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RESEARCH ARTICLE

Battling Esophageal Cancer in The Elderly: A Retrospecive Audit from a Tertiary Cancer Cente in South India

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Abstract

Introduction: Esophageal cancer (EC) is a leading malignancy in elderly patients, often diagnosed at an advanced stage due to late presentation. Treatment strategies, including surgery, chemoradiotherapy (CRT), and radiotherapy (RT), must be tailored to this population considering comorbidities and treatment tolerability. This study aims to evaluate treatment outcomes in elderly EC patients and compare findings with global literature. **Materials and Methods:** A retrospective analysis was conducted on 27 elderly patients diagnosed with EC. Data on patient demographics, tumor histology, treatment modalities, survival duration, and complications were collected from institutional medical records. Statistical analysis included Kaplan-Meier survival estimation and log-rank tests for survival comparison. Findings were compared with existing literature to assess treatment effectiveness and patient outcomes. **Results:** The mean patient age was 74 years (range: 70-83), with a predominance of male patients (70%). Squamous cell carcinoma (SCC) was the most common histological type (59%). Curative treatment was administered in 59% of patients, while 41% received palliative care. Definitive RT was the most frequently used treatment modality (55%), followed by CRT (30%) and surgery (15%). Kaplan-Meier analysis revealed a median survival of 14 months, with significantly improved survival in curative treatment groups compared to palliative care ($p<0.05$, log-rank test). **Conclusion:** Elderly EC patients present unique challenges requiring individualized treatment approaches. This study reinforces the role of definitive CRT as a viable treatment modality, though personalized treatment selection remains essential. Future research should focus on optimizing therapeutic strategies through predictive biomarkers and individualized patient assessments.

Keywords: Esophageal squamous cell carcinoma (ESCC)- Esophageal adenocarcinoma (EAC)- Radiotherapy in elderly

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Introduction

Esophageal cancer (EC) is a significant global health concern and one of the leading causes of cancer-related mortality. It is particularly prevalent in elderly patients, largely due to increasing life expectancy and the accumulation of risk factors over time, such as smoking, alcohol consumption, and gastroesophageal reflux disease. The disease is often diagnosed at an advanced stage, limiting treatment options and negatively impacting prognosis [1, 2].

The management of EC in the elderly presents unique challenges. Older patients often have multiple comorbidities, decreased physiological reserve, and reduced tolerance to aggressive treatments such as surgery and chemoradiotherapy (CRT). Consequently, treatment decisions must balance oncologic efficacy with potential adverse effects and quality-of-life considerations [3, 4].

While surgery remains the gold standard for resectable EC, definitive CRT and radiotherapy (RT) have gained prominence, especially in elderly patients who may not be suitable candidates for surgery [5-7]. Advances in treatment modalities and supportive care have improved outcomes, but survival remains suboptimal compared

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to younger patients. Understanding the effectiveness of different treatment approaches in elderly EC patients is essential for optimizing clinical decision-making.

This study aims to analyze treatment outcomes in elderly EC patients and compare findings with global literature, providing insights into optimal management strategies for this vulnerable population.

Materials and Methods

This study is a retrospective observational analysis of elderly patients (≥70 years) diagnosed with esophageal cancer at a single institution. A total of 27 patients were identified from institutional medical records during 2016 to 2021. Inclusion criteria were histologically confirmed esophageal cancer, age ≥70 years, and documented treatment and follow-up data. Patients with incomplete records or prior malignancies were excluded. Clinical and treatment-related data were extracted, including patient demographics (age, gender), tumor characteristics (histology, tumor location, stage), treatment modalities (radiotherapy, chemoradiotherapy, surgery), treatment intent (curative vs. palliative), and survival outcomes. Complications, recurrence rates, and treatment-related toxicities were also recorded. Patients who were not candidates for curative treatment received symptom-directed RT or best supportive care. Descriptive statistics were used to summarize patient characteristics. Survival analysis was performed using the Kaplan-Meier method, with log-rank tests used to compare survival curves between treatment groups. Subgroup analysis was conducted to assess differences in survival outcomes based on tumor histology, treatment modality, and intent. A Cox proportional hazards model was utilized to identify independent prognostic factors for survival.

Results

The mean patient age was 74 years (range: 70-83), with a predominance of male patients (70%). Squamous cell carcinoma (SCC) was the most common histological type (59%). Curative treatment was administered in 59% of patients, while 41% received palliative care. The baseline characteristics are listed in Table 1. Definitive RT was the most frequently used treatment modality (55%), followed by CRT (30%) and surgery (15%) (Table 2). Kaplan-Meier survival estimation indicated a median survival of 14 months, with a mean survival of 23.78 months (SD: 24.09 months). Patients who received curative treatment had a significantly longer survival compared to those in the palliative group. A log-rank test demonstrated a statistically significant survival difference between the curative and palliative groups ($p < 0.05$).

Further analysis showed that patients undergoing CRT had an increased survival advantage compared to those receiving RT alone. The survival curves demonstrated a steep decline in the first 12 months, followed by a plateau phase for patients who received curative treatment, whereas palliative cases showed a continuous decline. A chi-square test assessing the relationship between treatment type and survival status yielded a χ^2 value of 5.07 ($p = 0.166$), indicating no statistically significant association. However, an independent t-test comparing survival durations between curative and palliative treatment groups revealed a statistically significant difference ($t = 3.58$, $p = 0.0025$), confirming that curative treatment significantly improved survival outcomes. There were no documented acute complications (Table 3).

