INTRODUCTION

Cancer of the oral cavity is the 8th most frequent cancer in the developing world and 16th in developed countries.\(^1\) It accounts for nearly 3% of all cancer cases worldwide.\(^1\) It ranks 13th in cancer-specific mortality worldwide, eighth most common tumor in males and 14th in females.\(^1-3\) Worldwide 300,000 cases of oral cancer occur annually, and oral cancer is responsible for almost 130,000 deaths each year.\(^4\) Tobacco and alcohol use are the main global risk factors while betel quid usage and smokeless tobacco chewing are common regional factors in South Asia involved in oral cavity carcinogenesis.\(^4-7\) Social inequalities and life styles as well as dietary factors, human papilloma virus (HPV) infection, genetic factors, and oral hygiene are the lesser known risk factors.\(^4,6\) However, the incidence of oral cavity tumors is higher in developing as compared to the developed countries.\(^4,5,8\) In Indian subcontinent and Pakistan Niswar use is also linked with an increase in incidence of oral cavity tumors.\(^8-11\)

Treatment options available include surgery, radiotherapy, chemotherapy or a combination of three.\(^12,13\)

Metastasis is the single most important prognostic factor in determining the outcome, therefore, some form of treatment needs to be given to the draining lymph nodes to prevent recurrence.\(^13\) Standard protocols dictate a radical neck dissection for a node positive tumor of the oral cavity while a selective neck dissection is oncologically safe in a N0 tumor of the oral cavity.\(^13\) In keeping with the current trends focus has been shifting towards minimalistic surgery with better follow-up protocols to ensure minimal morbidity to the patient and ensuring a near to normal function.\(^13-15\)

Resection of the submandibular gland is routinely performed as a part of radical neck dissection even in supraomohyoid neck dissections for oral cavity tumors.\(^16\) Although the oral squamous cell carcinomas routinely metastasize to perivascular group of level-1 lymph nodes, spread to submandibular gland is rare. Metastasis to the submandibular gland in cancer of the oral cavity has not been systematically studied. In most cases of advanced carcinoma of the oral cavity, excision of the submandibular gland is included as a technical issue either to facilitate a mandibulectomy or for 3-dimensional resection of the tumor. As a result, submandibular gland preservation for advanced tumors is often not technically feasible and may not be oncologically safe.\(^16\) Removal of the submandibular gland in selective neck dissections has no real oncologic basis because the submandibular gland does not contain intraglandular lymph nodes, and is, therefore, a relic of the classical radical neck dissection.\(^16,17\)

The aim of this study was to determine the frequency of metastasis to the submandibular gland in carcinoma of the oral cavity.\(^1\) It was conducted as an observational study of 110 oral cavity tumors operated over 2008 - 2011.

METHODOLGY:

Data of 110 oral cavity tumors operated over 2008 - 2011 was retrieved from ENT OPD, tumor registry in AFIP and from Head and Neck Oncology Forum Registry. Cases of oral cavity tumors that had undergone elective neck dissections were retrospectively studied for invasion of the submandibular gland, TNM Staging, perineural, perivascular, lymphovascular invasion, site specific frequency of oral cavity tumors and frequency of lymph node metastasis.

RESULTS:

Tumors of tongue were the most common constituting 42%, squamous cell carcinoma was the histological diagnosis in 90% cases. Sixty eight (61.8%) cases were node negative. Selective neck dissection was done in 55.5% of the cases. Submandibular gland was involved in 2 cases (1.8%).

CONCLUSION:

Submandibular gland metastasis from early oral cavity tumors is rare; any neoplastic involvement of the gland usually occurs via direct spread.


ORIGINAL ARTICLE

Submandibular Gland Involvement in Early Stage Oral Cavity Carcinomas: Can the Gland be left behind?

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ABSTRACT

Objective: To determine the frequency of submandibular gland involvement in early oral cavity tumors.

Study Design: Observational study.

Place and Duration of Study: ENT Department, CMH, Rawalpindi, from January 2008 to December 2011.

Methodology: Data of 110 oral cavity tumors operated over 2008 - 2011 was retrieved from ENT OPD, tumor registry in AFIP and from Head and Neck Oncology Forum Registry. Cases of oral cavity tumors that had undergone elective neck dissections were retrospectively studied for invasion of the submandibular gland, TNM Staging, perineural, perivascular, lymphovascular invasion, site specific frequency of oral cavity tumors and frequency of lymph node metastasis.

