Evaluation of Local Control in Buccinator Muscle Excision with the Skin Versus Buccinator Muscle Excision without the Skin in Buccal Squamous Cell Carcinoma: A Randomized Clinical Trial

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Abstract

Background: The aim of this study was to compare local control and maximum mouth opening in excision the buccinator muscle with the skin versus excision the buccinator muscle without the skin.

Methodology: This study was conducted on 40 patients with buccal squamous cell carcinoma (BSCC) without previous treatment, also T1 to T3 and N0 to N2 squamous cell carcinoma was involved in this study. The patients were divided randomly in 2 groups, 20 patients for each group. All patients were assessed for local recurrence for 1 year. Maximum mouth opening was measured preoperative and compared by postoperative measuring.

Results: The local control was (100%) in the study group and (95%) in the control group, but There were no statistically significant differences between the two interventions (P value 1). The maximum mouth opening was decreased postoperatively than preoperatively and in study group than the control one,but there was no statistically significance difference (**P**- value **0.22**).

Conclusions: Excision the buccinator muscle with its associated skin seems to decrease the local recurrence and seems to decrease the maximum mouth opening, but with no statistically significant differences between the two interventions. Indicating the needs for further studies.

Keywords: *Buccal squamous cell carcinoma, buccinator muscle, local control.*

Introduction

Squamous cell carcinoma is the most common type of cancer occurs in the head and neck region, it represent about 90% of all cancers in this area.[1] It was reported that in developing countries oral carcinoma has a high incidence of mortality. One of its aggressive types is the buccal squamous cell carcinoma; it has a low grade of local control that decreases the patient's survival rate.[2]

Among the reasons for the high recurrence rate, to buccal squamous cell carcinoma, is the lack of information about the accurate depth of the tumor cell according to the anatomical architecture. Clinical palpation only cannot determine the depth of surgical margin, so the need for clinical classification to the depth of tumor cells invasion is mandatory.[3] A highly accurate

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image of ultrasonography (US), CT and MRI are required for diagnosis the depth of tumor cells invasion on anatomical architectures. The most important anatomical architecture in the cheek is the buccinator muscle. It may represent an anatomical barrier toward the tumor cells invation.[3]

The buccal squamous cell carcinoma has been treated by surgical excision of the buccinator muscle without the skin, based on the concept that the buccinator muscle represents an impediment for spreading of the neoplasmic cells.[4] The recurrence rate is highly correlated with the positive or closed resection margins of the tumors. Resection with at least 5 mm cuff of the surrounding normal histopathological tissue is correlated by a poor prognosis, this due to the compact and complex anatomy of the oral cavity. This made the achievement of tumor free margins, in the cheek that has a low thickness, remains a challenge.[4]

Study in oral squamous cell carcinoma that evaluate shrinkage in the resected margins of the tumors, introduced a technique that excises the skin with the buccinator muscle aiming to decrease the recurrence rate in the cheek area[4]. Improving the prognosis and the survival rate of the patient is goal of this technique, but the defect in the face will need an immediate reconstruction with a soft tissue flap to improve the patient appearance. The aim of this study is to assess whether the excision of buccinator muscle with the associated skin will improve the local control (recurrence rate) when compared to buccinator muscle excision without the associated skin.

Patients and Method

This was a randomized controlled trial conducted on 40 patients with buccal squamous cell carcinoma attending outpatient clinic in Oral and Maxillofacial Surgery Department- Faculty of Dentistry- Cairo University and El Monofia Hospital - Oncology Department- El Monofia University between November 2017 and July 2020. The patients were allocated randomly in two equal groups: control group, 20 pateints underwent excision the buccinators muscle without the skin. While for the intervention group, 20 patients underwent excision the buccinators muscle with the skin. All cases were subjected to surgical resection of the primary site according to the standard protocol for each site.

