Retrospective Cohort Study of How the Interval of Recurrence Affects The Survival in Head and Neck Squamous Cell Carcinoma Patients

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Abstract

Background: Despite advances in treatment techniques, a subset of patients with head and neck squamous cell carcinoma (HNSCC) invariably develop unresectable recurrent and/or distant metastatic (R/M) disease.

Objectives: To determine the association between overall survival (OS) and recurrence time in patients with HNSCC.

Patients and methods: This retrospective cohort investigation was done on data of 130 patients diagnosed with all stages and grades of HNSCC. Data from medical records included type of surgical procedure, symptoms of patients with recurrence, outcome, time of symptom appearance, prior treatment received, platinum sensitivity, recurrence interval, and location of recurrence.

Results: The early recurrence (ER) group had a significantly lower OS than the late recurrence (LR) group ($P<0.001$). The mean OS in ER group was 4.08 ± 1.17, whereas in LR group was 50.76 ± 65.42. The univariate logistic regression analysis showed that no radiotherapy, platinum resistance and ER were the only significant predictors for poor prognosis of HNSCC. The multivariate logistic regression analysis showed that no radiotherapy and ER were substantial predictors for poor prognosis of HNSCC.

Conclusion: The recurrence rate after various treatment modalities of patients with HNSCC was 40.8%, and about 45% of the patients showed ER within 2 to 6 months. The ER was associated with worse OS than the LR. The platinum-resistant, radiotherapy-resistant, margin-positive, and lymph node extracapsular spread were associated with worse outcomes.

Keywords: Interval of Recurrence; Survival; Head; Neck; Squamous Cell Carcinoma.

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Introduction

Head and neck cancers include a variety of oral cavity, laryngeal, and pharyngeal malignancies. Squamous cell carcinoma is the most prevalent histologic variety, accounting for nearly 4% of all cancers **(Barsouk et al., 2023)**. Over 550,000 patients are diagnosed with HNSCC annually, and it is responsible for over 380,000 deaths on a global scale **(Johnson et al., 2020)**. Despite advances in treatment techniques and changing demographics, a subset of patients with HNSCC invariably develop unresectable recurrent and/or distant metastatic (R/M) disease. Generally, patients with recurrent or metastatic head and neck squamous cell cancer (R/M HNSCC) have a terrible prognosis. The median survival ranges from six to fifteen months depending on the patient and disease-related factors **(Yan et al., 2020; Pannunzio et al., 2023)**.

Although a considerable number of patients with locally advanced HNSCC experience distant metastases, there is disagreement among guidelines about the utility of biomarker testing and imaging tests during post-treatment followup. This is partially because to a lack of understanding on the timing and patterns of disease recurrence **(Pisani et al., 2020)**. Early detection of recurrence is associated with improved survival in HNSCC patients. Early detection increases the likelihood that locally regional tumors can be treated with salvage surgery or reirradiation **(Heft Neal et al., 2020; Lee et al., 2020)**.

Curiously, clinical outcomes correlate with the recurrence interval following radical resection in specific malignant tumors. In kidney, gastric, pancreatic, liver, and esophageal malignancies, early recurrence (ER) following radical resection is associated with a worse prognosis than late recurrence (LR) **(Yan et al., 2023; Zhang et al., 2023)**. Chemotherapy conjugated with surgery or radiotherapy, is considered the primary management for patients with locally advanced HNSCCs (LAHNSCCs). Conversely, it is challenging to determine whether a patient's recurrence within 6 months is the result of platinum preparation resistance or radiation resistance **(Matsuo et al., 2024)**.

We aimed to explore the relationship between recurrence time and OS in patients with HNSCC.

Patients and methods

This retrospective cohort study was done on data of 130 patients aged 18 years old and above diagnosed with all stages and grades of HNSCC without distant metastasis at the time of initial treatment and receiving radical treatment at the Oncology Department, Sohag University Hospital, Sohag, Egypt, between 2020 and 2024. The institutional ethics committee gave the study an approval number (Soh-Med-15-10-3PD). The Declaration of Helsinki conducted the research.

Exclusion criteria were age lower than 18, presence of other malignancies, patients in whom new lesions appeared within less than 6 weeks, and patients who could not be followed up for over 2 years.

