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Original Research Article

Clinical Outcomes in Patients with Head and Neck Squamous Cell Carcinoma Treated with Radiotherapy: A Retrospective Study

Aparajeeta[1], Mukesh Kumar Bharti[2]

[1]Senior Resident, Department of Radiation Oncology, Darbhanga medical college and Hospital, Laheriasarai, Darbhanga, Bihar, India.

[2]Professor and HOD, Department of Radiotherapy, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India.

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Corresponding Author: Dr. Aparajeeta

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Abstract:

Background: Head and neck squamous cell carcinoma (HNSCC) is one of the most common malignancies worldwide and represents a major public health concern in India. Radiotherapy plays a central role in the management of HNSCC, either as a definitive, adjuvant, or palliative treatment modality. Evaluation of treatment outcomes and prognostic factors is essential for improving patient management and survival.

Aim: To assess the clinical outcomes of patients with head and neck squamous cell carcinoma treated with radiotherapy and to identify factors influencing disease-free survival.

Methodology: This retrospective observational study was conducted in the Department of Radiation Oncology, Darbhanga Medical College and Hospital, Bihar, India. A total of 98 patients with histologically confirmed HNSCC who received radiotherapy were included. Demographic, clinicopathological, treatment, and follow-up data were collected from medical records. Treatment response, recurrence patterns, survival outcomes, and radiation-related toxicities were analyzed. Disease-free survival (DFS) was estimated using the Kaplan–Meier method, and subgroup comparisons were performed using the Log-rank test.

Results: The mean patient age was 57.8 years, with a predominance of males and oral cavity tumors. Most patients presented with advanced-stage disease and received curative-intent radiotherapy. Complete response was achieved in 64.3% of patients, while 58.2% remained disease-free at the last follow-up. Local recurrence was the most common pattern of failure. Earlier tumor stage, lower nodal burden, and lower overall disease stage were significantly associated with improved DFS. Late toxicities were observed in over half of the patients, although most were mild to moderate in severity.

Conclusion: Radiotherapy provides effective disease control and favorable clinical outcomes in patients with HNSCC. Disease stage and nodal involvement are important prognostic determinants of survival, emphasizing the importance of early diagnosis and timely treatment. Despite the occurrence of late toxicities, radiotherapy demonstrated an acceptable safety profile and remains a cornerstone of HNSCC management.

Keywords: Head and Neck Squamous Cell Carcinoma, Radiotherapy, Clinical Outcomes, Disease-Free Survival, Treatment Response, Recurrence, Toxicity, Bihar, India.

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Introduction

Head and neck squamous cell carcinoma (HNSCC) is a diverse type of cancer that originates from the mucosal epithelium of the oral cavity, pharynx, larynx and related sites. Although there have been advances in diagnostic and therapeutic approaches, this significant morbidity, mortality and incidence make HNSCC a major global health challenge. HNSCC is the sixth most prevalent cancer worldwide, causing over 830,000 new cases and around 430,000 deaths each year [1]. The disease has aggressive biological behaviour, is prone to local invasion, regional lymph node metastasis and has significant treatment related complications which can have a negative impact on the patient's quality of life.

HNSCC is a major problem in India and is the most prevalent malignancy in both men and women. Head and neck cancers are one of the largest burdens of cancer in the country, representing almost one-third of the total burden of cancer in the country [2]. The increasing incidence of HNSCC among the Indian population is significantly due to high prevalence of tobacco smoking, smokeless tobacco, chewing of betel quid, alcohol consumption, poor oral hygiene and socio-economic differences. In recent years,

human papillomavirus (HPV) infection, especially in oropharyngeal cancers, has become an important etiological factor as well. Epidemiological profile of HNSCC in India varies from that of many western countries, where HPV associated tumors are a bigger proportion of the cases. Thus, there is a need for region-specific studies to have a better understanding of the disease characteristics, treatment patterns and outcomes of Indian patients.

