

## Submandibular Gland Preservation in Oral Cavity Squamous Cell Carcinomas: Our Analysis at A Tertiary Care Hospital

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### Abstract

#### Introduction:

Surgical excision forms the principal treatment of oral cavity squamous cell carcinomas. The comprehensive surgical management consists of Wide Local Excision of the tumor and Neck Dissection with removal of Submandibular gland. The submandibular gland accounts for 70–90 % of unstimulated salivary volume. Its excision as a part of neck dissection has been found to cause high Incidence (21% vs 7%) of postoperative xerostomia. Recent studies have highlighted that the preservation of the SMG is possible and oncologically safe in early-grade OCSCC with N0 neck as the involvement of SMG in such cases is low and its preservation decreases the chances of xerostomia.

#### Materials and Methods:

80 subjects were included in the study to estimate the prevalence of metastatic submandibular gland involvement in oral cavity squamous cell carcinomas. The presence of metastasis into the salivary gland was studied and the mechanism/route of involvement was analysed. The comparison was made between the early and advanced tumors for SMG metastasis irrespective of the primary subsite involvement.

#### Results:

In the current study low prevalence (6.2 %) of metastasis to SMG was seen. It was seen in high-grade tumors only. None of the early-grade tumors showed any evidence of SMG metastasis. The most common pattern (80%) of glandular involvement was a direct extension from the primary tumor.

#### Conclusions:

Our study concludes that SMG preservation neck dissections can be carried out in early-grade OCSCC irrespective of primary tumor site involvement. The advantages of preserving the SMG are multiple. Furthermore, the morbidity is markedly decreased with its preservation without any compromise on oncological safety.

**Keywords:** Head and neck Squamous cell carcinoma, Submandibular gland excision, Oral cavity tumors, Xerostomia, Neck dissection

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## Introduction

Oral cavity cancers account for 10% to 15% of all head and neck cancers, 90 % constitute squamous cell carcinomas and the largest burden of these cancers is commonly seen in Southeast Asian regions where the use of tobacco and betel quid is prevalent in addition to alcohol consumption (1,2). Surgical excision forms the principal treatment for patients with oral cavity squamous cell carcinomas (OCSCC). It comprises wide local excision of the primary tumor with 1-1.5cm clear margins along with the neck dissection. Neck dissection forms the standard of care as the presence of cervical metastases, both overt and occult is considered as the major poor prognostic factor affecting survival outcomes (3). Crile in 1906 was the first to describe radical neck dissection, which has evolved considerably since then (4).

Enormous work has been done in the quest to minimise morbidity associated with neck dissection, without compromising oncological safety. This has led to the evolution of Modified and selective neck dissections. Furthermore, it is routine to excise the submandibular gland (SMG) as a part of neck dissection (Radical or modified radical or even selective neck dissections (I-III/IV) for OCSCC patients. SMG excision along with the clearance of level IB is the standard practice to clear all possible lymph nodes at level 1b in OCSCC, because the clearance of the IB lymph nodes without SMG excision is technically difficult, it is closely related to the primary tumor, and presence of possible lymph nodes within the gland itself. However, excision of the SMG is not without sequelae and its preservation may impart many important functional benefits. The submandibular gland is accountable for 70–90 % of unstimulated total saliva (5).

The importance of saliva is not only to lubricate the oral cavity, it plays a significant role as an antibacterial medium. Furthermore, remineralization of teeth and food bolus preparation are among its vital functions. Insufficient unstimulated saliva culminates in the subjective feeling of xerostomia which in turn has a marked impact on quality of life (6).

Excision of the submandibular gland as a part of neck dissection in oral cavity squamous cell tumors has been found to lead to as high as 21 % incidence of postoperative xerostomia compared to only 7% among the non-surgically

managed subjects (7). Recent studies have highlighted that the preservation of the SMG is possible and oncologically safe in early-grade OCSCC with N0 neck as the involvement of SMG in such cases is low and preserving it decreases the chances of xerostomia (6,8,9).