Data were obtained from medical records included demographic features, pre-treatment body mass index (BMI), medical comorbidities, smoking status, tumour sites and volume, histopathology, stage, grade, total number of positive lymph nodes, total number of resected lymph nodes, total number of extra capsular infiltrations of lymph nodes, type of surgical procedure, TNM stage, kind of salvage treatment, symptoms of patients with recurrence, time of symptom appearance, outcome, prior treatment received (surgery, adjuvant therapy as indicated, radiation alone, or chemo radiation), platinum sensitivity, recurrence interval, diagnosis method of recurrence and location of recurrence.

Tumors were considered platinum refractory if they had persistent disease or developed a new recurrence/metastasis (either loco regional or distant) within 6

months of platinum-based chemotherapy or chemo radiotherapy. Tumors were considered platinum sensitive if they developed recurrent disease more than 6 months after platinum-based therapy or had never been treated with platinum chemotherapy **(Haring et al., 2023)**. Recurrence interval was defined as the duration from the end of initial treatment to the confirmation of recurrence by pathological examination after incisional biopsy **(Blatt et al., 2022)**. Only the time interval between the first recurrence and the end of the first treatment was computed for individuals with numerous tumor recurrences. In this study, return of disease within six months of radical therapy was considered an ER, but recurrence beyond six months was considered an LR **(Matsuo, 2024)**. To differentiate between new primary and recurrent tumors, we only included patients with OSCC whose histologic grade was equal to or higher than the primary tumor **(Nandy et al., 2022)**.

In addition, patients were considered platinum-resistant if they experienced a recurrence within 6 months of using the platinum preparation. Patients were also regarded as radiation-resistant if their lesions disappeared after radiotherapy was finished but returned within 6 months. **(Oronsky et al., 2017; Ferris et al., 2016)**. OS was defined as the period from initial treatment to death.

For comparison, all patients with recurrence were divided into 2 groups: the ER (n = 24) group and the LR (n = 29) group.

Statistical analysis

The statistical analysis was carried out using SPSS v26, a product of IBM Inc., located in Armonk, NY, USA. We used an unpaired Student's t-test to compare the two groups' quantitative variables, which were given as standard deviation and mean. We used the Chi-square test or Fisher's exact test to analyze qualitative variables when appropriate, which were presented as percentages or frequencies. Statistical significance was defined as a two-tailed P value less than 0.05. Relationship estimates between dependent and independent variables are also estimated using logistic regression. The Kaplan-Meier curve was utilised to demonstrate the OS.

Results

The current study included 130 patients, 46 (35.38%) females and 84 (64.62%) males, their mean age was 72.52± 11.2 years. Among the studied patients, 53 (40.77%) showed recurrence, there was an insignificant difference between ER group and LR group regarding the baseline characteristics (sex, age, BMI, smoking and area). (**Table.1).**

Table 1. Baseline characteristics of all the studied patients

Variables		Total (n=130)	Recurrence (n=53)		P value
			Early recurrence (n=24)	Late recurrence (n=29)	
Age (years)		72.52± 11.2	72.58± 13.55	68.79± 13.62	0.317
Sex	**Male**	84 (64.62%)	11 (45.83%)	12 (41.38%)	0.744
	Female	46 (35.38%)	13 (54.17%)	17 (58.62%)	
BMI (Kg/m^2)		27.55± 2.52	28.2± 2.6	27.42± 2.55	0.282
Smoking		50 (38.46%)	12 (50%)	12 (41.38%)	0.530
Area	**Oral cavity**	41 (31.54%)	13 (54.17%)	6 (20.69%)	0.254
	Nasopharynx	16 (12.31%)	3 (12.5%)	7 (24.14%)	
	Hypopharynx	22 (16.92%)	3 (12.5%)	6 (20.69%)	
	Oropharynx	18 (13.85%)	1 (4.17%)	5 (17.24%)	
	Larynx	12 (9.23%)	2 (8.33%)	2 (6.9%)	
	Sinonasal	7 (5.38%)	1 (4.17%)	2 (6.9%)	

	External auditory canal	14 (10.77%)	1 (4.17%)	1 (3.45%)	

BMI: body mass index. Data presented as mean ± SD or frequency (%),

(Table.2) shows that T classification was significantly different between ER group and LR group regarding T classification (P=0.036), T4 stage was significantly higher in ER group (45.83%), while T2 was considerably higher in LR group (51.72%). Both groups had an insignificant difference regarding N classification, P16, and multiplicity cancer in other organs.