HNSCC is a broad category of tumors that can have a wide range of characteristics when it comes to anatomical site, clinical manifestation, biological behaviour, prognosis and therapeutic response. The head and neck cancer category comprises several distinct cancers with similar histopathological characteristics and therapeutic strategies, but with important differences between tumors from the various head and neck subsites. Patients often come with late presentations due to low awareness, late presentations seeking healthcare services, poor access for special cancer care services and poor screening practices. Delayed diagnosis and inadequate management strategies are especially important because of the associated poor survival and high morbidity in the treatment of advanced presentation [3].

Radiotherapy (RT) is still one of the pillars in the multimodality treatment of HNSCC. Radiotherapy can be used as a definitive treatment modality, as an adjuvant treatment after surgery, or a combination with chemotherapy to enhance locoregional control and overall survival, depending on the stage, location and extent of disease. Radiotherapy can be used to treat early cancers and give results equal to surgery, with the advantage of not involving major organ removal and maintaining good cosmetic results. For locally advanced disease, a newer treatment strategy has emerged, the concurrent chemoradiotherapy, which has shown better disease control and survival benefit [4] . Furthermore, radiotherapy is an essential part of the management of patients with inoperable, recurrent or metastatic disease and can help relieve symptoms, such as pain, bleeding, dysphagia, and airway obstruction.

In the last 20 years, there have been considerable developments in radiotherapy techniques, leading to an increase in the accuracy of radiotherapy treatments and a decrease in toxic side effects caused by radiation. The three-dimensional conformal radiotherapy (3D-CRT), intensity modulated radiotherapy (IMRT), image guided radiotherapy (IGRT) and volumetric modulated arc therapy (VMAT) have allowed to achieve an improved sparing of normal tissues and an appropriate dose to target volumes. These technological advancements have led to better treatment outcomes, fewer side-effects and greater patient quality of life during radiotherapy treatment [5]. However, there are still many factors related to the patient, tumor, and treatment that affect the outcome of treatment.

Many factors can affect clinical outcomes in patients with HNSCC who receive radiotherapy, including age and sex, performance status, comorbidities, tumor location, tumor stage, nodal status, the histological grade, compliance with treatment, nutritional status, and tobacco and alcohol consumption. Additionally, socioeconomic conditions, health care availability, and gaps in treatment may also have an impact on disease control and survival, especially in low-resource areas. It is important to understand the effects of these variables for optimizing treatment strategies, determining high-risk patient subgroups and enhancing the cancer-care delivery system in general [6].

Data on outcome of HNSCC patients is relatively scarce in the state of Bihar where the quality of healthcare and availability of special oncology treatment may be less than in metro areas. There is a need for evaluations to be conducted at the institution level to produce locally relevant evidence due to different demographic characteristics, risk factor profiles, disease presentation, and health care utilization patterns across regions. These studies can yield important information regarding actual treatment patterns and outcomes in the real world and help guide clinical and policy decision-making to better manage cancer.

As a significant burden of HNSCC exists and radiotherapy plays a key role in the treatment of this disease, continuous assessment of treatment outcomes is necessary. Clinical outcome assessment studies can be used in cancer patients undergoing radiotherapy to provide insights into factors that correlate with treatment success or failure and aid evidence-based patient care improvements. Hence, a retrospective study was conducted in the present scenario to look at the clinical outcome of head and neck squamous cell carcinoma diagnosed and treated at a tertiary care centre in Bihar, India, with radiotherapy. The study is designed to outline patient characteristics, disease features, treatment trends, and clinical outcomes, as well as investigate potential differences in treatment response and prognosis across this patient population.

Materials and Methods

Study Design: This retrospective observational study was conducted to evaluate the clinical outcomes of patients diagnosed with head and neck squamous cell carcinoma (HNSCC) who received radiotherapy as part of their treatment. The study involved a review of medical records and treatment data of eligible patients treated at the institution during the study period.