The present study aimed to estimate the true prevalence of metastatic SMG involvement in OCSCC and to analyse the possible mechanism of its involvement in such cases. Furthermore, a comparison was made between the early and advanced tumors for SMG metastasis irrespective of the primary subsite involvement.

## Materials and Methods

The current study is a retrospective study conducted in the Department of ENT- Head and Neck Surgery, Hamdard Institute of Medical Sciences, a teaching hospital in the national capital of New Delhi India. The study was done to estimate the prevalence of metastatic submandibular gland (SMG) involvement in oral cavity squamous cell carcinomas (OCSCC). Analysis was also made for the route and pattern of metastasis to the gland. Furthermore, a comparison was made between the early and advanced tumors for SMG metastasis irrespective of the primary subsite involvement. The data was collected from the institutional online database. All cases of oral cavity squamous cell carcinomas operated on within the last 4 years from January 2019 to March 2023 were included in the study.

The patients with revision surgery, surgical excision without neck dissection, or who had received neoadjuvant chemo/ radiotherapy were excluded.

A total of 80 OCSCC patients fulfilled our study design. They were tabulated and studied in detail for the demographic, clinico-radiological, and pathological parameters. Patients were divided into early (T1-2, N0) and advanced tumors (T3-4, N1-3) based on AJCC 8<sup>TH</sup> edition classification. At our institute, we follow the NCCN guidelines updated from time to time for the comprehensive management of head and neck cancers.

All operable OCSCC cases are subjected to primary excision of the lesion with a 1 cm margin along with neck dissection, which ranges from selective (I-III), extended selective (I-IV), Modified radical (I –V) to radical neck dissections depending upon the site and stage of

the tumor. SMG excision forms the part and parcel of all the neck dissection types and is excised along with the level Ib lymph nodes in Toto. The presence of metastasis into the salivary gland was looked for and noted down in each group.

Patients with SMG involvement were further subjected to in-depth analysis and their histopathological slides were reviewed by the senior pathologist to ascertain the mechanism of their involvement. The institutional ethical committee clearance was sought and approval was granted.

**Results**

In the present study, the most common primary site of tumor involvement was the tongue (40%) followed by buccal mucosa (22.5%) and Gingivobuccal (GB) sulcus (18.75%). The least common site of involvement was the hard palate seen in only 1 case. Males were mostly affected with a male-female ratio of 4:1. Most of the cases were high-grade tumors (80%, n=65/80). Differentiation showed that 70% of cases were well differentiated, 20% were moderately differentiated and 2.5 % cases were poorly

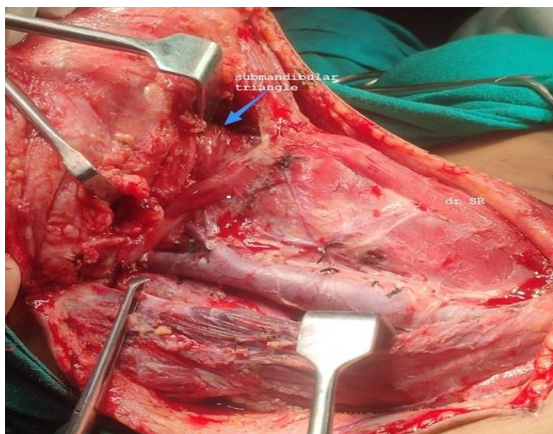
differentiated squamous cell carcinomas. Furthermore, two cases were verrucous in nature.

Histopathological examination showed 50 % had cervical lymph nodal metastasis and 25% of cases showed perineural and lymphovascular invasion each. Involvement of cheek skin and mandibular bone was seen in 12.5% (n=10) and 5% (n=4) of cases respectively. Furthermore, 11.25% of cases (n=9) showed postoperative positive margins, however only 1.25% (n=1) cases had extracapsular nodal involvement. Table 1 below shows the above findings.