Table 2. Tumour staging, P16 and multiplicity cancer in other organs of all the studied patients

Variables		**Total (n=130)**	**Recurrence (n=53)**		**P value**
			Early recurrence (n=24)	**Late recurrence (n=29)**	
T classification	**T1**	25 (19.23%)	2 (8.33%)	1 (3.45%)	**0.036***
	T2	48 (36.92%)	9 (37.5%)	15 (51.72%)	
	T3	23 (17.69%)	2 (8.33%)	8 (27.59%)	
	T4	34 (26.15%)	11 (45.83%)	5 (17.24%)	
N classification	**N0**	53 (40.77%)	10 (41.67%)	13 (44.83%)	0.802
	N1	22 (16.92%)	3 (12.5%)	3 (10.34%)	
	N2	38 (29.23%)	8 (33.33%)	7 (24.14%)	
	N3	17 (13.08%)	3 (12.5%)	6 (20.69%)	
P16	**Positive**	23 (17.7%)	9 (37.5%)	11 (37.93%)	0.974
	Negative	44 (33.8%)	15 (62.5%)	18 (62.07%)	
Multiplicity cancer in other organs		20 (15.4%)	4 (16.67%)	7 (24.14%)	0.735

*: statistically significant as p value <0.05. Data presented as frequency (%),

There was an insignificant difference between ER group and LR group regarding the initial treatment. (**Table. 3).**

Table 3. Initial treatment of all the studied patients

Variables		**Total (n=130)**	**Recurrence (n=53)**		**P value**
			Early recurrence (n=24)	**Late recurrence (n=29)**	
Surgery alone		39 (30%)	7 (29.2%)	8 (27.6%)	0.869
Surgery & chemoradiotherapy (platinum+)		11 (8.5%)	2 (8.3%)	3 (10.3%)	
Surgery & radiotherapy (platinum–)		20 (15.4%)	1 (4.2%)	2 (6.9%)	
Surgery & neoadjuvant chemotherapy (platinum+)		16 (12.3%)	3 (12.5%)	6 (20.7%)	
Radiotherapy alone		10 (7.7%)	3 (12.5%)	4 (13.8%)	
Chemoradiotherapy (platinum+)		23 (17.7%)	6 (25%)	3 (10.3%)	
Chemoradiotherapy (platinum–)		11 (8.5%)	2 (8.3%)	3 (10.3%)	
Treatment	**Surgery group**	86 (66.2%)	13 (45.8%)	16 (55.2%)	0.509
	No Surgery group	44 (33.8%)	11 (54.2%)	13 (44.8%)	

Data presented as frequency (%).

There was an insignificant difference between ER and LR groups regarding the postoperative pathological findings of the surgery group (margins and extracapsular spread). (**Table. 4).**

Table 4. Postoperative pathological findings of the surgery group

Variables		Total (n=86)	Early recurrence (n=13)	Late recurrence (n=16)	P value
Margins	**Positive**	24 (27.9%)	5 (38.46%)	6 (37.5%)	0.985
	Negative	59 (68.6%)	7 (53.85%)	9 (56.25%)	
	Unknown	3 (3.5%)	1 (7.69%)	1 (6.25%)	
Extracapsular spread	**LN extracapsular spread**	21 (24.4%)	8 (72.73%)	5 (31.25%)	0.103
	LN without extracapsular spread	40 (46.5%)	5 (45.45%)	11 (68.75%)	

Data presented as frequency (%), LN: lymph node.

OS by recurrence status: the patients with ER (recurrence within 6 months) and LR (recurrence after 6 months). Twenty-four patients (18.4%) had ER and 29 (22.3%) had LR. Recurrence was observed in 24 patients (18.4%) at two to six months, 13 patients (10%) at seven to twelve months, 9 patients (6.92%) at thirteen to twenty-four months, and 7 patients (5.38%) at twenty-five months. The LR group had a significantly better OS than the ER group (P<0.001). The mean OS in ER group was 4.08 ± 1.17, whereas in LR group was 50.76 ± 65.42. (**Fig.1, 2).**