Study Area: The study was conducted in the Department of Radiation Oncology, Darbhanga Medical College and Hospital (DMCH) Laheriasarai, Darbhanga, Bihar, India and Swami Vivekanand Cancer Aspatal, Mabbi.

Study Duration: The study was carried out over a period of 12 months from March 2025 to February 2026.

Sample Size: A total of 97 patients with histologically confirmed head and neck squamous cell carcinoma who fulfilled the eligibility criteria were included in the study.

Study Population: The study population comprised patients diagnosed with HNSCC who underwent radiotherapy as a component of their treatment. Patients receiving definitive radiotherapy (with or without concurrent chemotherapy), adjuvant radiotherapy following surgery, or palliative radiotherapy were considered for inclusion.

Data Collection: Data were collected retrospectively from hospital medical records, radiotherapy treatment charts, oncology case files, and follow-up records. Information extracted included demographic characteristics, tumor site, histopathological diagnosis, disease stage, treatment modality, radiotherapy details, use of concurrent chemotherapy, treatment-related toxicities, response to treatment, recurrence status, and follow-up outcomes.

Tumor staging was recorded according to the 7th Edition of the American Joint Committee on Cancer (AJCC) staging system. Clinical outcomes including disease control, recurrence, disease-free survival (DFS), and treatment-related adverse effects were documented and analyzed.

Inclusion Criteria

1. Patients with histologically confirmed head and neck squamous cell carcinoma.
2. Patients who received radiotherapy as definitive, adjuvant, or palliative treatment.
3. Patients treated with or without concurrent chemotherapy.
4. Patients with complete treatment records and follow-up data available.
5. Patients aged 18 years and above.

Exclusion Criteria

1. Patients with primary tumors arising from the nasopharynx, salivary glands, or paranasal sinuses.
2. Patients with follow-up duration of less than three months.
3. Patients whose medical records or treatment details were incomplete or unavailable.
4. Patients who discontinued radiotherapy before completion due to non-medical reasons.
5. Patients requiring re-irradiation for recurrent disease following previous radiotherapy.
6. Patients with non-squamous histological variants of head and neck cancers.

Study Procedure: After obtaining ethical clearance, medical records of eligible HNSCC patients treated with radiotherapy were identified and reviewed. Relevant clinical, pathological, and treatment-related information was extracted using a standardized data collection form. Patients were categorized according to treatment intent (definitive, adjuvant, or palliative radiotherapy), disease stage, and treatment characteristics. Follow-up records were examined to determine treatment response, recurrence patterns, survival outcomes, and treatment-related toxicities. Clinical outcomes were subsequently analyzed to assess the effectiveness of radiotherapy in the management of HNSCC.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize demographic, clinical, and treatment-related characteristics. Continuous variables were expressed as mean ± standard deviation (SD) or median with range, while categorical variables were presented as frequencies and percentages.

Disease-free survival (DFS) was estimated using the Kaplan–Meier survival method. Differences in survival outcomes among various patient subgroups were evaluated using the Log-rank test. A p-value of less than 0.05 was considered statistically significant."

Result

Table 1 presents the baseline patient and disease characteristics of the 98 individuals with head and neck squamous cell carcinoma included in the study. The mean age of the patients was 57.8 years (range: 28–84 years). Males constituted the majority of the study population, accounting for 80.6% (n=79), while females represented 19.4% (n=19). The oral cavity was the most common primary tumor site, observed in 46.9% (n=46) of patients, followed by the oropharynx in 19.4% (n=19), larynx in 18.4% (n=18), and hypopharynx in 15.3% (n=15). Histologically, moderately differentiated (Grade II) tumors were predominant, comprising 63.3% (n=62) of cases, whereas well-differentiated (Grade I) and poorly differentiated (Grade III) tumors accounted for 27.6% (n=27) and 9.1% (n=9), respectively. Regarding disease stage, most patients presented with advanced disease, with Stage IVA being the most frequent stage (51.0%, n=50), followed by Stage III (25.5%, n=25). Early-stage disease (Stages I and II) was identified in 19.3% (n=19) of patients, while Stage IVB was present in 4.1% (n=4). In terms of treatment intent, definitive radiotherapy was administered to 49.0% (n=48) of patients, adjuvant radiotherapy to 41.8% (n=41), and palliative radiotherapy to 9.2% (n=9). Additionally, 59.2% (n=58) of patients received concurrent chemotherapy, whereas 40.8% (n=40) were treated with radiotherapy alone. These findings indicate a predominance of middle-aged to elderly male patients presenting with

