Research Article

Tumor characteristics and clinical outcomes in head and neck squamous cell carcinoma: a retrospective analysis of 40 patients in Baghdad, Iraq

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Abstract: Background: Head and neck squamous cell carcinoma (HNSCC) shows wide variation in clinical behavior and outcome, and regional risk factors contribute to that variation. Local clinicopathological data are therefore needed before management strategies can be matched to the population being served. Aims: To analyze tumor characteristics, staging patterns, treatment modalities, and survival outcomes in a cohort of HNSCC patients from Baghdad, Iraq. Methods: We conducted a retrospective analysis of 40 HNSCC patients diagnosed between 2018-2022. Comprehensive data collection included demographics, tumor characteristics, TNM staging (AJCC 8th ed.), histopathological features, treatment modalities, and survival outcomes. Statistical analysis was performed using Kaplan-Meier survival curves, logistic regression, and correlation analysis. Results: The mean patient age was 62.98 years (range: 43-85), with a male predominance (80%). Laryngeal tumors were most prevalent (42.5%). Patients typically presented with large tumors (mean size: 6.94 cm) and aggressive histopathological features, including high rates of lymphovascular invasion (77.5%) and perineural invasion (47.5%). Advanced disease (Stage IV) was present in 50% of cases at diagnosis. Combined multimodal therapy was the most common treatment approach (57.1%). Survival showed a strong negative correlation with tumor stage ($p < 0.0001$), with Stage IV patients having a median survival of 0.67 years compared to over 4 years for early-stage disease. Conclusion: HNSCC in this Baghdad-based series was usually diagnosed late and showed biologically aggressive features, with correspondingly poor survival. Stage at diagnosis was the dominant prognostic factor. Earlier detection and locally relevant public-health measures targeting the risk profile of the region are needed.

Keywords: Head and neck cancer, oral squamous cell carcinoma, TNM staging, survival.

Introduction

Head and neck squamous cell carcinoma (HNSCC) refers to a diverse group of cancers that develop in the mucosal linings of the upper aerodigestive tract [1]. Even with recent therapeutic improvements, the global five-year survival rate has plateaued around 50-60%. This stagnation reflects the persistent difficulty of treating the disease [2,3]. Prognosis in HNSCC is determined by a combination of factors. Tumor size, anatomical subsite, depth of invasion, and histological grade each carry prognostic weight, as does the status of the regional lymph nodes. The composite AJCC stage integrates these variables and remains the principal reference for estimating outcome [4].

These prognostic markers are applied internationally, yet the epidemiology and clinical behavior of HNSCC vary considerably between regions [5]. In the Middle East, habits such as waterpipe (shisha) smoking and smokeless tobacco (shammah) use, together with local environmental exposures, may modify tumor biology [6,7]. Detailed clinicopathological reports from Iraq are nonetheless scarce in the international literature. This limits any assessment of local disease patterns and constrains region-specific decisions on screening priorities and treatment. The present study was undertaken to address that gap, examining the tumor character-

istics, stage distribution, treatment, and survival of an HNSCC cohort managed in Baghdad. We hypothesized that our patient cohort would show more advanced stages of the disease at presentation than what is typically seen in high-income nations.

Materials and methods

Study Design and Population

We conducted a retrospective review of 40 patients who received a primary diagnosis of HNSCC between January 2018 and December 2022. We sourced these cases from two locations: the Oral Histopathology Laboratory at the University of Baghdad's College of Dentistry, and the Gazi Alharri Hospital Histopathology Laboratory. To be included, patients needed a confirmed primary HNSCC diagnosis, no prior treatments (treatment-naïve), and full clinical records. We excluded cases with recurrent tumors, missing documentation, or tissue samples that were inadequate for analysis.

Data Collection Methods

Clinicopathological variables retrieved from the records included age, gender, primary tumor site, and documented risk factors. Tumor-related parameters were maximum dimension, depth of invasion, and WHO histological grade. Lymphovascular invasion (LVI) and perineural invasion (PNI) were recorded when reported. Disease extent was classified according to the AJCC TNM staging manual, 8th edition. Treatment modality and survival duration were obtained from the follow-up records.

Histopathological Assessment Procedures

All specimens were assessed by oral pathologists and graded according to WHO criteria, from well-differentiated (Grade 1) to undifferentiated (Grade 4). A second pathologist independently reviewed 25% of the cases. Inter-observer agreement was satisfactory.

Statistical Analysis Approach

Analyses were performed in IBM SPSS Statistics, version 26. Normality was tested with the Shapiro–Wilk test, and non-parametric methods were used where the assumption was not met. Descriptive statistics were generated for all variables. Survival was estimated by the Kaplan–Meier method and compared across stages with the log-rank test. Associations were examined using Spearman rank correlation, and binary logistic regression was used to model predictors of survival. Significance was set at $p < 0.05$.