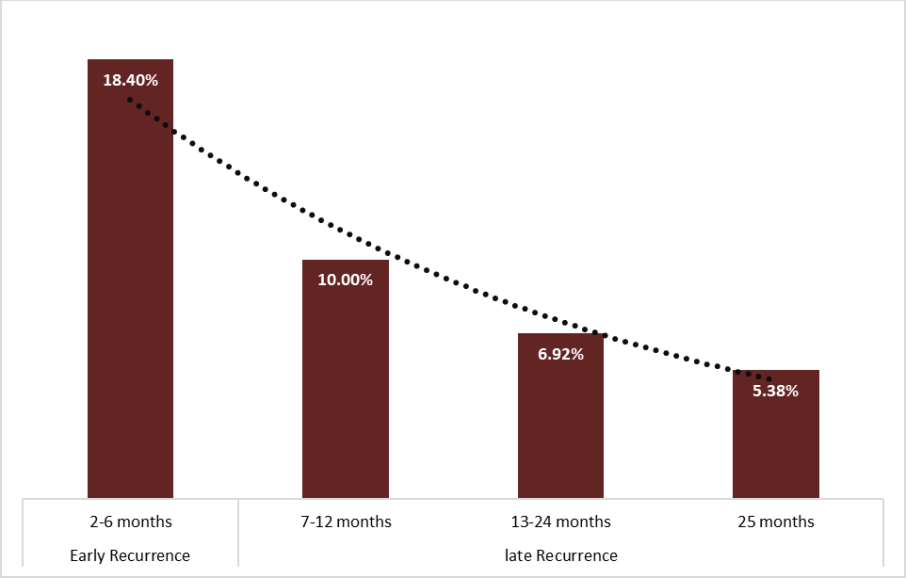


Fig.1. Recurrence time and frequency

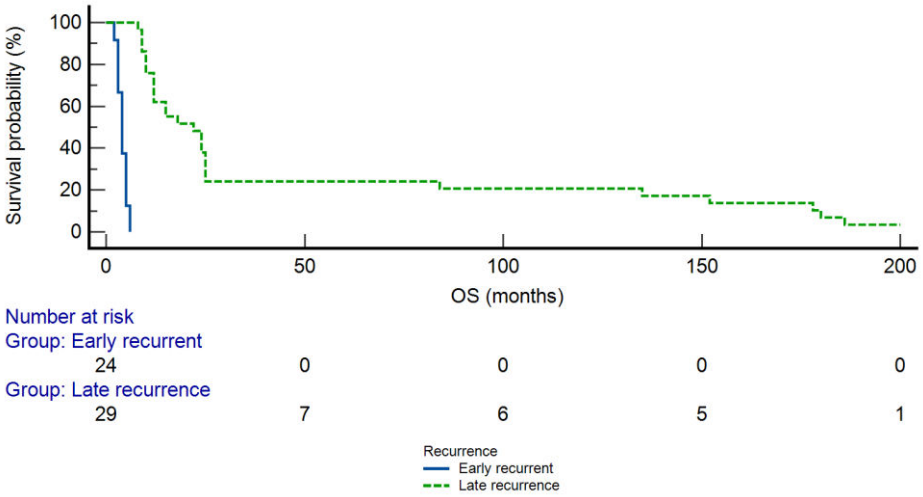


Fig.2. Kalpen Mayer survival analysis for early recurrence and late recurrence

Regarding the survival rate by resistance to platinum preparation; among the studied patients, 81 patients received platinum preparation as an initial treatment, 23 (28.40%) patients showed platinum-sensitive recurrence and 8 (9.88%) patients showed platinum-resistant recurrence. Compared to the platinum-sensitive group, the platinum-resistant group had a significantly worse prognosis (Median OS (95% CI): 5.0 (3.0 to 6.0) vs. 24 (15.0 to 25.0) respectively, P<0.001). (**Fig.3).**

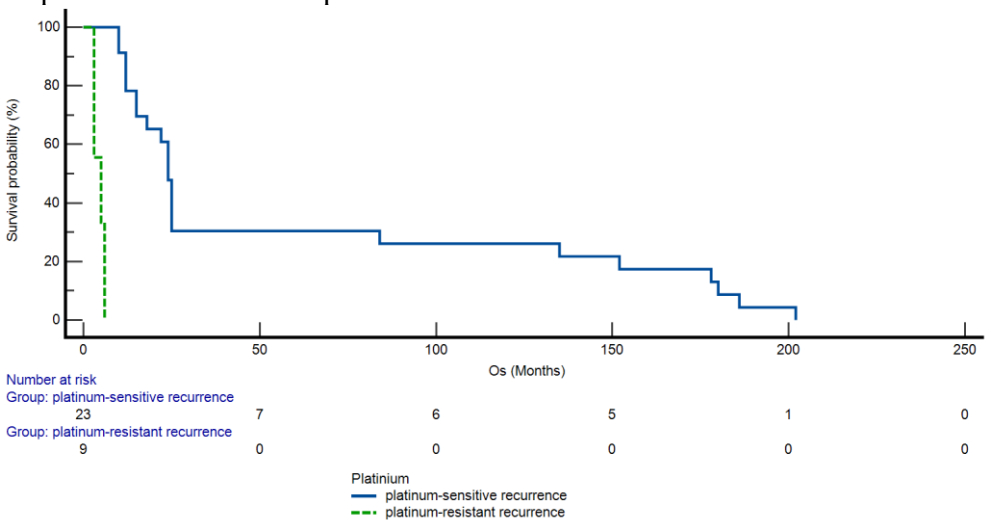


Fig.3. Kalpen Mayer survival analysis for patients treated with platinum showing platinum-resistant and platinum-sensitive

