



Strategies for Patients with Newly Diagnosed Oral Squamous Cell Carcinoma and A Positive Chest CT

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A B S T R A C T

Background: Head and neck squamous cell carcinoma (HNSCC) demands meticulous diagnostic strategies for precise staging, with the “Dutch Cooperative Head and Neck Oncology Group” guidelines guiding the selection of imaging modalities. Notably, patients with specific characteristics, such as three or more than three, 'bilateral', 'low jugular', or 'N3-neck lymph node' metastases, necessitate chest computed tomography (CT) for identifying those at the highest risk for distant metastasis.

Objective: The primary objective is to assess the value of routine chest CT scans in oral cavity SCC that has recently been discovered, regardless of the stage of tumor. Specific goals include exploring the frequency of positive findings, understanding their impact on treatment plans, evaluating potential treatment delays, and conducting a cost-effectiveness analysis.

Methodology: A retrospective study was conducted on a cohort of 115 patients at Khyber Teaching Hospital from time duration of January 2020 to January 2021. All diagnosed cases of Oral Squamous Cell Carcinoma (OSCC) were included. All patients underwent both head and neck CT scans and chest CT scans. The study aimed to identify abnormalities on chest CT, analyze their influence on treatment decisions, assess treatment delays, and calculate the cost-effectiveness of this diagnostic approach.

Results: Among the 115 patients, chest abnormalities were observed in 30% of cases, with malignancy confirmed in 15%. The oral malignancy stage had no impact on metastases or primary tumors in the lungs. The amount of time that passed between the first consultation and the start of treatment did not considerably increase with additional diagnostic procedures. Each lung cancer that was discovered incurred a screening fee of 24,86 rupees.

Conclusion: This study advocates for the routine use of chest CT in the diagnostic workup for all individuals with recently diagnosed SCC of the mouth, regardless of tumor stage. The findings underscore the clinical significance of chest imaging, offering insights into its frequency, impact on treatment planning, and cost-effectiveness. Integrating chest CT into standard protocols for this patient cohort is crucial for enhancing diagnostic precision and optimizing treatment strategies.

Keywords: OSCC; CT Scans; Carcinoma

Introduction

In the meticulous landscape of diagnosing head and neck squamous cell carcinoma (HNSCC), the intricacies of tumor staging demand an adept selection of imaging modalities.¹ Guided by the criteria outlined by the “Dutch Cooperative Head and Neck Oncology Group”, patients with specific characteristics, such as three or more than three, “bilateral, low jugular”, or “N3-neck lymph node metastases”, necessitates a chest computed tomogram (CT) to identify those at the highest risk for distant metas-tasis.² While conventional practice dictates a chest X-ray for other patients, the preferred standard remains a CT scan, emphasizing the imperative for precise diagnostic imaging strategies.³

Crucially, patients diagnosed with squamous cell carcinoma (SCC) of the oral cavity stand at the nexus of particular attention, given the shared etiological underpinnings with lung carcinoma.⁴ Recognizing the potential concurrence of lung carcinoma in this cohort, the incidence of second primary tumors and intrapulmonary metastasis exhibits notable variability, ranging from 3% to 19%.⁵ The intricacies of this variability, influenced by factors such as tumor size, location within the upper aerodigestive tract, and the presence of locally advanced or recurrent tumors, form the foundation for risk assessment delineated in current guidelines.⁶

While existing Dutch guidelines eschew a universal recommendation for 'a diagnostic search for synchronous second' tumors in all 'HNSCC' patients, the profound implications of a second primary pulmonary tumor on treatment choices and planning necessitate a closer examination⁷. Consequently, a comprehensive investigation into the value of a chest CT in recently diagnosed SCC of the oral cavity, regardless of tumor stage, has been initiated.⁸ This ambitious study draws data from a meticulously selected cohort routinely subjected to both head and neck CT scans and chest CT scans.

The overarching objectives of this research extend beyond mere identification of abnormalities; it seeks to unravel the intricate interplay between chest CT findings and subsequent patient treatment dynamics. This includes exploring the frequency of positive findings on chest CT scans, understanding their impact on treatment plans through additional diagnostic procedures, and evaluating potential treatment delays. Furthermore, the study undertakes a critical analysis of the cost-effectiveness of adopting this diagnostic imaging approach for pulmonary tumors within this specific patient group.

By exploring these important aspects, the research aspires to offer subtle revelations that could refine the existing diagnostic paradigms, ultimately enhancing the comprehensive management of SCC of the oral cavity. In the subsequent sections, the methodologies employed in this study will be expounded upon, offering a roadmap for

understanding the meticulous design and execution of this investigation. The aim of this study is to assess the value of routine chest CT scans in newly diagnosed squamous cell carcinoma (SCC) of the oral cavity, exploring their frequency of positive findings, impact on treatment planning, and cost-effectiveness.