Results

Patient Demographics and Clinical Presentation

Demographic and clinical characteristics are presented in Table 1. Mean age at diagnosis was 62.98 ± 10.39 years, and 80.0% of patients were male. The larynx was the most frequent primary site (42.5%), followed by the oral tongue (17.5%). Tobacco smoking was the commonest risk factor, documented in 75.0% of cases.

Tumor Characteristics and TNM Staging

Tumor and staging data are shown in Table 2. The mean maximum tumor dimension was 6.94 cm, indicating a high tumor burden at presentation. Lymphovascular invasion was identified in 77.5% of cases and perineural invasion in 47.5%. Grade 2 (moderately differentiated) tumors predominated, accounting for 52.5%.

The T-stage distribution was weighted towards advanced disease, with T4a the single most common category (42.5%). Most patients had no clinical nodal involvement (N0, 60.0%); however, distant metastasis (M1) was already present in 30.0% at the time of diagnosis.

Table 1: Summary of Patient Demographics and Clinical Characteristics (N=40).

Characteristic	*Value*
Age (Years)	
Mean ± SD	*62.98 ± 10.39*
Range	*43 – 85*
Gender	
Male	*32 (80.0%)*
Female	*8 (20.0%)*
Primary Tumor Site	
Larynx	*17 (42.5%)*
Oral Tongue	*7 (17.5%)*
Buccal Mucosa	*5 (12.5%)*
Floor of Mouth	*4 (10.0%)*
Oropharynx	*3 (7.5%)*
Other	*4 (10.0%)*
Risk Factors	
Tobacco Smoking	*30 (75.0%)*
Alcohol Use	*8 (20.0%)*
Both	*6 (15.0%)*
None Identified	*5 (12.5%)*

Table 2: Tumor and Staging Characteristics (N=40).

Parameter	*Category*	*Count (%)*
Tumor Size (cm)	*Mean ± SD*	*6.94 ± 4.77*
Tumor Depth (cm)	*Mean ± SD*	*0.92 ± 0.40*
Histological Grade	*Grade 1*	*11 (27.5%)*
	Grade 2	*21 (52.5%)*
	Grade 3	*5 (12.5%)*
	Grade 4	*3 (7.5%)*
Lymphovascular Invasion	*Present*	*31 (77.5%)*
Perineural Invasion	*Present*	*19 (47.5%)*
T-Stage	*T1*	*7 (17.5%)*
	T2	*8 (20.0%)*
	T3	*8 (20.0%)*
	T4a	*17 (42.5%)*
N-Stage	*N0*	*24 (60.0%)*
	N1	*8 (20.0%)*
	N2	*4 (10.0%)*
	N3	*1 (2.5%)*
	Nx	*3 (7.5%)*
M-Stage	*M0*	*24 (60.0%)*
	M1	*12 (30.0%)*
	Mx	*4 (10.0%)*
Overall Stage	*I*	*7 (17.5%)*
	II	*6 (15.0%)*
	III	*7 (17.5%)*
	IV	*20 (50.0%)*

Treatment Modalities

Among the 35 patients with complete treatment data, a combined multimodal approach (surgery, chemotherapy, and radiotherapy) was the most common strategy, utilized in 57.1% of cases, primarily for advanced-stage disease. Surgery alone was reserved for early-stage disease (20.0%).

Survival Analysis and Prognostic FactorsKaplan–Meier analysis showed a significant difference in survival across tumor stages (log-rank $p < 0.0001$). Survival correlated inversely with advancing stage (Spearman $rs = -0.629$, $p < 0.001$).

