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Original Research Article

A retrospective analysis of the burden and treatment patterns of esophageal cancer over one year in a tertiary healthcare institution in the Western Himalayan region

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ABSTRACT

Background: Esophageal cancer (EC) is a highly aggressive malignancy with a poor prognosis, particularly in advanced stages. By 2024, EC incidence is expected to increase by 63.5% over 2020. The objective of the study was to analyse the EC burden and treatment patterns in Dr. RPGMC, Kangra, Himachal Pradesh, Radiotherapy and Oncology Department, with a focus on palliative radiotherapy.

Methods: A retrospective analysis of 83 patients treated at our institute between 2023 and 2024 for esophageal cancer (7.9% of all new cases). Patients received treatment in two groups: palliative (n=34) and radical (n=49). Analysis was done on demographic, histopathological, cancer staging, and treatment modalities data. Self-expandable metallic stent (SEMS) implantation, palliative chemotherapy, or radiotherapy were all considered forms of palliative care. It was evaluated if palliative radiotherapy improved dysphagia.

Results: Almost 8% of all cancers were esophageal cancers. There were 30.1% women and 69.8% men, with an average age of 63.9±9.6 years. In 98% of cases, squamous cell carcinoma was found. Of the palliative patients, three had SEMS placement, nine had chemotherapy, and twenty-two had radiotherapy. Following radiotherapy, dysphagia improved in 63.6% of palliative cases, or 68% of cases. Alcohol consumption and smoking were prevalent among men (76%).

Conclusions: The study highlights the burden of EC and the importance of tailored treatment strategies. While radical treatment remains the preferred approach, palliative care plays a crucial role in symptom management for advanced cases (alleviating dysphagia, improving QOL).

Keywords: Dysphagia, Esophageal cancer, Palliative care, Radiation oncology

INTRODUCTION

Esophageal cancer (EC) is the eleventh most common cancer diagnosed globally and the seventh leading cause of cancer-related deaths, making it a serious global health concern, by 2024, its incidence is expected to increase by 63.5%. It is anticipated that the number of cancer cases in India will increase by roughly 67% between 2020 and

2040, underscoring the increasing difficulty in treating this illness.¹ Sub-Himalayan region reports approximately 8,500 new cancer cases annually, but its predominantly rural population (89.97%) poses significant challenges, as many cases go undetected in this area.²

EC is an aggressive cancer that spreads quickly and has a poor prognosis, especially in advanced stages, making

early diagnosis crucial but challenging because patients may present with non-significant symptoms, including, dysphagia, coughing, recurrent pneumonia, chest tightness, retrosternal pain, acid regurgitation, dyspnoea, and weight loss.³

The rising incidence and mortality of EC are attributed to global trends such as aging populations and population growth, and the increasing prevalence of lifestyle-related risk factors including obesity, poor diet, physical inactivity, smoking and alcohol use.⁴ Histologically, squamous cell carcinoma (SCC) and adenocarcinoma dominate, known to differ notably in terms of risk factors and epidemiology.⁵ SCCs are linked with inflammatory changes leading to dysplasia and in situ malignant conditions. In high, human development index (HDI) regions, smoking, and alcohol are key risk factors for SCC, while in lower HDI settings, risk factors remain unclear. Adenocarcinoma, linked to obesity, gastroesophageal reflux, and Barrett's esophagus, accounts for two-thirds of cases in high HDI regions, with rising incidence expected due to increasing obesity rates.^{6,7}

Dysphagia is one of the most distressing symptoms of EC and often leads to malnutrition, weight loss, and frequent hospitalizations.⁸ Its severity impacts the quality of life (QOL), contributing to social withdrawal and emotional distress like self-consciousness during meals.⁹⁻¹¹

Esophageal cancer patients are divided into radical treatment and palliative groups. Neoadjuvant radiotherapy followed by esophagectomy is offered in patients fit for radical treatment. The effectiveness of treatment is also increased by the use of targeted therapies like monoclonal antibodies and advanced therapies like immunotherapy. For palliative group patients, the focus is on improving dysphagia and enhancing quality of life which can be done by self-expandable metallic stent (SEMS) placement, palliative chemotherapy, or palliative radiotherapy.¹²

Palliative radiation therapy (RT) has been shown to offer higher QOL and survival than the placement of SEMS. Dysphagia can be temporarily relieved with self-expanding metallic stents, though some drawbacks exist.^{13,14}