Survival rate by resistance to radiotherapy: Among the 75 patients who underwent radiotherapy at initial treatment (involving after surgery), 8 (10.67%) had radiotherapy-resistant recurrence, whereas 21 /75 (28%) had radiotherapy-sensitive recurrence. The prognosis of the radiotherapy-resistant group was significantly less favourable than that of the radiotherapy-sensitive group (Median OS (95% CI): 3.0 (2.0 to 5.0) vs. 135 (25.0 to 178.0) respectively, P<0.001). (**Fig. 4).**

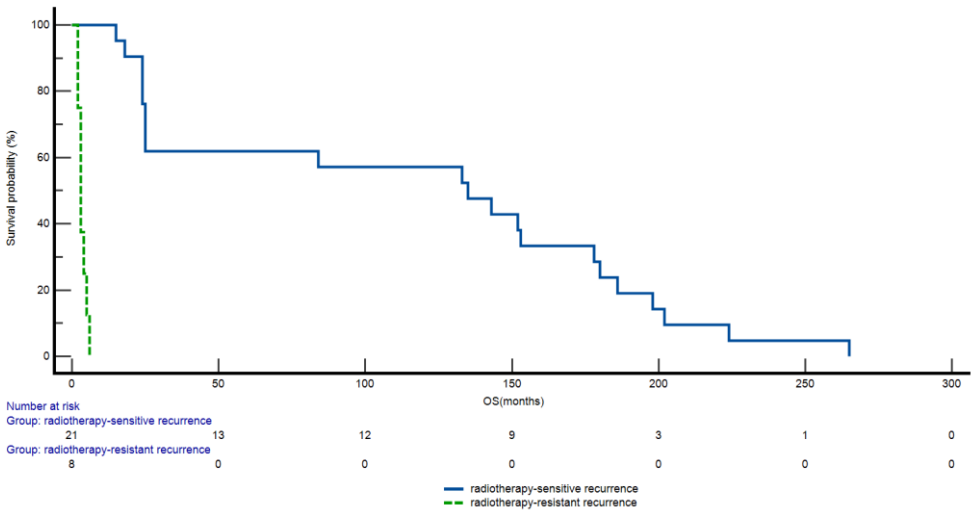
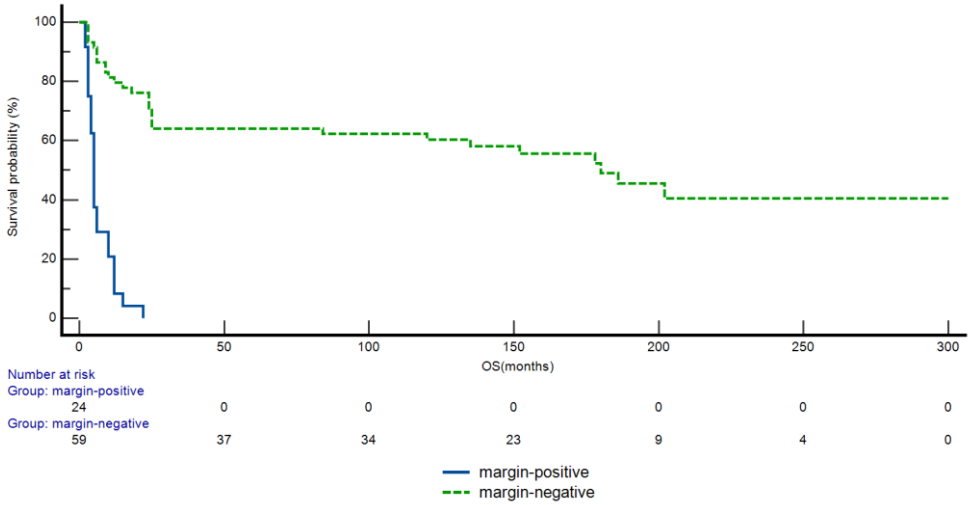