The metastatic involvement of SMG was seen in 6.2 % (n=5/80) of cases. These consisted of carcinoma buccal mucosa (n=2), tongue (n=2), and floor of mouth (n=1). These tumors were high grade and 80% had cervical nodal metastasis (n=4/5). None of the early-grade tumors showed any evidence of SMG metastasis. Analysis of the pattern of glandular involvement demonstrated that the direct continuation of the primary tumor into the gland was the most common route of spread, seen in 80% ( n=4) of cases. In 20% (n=1) extracapsular spread from level 1 lymph node was seen. Figure 1 shows IB level clearance

**Table 1:** Demographic and clinicopathological variables of patients.

Variables	number	percentage %
Sex		
Males	65	81.25 %
Females	15	18.75%
Site of involvement		
Tongue	32	40 %
Buccal Mucosa	18	22.5%
Gingivobuccal sulcus	15	18.75%
Lip	4	5%
Retromolar trigone	4	5%
Alveolus	6	7.5%
Hard palate	1	1.25%
Early grade tumors (T1-2, N0)	15	18.75%
High grade tumors (T3-4, N+)	65	81.25%
Lymph nodal involvement	40	50 %
N1	12	15%
N2a	3	3.75%
N2b	25	31.25%
N2c	0	0%
N3	0	0%
ECA	1	1.25%
PNI	20	25%
LVI	20	25%
Differentiation		
Well	57	71.25%
Moderately	16	20.0%
Poorly	2	2.5%
Skin involvement	10	12.5%
Bony involvement	4	5%
Postoperative positive margins	9	11.25%



**Fig1:** IB level clearance

### Discussion

Level 1b lymph nodes have been categorised into five groups by Rouviere et al. (10) they include Pre glandular and retro-glandular, Pre vascular and retro-vascular, and intra-capsular submandibular lymph nodes. Furthermore, Di Nardo et al. (11) have added a sixth group and named them as deep submandibular lymph nodes. However, these lymph nodes are small and seldom present in the area.

Neck dissections routinely performed for oral cavity squamous cell carcinomas (OCSCC) include clearance of Level IB nodes with the removal of SMG (12,13). However, in recent years preservation of the submandibular gland in oral cavity tumors has been explored by many authors.

At our institute, we follow the NCCN guidelines updated from time to time for comprehensive management for OCSCC. All operable OCSCC cases are subjected to wide local excision of the tumor with 1 cm margins along with the neck dissection which ranges from selective, extended selective, and Modified radical to radical neck dissections depending upon the stage of the tumor. SMG excision forms the part and parcel of all these neck dissection types.

The occult metastatic involvement of level Ib can be as high as one-quarter (27%) in oral cavity cancers (14). However, various authors have observed in their respective studies that the metastatic involvement of the Submandibular gland in OCSCC is low and removal of the gland is not necessary in every case (15-18).

Furthermore, presence of Intracapsular submandibular lymph nodal involvement in

oral cavity SCC is seldom seen and amounts to less than 1 percent (0.7%) that too in advanced tumors only (19,20).

It has been seen that the route or pattern of glandular involvement can be by three methods; first and foremost is direct extension from the primary tumor site leading to invasion of the glandular

parenchyma, the second is by extracapsular spread from the metastatically involved any of the level Ib lymph nodes, and the third is by lymphatic spread into the intracapsular or deep glandular lymph nodes.

In the current study, the prevalence of metastatic involvement of the submandibular gland is 6.2 % only. The direct involvement of the gland by the primary tumor was seen in 80% of cases and in the remaining 20% of cases, extracapsular spread from level 1 lymph node was seen. All the cases of SMG metastasis were seen in high-grade oral cavity tumors only. None of the early-grade tumors showed any evidence of glandular involvement.

Our findings are corroborated by the findings of Basaran et al. (21), who in their study of 236 patients with oral cavity SCC found that only 4% of patients had metastatic involvement of SMG, the most common pattern of glandular involvement was a direct invasion from the primary tumor. Furthermore, they also confirmed the involvement of SMG was mostly seen in high-grade tumors of the tongue and the floor of the mouth (>60 %, n=8/13).

The systematic review of 2306 patients with 2792 glandular excisions was analysed by Yusuf Dundar et al (22) to look for SMG metastatic involvement. The study revealed that only 2.0% of patients had metastatic gland involvement and they concluded that glandular preservation in selective neck dissections in subjects with early-stage OCSCC with no neck nodes can be performed without affecting oncological safety. These findings were similar to our results (2% vs. 6%).