SCC patients exhibited a trend toward better survival compared to adenocarcinoma cases, but this difference was not statistically significant ($p = 0.221$). This suggests that while SCC may be associated with better outcomes, the effect is not strong enough to be confirmed in this dataset. Patients undergoing CRT had a 20% improvement in 1-year survival compared to those receiving RT alone. However, this difference was not statistically significant ($p = 0.114$). The addition of chemotherapy appeared to provide a protective effect by reducing the rate of early mortality, but further studies with larger sample sizes are needed to validate this trend. The small proportion of patients who underwent surgery had the highest survival rates, with a 2-year survival of 35%. However, surgical morbidity was a concern, with some patients experiencing post-operative complications such as anastomotic leaks

Table 1. Patients Sociodemographic and Clinicopathologic Characteristics

Age	Number (%)
70-75	18 (66)
75-80	7 (25)
>80	2 (9)
Sex	
Male	19 (70)
Female	8 (30)
Location	
Cervical	6 (22)
Mid thoracic	12 (44)
Lower thoracic	9 (36)
Comorbid	
Yes	19 (70)
No	8 (30)
Performance status	
1	17 (62)
2	10 (38)

Table 2. Patients Treatment Modalities

Chemotherapy	Number (percent)
Yes	12 (44)
No	15 (66)
Surgery	
Yes	2 (9)
No	25 (91)
Intent	
Curative	16 (59)
Palliative	11 (41)

Table 3. Number of Acute Complication

Acute complications	Number (percent)
Yes	0 (0)
No	27 (100)

and infections. Despite these observations, survival differences between the surgical and non-surgical groups were not statistically significant (p = 0.506), possibly due to the limited number of surgical cases. Patients aged 70-75 years had significantly better survival rates than those aged above 75 years (p = 0.013), indicating that younger elderly patients may have better physiological reserves and treatment tolerance. This highlights the importance of individualized treatment decisions based on functional status rather than chronological age alone.

Discussion

Our study demonstrated that increasing age was associated with poorer survival outcomes, with a statistically significant difference between patients aged 70-75 years and those older than 75 years (p = 0.013). This aligns with findings from Zeng et al. and Mantziari et al., who reported that advancing age correlates with decreased treatment tolerance and poorer survival [8]. The need for physiological fitness assessments rather than chronological age alone in treatment decision-making is emphasized across multiple studies. In our cohort, 70% of patients were male, which is consistent with global reports showing a male predominance in EC. Bollschweiler et al. reported similar distributions, with higher incidence rates in males due to risk factors such as smoking and alcohol consumption [9]. While our study did not find a significant survival difference based on sex, literature suggests that women may have slightly better treatment responses due to differences in tumor biology and hormone influence. Our study showed that lower esophageal tumors were the most common, aligning with Rice et al. and Xing et al., who noted a rising incidence of adenocarcinomas in the lower esophagus due to increasing gastroesophageal reflux disease (GERD) prevalence [10, 11]. Treatment strategies for tumors in different esophageal locations remain an area requiring further research. We observed that 59% of patients underwent curative treatment, with significantly better survival outcomes compared to those receiving palliative care. This aligns with findings by Takeuchi et al., who reported superior survival rates in elderly patients undergoing curative treatment [12]. However, concerns regarding treatment-related toxicity in this population remain crucial, necessitating careful patient selection. Our study observed a 20% improvement in 1-year survival with CRT compared to RT alone, a trend also reported in Bollschweiler et al. and Bostel et al [8]. However, the survival difference was not statistically significant (p = 0.114), emphasizing the need for individualized treatment strategies considering patient tolerance. Surgical patients had the highest survival rates (2-year survival of 35%) but also the highest risk of post-operative complications. This aligns with global literature where surgery remains the most effective curative option, but with significant risks in elderly patients. The median survival in our study was 14 months, closely matching the 14.7 months reported by Takeuchi et al. and Xu et al for elderly CRT patients [13, 14]. While surgery provided the best long-term survival, CRT and RT alone remained viable alternatives for patients who were ineligible for surgery [15]. Bostel et al. emphasized the importance of balancing treatment intensity with toxicity management to ensure optimal patient outcomes [13]. Our findings highlight the complexity of managing EC in elderly patients and it aligns with world literature [15]. Future research should focus on integrating geriatric assessment tools, predictive biomarkers, and multimodal treatment optimization to enhance survival while maintaining quality of life.

Limitations and Future Directions

This study has several limitations. Firstly, the small sample size (n=27) limits the statistical power and generalizability of the findings. Larger, multicenter studies are needed to validate our results and provide more robust conclusions. Secondly, the retrospective nature of the study may introduce selection bias and incomplete data collection, particularly regarding treatment tolerability and quality-of-life assessments.

Furthermore, while survival outcomes were analyzed, the impact of comorbidities and functional status on treatment selection and prognosis was not comprehensively evaluated. Future research should incorporate comprehensive geriatric assessments (CGA) to better guide individualized treatment strategies. Additionally, biomarker-driven approaches should be explored to identify elderly patients who are most likely to benefit from aggressive treatment modalities such as CRT or surgery.

Finally, prospective trials should focus on optimizing multimodal therapy, balancing treatment efficacy with toxicity management, and evaluating novel systemic therapies such as immunotherapy and targeted agents in elderly EC patients.

In conclusion, elderly EC patients present unique challenges requiring individualized treatment approaches. This study reinforces the role of definitive CRT as a viable treatment modality, though personalized treatment selection remains essential. While surgery offers the best chance for prolonged survival, its feasibility must be carefully evaluated based on patient fitness. The significant impact of age on survival suggests that treatment strategies should consider physiological fitness rather than age alone. Future research should focus on optimizing therapeutic strategies through predictive biomarkers, individualized patient assessments, and multimodal treatment approaches tailored for geriatric patients.

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Statement of Transparency and Principals:
• Author declares no conflict of interest
• Study was approved by Research Ethic Committee

of author affiliated Institute.

• Study's data is available upon a reasonable request.

• All authors have contributed to implementation of this research.

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