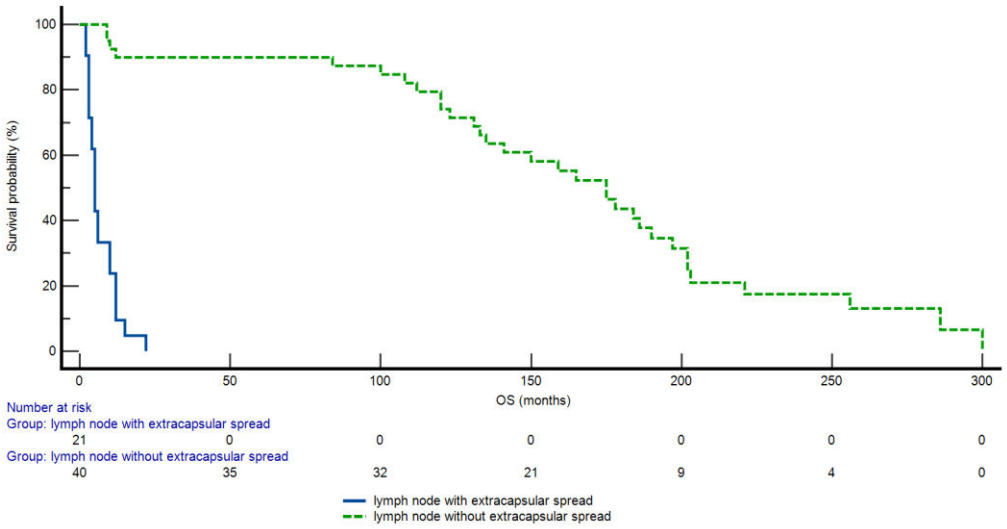
Fig. 4. Kalpen Mayer survival analysis for radiotherapy-resistant recurrence and radiotherapy-sensitive recurrence

Patients who were margin-positive had a significantly worse prognosis than those who were margin-negative, with a survival rate of 24 (27.9%) compared to 59 (68.6%). The prognosis of patients who were margin-positive was significantly less favourable than that of those who were margin-negative. (Median OS (95% CI): 5 (4.0 to 6.0) vs. 180 (84.0 to 202.0), P<0.001). **(Fig.5A).**

Patients who experienced lymph node extracapsular spread 21 (24.4%) had a significantly less favourable prognosis than those who did not experience extracapsular spread 40 (46.5%). The prognosis of patients with lymph node extracapsular spread was considerably worse than that of those without (Median OS (95% CI): 5 (3.0 to 10.0) vs. 175 (133.0 to 197.0), P<0.001). **(Fig.5B).**



(A)



(B)

Fig. 5. Kalpen Mayer survival analysis for (A) for patients who were margin-positive and margin-negative, (B) for patients with and those without lymph node extracapsular spread

The univariate logistic regression analysis showed that no radiotherapy, platinum resistance and ER were the only significant predictors for poor prognosis of HNSCC, while age, sex, BMI, smoking, area, T and N classification, P16, multiplicity cancer in other organs, margins and platinum sensitivity were insignificant predictors for poor prognosis of HNSCC.

The multivariate logistic regression analysis showed that no radiotherapy and ER were significant predictors for poor prognosis of HNSCC. (**Table.5).**

Table 5. Logistic regression analysis for prediction of poor prognosis

Variables	Univariate			Multivariate		
	OR	95% CI	P value	OR	95% CI	P value
Age (years)	1.0116	0.9806 to 1.0437	0.467	1.005	0.9722 to 1.0389	0.769
Sex	1.3634	0.6616 to 2.8097	0.401	1.2897	0.5971 to 2.7854	0.517
BMI (Kg/m^2)	1.0111	0.8818 to 1.1593	0.875	1.0348	0.8932 to 1.1989	0.648
Smoking	1.3380	0.6579 to 2.7213	0.421	1.3891	0.6500 to 2.9688	0.396
Area	0.9353	0.7883 to 1.1098	0.443	0.9399	0.7864 to 1.1233	0.496
T classification	0.8067	0.5839 to 1.1146	0.193	0.8041	0.5738 to 1.1269	0.206
N classification	0.7314	0.3667 to 1.4590	0.374	0.8256	0.3909 to 1.7436	0.615
P16	1.2031	0.6043 to 2.3955	0.598	1.0762	0.5227 to 2.2160	0.842
Multiplicity cancer in other organs	1.3993	0.6953 to 2.8163	0.3464	1.4295	0.6754 to 3.0256	0.350