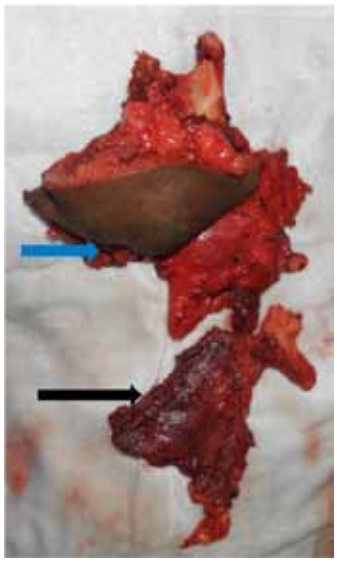
Eligibility Criteria:

Inclusion Criteria: All primary buccal SCC lesions with no previous treatment were involved. T1 to T3, N0 to N2 squamous cell carcinoma of the oral cavity. Patients were physically and psychologically able to tolerate procedures. Patients should be free from any systemic disease that may affect normal healing, and predictable outcome. Cooperative patients, who accept the procedure and return for follow up, examination and evaluation. Patients with secondary oral carcinoma, history of head and neck carcinoma of any other anatomical site apart from the primary site, history of radiotherapy or chemotherapy for tumors in the head and neck region, recurrent disease, and positive metastasis in remote areas were excluded.

Preoperative records and evaluation: A preoperative assessment of all patients was carried out including history taking, clinical and radiographic examinations. Each patient was interviewed in order to obtain a medical and dental history: Full medical history, Clinical examination of the primary tumor through inspection, palpation, determination of primary site, size, the lymph node involvement and staging, Multi Slice CT scan or MRI for pre-operative evaluation of nodal status, Ultrasonography to measure the depth of the tumor, Laboratory investigations (CBC, Coagulation profile, liver function tests; ALT, AST, serum albumin, kidney function tests; serum creatinine, blood urea and random blood glucose level), Preoperative anesthesia assessment for fitness for general anesthesia, Radiological examination (chest x-ray)

Surgical Procedures: Following confirmation of the diagnosis by incisional biopsy from the primary tumor site and histopathologic analysis, all cases were subjected to surgical procedure and the following was performed: Resection of the primary tumor site with surrounding safety margin from 1-2 cm. The extent of tumor was assisted by visual exam, palpation, and imaging. The borders of the tumor were determined by visual inspection and palpation. Where the primary site was the buccal mucosa invading the buccinator muscle with or without clinical palpable LN, the excision included buccal mucosa, buccinator muscle, and buccal fat pad together with the marginal mandibular branch *en block* with neck dissection fig. Also excision the skin in the study group **(figure: 1)** or without excision the skin in the control group **(figure: 2).**

For regional control the neck management includes radical neck dissection (RND), modified radical neck dissection (MRND) and/or supraomohyoid neck dissection depending on the primary tumor size and location, clinical presentation and involvement of cervical lymph nodes. **(Figure: 3)** Postoperatively, patients with unfavorable pathologic features including involved margin, nodal extracapsular extension, > 2 positive cervical nodes, perineural invasion, or lymphovascular permeation were scheduled to receive adjuvant radiotherapy and/or chemotherapy.



Figure(1): Post resection Specimen the blue arrow show the resected skin associated to the buccinator muscle. The black arrow show the lymph node specimen.

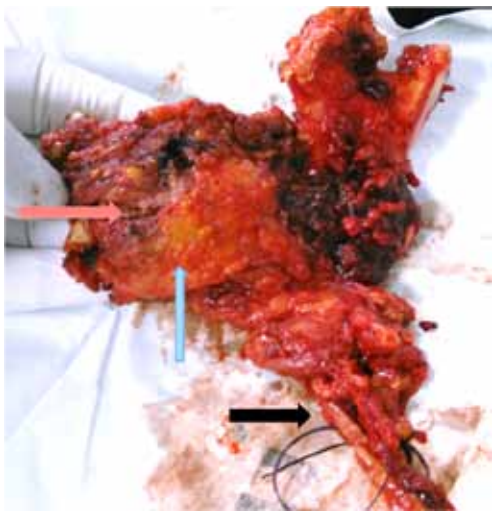


Figure (2): Post resection Specimen, Red arrow show buccinators muscle, Blue arrow show subcutaneous tissue and black arrow show lymph node specimen.

