RESEARCH PAPER

Does clinical tumor size concordance with pathological tumor size in oral squamous carcinoma or not ? A retrospective study.

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ABSTRACT

Background

Oral squamous cell carcinoma (OSCC) is the most common malignant neoplasm of the oral cavity and is frequently diagnosed at advanced stages (T3/T4) in developing countries. Accurate tumor staging is essential for prognosis and treatment planning. However, discrepancies between clinical tumor staging (cT) and pathological tumor staging (pT) are commonly observed. The present study aimed to evaluate the concordance between clinical and pathological tumor size categorization according to TNM staging in patients with OSCC.

Materials and Methods

This retrospective study included 40 histopathologically confirmed OSCC patients treated at the Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospital. Clinical data including age, gender, medical history, social history, lymph node status, and TNM staging were collected from hospital records. Clinical tumor staging was assessed preoperatively using physical examination and Pathological staging was performed after surgical excision according to the seventh edition of the Tumor–Node–Metastasis (TNM) classification. Statistical analysis was performed using SPSS version 23 software. Chi-square test and Mann–Whitney U test were used for analysis, and $p < 0.05$ was considered statistically significant.

Results

Among the 40 patients included in the study, 34 were males with a mean age of 52.50 ± 10.53 years, while 6 were females with a mean age of 57.16 ± 9.24 years. Concordance rates between clinical and pathological staging were 50% for T1, 10% for T2, 0% for T3, 58.82% for T4a, and 33.33% for T4b lesions. Overall concordance between clinical and pathological staging was 37.5%. The discrepancy between clinical and pathological staging was statistically significant ($p = 0.01$).

Conclusion

This study demonstrated significant discrepancies between clinical and pathological tumor staging in OSCC patients, particularly in intermediate-stage tumors such as T2 and T3 lesions. These findings emphasize the limitations of routine clinical staging and highlight the importance of pathological evaluation for accurate tumor assessment, treatment planning, and prognosis. Improved diagnostic approaches and advanced imaging modalities may help reduce staging discrepancies and improve patient outcomes.

Keywords: OSCC, TNM staging, oral cancer, clinical staging, pathological staging, tumor size, retrospective study.
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INTRODUCTION

Oral squamous cell carcinoma (OSCC) is the most common malignant tumor affecting the oral cavity and accounts for the majority of oral cancer cases worldwide. Despite advances in diagnostic and treatment modalities, OSCC remains a major public health concern, particularly in developing countries where patients often present at advanced stages (T3/T4). Delayed diagnosis and challenges in accurate staging contribute significantly to poor prognosis and increased mortality rates [1]. OSCC is strongly associated with risk factors such as tobacco use, alcohol consumption, betel quid chewing, and human papillomavirus (HPV) infection. Advanced-stage OSCC is characterized by increased tumor size, local tissue infiltration, and a higher risk of regional lymph node metastasis, resulting in poor treatment outcomes [2].

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The anatomical location of the primary tumor plays an important role in disease progression because adjacent tissues may serve as pathways for direct invasion into muscles, bones, and neurovascular structures [3]. Accurate staging of OSCC is therefore essential for prognosis and treatment planning. The Tumor–Node–Metastasis (TNM) classification system remains the most widely used staging method for evaluating tumor extent, lymph node involvement, and distant metastasis. Among these parameters, lymph node metastasis is considered one of the strongest predictors of poor survival in OSCC patients [4].

Clinical tumor staging (cT) is based on physical examination, whereas pathological tumor staging (pT) is determined following surgical excision and histopathological analysis. However, discrepancies between clinical and pathological staging are commonly observed and may lead to inappropriate treatment planning [4,5]. Overestimation of tumor size may result in overtreatment and unnecessary morbidity, whereas underestimation may lead to inadequate treatment and poor prognosis. Intermediate-stage tumors, particularly T2 and T3 lesions, often demonstrate significant discordance between clinical and pathological evaluations [6].