Retrospective analysis of 157 neck dissections carried out for oral cavity cancers by Nk Panda et al (9) found 3.68% (6/163) glands showing metastatic involvement by the tumor.

Four out of the 6 (66.6%) of involved glands demonstrated direct extension from the primary lesion, one displayed extracapsular spread from level Ib lymph nodes (16%) and both modes of spread were evident in one. They did not find

any evidence of metastasis to the gland itself (0%). These observations again confirmed our results (3.68 vs 6%) and the major pattern of the SMG involvement in their study was also through direct invasion by primary tumors (66 % vs. 80%) as seen in our results.

It may be technically difficult to completely remove the lymph nodes present in level Ib without excision of the gland, however, it is not impossible. It can be attempted in cases where direct involvement of the gland is ruled out or least expected as the involvement of the SMG is hardly seen due to the seldom presence of parenchymal lymph nodes inside it (17). A recently published American Head and Neck Society survey on neck dissection stated that only 43.1% of head and neck surgeons routinely try to preserve the submandibular gland during level Ib dissection (23).

The impact of submandibular gland preservation in neck dissections in patients with early-stage OCSCC has been explored by various authors. It has been seen that the unilateral excision of the submandibular glands leads to postoperative xerostomia in 21% of the patients (7). This is a major concern for patients who undergo SMG excision as there is a significant decrease in the unstimulated salivary flow in the postoperative period. Xerostomia is defined as a persistent sensation of dry mouth due to impaired saliva production affecting functions of speaking, chewing, swallowing, and taste perception. Inadequate amounts of saliva lead to increasing incidences of dental caries, oral candidiasis, odynophagia, poor oral intake, and thus poor general health and weight loss. These factors add to the morbidity associated with head and neck malignancies.

The study carried out by Gu et al (24) to analyse the impact of SMG preservation on quality of life found marked differences vis a vis subjective feeling of saliva production, chewing capacity, and swallowing outcomes in 31 patients in whom the gland was preserved, compared to 131 patients where the gland was excised.

Moreover, at 1 year of follow-up, the saliva flow rate in the preservation group was seen significantly higher than in the excision group

The same author evaluated the survival outcomes between gland preservation and excision groups and did not find any difference

in loco-regional recurrence or disease-specific survival between the two groups.

Gland-sparing neck dissections decrease the chances of damage to hypoglossal, lingual, and marginal mandibular nerves. Furthermore, the ligation of facial vessels becomes unwarranted in such procedures and their preservation can be useful for immediate reconstruction with viable pedicled local flaps.

Survival analysis by Chen et al (25) provides the strongest evidence for gland preservation. The study was probably the first to analyse the impact of gland preservation on survival. They analysed the 408 patients with cT1-2 N0 oral SCC. 33 patients were subjected to submandibular gland preservation neck dissections. They could not find a significant difference in the 5-year survival rates between the two groups (87.5% vs 95.6%,  $p = 0.54$ ). Furthermore, out of these 33 patients, 8 were diagnosed with Buccal Carcinoma. The 5-year disease-free survival rates among these cases with and without gland preservation were 75 and 69%, respectively, and the difference was not significant ( $p = 0.83$ ) in these subsets of cases too. However, the study has limitations as the number of patients undergoing gland-sparing neck dissections was less.

The study carried out by Lanzer et al. (26), highlighted the importance of oral cavity subsite involvement before embarking upon SMG preservation neck dissections. They found that 28.6% of the patients with SCC of the floor of the mouth or the tongue developed regional recurrence, which was significantly impacted by SMG removal ( $p < 0.001$ ). However, SMG preservation did not affect regional recurrence-free survival. They stated that the submandibular gland needs to be removed for SCC of the floor of the mouth and tongue.

### **Conclusion**

We conclude that submandibular gland preservation neck dissections can be carried out in early-grade OCSCC irrespective of primary tumor site involvement.

The advantages of preserving the gland are multiple. Moreover, without compromising the oncological safety preservation of the gland confers low morbidity associated with neck dissections.

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