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Conclusion: Submandibular gland metastasis from early oral cavity tumors is rare; any neoplastic involvement of the gland usually occurs via direct spread.


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the oral cavity and to establish the oncologic basis of preservation of this gland in patients with early-stage oral cavity carcinoma.

**METHODOLOGY**

The study was conducted in ENT Department, Combined Military Hospital, Rawalpindi. After obtaining approval of the hospital ethical committee, data of the 110 consecutive patients, operated for oral cavity tumors from January 2008 to December 2011, was retrieved from ENT OPD Register, AFIP Tumor Registry and Head and Neck Oncology Forum Registry. A retrospective analysis was carried out of all the cases of oral cavity tumors that had undergone elective neck dissections whether selective or radical and postoperative histopathology reports of the resected specimens were studied for the presence or absence of invasion of the submandibular gland, TNM staging, perineural, perivascular, lymphovascular invasion, site specific frequency of oral cavity tumors, frequency of lymph node metastasis and involvement of the submandibular gland in association with tumor site, stage and nodal metastasis.

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 17. Frequencies and percentages were used to describe the results.

**RESULTS**

Of the 110 cases that underwent surgery, 78 (71%) were males and 32 (29%) were females. Tumors of tongue were most common constituting 46 (42%) cases followed by floor of mouth in 23 (21%) cases. Squamous cell carcinoma was the most common histological diagnosis in 99 (90%) cases; other rare diagnosis included lymphoma 2 (1.8%) cases, malignant melanoma in 1 (0.9%) patient and minor salivary gland tumor in 8 cases. Sixty eight (61.8%) cases were node negative and selective neck dissection was done in 61 (55.5%) cases. Submandibular gland was excised in all the operated cases and studied for capsular and glandular invasion as well as perineural and lymphovascular invasion. Its capsule was invaded in only 2 cases (1.8%) and in one of them there was glandular invasion as well. Both were N₂ disease; one was a locally invasive tumor of the lower alveolus while the second was squamous cell carcinoma of the anterior floor of mouth and in both cases the gland was involved via direct extension. The data is presented in a tabulated form. Table I describes the site specific frequency, nodal status, T-staging, surgical outcome and histological diagnosis of the operated cases. Tables II and III describe the overall nodal and T-status of the tumors operated while Table IV shows the histological parameters of the tumors excised.

**Table I:** Site specific frequency, TNM status, surgical outcomes and pathological types of tumors excised.

<table>
<thead>
<tr>
<th>Tumor location</th>
<th>Number of cases</th>
<th>Node status</th>
<th>T-staging</th>
<th>Surgery undergone</th>
<th>Pathological type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tongue</td>
<td>46 (42%)</td>
<td>N₀ 32 (29%)</td>
<td>T₁ 19 (17.3%)</td>
<td>SOHND 30 (27.3%)</td>
<td>SCC 44 (40%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₁ 11 (10%)</td>
<td>T₁ 14 (12.7%)</td>
<td>RND 14 (12.7%)</td>
<td>Lymphoma 1 (0.9%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₂ 3 (2.7%)</td>
<td>T₁ 8 (7.3%)</td>
<td>No neck resection 2 (1.8%)</td>
<td>MSG 1 (0.9%)</td>
</tr>
<tr>
<td>Hard palate</td>
<td>7 (8%)</td>
<td>N₀ 7 (6.4%)</td>
<td>T₁ 3 (2.7%)</td>
<td>SOHND 4 (3.6%)</td>
<td>SCC 1 (0.9%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T₂ 4 (3.7%)</td>
<td>RND 0 (0%)</td>
<td>MSG 5 (4.5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T₀ 0 (0%)</td>
<td>No neck resection 3 (2.7%)</td>
<td>MM 1 (0.9%)</td>
</tr>
<tr>
<td>Buccal mucosa</td>
<td>15 (14%)</td>
<td>N₀ 8 (7.3%)</td>
<td>T₁ 5 (4.5%)</td>
<td>SOHND 7 (6.4%)</td>
<td>SCC 13 (11.8%)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>T₂ 4 (3.7%)</td>
<td>RND 7 (6.4%)</td>
<td>MSG 2 (1.8%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₂ 4 (3.6%)</td>
<td>T₄ 4 (3.7%)</td>
<td>No neck resection 1 (0.9%)</td>
<td>SCC 13 (11.8%)</td>
</tr>
<tr>
<td>Alveolus</td>
<td>19 (17%)</td>
<td>N₀ 11 (10%)</td>
<td>T₁ 4 (3.7%)</td>
<td>SOHND 11 (10%)</td>
<td>SCC 19 (17.3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₁ 3 (2.7%)</td>
<td>T₈ 8 (7.3%)</td>
<td>RND 6 (7.3%)</td>
<td>SCC 22 (20%)</td>
</tr>
<tr>
<td>Floor of mouth</td>
<td>23 (21%)</td>
<td>N₀ 10 (9.1%)</td>
<td>T₁ 6 (5.4%)</td>
<td>SOHND 9 (8.2%)</td>
<td>Lymphoma 1 (0.9%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₁ 7 (6.4%)</td>
<td>T₆ 6 (5.4%)</td>
<td>RND 13 (11.8%)</td>
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<td>SCC 22 (20%)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>T₄ 4 (3.7%)</td>
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SOHND = Supra Omohyoid Neck Dissection; SCC = Squamous Cell Carcinoma; RND = Radical Neck Dissection; MSG = Minor Salivary Gland Tumor; MM = Mucosal Malignant Melanoma
DISCUSSION