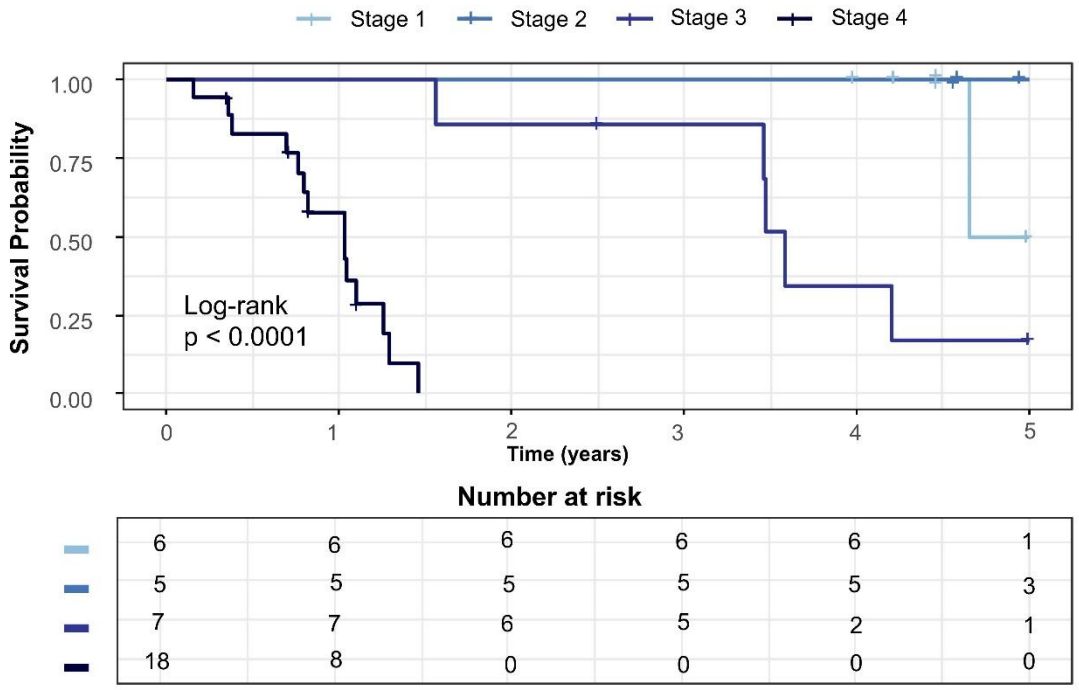

Figure 1: Kaplan-Meier survival curves demonstrating overall survival stratified by AJCC 8th Edition stage (I, II, III, IV).

Median survival was not reached for Stage I and II patients, whose survival exceeded 4 years, and was approximately 3.5 years for Stage III. In Stage IV, median survival fell to 0.67 years (95% CI 0.53–0.81), reflecting the steep decline in the survival curve evident within the first year of follow-up (Figure 1). The separation between the early- and late-stage curves was apparent throughout the observation period. Binary logistic regression confirmed this relationship, indicating that each one-stage increment reduced the odds of survival by 54.8% (OR = 0.452, $p = 0.022$).

Discussion

This study describes the clinicopathological pattern of HNSCC in a cohort from Baghdad. A central observation was that half the cohort (50%) presented with Stage IV disease, often with aggressive histological features. This proportion is higher than that reported from many high-income countries, where greater public awareness and readier access to care support earlier diagnosis [8,9]. It is, however, consistent with figures from other low- and middle-income settings. The pattern points to a systemic problem in which presentation is delayed by financial barriers, limited health literacy, and restricted access to specialized care [10,11]. A previous Iraqi report is relevant here: it found gaps in oral cancer awareness even among general dental practitioners, a factor likely to contribute to diagnostic delay [12].

The aggressive biological nature of the tumors in our cohort is evidenced by the large mean tumor size (6.94 cm) and the high prevalence of LVI (77.5%) and PNI (47.5%). These features are established independent poor prognostic indicators associated with increased risk of nodal metastasis and treatment failure [13,14]. The significance of PNI, in particular, has been noted in other regional studies of head and neck malignancies, and its underlying molecular mechanisms in OSCC are an active area of investigation [15,16].The high rates observed here may reflect the advanced T-stage at presentation but could also be influenced by regional risk factors. Chronic exposure to carcinogens from waterpipe smoking, which is prevalent in the Middle East, has

been linked to distinct molecular pathways and more aggressive tumor phenotypes [7,17]. Further investigation into the molecular profile of these tumors is warranted.

The survival analysis is consistent with the established prognostic role of TNM stage in HNSCC [4,18]. Median survival fell from more than 4 years in early-stage disease to approximately 8 months in Stage IV. Stage at diagnosis was therefore the strongest determinant of outcome in this cohort, which supports the case for regional down-staging programs aimed at earlier detection. The associated reduction in the odds of survival of 54.8% per stage increment provides a quantitative measure that may be useful in patient counseling and in arguments for routine screening.

Multimodal treatment was used in most patients (57.1%), in keeping with international guidelines for advanced HNSCC [19,20]. Despite this, median survival in Stage IV was only 0.67 years, which indicates that conventional intensive therapy has limited value once disease is highly advanced or metastatic. Improving these outcomes will require access to newer options. Immunotherapy and targeted agents have shown benefit in comparable patient groups elsewhere [21,22,23], and expanding their availability, together with participation in clinical trials, should be a regional priority.

