EVALUATION OF SUBMANDIBULAR GLAND INVOLVEMENT IN ORAL CAVITY CANCERS: A SINGLE CANCER CENTRE RETROSPECTIVE STUDY

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Abstract: The aim of this study was to determine the incidence and the mechanism of submandibular gland (SMG) metastasis in oral cavity squamous cell carcinomas (OCSCC). In a retrospective study, the authors analysed total 230 patients over period of one year who underwent neck dissection and SMG removal as part of neck dissection. Metastasis to submandibular gland was not found in any of the cases. Metastatic SMG infiltration are very rare and infrequent. Preservation of submandibular glands can be a considered in patients undergoing prophylactic neck dissection or contralateral side in case of bilateral neck dissection if there is no clinical and radiological SMG gland infiltration.

Keywords: oral cavity squamous cell cancer (OCSCC), Submandibular gland (SMG)

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INTRODUCTION:

Squamous cell carcinoma constitutes more than 90 percent of oral cavity cancers. Most common causative factors are tobacco and alcohol abuse. Resectable and operable tumours undergo wide local excision of primary tumour along with neck dissection with or without soft tissue/bony reconstruction.[1]

Although metastasis to lymph node in submandibular triangle (IB) is common, metastatic involvement of submandibular gland is rare. Submandibular gland (SMG) is routinely excised along with level IB lymph node as a part of neck dissection. SMG secrets 70 -80% of resting saliva which has many important functions like lubrication, mastication, digestion, speech, immune function etc. SMG excision leads to xerostomia leading to discomfort in oral cavity, dental carries, and infection like oral candidiasis and accelerate post radio therapy osteoradionecrosis and poor quality of life.[2] These complications can be prevented by preservation of at least one salivary gland. There is lack of consensus regarding SMG preservation in literature.

Aim: To study the incidence of submandibular gland (SMG) involvement in oral cavity squamous cell cancer (OCSCC) in the Department of Surgical Oncology, Mahatma Gandhi Hospital & Medical College, Jaipur.

Inclusion criteria: 1). Operable Squamous cell carcinoma of Oral Cavity and were treated by surgery. 2). Resectable Squamous cell carcinoma of proper oral cavity as per prevailing guidelines. **Exclusion criteria:** 1).
Cancers other than Squamous cell carcinoma. 2). Patients with neoadjuvant protocol (chemotherapy + radiotherapy) 3. Squamous cell carcinoma with distance metastasis.

Table I: Distribution of cases as per Pathologic and demographic variables

Age (years)	**23-85 (mean age: 54 years)**
Sex	
Male	198 (86.06 %)
Female	32 (13.91 %)
Tobacco addiction	
Present	169 (73.47 %)
Absent	61(26.52 %)
Alcohol intake	
Present	149 (64.78 %)
Absent	81 (35.21%)
Perineural invasion	
Present	20 (8.69 %)
Absent	210 (91.30%)
Lymphovascular invasion	
Present	21 (9.13 %)
Negative	219 (95.21%)
Tumour differentiation	
Well	178 (77.39%)
Moderate	46 (20%)
Poor	6 (2.60 %)

TABLE II: Distribution of Cases as Per Location of Cancer in Oral Cavity

Primary site	**Total number of cases**
Buccal Mucosa	130 (56.52%)
Tongue	45 (19.56%)
Alveolus	22 (9.56%)
Gingio Buccal Sulcus	16 (6.95%)
Floor of Mouth	7 (3.04 %)
Retro Molar Trigone	4 (1.73 %)
Lip	4 (1.73%)
Hard palate	2 (0.86 %)

TABLE III: Distribution of Squamous Cell Carcinoma according to Primary T Stage and Pathological Lymph Node (N) Stage

T stage	Number of patient	N stage	Number of patient
T1	31(13.74 %)	N0	141(44.06 %)
T2	77(33.47 %)	N1	16(5%)
T3	52 (22.60 %)	N2	40(12.5%)
T4A	70(30.43%)	N3b	33(10.31%)

TABLE IV: Distribution of Squamous Cell Carcinoma of Oral Cavity According To Level 1a, 1b and Submandibular Gland Involvement and Laterality of Neck Dissection

Level 1a lymph node	Level 1b lymph node	Total SMG excision	Sub mandibular gland involvement	T1 n0	T2 n0	U/l neck dissection	B/l neck dissection
9	36	253	0	22	48	230	23

RESULTS:

Demographic variables:

The current study included 230 patients of squamous cell carcinoma oral cavity. The mean age of presentation was 54 years (23 -85 years). There were 198(86.06%) males and 32(13.91%) females. Tobacco addiction and alcohol intake habits were found in 169(73.47%) and 149(64.78%) patients respectively.

Pathologic variables:

The most common site was carcinoma was buccal mucosa in 130 patients (56.52%) followed by tongue 45(19.56%), alveolus 22 (9.56%), gingivobuccal sulcus 16 (6.95%), floor of mouth 7 (3.04%), retro molar trigone 4 (1.73%), lip 4 (1.73%) and hard palate 2 (0.86%).

Carcinoma of T1 stage was found in 31(13.74%), T2 in 77(33.47%) T3 in 52 (22.60%) and T4A in 70 (30.43%) cases. Most common tumour differentiation were of well differentiated in 178 (77.39%), followed by 46(20%) moderately differentiated and 6 (2.60%) poorly differentiated. Perineural invasion were noted in 20 (8.69%) patients and lymphovascular invasion in 21 (9.13%) patients. All 230 patients under went unilateral neck dissection and 23 patients, bilateral neck dissection was done. Lymph node metastasis was not found in 141(61.30%) patients whereas 16 (6.95%) patients were found to have N1 disease, 40 (17.39%) patients were found to have N2 disease and 33(14.34%) patients were found to have peri nodal spread (N3 disease). Submandibular gland was not involved in any of the case.