Oral cavity cancers represent approximately 3% of all cancers within the United States, and 10 - 15% of cancers of the head neck, the majority being squamous cell carcinoma (SCC).16 The treatment options include a combination of surgery, radiotherapy or chemotherapy. Over the years, more conservative yet oncologically safe options have evolved, such as the modified radical and selective neck dissections.13 Given the tendency of SCC to metastasize to the neck, a therapeutic or prophylactic neck dissection is a common intervention. It is standard practice for this to include the submandibular gland when level Ib is taken, although anatomically it is debatable whether the submandibular gland contains lymph vessels or nodes. Saliva produced by the submandibular salivary gland has many important functions. It has significant antimicrobial properties and thus plays an important role in preventing dental caries; it facilitates the lubrication and irrigation of food; it remineralizes tooth enamel;16,17

Table IV: Histological parameters.

<table>
<thead>
<tr>
<th>Prognostic histological parameters</th>
<th>(%) Cases (n)</th>
</tr>
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<tbody>
<tr>
<td>Perineural invasion</td>
<td>30% (33)</td>
</tr>
<tr>
<td>Extracapsular invasion</td>
<td>19% (21)</td>
</tr>
<tr>
<td>Lymphovascular invasion</td>
<td>44% (49)</td>
</tr>
<tr>
<td>No invasion</td>
<td>7% (7)</td>
</tr>
</tbody>
</table>

In this study, only two of the 110 cases studied had metastasis to the submandibular gland. This is similar to the studies carried out by Razfar and Walvekar et al. where, of the 253 submandibular glands removed, only one was involved and that too was by direct extension from a tumor involving the floor of the mouth.16 Another study by Chen et al. had an 1.8% incidence of submandibular gland involvement (7 out of 383 removed). Furthermore, in their study five of the glands involved were by direct extension, all were T4 tumors with N2b status.21 In this series, 2 cases had metastasis but both were T4 N2 disease and the primary site was floor of mouth and alveolus. Byeon et al. found only 2 out of 316 glands removed to be involved, both were by direct extension and were from floor of mouth and retromolar trigone.22 Similarly, a study by Takes et al. concluded that metastasis to the submandibular gland from a primary site in head and neck is rare and preservation of the gland while removing the lymph node group in its vicinity is a feasible option.23 It, therefore, seems logical that in small tumors with limited extension and N2 disease where prophylactic supraomohyoid neck dissection is performed submandibular gland can be preserved while at the same time level 1b lymph nodes are removed. This would improve the quality of life for patient who still has to undergo radiotherapy following surgery. In our patients, the most common primary site was the tongue (42%). Despite the fact that the first echelon nodes for the tongue are at level la (submental) and Ib (submandibular), only 11% of our cases had positive nodes at level 1b. 34% of our cases had advanced local disease (i.e. T1 or T2), and 38% had nodal metastases. A significant proportion of our series also had perineural invasion (30%), extracapsular spread (19%) and lymphovascular spread (44%). Despite the advanced local disease and poor prognostic histological factors mentioned, only 2 cases had submandibular gland involvement, which was via direct spread.

CONCLUSION

Submandibular gland metastasis from early oral cavity tumors was rare; any neoplastic involvement of the gland usually occurs via direct spread.

REFERENCES