Radiotherapy, including internal high dose-rate (HDR) brachytherapy and external beam radiotherapy (EBRT), provides prolonged relief from dysphagia.¹⁵⁻¹⁷ EBRT particularly, is useful for improving patient outcomes with different radiation doses ranging from 6 Gy to 30 Gy, because it is less invasive and more accessible.^{18,19}

This study aims to evaluate the burden of esophageal cancer, including its proportion among all cancer cases treated over a year (2023-2024), and compare the effectiveness of palliative radiation therapy regimens for dysphagia relief in advanced-stage patients. Although evidence supports the use of RT for dysphagia relief, limited studies have compared different radiation doses to

determine the optimal regimen for symptom relief in resource-limited settings. By assessing the effectiveness of two radiation doses (20 Gy and 30 Gy) in relieving dysphagia, this study seeks to provide valuable insights into palliative care practices for advanced-stage EC.

METHODS

Study type

This retrospective observational study analysed esophageal cancer burden, patient demographics, lifestyle factors, disease characteristics, and the impact of palliative treatments, particularly radiotherapy regimens and outcomes, associated dysphagia and QoL over one year.

Study place

The study was conducted at the Department of Radiation and Oncology and Department of Pharmacology, at Dr. Rajendra Prasad Government Medical College, Kangra at Tanda, Himachal Pradesh, India.

Duration/period of study

Patients with esophageal cancer over the years 2023-2024 were included in the study. The study lasted over three months for data collection and processing results.

Selection criteria for the patients

Newly diagnosed adult patients of esophageal cancer visiting the OPD of Radiation and Oncology in the year 2023-24 at Dr. Rajendra Prasad Government Medical College, Kangra at Tanda, Himachal Pradesh, India, were included.

Procedure

The study included 55 patients diagnosed with esophageal cancer out of a total of 83 newly diagnosed at the centre, recruited from the Radiation Oncology department. Inclusion criteria encompassed adults aged 18 years and older with a confirmed histopathological diagnosis of esophageal cancer. Patients with prior treatment for esophageal cancer or other malignancies or who did not give consent were excluded.

Data were collected through medical record reviews. The parameters recorded include clinic-demographic data, lifestyle factors, disease characteristics, treatment received, and dysphagia assessment.

Dysphagia assessment was done using a standardized grading system based on patient-reported outcomes. Rated their swallowing difficulties on a scale from 0 to 4 - 0: a normal diet can be consumed, 1: some solid foods can be swallowed, 2: only semisolid foods can be eaten, 3: only liquids can be swallowed, and 4: swallowing is impossible.²⁰

Ethical approval

The study was conducted as per ethical guidelines after IEC approval vide letter No. HFW-H DRPGMC/Ethics/2024/54; IEC/046/2024 Dated 27.04.2024. The research protocol was reviewed and approved by the Institutional Ethical Committee, ensuring that patient confidentiality and rights were upheld throughout the study.

Statistical analysis

The collected data was entered into a Microsoft excel spreadsheet. Data is presented as mean±standard deviation. Pie charts, bar diagrams, and appropriate tables were used to make the data more presentable.

RESULTS

The esophageal cancer patients diagnosed with esophageal cancer over one year were analysed, and categorized into two groups: a palliative treatment group (n=34) and a radical treatment group (n=49). Within the palliative group of patients, 3 underwent SEMS placement, 9 received palliative chemotherapy and 22 patients underwent

palliative radiotherapy. These patients had a mean age of 63.9 ± 9.6 years at the time of diagnosis, with 58 (69.8%) men and 25 (30.1%) women.

Patient demographics

83 patients made up the cohort, and their average age was 63.9 ± 9.6 years. Male patients made up 69.8% of the total (n=58), while female patients made up 30.1% (n=25). This is consistent with previous research that indicates a higher incidence of esophageal cancer in men (Table 1).

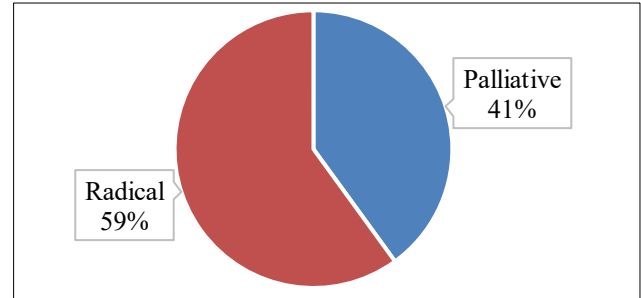


Figure 1: Distribution of patients into two groups, viz., radical and palliative groups.

Table 1: Demographic, lifestyle factors, disease characteristics, and cancer staging of patients.