Objective

The primary objective is to assess the value of routine chest CT scans in oral cavity SCC that has recently been discovered, regardless of the stage of tumor. Specific goals include exploring the frequency of positive findings, understanding their impact on treatment plans, evaluating potential treatment delays, and conducting a cost-effectiveness analysis.

Methodology

This retrospective study analyzed data from a cohort of 115 patients with a diagnosis of oral squamous cell carcinoma (OSCC). The study was conducted in Khyber Teaching Hospital between time duration of January 2020 and January 2021.

All Patients with newly diagnosed OSCC who underwent both head and neck computed tomography (CT) scans and chest CT scans as part of 'routine diagnostic workup' were included in the study whereas Patients with a history of prior head and neck cancer, those with contraindications to 'CT scans', or incomplete medical records were excluded from the study.

Patient records, radiological reports, and pathology results was reviewed to extract relevant information. Variables of interest include patient demographics, tumor characteristics, chest CT findings, pathological confirmation of pulmonary abnormalities, treatment plans, and time intervals between diagnostic procedures and treatment initiation.

The primary outcome measures include the frequency of positive findings on chest CT scans, the influence of these findings on treatment planning (such as the need for additional diagnostic procedures and treatment delays), and the cost-effectiveness of the diagnostic imaging approach.

Descriptive statistics was employed to characterize the study population and summarize key variables. Frequency distributions were used to analyze the prevalence of positive chest CT findings. Correlation analyses assessed the relationship between chest CT findings and subsequent treatment modifications. Cost-effectiveness analysis involves calculating direct costs associated with chest CT scans and potential cost savings resulting from early detection or avoidance of unnecessary procedures.

This study adheres to ethical guidelines and principles,

Table 1. Demographic Characteristics of The Study Population

Demographic Characteristic	Total Patients (n=115)
Age (years)	55.3 ± 8.7
Gender	
Male	60
Female	55
Socioeconomic Status	
Low	40
Moderate	50
High	25

ensuring patient confidentiality and anonymity during data analysis and reporting. Institutional review board (IRB) approval was obtained before the commencement of data collection.

Statistical analyses will be performed using SPSS 25. Significance levels will be set at $p < 0.05$, and confidence intervals will be determined to quantify the precision of estimates.

Results

The study included a total of 115 patients diagnosed with oral squamous cell carcinoma (OSCC) between January 2020 to January 2021. The patient population exhibited a diverse demographic profile, including variations in age, gender, and socioeconomic status. The mean age of the patients was 55.3 years, with a standard deviation of 8.7. The gender distribution comprised 60 males and 55 females. Socioeconomic status varied, with 40 patients classified as low, 50 as moderate, and 25 as high (Table 1). Among the 115 patients, routine chest CT scans revealed positive findings in 25% of cases. The positive findings included a spectrum of abnormalities, with benign lesions

identified in 10 cases and malignant tumors in 19 cases (Table 2).

Analysis of the data indicated that positive findings on chest CT scans had a notable impact on treatment planning in 18% of cases. Additional diagnostic procedures, such as biopsies and further imaging studies, were performed in response to chest CT findings. Treatment delays occurred in 10% of cases due to the need for comprehensive evaluation and adjustment of treatment strategies (Table 3).

The cost-effectiveness analysis demonstrated that the diagnostic imaging approach, including routine chest CT scans, incurred an additional cost of 2486 rupees per observed pulmonary abnormality. The potential cost savings resulting from early detection or avoidance of unnecessary procedures were estimated to be 15% of the total cost of diagnostic workup (Table 4).

Correlation analyses revealed a statistically significant association between positive chest CT findings and subsequent treatment modifications ($p < 0.05$). Patients with pulmonary abnormalities identified through chest CT scans were more likely to undergo alterations in their treatment plans (Table 5).

Table 2. Frequency of Positive Findings on Chest CT

Positive Findings	Number of Cases
Total Patients with Positives Chest CT	29
Types of Positive Findings	
Benign Lesions	10
Malignant Tumors	19

Table 3. Influence on Treatment Planning

Treatment Impact	Number of Cases
Total Patients with Treatment Impact	21
Types of Treatment Modifications	
Additional Diagnostic Procedures	12
Treatment Delays	9

Discussion

The current study, investigating the utility of routine chest computed tomography (CT) scans in the diagnostic workup for squamous cell carcinoma (SCC) of the oral cavity, aligns with and contributes to a growing body of literature. Several studies have delved into the intricacies of imaging modalities, their impact on treatment decisions, and the broader implications for patient management.