Margins	1.0513	0.6780 to 1.6302	0.823	1.0416	0.6596 to 1.6449	0.861
No radiotherapy	7.1441	2.6889 to 18.981	**<0.001***	6.6179	2.255 to 19.4211	**0.001***
Platinum resistance	5.9687	2.6435 to 13.476	**<0.001***	1.0048	0.9709 to 1.0399	0.784
Platinum sensitivity	1.5565	0.7777 to 3.1151	0.211	1.9207	0.8862 to 4.1628	0.098
Early recurrence	2.1083	1.0470 to 4.2452	**0.037***	2.5521	1.1090 to 5.8729	**0.028***

BMI: body mass index, OR: odd ratio, *: statistically significant as p value <0.05, CI: confidence interval.

Discussion

The sixth most prevalent malignancy worldwide is HNSCC. Radical therapy is the preferred treatment for local HNSCCs that lack distant metastases. In accordance with the stage, this treatment could involve a combination of surgical therapy, radiotherapy/chemo radiotherapy, or both **(Mody et al., 2021)**. Conversely, due to the fact that LAHNSCCs constitute over 60% of local HNSCCs, nearly half of them recur, with the majority of them recurring within the first two years of treatment **(Borsetto et al., 2021; Lacas et al., 2021)**.

In HNSCC, an association between patient survival and recurrence timing is reported; however, insufficient investigations have been conducted. A platinum-sensitive cancer is defined as recurrence occurring after 6 months of platinum-based chemotherapy, while platinum-resistant cancer is defined as recurrence occurring within six months **(Weckx et al., 2019; Pujade-Lauraine et al., 2021)**. The concept of platinum resistance is shared by HNSCC and ovarian cancer **(Haddad et al., 2023)**. The prognosis for platinum-resistant HNSCC is unfavorable **(Sato et al., 2019)**.

Prognostic factors have been identified in patients who are undergoing treatment for recurrent oropharyngeal squamous cell carcinoma (OPSCC) in previous studies **(Ward et al., 2018; Rampinelli et al., 2023)**. It has been consistently acknowledged that both time to recurrence and comorbidity status are predictors of survival in this context **(Kao and Ooi, 2018)**.

In the present study, among the studied patients, 53 (40.77%) patients showed recurrence, there was an insignificant difference between ER group and LR group regarding the baseline characteristics (age, sex, BMI, smoking and area). There was an insignificant difference between ER group and LR group regarding the initial treatment.

To the best of our knowledge, there have been only a few studies that have examined the relationship between prognosis and recurrence after initial treatment, which includes all treatment modalities **(Lupato et al., 2022; Haring, 2023)**.

It is well established that short disease-free interval (DFI) is associated with poorer oncologic outcomes in recurrent HNSCC **(Heft Neal, 2020)**. **Haring et al. (2023)** demonstrated that short DFI is associated with higher likelihood of locoregional recurrence. Conversely, longer DFI is associated with greater likelihood of metachronous distant metastases. Whether short DFI reflects aggressive tumor biology or is a marker of microscopic residual disease following treatment, predisposing to locoregional recurrence, remains unclear.

In the present investigation, there was an insignificant difference between ER group and LR group regarding the postoperative pathological findings of the surgery group (margins and extracapsular spread).

Additionally, **Lupato et al. (2022)** performed a previous meta-analysis to assess the prognostic role of pre- and post-surgery factors in patients undergoing SS for recurrent head and neck cancer and showed that ER and regional recurrence double the risk of death.

Due to doubts concerning the concept of platinum resistance, we identified the recurrence within 6 months as ER, which is frequently employed in the treatment of head and neck cancer. We also looked at whether individuals who had a recurrence within 6 months of taking platinum were originally resistant to all treatments or just platinum. This was done to investigate the relationship between the interval to HNSCC recurrence and prognosis.

Liu et al. (2017) demonstrated that the negative factors associated with functional and oncologic improvement involved a shortened interval between radiation and salvage surgery, microscopic carotid artery invasion, and previous concurrent chemotherapy or targeted therapy. Regardless of the patient's prior treatment or recurrence status, these factors were comparable to those reported in prior studies on salvage surgery for recurrent HNSCC **(Li et al., 2013; Elbers et al., 2019; Gigot et al., 2022)**.

In the present investigation, the OS of the ER group was significantly lower than that of the LR group (P<0.001). In comparison to the platinum-sensitive group, the platinum-resistant group had a significantly less favourable prognosis (Median OS (95% CI): 5.0 (3.0 to 6.0) vs. 24 (15.0 to 25.0) respectively, P<0.001). The prognosis of the radiotherapy-resistant group was significantly less favourable than that of the radiotherapy-sensitive group (Median OS (95% CI): 3.0 (2.0 to 5.0) vs. 135 (25.0 to 178.0) respectively, P<0.001).