Parameters	Details (%)	
Demographics		
Age (years)	Mean: 63.9±9.6	
Gender	Male: 58 (69.8)	Female: 25 (30.1)
Geographical location	Western-Himalayan region	
Lifestyle factors		
History of smoking	Smokers: 64 (77)	Non-smokers:19 (23)
History of alcohol consumption	Alcohol intake: 56 (67.5)	Non-alcohol intake: 27 (32.5)
Disease characteristics		
Histological classification	Squamous cell carcinoma: 98	Adenocarcinoma: 2
Cancer staging (according to available staging data of 55 patients)		
Stage II: 9 patients (16.36)	Stage III: 41 patients (74.55)	Stage IV: 5 patients (9.09)

Lifestyle factors

Approximately 97% of the male patients (56 out of 58) had smoked, and all had a history of alcohol use. In contrast, 24% (6 out of 25) of the female patients had a history of smoking, and none of them reported drinking.

Disease characteristics and impact on prognosis

At diagnosis, the majority of patients had advanced disease with high rates of lymphadenopathy and metastases. 98% of cases were histologically identified as squamous cell carcinoma and 2% were adenocarcinoma.

83 diagnosed cases of carcinoma esophagus were then treated with various modalities and intentions. Forty-nine patients were treated with radical intention and received neoadjuvant chemo-radiotherapy (50 to 50.4 Gy in 25 to

28 fractions at the rate of 1.8-2 Gy plus concurrent chemotherapy, injection paclitaxel 50 mg/m² and injection Carboplatin AUC2 weekly) followed by assessment for surgery. Thirty-four patients were treated with palliative intent, out of which three underwent SEMS placement only, and 9 received palliative chemotherapy. The treatment regimen included oral administration of Capecitabine at a dosage of 1000 mg/m², administered twice daily for 14 consecutive days, followed by a 7-day rest period to complete a 21-day cycle. Patients received a total of 6 to 8 cycles based on clinical assessment and treatment response.

Twenty-two patients were given palliative radiotherapy. Palliative radiotherapy regimens used were either 30 Gy in 10 fractions over 2 weeks at the rate of 3 Gy or 20 Gy in 5 fractions over one week at the rate of 4 Gy.

Treatment outcomes

In the radical treatment arm (neo-adjuvant chemo-radiotherapy), 3 had complete response, 15 had partial response, 21 had stable disease, 6 had progressive disease, and 4 patients did not complete treatment due to toxicity or poor tolerability or defaulted. However, only 14 patients could get more than 3 cycles of concurrent chemotherapy. Grade 3 dysphagia was seen in 23 patients (46.9%) in this group and haematological toxicity was seen in 5 patients. Treatment break of more than one week was seen in 2 patients.

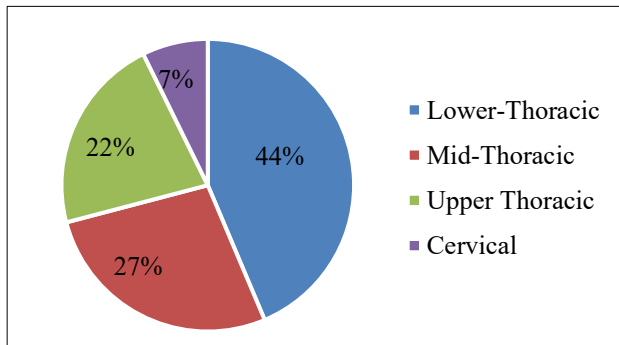


Figure 2: Esophageal cancer sites (according to available data of 55 patients).

Table 2: Gender-wise distribution of patients.

Groups		Frequency	
Palliative	34	Palliative RT	22
		Palliative CT	9
		SEMS	3
Radical	49		

Table 3: Gender-wise distribution of patients.

Gender	Palliative group (n=34) (%)	Radical group (n=49) (%)	Total (83) (%)
Men	23 (67.6)	35 (71.4)	58 (69.8)
Women	11 (32.4)	14 (28.6)	25 (30.1)

Among the palliative patients, 3 (8.8%) underwent SEMS placement, and all of them had immediate improvement in dysphagia. Among 9 (26.5%) patients who received palliative chemotherapy, 4 showed improvement in dysphagia.

When patients receiving palliative radiotherapy were studied, there were 22 patients, 15 males and 7 females. In these patients, pre-treatment grade 2 dysphagia was seen in 4 patients, and grades 3 and 4 were seen in 10 and 8 patients respectively. Post-treatment, 7 of those initially at grade 3 and 6 of those at grade 4 showed improvement, underscoring the benefit of radiation in symptom management.

