

Evaluation of involvement of submandibular gland in oral SCC

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ABSTRACT

Background: The management of Oral Squamous Cell Carcinoma (OSCC) has evolved significantly over the years, particularly concerning the surgical approach to neck dissection and the preservation of the Submandibular Gland (SMG). The decision to preserve the SMG during neck dissection is influenced by various factors, including the stage of the carcinoma, the anatomical location of the tumor, and the involvement of lymph nodes. Recent literature suggests that in specific cases, particularly early-stage carcinomas that do not originate from the floor of the mouth and do not involve level Ib lymph nodes, the SMG can be preserved safely during neck dissection. We also tried to detect the proportion of SMG intact or invasion by tumor cells in our study.

Materials and methods: 96 patients who were diagnosed with oral cavity mucosa cancer and applied and received treatment between 2013-2023 were investigated. 67 of the patients were men and 29 were women. Neck dissection was performed in 71 of these patients and a total of 77 SMGs were removed and sent for pathohistological examination.

Result: 71 patients were treated with ND and 25 patients were not treated with ND (Table 1). 37 patients were treated with unilateral SND, 18 patients with unilateral MRND, 10 patients with unilateral RND and 6 patients with bilateral ND. In all of patients, weren't found metastatic cells into the submandibular salivary gland.

Conclusion: Finally, we see in our study with comparing other studies that the incidence of SMG metastasis is quite low. It is more appropriate to preserve the gland, especially in the early stages and when no pathological lymph nodes are seen radiologically.

Keywords: oral squamous cell carcinoma, neck dissection, submandibular gland

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INTRODUCTION

Oral cancers comprise a large portion of cancers head and neck region and still remain a significant problem. In oral cancers, surgeons today choose more conservative and functional neck dissections. Radical and aggressive approaches are avoided as much as possible¹. At this time, dissection is usually performed in lymph nodes located at levels I, II and III. Occasionally, It may be extended to levels IV and V. The preservation of the SMG is not merely a surgical preference; it has significant implications for the patient's quality of life post-treatment. Xerostomia, or dry mouth, is one of the most debilitating side effects experienced by patients following head and neck cancer treatments, severely impairing their quality of life [1]. Cancer cells often use the submandibular gland as a station to spread to the lymph nodes in the neck. The removal of the submandibular gland in level I dissections is a debated topic. Recently, conservative approaches have been used to preserve the submandibular gland in order to prevent conditions like xerostomia, which reduce the patient's quality of life. When the gland is removed, especially when both are taken out, many patients experience dental caries, gingivitis, periodontitis and osteonecrosis [2]. The incidence of xerostomia in head and neck cancer patients who have received radiotherapy is generally reported to be between 94 and 100% [3]. This raises questions about how this situation affects cancer in oral cancers. For instance, what is the impact on metastasis rates ?

METHODOLOGY

We retrospectively reviewed the clinical and pathological data of patients diagnosed with squamous cell carcinomas of the oral cavity treatment in our institute between 2013 and 2023. A total of 96 patients who met the following criteria were included surgically resectable oral cancer (stages T1-4, N1-3, M0). All cases of OSCC were confirmed by histopathology. Patients with a prior history of surgery, radiation or chemotherapy and those with histology other than squamous cell carcinoma were excluded. In our study, 67 male patients and 29 female patients were investigated. Neck dissection was performed in 71 of them. Bilateral neck dissection was performed in 6 patients and unilateral neck dissection was performed in 65 patients. Totally, was performed 77 neck dissection and was investigated 77 SMG. Post-operative histopathological reports were reviewed to record the involvement of the submandibular gland. The presence of lymph nodes within the gland and direct invasion of the gland were assessed.

RESULTS

Records of a total 96 patients (67-male, 29-female) were undertaken in the study. The most common primary site was lower floor of mouth (n=23), tongue (n=21), cheek mucosa (n=17), palate (n=8), retromolar trigone (n=5), lateral pharyngeal wall, soft palate (n=4) and lip cancers extending to the lip (n=16). Their tumor stage and node stage according to the histopathological examination were T1 (n=7), T2 (n=28), T3 (n=36), T4 (n=25), N1 (n=13), N2 (n=12), N3 (n=7). Totally 77 submandibular glands were resected (Table 1).

Tab. 1. Demographic characteristics of patients undergoing to ND

| | Frequency | % | Valid (%) | Cumulative (%) |
|-------------------------------|-----------|------------|------------|----------------|
| Sex | | | | |
| Male | 67 | 69.8 | 69.8 | 69.8 |
| Female | 29 | 30.2 | 30.2 | 100 |
| Total | 96 | 100 | 100 | |
| Age | | | | |
| 30 years-39 years | 3 | 3.1 | 3.1 | 3.1 |
| 40 years -49 years | 14 | 14.6 | 14.6 | 17.7 |
| 50 years -59 years | 26 | 27.1 | 27.1 | 44.8 |
| 60 years -69 years | 37 | 38.5 | 38.5 | 83.3 |
| *>= 70 | 16 | 16.7 | 16.7 | 100 |
| *Total | 96 | 100 | 100 | |
| Tumor Localization | | | | |
| Orofaringeal carcinoma | 4 | 4.2 | 4.2 | 4.2 |
| Tongue cancer | 21 | 21.9 | 21.9 | 26 |
| Cancer floor of the mouth | 23 | 24 | 24 | 50 |
| Cancer of buccal mucosa | 17 | 17.7 | 17.7 | 67.7 |
| Cancer of gingiva | 2 | 2.1 | 2.1 | 69.8 |
| Cancer of hard palate | 8 | 8.3 | 8.3 | 78.1 |
| Cancer of retromolyar trigone | 5 | 5.2 | 5.2 | - |
| Lip cancer | 16 | 16.7 | 16.7 | 83.3 |
| *Total | 96 | 100 | 100 | 100 |

There was no significant association between N stage and involvement of SMG (P=0.95).

