	Percentage (%)
Age (Mean ± SD)	68.4 ± 5.7 years	-
Gender		
Male	94	58.7%
Female	66	41.3%
Comorbidities		
Hypertension	52	32.5%
Diabetes Mellitus	47	29.3%
Cardiovascular Disease	24	15%
Chronic Kidney Disease	18	11.2%

Table 2: Cancer Characteristics

Cancer Type	Number of Patients (n=160)	Percentage (%)
Head & Neck Cancer	48	30%
Lung Cancer	32	20%
Gastrointestinal Cancer	28	17.5%
Genitourinary Cancer	22	13.7%
Breast Cancer	18	11.2%
Others	12	7.6%

Disease Stage	Number of Patients	Percentage (%)
Early Stage (I–II)	38	23.7%
Locally Advanced (III)	72	45%
Metastatic (IV)	50	31.3%

Table 3: Radiation Therapy Details

Treatment Intent	Number of Patients (n=160)	Percentage (%)
Curative	98	61.3%
Palliative	62	38.7%

Radiation Technique Used	Number of Patients	Percentage (%)
3D-CRT	72	45%
IMRT	54	33.8%
SBRT	22	13.7%
Conventional Radiotherapy	12	7.5%

Total Radiation Dose	Curative Treatment	Palliative Treatment
Dose Range (Gy)	50–70 Gy	20–40 Gy

Table 4: Treatment Toxicity (Based on RTOG Criteria)

Toxicity Type	Number of Patients	Percentage (%)
Acute Toxicity		
Grade 1–2 (Mild-Moderate)	112	70%
Grade 3 (Severe)	38	23.7%
Grade 4 (Life-threatening)	10	6.3%
Late Toxicity		
Fibrosis	26	16.3%
Radiation Pneumonitis	14	8.7%
Lymphedema	9	5.6%

Table 5: Clinical Outcomes

Outcome Measure	Curative Cases (n=98)	Palliative Cases (n=62)
Overall Response Rate (ORR)	81.6%	-
Complete Response (CR)	44 (44.9%)	-
Partial Response (PR)	36 (36.7%)	-
Stable Disease (SD)	12 (12.2%)	-
Progressive Disease (PD)	6 (6.1%)	-
Survival Analysis		
Median Overall Survival (OS)	24.8 months	-
1-year OS rate	78.2%	-
2-year OS rate	58.6%	-
Median Progression-Free Survival (PFS)	15.2 months	-
Palliative Symptom Relief	-	74.2% (n=46)
Median Duration of Symptom Control	-	8.4 months

Table 6: Factors Affecting Outcomes

Factor	Association with Outcome	Statistical Significance (p-value)
Early-stage cancer (I-II)	Better survival outcomes	$p = 0.002$
Higher performance status (ECOG 0–1)	Improved prognosis	$p = 0.01$
Use of IMRT/SBRT	Lower toxicity, better survival	$p = 0.03$
Advanced-stage disease (III-IV)	Poor prognosis	$p < 0.001$
Presence of multiple comorbidities	Reduced survival	$p = 0.005$
Higher radiation toxicity	Increased complications	$p = 0.008$

Discussion

This study examines the challenges of treating elderly cancer patients with radiation oncology in curative and palliative settings. With sophisticated procedures like IMRT and SBRT, radiation therapy can relieve symptoms and improve survival in older cancer patients. The study also emphasises individualised therapy planning based on age, comorbidities, and performance level. The curative response rate (81.6%) matches Pignon et al. (2020), who showed a 79% ORR in elderly head and neck cancer patients treated with IMRT. Amini et al. (2021) found a 2-year OS rate of 55% in older lung cancer patients getting SBRT, similar to our study's 58.6%. These data indicate that radiation therapy is still the mainstay of cancer treatment in elderly patients, especially when new techniques reduce toxicity.

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elderly patients, especially when new techniques reduce toxicity.

To validate the results, prospective, multicenter studies with bigger sample numbers should be the main focus of future study. To better understand the balance between treatment efficacy and quality of life in older cancer patients, it will be essential to incorporate thorough geriatric assessments and patient-reported outcome measures. Furthermore, it is important to investigate how hypofractionated radiation and newer techniques like proton therapy can reduce toxicity in this population. By showing that cutting-edge radiation treatments can increase survival outcomes while preserving acceptable toxicity profiles, this study supports the significance of radiation oncology in the management of elderly cancer patients. Optimising care for this susceptible patient population will require tailored treatment plans that use geriatric evaluations and cutting-edge technologies.

Conclusion

Radiation therapy improves curative and palliative results for older cancer patients, according to one study. IMRT and SBRT enhanced survival rates and reduced toxicity, especially in early-stage illness and good performance status patients. However, many comorbidities and advanced cancer worsened prognosis. This study emphasises the necessity of patient-specific treatment options to improve results, despite its limitations. Prospective trials using complete geriatric assessments and quality-of-life indicators should improve radiation therapy procedures for elderly cancer patients.

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