Figure (3): Post-resection appearance

Postoperative Evaluation: Postoperative follow up will carried out every week for the first month to evaluate the wound healing, then every 2 weeks for the 2 & 3 months, then every month for the first year to evaluate the local control (recurrence). Intraoral and extra oral clinical photographs will take three months postoperatively.

Outcome Results:

The following assessment surveys (clinical evaluations) will be carried out for both groups:

The local control (recurrence) will be observed clinically (binary) by the surgical team in the follow up time this carried by inspection, palpation and biopsy for the recurrence lesions. This observation started at the 3rd month after surgery and persisted until the first year.

The second outcome is the maximum mouth opening. It will be calculated by the researcher preoperative and postoperative at the 3rd month using a ruler in mm (continuous). It was done by measuring the distance from the incisal margin of the upper incisors to the incisal margin of the lower incisors.

All measurements were collected and tabulated for statistical analysis.

Statistical Analysis: Statistical analysis was performed using SPSS (Statistical package for the social sciences- IBM® SPSS® Statistics Version 20 for Windows, IBM Corp., Armonk, NY, USA). Quantitative data is represented as mean ± standard

deviation. Qualitative data is represented as percentage and frequency. Student's t-test was used to compare quantitative variables between the two groups. Fisher's exact test was used to compare qualitative variables between the two groups. The results were considered statistically significant if the p value was less than 0.05.

Results

This study was conducted on fourteen patients with buccal squamous cell carcinoma. The patients were allocated randomly in two equal groups. For the control group, 20 pateints underwent excision the buccinators muscle without the skin. While for the intervention group, 20 patients underwent excision the buccinators muscle with the skin.

The mean age of patients presented in control group was (50.2 ± 12.32). 11 male were presented in this group (55%) and 9 female (45%). The mean age of patients presented in study group was (56.55 ±11.27). 10 male were presented in this group (50%) and 10 female (50%).

Clinical Results: In the control group, all patients underwent surgery without complications, unless one patient had dehiscence the intraoral flap by the first week but by good oral hygiene and daily irrigation, it disappeared. On the other hand the patients of the study group had no dehiscence all over the follow up period.

Primary Out Comes:

1. **Recurrence (local control):** The control group had recurrence rate (5%) only one patient has recurrence after 4 weeks in the primary site. The patient underwent radiotheraby after surgery and scheduled to another surgery after completing his radiotherapy. On the other hand the study group had no recurrence (0%) over the follow up period. There was no statistically significance difference between the 2 groups. (**P** – Value **1).**
2. **Maximum mouth opening:** In the control group, the maximum mouth opening was (41.5 ± 2.6) preoperatively, and it decreased to (26.3 ± 5.12) postoperatively. The difference between the preoperative and post operative MMO was decreased by (15.2 ± 4.5).

In the study group, the maximum mouth opening was (38.55 ± 4.16) preoperatively, and it decreased to (21.8 ± 4.08) postoperatively. The difference between the preoperative and post operative MMO was decreased by (16.75 ± 3.35).

The decrease of MMO in the study group was more than the control one, but there was no statistically significance difference between the change in MMO of the control and study group with (**P**- value **0.22**).

Discussion

Buccal squamous cell carcinoma is aggressive type of oral carcinoma with high invasion pattern. In D2 classification, in which the tumor invades the buccinator muscle without loss of muscle continuity, the recurrence rate is high comparing the D1(tumor invade mucosal and submucosal layer) and D3 (tumor invade until subcutaneous or cutaneous layers)classification.[3] In this study we excised the skin plus the buccinator muscle in the study group in a trail to increase the local control. On the other hand we excised the buccinator muscle only in the control group.