Therefore, understanding the relationship between clinical and pathological tumor staging is essential for improving preoperative assessment and treatment strategies in OSCC patients. The present study aimed to compare clinical and pathological T staging in surgically treated OSCC patients and evaluate the concordance between the two methods.

KEY WORDS: OSCC, TNM staging, tumor, clinical, pathological, T3/T4, lymph node.

MATERIALS AND METHODS

Study Design

A retrospective study was conducted among patients diagnosed with OSCC at the Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospital, Chennai.

Sample Size

A total of 40 patients were included in the study, comprising 34 males and 6 females.

Inclusion Criteria

1. Histopathologically confirmed OSCC patients irrespective of tumor size
2. Patients who underwent definitive surgical treatment.
3. Availability of complete clinical and pathological records.

Exclusion Criteria

1. Patients with incomplete records.
2. Patients who received neoadjuvant therapy.

Clinical Tumor Staging

Clinical tumor size was assessed preoperatively using physical examination.

Pathological Tumor Staging

Pathological tumor size was determined from surgically excised specimens by histopathological examination using calipers for accurate measurement.

Statistical Analysis

Data analysis was performed using SPSS version 23. The Mann–Whitney U test was used to compare age distribution between genders. Chi-square test was used to evaluate concordance between clinical and pathological staging. A p-value < 0.05 was considered statistically significant.

RESULT

Table 1: Distribution of Study Subjects According to Age and Gender

Variable	Gender	N	Mean	Std. Deviation	Mann whitney U test	P value
Age	Male	34	52.50	10.53	71.00	0.23
	Female	6	57.16	9.24		

Table 1 Among the 40 study subjects, 34 were males with a mean age of 52.50 ± 10.53 years, while 6 were females with a mean age of 57.16 ± 9.24 years. The Mann–Whitney U test value was 71.00 with a p-value of 0.23, indicating no statistically significant difference in age distribution between male and female patients.

TABLE:2 Comparison of Clinical T and Pathological T stage

Clinical T	Pathological T							
	T1	T2	T3	T4a	T4b	Total	Accordance ratio	Accordance rate
T1	3	3	0	0	0	6	3/6	50
T2	0	1	2	2	5	10	1/10	10
T3	1	1	0	2	0	4	0/4	0
T4a	1	5	0	10	1	17	10/17	58.82
T4b	0	1	0	1	1	3	1/3	33.33
Total	5	11	2	15	7	40	15/40	37.5
Chi-square test value	0.008							
P value	0.01*							

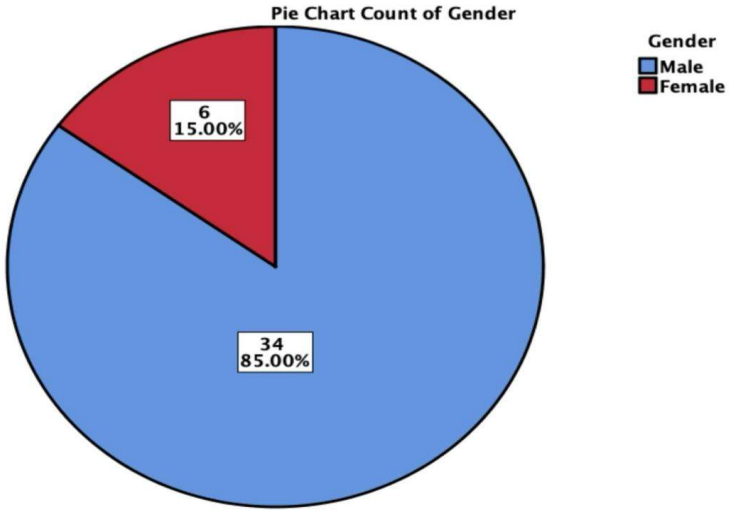
Comparison between clinical and pathological tumor staging demonstrated varying levels of concordance. Among the six patients clinically diagnosed as T1, three patients were confirmed pathologically, resulting in a concordance rate of 50%. Among T2 lesions, only one out of ten patients demonstrated matching pathological staging, resulting in a concordance rate of 10%. No concordance was observed among T3 lesions.