Efforts should focus on public education about HNSCC risk factors and early symptoms, the development of structured early-detection and screening pathways, and improved access to timely multidisciplinary care. Expanding access to immunotherapy and targeted treatment, and supporting enrollment in clinical trials, would further strengthen the management of advanced disease in the region.

Conclusion

In this Baghdad-based cohort, HNSCC was characterized by late-stage presentation and biologically aggressive features, including large tumor size and high rates of lymphovascular and perineural invasion. Half of the patients had reached Stage IV by the time of diagnosis, and survival declined markedly with advancing stage. Among the factors examined, stage at diagnosis was the strongest determinant of outcome. These results reflect a pattern of delayed presentation comparable to that reported from other low- and middle-income settings, and indicate that outcomes in this population are constrained primarily by the stage at which disease is detected.

Conflict of interest

The authors have no conflicts of interest to declare.

Author contributions

Conceptualization, O.S.M. and B.H.A.; Methodology, O.S.M. and B.H.A.; Formal Analysis, B.H.A.; Investigation, O.S.M. and B.H.A.; Data Curation, B.H.A.; Writing—Original Draft Preparation, O.S.M. and B.H.A.; Writing—Review and Editing, B.H.A.; Supervision, B.H.A. All authors have read and agreed to the published version of the manuscript.

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دراسة بأثر رجعي للخصائص الورمية ونتائجها السريرية في سرطان الخلايا الحرشفية للرأس والعنق لدى 40 مريضاً في بغداد

عمر شبلي مسعدي، بشار حامد عبدالله، بشير سلمان

المستخلص:

يُظهر سرطان الخلايا الحرشفية في الرأس والعنق (HNSCC) تبايناً كبيراً في مظاهره السريرية ونتائجه، والتي تتأثر جزئياً بعوامل الخطر الإقليمية. إن فهم الخصائص الورمية المحلية وعلاقتها بمعدلات البقاء على قيد الحياة أمر ضروري للوصول إلى الرعاية المثلى لمجموعات سكانية محددة. يهدف البحث الى تحليل خصائص الورم، وأنماط تحديد المراحل، والأساليب العلاجية المتبعة، ونتائج البقاء على قيد الحياة لدى مجموعة من مرضى سرطان الخلايا الحرشفية في الرأس والعنق في بغداد، أجرينا تحليلاً استعادياً لـ 40 مريضاً تم تشخيصهم بسرطان الخلايا الحرشفية في الرأس والعنق بين عامي 2018-2022. شمل جمع البيانات الشامل المعلومات الديموغرافية، وخصائص الورم، وتصنيف مراحله (TNM) وفقاً للإصدار الثامن للجنة الأمريكية المشتركة للسرطان (AJCC)، والسمات النسيجية المرضية، والأساليب العلاجية، ونتائج البقاء على قيد الحياة. تم إجراء التحليل الإحصائي باستخدام منحنيات كابلان-ماير للبقاء، والانحدار اللوجستي، وتحليل الارتباط.النتائج :بلغ متوسط عمر المرضى 62.98 عاماً (المدى: 43-85)، مع هيمنة الذكور بنسبة (80%). كانت أورام الحنجرة هي الأكثر انتشاراً (42.5%). راجع المرضى عادةً بأورام كبيرة الحجم (متوسط الحجم: 6.94 سم) وسمات نسيجية مرضية عدوانية، بما في ذلك معدلات عالية من الغزو اللمفاوي الوعائي (77.5%) والغزو حول العصبي (47.5%). كان المرض في مرحلة متقدمة (المرحلة الرابعة) موجوداً لدى 50% من الحالات عند التشخيص. كان العلاج متعدد الوسائط المشترك هو النهج العلاجي الأكثر شيوعاً (57.1%). أظهرت معدلات البقاء ارتباطاً سلبياً قوياً مع مرحلة الورم ($p < 0.0001$) ، حيث بلغ متوسط البقاء على قيد الحياة لمرضى المرحلة الرابعة 0.67 عاماً مقارنة بأكثر من 4 أعوام للمرضى في المراحل المبكرة.الاستنتاجات :في هذه المجموعة العراقية من المرضى، يراجع مرضى سرطان الخلايا الحرشفية في الرأس والعنق غالباً في مراحل متقدمة من المرض وبخصائص ورمية عدوانية، مما يؤدي إلى معدلات بقاء إجمالية منخفضة. تظل مرحلة الورم هي أقوى مؤشر للتنبؤ بالنتائج، مما يسلط الضوء على الأهمية الحاسمة لمبادرات الكشف المبكر واستراتيجيات الصحة العامة المصممة خصيصاً لتناسب عوامل الخطر الإقليمية.