Aggressive treatment was done to decrease the recurrence rate of the BSCC with its high invasion pattern. ***Parsonset al.,*** reported the higher invasion of BSCC in oral SCC, and explained the large discrepancy of BSCC than other sites of oral SCC.[5] also, ***Strome et al.,*** reported the disappearance of the buccinator muscle in the resected specimen, in patients with local recurrence of stage I and II buccal SCC without tumor cells in the mucosal margin were examined histopathologically.[6]

A high rate of local recurrence was be reported in local excisions of T1 and T2 buccal mucosa cancers with pathologically negative margins. Low T-stage and negative margins are not adequate predictors of local control. Even patients with early buccal tumors may benefit from adjuvant therapy to enhance local control, **Sieczka et al.**[7]

According tothe clinical classification of SCC of buccal mucosa ***Diaz et al.*** considered the buccinator muscle to be the most important layer, due to the potential role of this muscle as a barrier against tumor invasion.[2] The explained the tumor invasion beyond the mucosa to include the buccinator and then spreads further to the buccal fat, there is no longer any good anatomic barrier beyond which to spread.[2]

Yoshihide et al,[3] reported the tumor invasion into the deep layers, including the buccinator and buccal fat, even in those buccal mucosal tumors classified as having early stage disease. They concluded that this could account for why, when resection was performed based on tumor size, the tumor may still remain in the

deep surgical margin, thus frequently resulting in local failure.

Lubek et al, concluded the aggressive pattern of buccal SCC, and they considered it as an aggressive subsite within the oral cavity, with high rates of locoregional disease recurrence independent of surgical margin status. Elective neck dissection (END) and adjuvant therapy should be considered for early-stage disease. Successful salvage is rare in cases of early recurrence.[8]

As the previous studies reported the aggressive pattern of buccal SCC, its invasion in cheek layer and the recurrence rate of D2 (14.3%) which is higher than D1 (0%) and D3 (7.7%), we choose D2 for this research hoping decrease this recurrence rate percentage.[3]

Therapeutic neck dissection was recommended by Lubek J et al, in clinically invaded lymph nodes[8].also, Eicher et al. recommended elective neck dissection (END) for patients whom had moderately or poorly differentiated SCC, radiological or histological signs of bony invasion, and tumors in the mandibular symphyseal region[9].

The END recommended as first-line treatment for all intermediate and advanced stage patients, with the exception of patients with stage T1 tumors, who have a low risk of nodal metastasis and for whom observation (OBS) may be an acceptable alternative to END if the patients strictly comply with a cancer surveillance protocol, Feng et al.[10]

They concluded that the follow-up compliance of patient populations was the vital factor in adopting the OBS strategy for the cN0 neck. They stated that early detection of regional recurrence led to a 100% cervical salvage rate irrespective of T stage, the salvage rate otherwise dropping as remarkably low as <30.0%.[10,11]

One of the important predictor of BSCC prognosis is the local control.[12,13] in the current study, the local control was (95%) in the control group in which we excised the buccinator muscle without the skin. The local control was (100%) in the study group in which we excised the buccinator muscle with the skin. There was no statistically significance difference between the 2 groups but there is high in the local control percentage comparing the results of ***Yoshihide et al*** study as it had local control (85.3%) with the same classification D2 the limit of this study is the sample size was law due to the less income of cases, the statistical results may have significance differences with large samples.[3]

Conclusion

With the limitation of this study, we pointed out that removal the buccinator muscle with its associated skin in buccal squamous cell carcinoma seems to decrease the local recurrence. However, we recommend further studies with longer follow up periods to elucidate more about this topic.

Ethical Clearance: The study followed the declaration of Helsinki on medical research and the study was approved by the research ethics committee - Faculty of Dentistry- Cairo University.

Conflict of Interest: No

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