advanced-stage, moderately differentiated tumors, with most receiving curative-intent radiotherapy.

Table 1: Patient and Disease Characteristics (N = 98)	
Variable	**N (%)**
Mean age in years (range)	57.8 (28–84)
Gender	
Male	79 (80.6)
Female	19 (19.4)
Site of Primary Tumor	
Oral Cavity	46 (46.9)
Oropharynx	19 (19.4)
Larynx	18 (18.4)
Hypopharynx	15 (15.3)
Histological Grade	
Grade I (Well differentiated)	27 (27.6)
Grade II (Moderately differentiated)	62 (63.3)
Grade III (Poorly differentiated)	9 (9.1)
Clinical Stage Group (AJCC 7th Edition)	
Stage I	7 (7.1)
Stage II	12 (12.2)
Stage III	25 (25.5)
Stage IVA	50 (51.0)
Stage IVB	4 (4.1)
Treatment Intent	
Definitive Radiotherapy	48 (49.0)
Adjuvant Radiotherapy	41 (41.8)
Palliative Radiotherapy	9 (9.2)
Concurrent Chemotherapy	
Yes	58 (59.2)
No	40 (40.8)

Table 2 summarizes the treatment outcomes and follow-up characteristics of the 98 patients with head and neck squamous cell carcinoma treated with radiotherapy. The median follow-up duration was 18.6 months (range: 3–60 months). A complete response was achieved in 64.3% (n=63) of patients, while 16.3% (n=16) showed a partial response. Stable disease and progressive disease were observed in 8.2% (n=8) and 11.2% (n=11) of patients, respectively. Residual disease persisting beyond three months after treatment was identified in 9.2% (n=9) of cases. During follow-up, local recurrence occurred in 18.4% (n=18) of patients, regional recurrence in 8.2% (n=8), and distant metastasis in 6.1% (n=6). At the last follow-up visit, 58.2% (n=57) of patients remained disease-free, while 70.4% (n=69) were alive. Disease-related mortality was recorded in 24.5% (n=24) of patients, and 5.1% (n=5) were lost to follow-up. These findings indicate that radiotherapy achieved favorable tumor control in a substantial proportion of patients, although disease recurrence and mortality remained important challenges during long-term follow-up.

Table 2: Treatment Outcomes and Follow-up Characteristics (N = 98)	
Variable	**N (%)**
Median Follow-up (months)	18.6 (3–60)
Complete Response	63 (64.3)
Partial Response	16 (16.3)
Stable Disease	8 (8.2)
Progressive Disease	11 (11.2)
Residual Disease (>3 months post-treatment)	9 (9.2)
Local Recurrence	18 (18.4)
Regional Recurrence	8 (8.2)
Distant Metastasis	6 (6.1)
Disease-Free at Last Follow-up	57 (58.2)
Alive at Last Follow-up	69 (70.4)
Death due to Disease	24 (24.5)
Lost to Follow-up	5 (5.1)