The T4a group demonstrated the highest concordance rate, with 10 out of 17 patients (58.82%) showing agreement between clinical and pathological staging. In the T4b group, one out of three patients demonstrated concordance, resulting in a concordance rate of 33.33%. Overall, 15 out of 40 patients (37.5%) demonstrated agreement between clinical and pathological staging.

The chi-square test demonstrated a statistically significant difference between clinical and pathological staging ($p = 0.01$), highlighting the limitations of clinical staging in accurately determining tumor extent.

Figure 1: Distribution of Study Subjects According to Gender

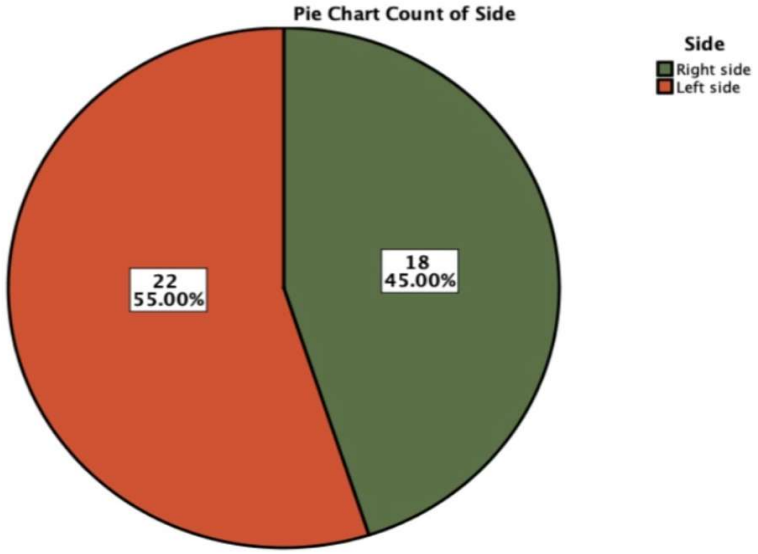
Figure 1 presents the distribution of the study subjects based on their gender using a pie chart.



The study population is predominantly male, with 85% of the subjects being male and only 15% being female. This significant gender disparity suggests that the study's findings may be more representative of the male population. Future research should aim for a more balanced gender distribution to ensure the results are generalizable to the broader population.

Figure 2: Distribution of Study Subjects According to Side

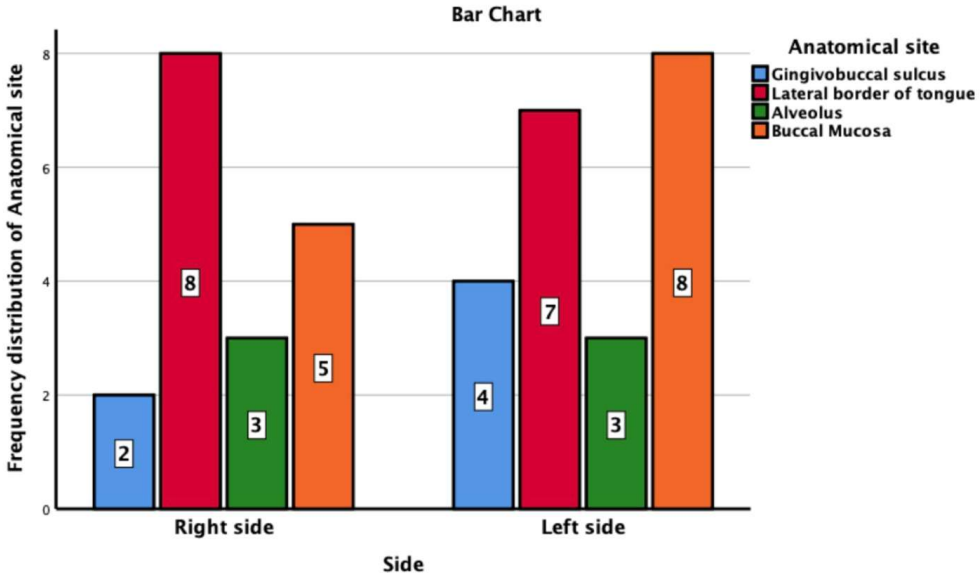
Figure 2 shows the distribution of the tumors on the right and left sides of the body using a pie chart.