DISCUSSION:

Whereas parotid gland secrets stimulated saliva, submandibular salivary gland secrets most of resting saliva. Saliva helps in speech, mastication, lubrication and contains IgA, lactoferrin and other enzyme which have antibacterial properties.

People having xerostomia have poor quality of mouth and also high incidence of mandibular osteoradionecrosis.[3]

In OCSCC, submandibular gland is excised as part of all types of neck dissection.

SMG and level IB cervical lymph are both located in submandibular triangle. In OCSCC, level IB is first and the most common site of nodal metastasis. But, SMG metastasis and infiltration of SMG is very rare. SMG is covered by fibrous capsule which resist tumour invasion.[4]

Table VI: Studies showing of SMG involvement according to primary OCSCC.

Authors	Total no of cases	FOM	Tongue	Alveolar ridge	Buccal mucosa	RMT	Palate
Beyon et al.[4]	201	1/35	0/132	0/9	0/14	1/10	-
Siegel et al.[5]	150	5/25	2/54	2/11	0/6	0/11	0/6
Chen et al.[6]	342	3/17	0/121	2/20	5/143	0/22	0/14
Razfar et al.[7]	132	1/36	0/58	0/7	0/9	0/16	0/5
Our series	230	0/7	0/45	0/16	0/130	0/4	0/2

Table VII: Review of literature: studies showing mechanism of SMG involvement

Author	SMG resection	Direct tumour invasion	Metastatic lymphadenopthy	Metastasis to SMG
Chen et al.[6]	383	5	1	1
Byeon et al.[4]	316	2	0	0
B. Basaran et al.[3]	294	8	4	1
Razfar et al.[7]	153	1	0	0
Siegel et al. [5]	196	6	3	0
Our series	253	0	0	0

There are three mechanism of SMG involvement. The most common mechanism is by direct invasion by primary tumour or invasion by lymph nodal metastasis with perinodal spread directly due to their adjacent location. Floor of mouth (FOM) and tongue are the most common subsite that invade SMG. T3 and T4 tumours with nodal burden increases incidence of SMG involvement. B Basaran et al.,[3] reported only 8(3.3%) direct involvement SMG in 236 oral cavity SCC. The primary subsites were tongue and FOM with T3-T4 stage. Byeon et al. reported only one case (0.49 %) out of 201 showing direct SMG invasion from FOM SCC, two(1.3%) cases of SMG infiltration from FOM and tongue in T4 disease, six (3.06%) Cakir Cetin et al.[8] reported two (1.3%) cases of SMG involvement from FOM and tongue with T4 disease. Spiegel et al.[5] reported six (3.06 %) case of direct SMG involvement out 196 OCSCC. The primary sites were ipsilateral FOM, tongue and alveolar ridge. Dundar et al.[9] reported SMG involvement in 58 (2.07%) of 2792 patients and 75 % of it was by direct involvement.

The second mechanism of SMG invasion is through metastatic cervical level IB lymphadenopathy. Despite more frequent metastasis of level IB lymph node, local SMG infiltration is not seen. Level IB lymph nodes were divided into five groups by Rouviere et al.[10] namely -preglandular, prevascular, retrovascular, retroglandular and intracapsular lymph node. Most of metastasis occur in perivascular group (prevascular, retrovascular). Siegelet al.[5] studied 196 cases of OCSCC and only 3(1.53%) cases found SMG involvement by metastatic lymphadenopathy. Razfar et al.[7] reported one (0.31%) case of operated 316OCSCC, SMG involvement through metastatic lymph node. B. Basaran et al.[3] investigated and analysed 294 neck dissection for OCSCC and found only 13(4%) case of SMG involvement. Of which eight (2.72%) cases were due to direct invasion, four (1.36%) cases were due to metastatic periglandular lymphadenopathy and one (0.34%) case with confirmed metastasis. The most common subsites were FOM and tongue.

The least common way SMG metastasis is through intraglandular lymphatic tissue. Intraglandular metastasis is primarily through hematogenous route from non head and neck primary cancer. Vessecchia et al.[11] reported intraglandular SMG involvement from breast, lung and genitourinary malignancy. Vaidya et al. reported two cases intraglandular SMG involvement in tongue and palate.

In a series of 383 cases, Chen et al.[6] reported one case (0.26%) of intraglandular SMG involvement in T4N2 stage cancer of oral cavity and one (0.26%) case bilateral SMG involvement.

Bo Gu et al.[1] analysed 31 SMG sparing neck dissection in total 137 patients in cT1-2N0 buccal SCC. and reported five year loco regional control (LRC)in SMG excision and SMG sparing groups were 74 % and 75 % respectively without significant difference (p=0.97). They also found no significant difference (p=0.70) in five year DSS in both SMG sparing and SMG excision group.

CONCLUSSION:

SMG invasion is very rare in early stage OCSCC except cancer of FOM and tongue. Capsule of submandibular gland have resistance for tumour invasion. It may be considered to dissect only capsule of gland with surrounding lymphatic unless the gland is adherent to primary tumour and in advanced stage of OCSCC. The involvement of SMG in our and other studies were very rare or zero. Hence, it appears that SMG can be spared in selected case. For to confirm it, we need robust data by doing long term randomised control studies.

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