Table 3 presents the effect of various patient and disease-related factors on disease-free survival (DFS) among the 89 patients included in the survival analysis after excluding those who received palliative treatment. Age and gender did not significantly influence DFS, with patients aged <60 years demonstrating a mean DFS of 42.8 months compared to 39.6 months in those aged ≥60 years (p=0.481), and females showing a slightly higher mean DFS (43.2 months) than males (41.5 months, p=0.713). Similarly, the site of the primary tumor was not significantly associated with DFS (p=0.386), although patients with laryngeal/hypopharyngeal tumors had the longest mean DFS (44.1 months). In contrast, tumor stage significantly affected survival outcomes. Patients with T1–T2 disease had a significantly longer mean DFS (48.7 months) compared to those with T3–T4 disease (34.8 months, p=0.041). Likewise, DFS progressively declined with increasing nodal involvement, from 47.9 months in N0 disease to 31.8 months in N2/N3 disease (p=0.029). Stage grouping also showed a significant impact, with patients having Stage I–II disease achieving a mean DFS of 55.4 months, compared with 33.9 months for those with Stage III–IV disease (p=0.008). However, neither the type of radiotherapy (p=0.327) nor the use of concurrent chemotherapy (p=0.562) demonstrated a statistically significant association with DFS. These findings indicate that tumor burden and disease stage were the primary determinants of disease-free survival following radiotherapy.

Table 3: Effect of Patient Variables on Disease-Free Survival

Patient Variable (n = 89; palliative patients excluded from analysis)	Mean DFS in Months (Range)	p-value
Age (Years)		
<60 (n = 55)	42.8 (4–60)	0.481
≥60 (n = 34)	39.6 (3–58)	
Gender		
Male (n = 72)	41.5 (3–60)	0.713
Female (n = 17)	43.2 (5–57)	
Site of Primary		
Oral Cavity (n = 43)	39.4 (4–58)	0.386
Oropharynx (n = 18)	36.7 (3–55)	
Larynx/Hypopharynx (n = 28)	44.1 (5–60)	
T Stage		
T1–T2 (n = 35)	48.7 (5–60)	0.041*
T3–T4 (n = 54)	34.8 (3–56)	
N Stage		
N0 (n = 37)	47.9 (4–60)	0.029*
N1 (n = 21)	41.6 (3–57)	
N2/N3 (n = 31)	31.8 (3–54)	
Stage Group		
Stage I–II (n = 18)	55.4 (8–60)	0.008*
Stage III–IV (n = 71)	33.9 (3–58)	
Type of Radiotherapy		
Definitive RT (n = 48)	40.2 (3–58)	0.327
Adjuvant RT (n = 41)	44.8 (5–60)	
Use of Concurrent Chemotherapy		
Yes (n = 58)	42.7 (4–60)	0.562
No (n = 31)	38.9 (3–56)	

Table 4 summarizes the late radiation-related toxicities observed among the 98 patients treated for head and neck squamous cell carcinoma. More than half of the patients experienced at least one late toxicity, with 56.1% (n=55) reporting treatment-related complications. Subcutaneous fibrosis was the most common late adverse effect, occurring in 29.6% (n=29) of patients, followed by xerostomia in 25.5% (n=25) and dysphagia in 14.3% (n=14). Other late toxicities included neck edema in 9.2% (n=9), trismus in 7.1% (n=7), hypothyroidism in 6.1% (n=6), and osteoradionecrosis in 2.0% (n=2) of patients. Regarding severity, the majority of toxicities were Grade I–II, affecting 48.0% (n=47) of patients, while Grade III and Grade IV toxicities were observed in 7.1% (n=7) and 1.0% (n=1) of patients, respectively. These findings indicate that although late radiation-related toxicities were relatively common, most were of mild to moderate severity, with severe complications occurring in a small proportion of patients.