Our study's finding of a mean age of 55.3 years aligns with several previous investigations examining the demographic profile of OSCC patients. Studies by Chung EJ et al. (2020) and Chen Z et al. (2023) also reported mean ages in a similar range, indicating consistency in the age distribution of OSCC cohorts across different populations and settings.⁹⁻¹⁰ In contrast to our findings, some investigations have reported slightly higher or lower mean ages among OSCC patients. A study by Mneimneh WS et al. (2021) found a slightly lower mean age, while another study by Chen S et al. (2020) reported a slightly higher mean age. These variations may be influenced by differences in study populations, geographical locations, and inclusion criteria.¹¹⁻¹²

The near-equal gender distribution observed in our study (60 males and 55 females) is consistent with findings from studies by Ferndale L et al. (2020) and Faisal M et al. (2021).¹³⁻¹⁴ These studies similarly reported relatively balanced gender distributions among OSCC patients, suggesting that the gender composition of OSCC cohorts may be more evenly distributed than previously thought. Other studies have reported different gender disparities in

OSCC cohorts. For instance, research by Khan AS et al. (2022) observed a higher proportion of male patients, whereas a study by Capote-Moreno A et al. reported a higher proportion of female patients. These discrepancies highlight the variability in gender distribution across different populations and underscore the need for further investigation into potential contributing factors.¹⁵⁻¹⁶

Our study's detection rate of pulmonary abnormalities aligns with several previous investigations examining the utility of chest CT scans in OSCC staging. Studies by Sekikawa S et al. (2020) and Tomioka H et al. (2021) reported pulmonary metastases in OSCC patients undergoing chest imaging, emphasizing the consistency of findings across different cohorts.¹⁷⁻¹⁸ The impact of positive chest CT findings on treatment planning in our study echoes the conclusions of studies by Subramaniam N et al. (2021).¹⁹ It highlighted the significant role of chest imaging in guiding therapeutic decisions and improving patient outcomes in OSCC management.

In conclusion, the findings of our study harmonize with a multitude of investigations, collectively advocating for the routine inclusion of chest CT in the diagnostic pathway for oral SCC. The consistent patterns observed across these studies reinforce the clinical relevance of chest imaging and underscore its potential to inform tailored treatment strategies for enhanced patient outcomes.

Conclusion

The comprehensive evaluation of routine chest computed tomography (CT) in newly diagnosed squamous cell carcinoma (SCC) of the oral cavity has illuminated

Table 4. Cost-Effectiveness Analysis

Cost Component	Cost (Rupees)
Total Cost of Diagnostic Workup	50,000
Additional Cost Due to Chest CT	2486 per case
Estimated Cost Savings from Early Detection	7500

Table 5. Correlation between Chest CT Findings and Treatment Modifications

Correlation Analysis	p-value (p < 0.05)
Positive Chest CT Findings	0.042
Treatment Modifications	0.035

significant insights into diagnostic practices and treatment dynamics. The findings from our study, encompassing a cohort of 115 patients, underscore the clinical relevance of chest imaging in this specific patient group. The observed frequency of chest abnormalities, with 15% confirmed as malignancies, accentuates the importance of a systematic diagnostic approach. Importantly, the independence of pulmonary tumors and metastases from the stage of oral cancer challenges conventional assumptions, emphasizing the need for thorough evaluation regardless of tumor progression.

Our investigation further reveals that additional diagnostic procedures prompted by chest CT findings do not prolong the time span between the initial consultation and the initiation of management. This crucial insight addresses concerns regarding potential delays, reinforcing the feasibility and expediency of incorporating chest CT into routine diagnostic protocols. Moreover, the calculated cost of 2486 rupees per observed pulmonary malignancy provides a basis for understanding the economic implications of this diagnostic strategy. While costs are involved, the clinical significance of early detection and its potential impact on treatment decisions underscore the cost-effectiveness of routine chest CT in this context.

Future Recommendations

Implementation of Routine Chest CT: Based on the observed clinical significance and cost-effectiveness, we recommend the routine inclusion of chest CT in the diagnostic workup for all individuals with recently diagnosed SCC of the oral cavity. This should be regardless of the tumor stage, emphasizing the potential benefits of early detection.

Validation Studies: Conducting validation studies across diverse patient populations and healthcare settings would strengthen the generalizability of our findings. Further research should explore the reproducibility of our results in different geographic locations and demographic groups.

Longitudinal Studies: Long-term, prospective studies are warranted to assess the impact of routine chest CT on patient outcomes, survival rates, and treatment efficacy. This could provide valuable insights into the sustained benefits of early detection and tailored treatment planning.

Cost-Benefit Analysis: Continuous evaluation of the cost-effectiveness of routine chest CT, considering evolving healthcare technologies and practices, would inform healthcare policies and resource allocation.

Guideline Revision: Our findings prompt a reconsideration of existing guidelines concerning diagnostic strategies for SCC of the oral cavity. Collaborative efforts among healthcare institutions and professional bodies should be initiated to incorporate the evidence-based benefits of routine chest CT into updated guidelines.

In conclusion, the integration of routine chest CT into the diagnostic algorithm for SCC of the oral cavity represents a paradigm shift with tangible clinical benefits. Our study not only contributes to the evolving landscape of head and neck cancer diagnostics but also advocates for a proactive approach to enhance patient outcomes through early detection and tailored treatment strategies.

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