The distribution of tumors is relatively balanced between the right and left sides, with 55% of tumors occurring on the right side and 45% on the left side. This suggests that there is no strong predilection for tumor occurrence on either side of the body.

Figure 3: Frequency Distribution of Anatomical Site Based on Right and Left Side

Figure 3 illustrates the frequency distribution of tumors at different anatomical sites, comparing the right and left sides, using a bar chart.



The frequency distribution of tumors across different anatomical sites varies slightly between the right and left sides. The gingivobuccal sulcus and lateral border of the tongue demonstrated slightly higher tumor occurrence on the left side, whereas alveolar and buccal mucosal lesions showed relatively balanced distribution.

These results underscore the limitations of clinical staging and emphasize the importance of pathological evaluation in ensuring accurate cancer staging and treatment planning. The significant difference between clinical and pathological stages, as indicated by the chi-square test and p-value, highlights the need for improved diagnostic techniques to enhance the accuracy of pre-treatment assessments.

DISCUSSION

The present study demonstrated significant discrepancies between clinical and pathological tumor staging in OSCC patients, particularly among intermediate-stage tumors such as T2 and T3 lesions. Similar findings have been reported in previous studies, highlighting the limitations of clinical staging in accurately assessing tumor extent [8]. Clinical examination alone may fail to detect microscopic invasion and infiltration into adjacent tissues, thereby contributing to staging inaccuracies.

Tumor size assessment is an important parameter in TNM staging and treatment planning. Previous studies have demonstrated varying levels of agreement between clinical and pathological staging [9]. In the present study, T1 and T4a lesions demonstrated relatively higher concordance rates, whereas T2 and T3 lesions showed poor agreement. These findings suggest that intermediate-stage tumors are more difficult to assess clinically due to ill-defined tumor margins and variations in tumor infiltration.

Advanced imaging modalities such as MRI and CT scans may improve the accuracy of tumor assessment; however, discrepancies still exist [10–12]. Previous studies evaluating MRI and pathological tumor measurements have reported both underestimation and overestimation of tumor size [13,14]. The integration of advanced imaging techniques, molecular markers, and artificial intelligence-based diagnostic tools may further improve staging accuracy and treatment planning in OSCC patients [15].

The findings of the present study emphasize the importance of pathological evaluation as the gold standard for definitive tumor staging. Improved clinical assessment strategies and advanced diagnostic techniques are necessary to reduce discrepancies between clinical and pathological staging and thereby improve patient management and prognosis.

Limitations of the Study

The limitations of the present study include a relatively small sample size, retrospective study design, and single-center data collection, which may limit the generalizability of the findings. Further multicenter studies with larger sample sizes are recommended to validate these findings.

CONCLUSION

This study demonstrated a significant discrepancy between clinical and pathological tumor staging in patients with oral squamous cell carcinoma (OSCC), particularly in intermediate-stage tumors such as T2 and T3, which showed poor concordance rates. In contrast, T1 and T4a tumors demonstrated relatively better agreement between clinical and pathological assessments. These findings highlight the limitations of routine clinical examination and imaging techniques in accurately determining the true extent of tumor involvement. Accurate staging is essential for appropriate treatment planning, prognosis evaluation, and overall patient management, as discrepancies may lead to under-treatment or over-treatment. Therefore, pathological evaluation remains the gold standard for definitive tumor staging. The use of improved diagnostic methods and advanced imaging modalities may help reduce staging discrepancies and enhance the accuracy of preoperative assessment, ultimately improving treatment outcomes and quality of care in OSCC patients.

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None

Conflict of interest

The authors would like to declare no conflict of interest in the present study.

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