Table 4: Improvement in grade of dysphagia in palliative RT.

Grade of dysphagia in palliative RT	Count	Improvement
G2	4	1
G3	10	7
G4	8	6
Total	22	14

Dose-response and comparison of radiation doses in palliative RT patients

Patients receiving 30 Gy/10# radiation showed a greater improvement in dysphagia than those receiving 20 Gy/5#. Specifically, 80% of the 30 Gy group reported a reduction of at least one dysphagia grade, compared to 55% in the 20 Gy group.

DISCUSSION

Esophageal cancer contributes significantly to the global cancer burden, accounting for 7–8% (83) of cases at our institute, with a total of 1113 new cancer cases reported at our institute between 2023-24. In a study done by Jain et al, the average 5-year survival was reported to be 18.4%.²¹ According to the 2022 GLOBOCAN report, 71% of esophageal cancer patients are males, a trend consistent with our findings.²² Histologically, squamous cell carcinoma and adenocarcinoma are two predominant histologies. The most common risk factor includes smoking in squamous cell carcinoma and Barrett's esophagus for adenocarcinomas. A retrospective study of esophageal cancer patients by Choksi et al over 20 years showed 80.25% had squamous cell carcinoma.²³ In the present study, we found that 98% were SCC cases were related to the high prevalence of smoking among our patients.

Esophageal cancer patients require a multidisciplinary approach to treatment, which includes radiotherapy, chemotherapy, surgery, and immunotherapy. The standard of care is neoadjuvant chemo-radiotherapy followed by assessment for surgery for locally advanced esophageal cancers proven by the CROSS trial and meta-analysis.²⁴⁻²⁶

In managing esophageal cancer, the growing number of elderly patients with co-morbidities and poor performance status poses difficulties, especially for those with severe dysphagia and weak general conditions that restrict their eligibility for radical treatment. With 30% of patients having metastases and 60% of patients presenting with advanced disease, palliative interventions including SEMS placement, palliative chemotherapy, radiotherapy, and best supportive care are essential for managing symptoms. One-fifth of metastatic or incurable esophageal cancers receive palliative chemotherapy. Single-agent 5-fluorouracil or tablet Capecitabine was used in our patients, which was used in other similar studies too, and

the same drug and dosage were used in a study done by Kranzfelder et al.²⁶

SEMS are known to provide immediate relief but carry risks such as stent migration or perforation. In contrast, external beam radiation provides effective dysphagia relief with fewer procedural risks, offering a valuable non-invasive alternative, especially in settings where advanced procedural support is limited.¹²

Following radiation therapy, 68% of patients in the palliative group reported a significant improvement in their ability to swallow, highlighting the treatment's efficacy in reducing one of the most incapacitating symptoms linked to esophageal cancer. Javed et al noted that patients treated with the 30 Gy/10# regimen showed a significantly higher rate of symptom improvement (80%) compared to those receiving 20 Gy/5# (55%).²⁷

In addition to dose-related differences, the study found a significant correlation between lifestyle factors, particularly smoking and alcohol use, and dysphagia severity. This lifestyle-related trend reinforces the role of behavioral risk factors in symptom severity and highlights the importance of targeted counseling for at-risk groups.

The findings of this study align with previous research indicating that palliative radiation therapy, particularly at doses of 30 Gy or higher, effectively alleviates dysphagia in esophageal cancer patients. The higher improvement rates with this dose align with other research suggesting a dose-response relationship in palliative care, with higher doses leading to more substantial symptom relief.

This study thus reinforces the suitability of palliative radiation as a primary modality in areas with restricted access to curative treatments or intensive procedural care.

Overall, our findings can inform regional treatment protocols by supporting the use of higher radiation doses in dysphagia management. This approach could be applied in settings where patients have limited access to curative treatments, thereby enhancing palliative care's role in improving patient quality of life and symptom management.

CONCLUSION

This retrospective analysis highlights the diverse approaches employed in the palliation of esophageal cancer at our institution, emphasizing the importance of individualized care for patients with advanced disease. It also provides crucial insights into the distribution of cases across age groups, gender, and regions, which can inform public health strategies and resource allocation. The findings underscore the critical role of multidisciplinary strategies, including endoscopic interventions, radiotherapy, chemotherapy, and supportive care, in improving symptom management, maintaining quality of life, and addressing disease-related complications.

While endoscopic techniques like stent placement and dilatation emerged as effective in alleviating dysphagia, radiotherapy and systemic therapies provided additional benefits in controlling local tumor progression. The study also brings attention to different palliative regimens used in radiotherapy with their outcomes.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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