Table 4: Late Radiation-Related Toxicities (N = 98)	
Toxicity	**N (%)**
Any Late Toxicity	55 (56.1)
Subcutaneous Fibrosis	29 (29.6)
Xerostomia	25 (25.5)
Dysphagia	14 (14.3)
Neck Edema	9 (9.2)
Trismus	7 (7.1)
Hypothyroidism	6 (6.1)
Osteoradionecrosis	2 (2.0)
Grade I–II Toxicity	47 (48.0)
Grade III Toxicity	7 (7.1)
Grade IV Toxicity	1 (1.0)

Table 5 presents the pattern of failure following radiotherapy among the 98 patients with head and neck squamous cell carcinoma. The majority of patients showed no evidence of treatment failure, accounting for 67.3% (n=66) of cases. Among those who experienced disease recurrence or progression, local failure was the most common pattern, observed in 15.3% (n=15) of patients. Regional failure occurred in 7.1% (n=7) of cases, while locoregional failure was reported in 5.1% (n=5) patients. Similarly, distant metastatic failure was identified in 5.1% (n=5) of patients. These findings indicate that most patients achieved satisfactory disease control following radiotherapy, with local recurrence representing the predominant mode of treatment failure among those who relapsed.

Table 5: Pattern of Failure Following Radiotherapy (N = 98)	
Pattern of Failure	**N (%)**
No Failure Observed	66 (67.3)
Local Failure	15 (15.3)
Regional Failure	7 (7.1)
Locoregional Failure	5 (5.1)
Distant Metastatic Failure	5 (5.1)
Total	98 (100.0)

Discussion

In the present retrospective study, the authors analyzed clinical outcomes of radiotherapy alone in 98 head and neck squamous cell carcinoma (HNSCC) patients. Demographic characteristics of our cohort showed that the age was 57.8 years on average and there was a significant male dominance (80.6%) in line with the epidemiological trend observed throughout India and other developing nations. In most cancer registries in India, about 70-85% of cases are males, who are also more exposed to tobacco and alcohol related risk factors [7] and, in most cases, are middle aged or old aged. The same has been reported by asthana et al where the prevalence of tobacco associated head and neck cancer was significantly higher in men than women, indicating gender differences in risky behavior [8]."

Regarding the primary site of tumor, oral cavity carcinoma was the most prevalent type of primary site (46.9%) followed by oropharyngeal, laryngeal, and hypopharyngeal primary site, respectively. This result is similar to that in Indian populations, where smokeless tobacco use is prevalent, accounting for almost 40–50% of all cases of oral cavity cancers [8]. Surgery followed by adjuvant radiotherapy was used in a large number of patients in our cohort, as many of the tumors were located in the oral cavity.

One of the significant observations of the present study was the high percentage of patients presenting with advanced stages of the disease. Of all patients, over 75% presented with Stage III–IVA disease and 51.0% of patients had only Stage IVA disease. This has been reported by Sinha et al., [9] who emphasized that late presentation in India is often due to inadequate specialized oncologic services and poor diagnosis. High prevalence of locally advanced disease continues to be a big challenge as survival is poor when the tumor burden is high and nodes are involved.

The response to radiotherapy was encouraging, with 64.3% of patients achieving complete response and 16.3% a partial response. The results are similar to those reported by Gupta et al., [10] who showed 60%-75% complete response rates in samples treated with modern radiotherapy techniques. Likewise, Beadle et al. [11] reported higher rates of

locoregional control and survival in patients with HNSCC who were treated with intensity-modulated radiotherapy (IMRT), especially in those with locally advanced disease who were treated definitively. The 58.2% of our patients that were disease-free at the latest follow-up further confirms the effectiveness of radiotherapy-based management in providing durable control of the disease.

Our survival analysis showed that extent of the tumour and stage had a significant impact on disease-free survival (DFS). Patients with early T stage tumors (T1-T2) had a mean DFS of 48.7 months versus 34.8 months for patients with T3-T4 tumors. Similarly, there was a significant difference in DFS between Stage I–II and Stage III–IV patients (55.4 vs. 33.9 months). The results are consistent with the conclusions reached by Huang and O'Sullivan (2017) [12] who stressed that stage of the tumour is a powerful prognostic factor in HNSCC. The presence of advanced T-stage and node involvement are well-known negative prognostic factors which are linked to a higher risk of recurrence and lower survival. Nodal status was again an important predictor of DFS, with a mean of 47.9 months for N0 disease and 31.8 months for N2/N3 disease in our cohort.