Patients with very ER, who experienced macroscopic tumor recurrences while awaiting radiotherapy, comprised approximately 20% of all patients who underwent chemo radiotherapy following surgery. These patients had a less favorable prognosis **(Lee et al., 2021)**. However, a precise mechanism for the bad prognosis of patients with ER has not been established. However, the identification of weak prognoses is still a possibility in certain genomic and proteomic analyses, which are currently in the research phase **(Salehi et al., 2022; Yasui et al., 2022)**. This is the reason why the selection and identification of patients with ER prior to treatment continue to be a challenge. Also, even when patients are identified, preventive measures are challenging to implement **(Matsuo, 2024)**.

Additionally, **Pitakpaiboonkul et al. (2024)** who analyzed non-curable recurrent/metastatic (R/M)-HNSCC patients to assess outcomes of early recurrent patients receiving 1L systemic treatment and assess time-to-recurrence intervals (TTRI) and recurrent patterns' impact on survival. Their study determined a significant difference in progression-free survival (PFS) and OS were observed among TTRI groups. R/M-HNSCC patient survival was significantly impacted by TTRI, although recurrence pattern was not. Patients with early recurrences benefited from systemic treatments, despite the poor prognosis.

In our study, univariate logistic regression analysis showed that no radiotherapy, platinum resistance and ER were the only significant predictors for poor prognosis of HNSCC. The multivariate logistic regression analysis showed that no radiotherapy and ER were the only significant predictors for poor prognosis of HNSCC.

Conforming to the present results, **Matsuo (2024)** performed retrospective study and aimed to determine the association between recurrence time and OS in patients with HNSCC. ER was characterized as the recurrence of the disease within 6 months of radical treatment, while LR was described as the recurrence of the disease after more than 6

months. In their multivariate analyses, they found that ER (HR=3.200, 95% CI=1.570-6.521, p=0.001) and the lack of radiation treatment (HR=0.374, 95%CI=0.191-0.733, p=0.004) were the independent risk factors for a bad outcome in LAHNSCC. No significant prognostic factors were identified for radiation sensitivity, platinum sensitivity, platinum resistance, and radiation resistance. Time of recurrence, initial treatment regimen, and approach for changing salvage therapy based on recurrence status should all be considered when choosing a treatment for patients with recurrent HNSCC.

In the current study, patients who had a margin-positive diagnosis had a significantly less favorable prognosis than those who had a margin-negative diagnosis. The prognosis of patients who were margin-positive was significantly less favorable than that of those who were margin-negative (P<0.001). Patients who experienced lymph node extracapsular spread had a significantly less favorable prognosis than those who did not experience extracapsular spread. The prognosis of patients with lymph node extracapsular spread was significantly less favorable than that of those without (P<0.001).

Furthermore, we demonstrated that the prognosis of all positive patients who underwent surgery was poor. Also, a significant number of patients who were margin-positive, which are regarded risk factors for a bad prognosis, received radiation treatment after surgery or chemo radiotherapy. This revealed that it is challenging to entirely eradicate the poor prognostic environment as a tumor factor, even when a multimodal treatment regimen that includes radiotherapy, surgery, and chemotherapy is implemented. In order to address this challenge, trials are presently in progress, involving the use of immune checkpoint inhibitors as preoperative immunotherapy and as maintenance therapy following chemo radiotherapy or surgery. These trials are being conducted as new strategies to enhance OS, and results are anticipated **(Pfister et al., 2020)**.

It is important to note that the treatment strategies for patients with small cell lung cancer vary depending on the duration to relapse. Two categories of patients are identified based on their sensitivity to relapse: one group responds well to first-line chemotherapy and experiences long intervals between relapses, and the other group experiences short intervals between relapses. The prognosis of patients with ER may be enhanced by employing comparable measures for HNSCC **(Horita et al., 2016; Wakuda, 2020)**.

Conclusion

The recurrence rate after various treatment modalities of patients with HNSCC was 40.8% and about 45% of the patients showed ER within 2 to 6 months. The ER was associated with worse OS than the LR. The platinum-resistant, radiotherapy-resistant, margin-positive, lymph node extracapsular spread were associated with worse outcome. No radiotherapy and ER were significant predictors for poor prognosis of HNSCC.

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