71 patients were treated with ND and 25 patients were not treated with ND. 37 patients were treated with unilateral SND, 18 patients with unilateral MRND, 10 patients with unilateral RND and 6 patients with bilateral ND. Due to the low number of RND patients, such patients were grouped together with patients with MRND in a group called (M) RND.

In the bilateral ND group, 6 patients were treated with SND on both sides of the neck, 2 patients were treated with SND on one side and MRND on the other side, 1 patient was treated with

MRND on both sides, and 1 patient was treated with MRND on one side and RND on the other side of the neck (Table 2).

In all of patients, weren't found metastatic cells into the submandibular salivary gland.

Tab. 2. Characteristics of ND groups

| | SND | (M) RND | Bilateral ND | p |
|--------------------------------|-----|---------|--------------|----------|
| Tumor stage (T of TNM) | | | | |
| T1 | 12 | 1 | 1 | 0.149 |
| T2 | 15 | 10 | 3 | |
| T3 | 8 | 12 | 0 | |
| T4 | 2 | 5 | 2 | |
| Nodule stage (N of TNM) | | | | |
| N0 | 34 | 18 | 5 | 0.000*** |
| N1 | 3 | 0 | 0 | |
| N2 | 0 | 8 | 1 | |
| N3 | 0 | 2 | 0 | |

** p<0.01; *** p<0.001

DISCUSSION

The aim of this study was to estimate the involvement of the submandibular gland in patients affected by squamous cell carcinoma of the oral cavity and to explore the possibility of its preservation during neck dissection. A review of cases of head and neck cancer indicated that the involvement of the SMG was minimal, with studies showing a low incidence of metastatic involvement of the SMG in patients with OSCC, suggesting that the gland can often be preserved without compromising oncological outcomes [3].

The patterns of SMG involvement in OSCC can be categorized into three main mechanisms: anatomic proximity, hematogenous metastasis, and lymphatic spread. Notably, the SMG is thought to lack a robust vascular network, which may contribute to its lower risk of metastasis compared to other glands. A comprehensive analysis of neck dissection outcomes has shown that the majority of patients do not exhibit metastatic cells in the SMG, reinforcing the notion that gland preservation is feasible and beneficial in many cases [13].

Although the neck dissection procedure has undergone several improvements, the SMG dissection was always recommended in OSCC. Since preserving the submandibular gland prevents many diseases, its removal should be carefully investigated in terms of oncology [4-6]. Given that the SMG lies in level Ib, the analysis of the oncological safety of leaving the gland in situ could have important clinical implications. In recent years multiple authors advocate for the preservation of the gland when dissection of level I is included in the treatment plan. This relies on the observation that xerostomia is one the most debilitating symptoms for the patients, impairing their quality of life after head and neck cancer treatment [7]. In a review of 107 head and neck cancer cases, Ebrahim et al found the submandibular gland to be involved in 1 case. here are three potential patterns of SMG involvement: anatomic proximity, hematogenous metastasis, and lymphatic spread. SMG is thought to lack a blood vessel network, which is

different from other glands [6]. Although a prior literature review showed a low risk of SMG metastasis in breast, lung, and renal cancers, no hematogenous metastasis in SMG was found in OSCC patients. Oresto Loka and colleagues investigated 852 submandibular regions in 642 patients [3]. They write: Combining the results of the retrospective data collected and the meta-analysis of the literature, it is reasonable to assume that in the following cases the SMG can be preserved during neck dissection: early stage carcinomas, tumors not arising from the floor of the mouth, no involvement of the level Ib lymph nodes and neck dissection contralateral to the side of the tumor³. In addition, it is intuitive that if there is a suspicion of direct extension to the submandibular duct it is likely that the whole gland with its ductal system should be removed for oncological safety [8].

In the context of surgical techniques, the choice between elective, selective, or modified radical neck dissection is guided by the tumor's localization, stage, and the presence of lymphatic involvement [12]. The surgical dissection of the Tumor-Node (T-N) tract has been associated with improved prognostic outcomes in advanced forms of squamous carcinoma, particularly in the tongue and floor of the mouth [12]. This highlights the importance of a tailored surgical approach that considers both oncological safety and the preservation of critical structures such as the SMG.

The implications of preserving the SMG extend beyond immediate surgical outcomes; they also encompass long-term patient well-being. The preservation of salivary function is vital for maintaining oral health, facilitating swallowing, and enhancing overall quality of life post-treatment. Therefore, the decision to remove or preserve the SMG should be made with careful consideration of the potential benefits and risks, taking into account the individual patient's clinical scenario.

When we compared the results of our research with other studies, we got close results. As regards the Tumor-Node (T-N) tract, recent literature agrees that its surgical dissection with preserving of SMG is associated with a better prognosis in advanced forms of oral squamous cell carcinoma [9, 10].

CONCLUSION

In conclusion, the evolving understanding of the role of the SMG in OSCC management underscores the importance of a nuanced approach to neck dissection. Evidence suggests that in many cases, particularly early-stage tumors without lymph node involvement, the SMG can be preserved without compromising oncological safety. This shift in practice not only aims to improve surgical outcomes but also to enhance the quality of life for patients undergoing treatment for oral squamous cell carcinoma. We see in our study with comparing other studies that the incidence of SMG metastasis is quite low. It is more appropriate to preserve the gland, especially in the early stages and when no pathological lymph nodes are seen radiologically. If post-operative radiotherapy is chosen, coordination with the radiotherapist is fundamental to plan a sparing of the gland from high dose irradiation.

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