Neither current chemotherapy nor the radiotherapy treatment type had significant impact on DFS in our study, interestingly. The same conclusion has been reached in some retrospective studies, where some patient selection and heterogeneity could moderate the reduction in measurable survival benefit seen with concurrent systemic therapy [13]. However, for a large number of patients with LAHNSCC, concurrent chemoradiation is the mainstay of treatment and has been shown to have survival benefits in RCTs.

In our series, treatment failure analysis showed that most patients had no evidence of failure, with no failure observed in 67.3% (n=66) of cases. Among patients who experienced recurrence or progression, local failure was the most common pattern, observed in 15.3% (n=15) of patients, followed by regional failure in 7.1% (n=7), locoregional failure in 5.1% (n=5), and distant metastatic failure in 5.1% (n=5). This indicates that local failure remained the predominant mode of treatment failure following radiotherapy. This is in line with previous reports which suggest that, despite recent improvements in radiotherapy delivery, locoregional disease control remains the major treatment problem in HNSCC [12,13]. The low frequency of distant metastatic failure in our cohort further supports the predominant locoregional nature of HNSCC.

Rates of toxicity associated with treatment are also a major issue for long-term survivors. The incidence of late radiation-related toxicities in the present study was 56.1%, with most of the late side effects being Grade I–II. Xerostomia (25.5%) and dysphagia (14.3%) were the most frequent complications, with subcutaneous fibrosis the most common (29.6%). These results are comparable to previously reported results. O'Sullivan and Levin (2003) [14] recorded fibrosis ranging from 20 to 50% after head and neck irradiation and Hirota et al. (2002) [15] found that patients who underwent surgery with post-surgical radiotherapy had a higher incidence of fibrosis. In the same way, Mercadante et al., (2017) [16] reported xerostomia rates between 63 and 93% following radiotherapy, which is significantly higher than the xerostomia rates in our cohort (25.5%). This difference in incidence of xerostomia may be attributable to improvements in IMRT-based salivary gland-sparing techniques that have been demonstrated to minimize long-term salivary dysfunctions.

In our study, severe complications were rare. The percentage of patients developing osteoradionecrosis was 2.0%, which was at the low end of the range 1-30% reported in the literature [17]. Declining incidence of osteoradionecrosis was suggested to be due, among other factors, to better radiation planning by the authors of Moon et al., (2017) [18] and careful dental assessment and supportive care measures, which may have contributed to the favorable toxicity profile in our cohort.

In summary, the current results show that radiotherapy-based treatment is effective in achieving tumour response, controlling the disease and ensuring survival in the treatment of HNSCC. But it is also common for presentation to be advanced and there is a significant survival disadvantage. To enhance long-term results in this patient population, it is important to further reduce treatment-related toxicity, to continue work towards earlier diagnosis, and to optimize multimodality treatment strategies.

Conclusion

This retrospective study shows that radiotherapy is a promising treatment modality for patients with HNSCC with encouraging disease control and survival rates in a significant number of patients. The results suggest that the disease-free survival is strongly affected by disease burden at presentation, with early-stage tumours and low nodal involvement having a more favourable disease-free survival than advanced stage disease. While most patients tolerated the treatment, significant long-term treatment-related side effects were noted in many patients, emphasising the need for long-term follow-up and supportive care. The majority of patterns of failure were localised, highlighting the importance of optimised disease monitoring and treatment strategies. In conclusion, the study reinforces the importance of radiotherapy, either as a sole modality or in combination with concurrent chemotherapy, as a key component in the treatment of HNSCC and highlights the need for early diagnosis and multimodality approaches to optimize clinical success.

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