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Long Term Functional and Esthetic Outcomes After Fibula Free Flap Reconstruction of the Mandible

I. Petrovic

R. Blaser

Timothy Blackwell
Rowan University

C. McCarthy

I. Ganley

See next page for additional authors

Author(s)
I. Petrovic, R. Blaser, Timothy Blackwell, C. McCarthy, I. Ganley, S. Patel, P. Cordeiro, and J.P. Shah

Memorial Sloan Kettering Cancer Center

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Petrovic I., Baser R., Blackwell T., McCarthy C., Ganly I., Patel S., Cordeiro P., Shah JP.

Memorial Sloan Kettering Cancer Center, 1275 York Ave, New York, NY 10065

Abstract

Objectives: To report functional and esthetic outcomes, after fibula free flap (FFF) reconstruction of the mandible for oral cancer, assessed by physicians, non-clinicians and patients.

Materials and Methods: Twenty-five long term survivors from oral cancer after FFF reconstruction were recalled for head and neck examination by surgeons and patient reported outcomes, using EORTC, QLQ C-30, H&N-35 and FACE-Q questionnaires.

Results: Physicians reported 64% restoration of functionality compared to normal. Patients reported high scores on QLQ-C30, but lower scores on H&N-35. Esthetic scores were reported higher by clinicians than non-clinicians. The decline in function and appearance was attributed to loss of lower dentition, trismus, mal occlusion, xerostomia and tissue atrophy.

Conclusion: To minimize the decline in function and appearance, immediate dental implants in FFF, better reconstruction of the temporomandibular joint, newer methods of radiotherapy to minimize xerostomia and oral exercises to prevent trismus should be considered.

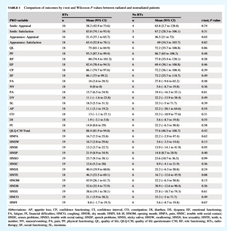

FIGURE 3 An extreme example of progressive tissue atrophy [Color figure can be viewed at wileyonlinelibrary.com]

FIGURE 4 Follow-up photographs in nonradiated patient [Color figure can be viewed at wileyonlinelibrary.com]

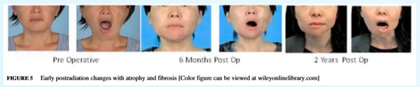

FIGURE 5 Early postradiation changes with atrophy and fibrosis [Color figure can be viewed at wileyonlinelibrary.com]

FIGURE 6 Late postradiation changes with atrophy and fibrosis [Color figure can be viewed at wileyonlinelibrary.com]

Acknowledgements

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Methodology

The aim of this study is to assess the long term functional and esthetic outcomes after segmental mandibulectomy and FFF reconstruction from the patient, physician and public perception. Secondary objectives were to assess the relationship between time since reconstruction and progressive deterioration of functional and esthetic outcomes and the impact of post-op radiotherapy on the extent of bone and soft tissue atrophy. We performed a retrospective chart review on patients who had a FFF on the MSK Head and Neck service from 1987 to 2013. A total of 416 patients underwent a FFF at MSK and only 61 were eligible for the study. Of this number, we signed 25 patients on to the study and were required to either travel to MSK or conduct a phone/video interview.

Evaluation of long-term functional and esthetic outcomes by a clinician: The treating physician performed a head and neck physical exam along with an 11-item questionnaire that evaluated oral function. Four photos were also taken of the patient and these were evaluated by both the physician and the public and the patients were graded on a poor to excellent scale.

Evaluation of long-term functional and esthetic outcomes by a lay person: Four pictures were taken at the 6 month post-op and four pictures were taken at the time of follow up and these people were given a short questionnaire to assess the esthetics of the patients.

Evaluation of patients' perception of their long-term Quality of Life and functional outcomes, symptoms, and esthetic outcomes: We used three questionnaires: European Organization for Research and Treatment of Cancer (EORTC) core quality of life questionnaires, its head and neck cancer-specific module, and FACE-Q Oncology Module: Mandibulectomy.

Statistical Methods: We used descriptive statistics Means and 95% confidence intervals were plotted for continuous variables. Categorical variables were summarized using frequency counts and percentages. Pearson correlation coefficients were calculated to quantify the impact of time since reconstruction on various functional and esthetic outcomes. We used paired t-tests to evaluate whether the ratings of the archived early post-operative photographs were significantly different from the rating of the new photographs taken at study assessment.

Results

Study Population: The median age of patients in the study group was 60.2 years and 72% were men. 56% of patients had their primary tumor involving the alveolus or lower gum and 76% of the patients had a histological diagnosis of squamous cell carcinoma. Other patients had adenoid cystic carcinoma, myoepithelial carcinoma of minor salivary gland, recurrent odontogenic keratocyst, osteogenic sarcoma and verrucous carcinoma. Finally, 56% of patients had cT3-4 primary tumors and 20% had clinically N+ disease.

PROS: The results of the patient reported esthetic and functional outcomes are summarized in Figure 1. The FACE-Q showed that patients reported higher appraisal of satisfaction with their smile than with their overall facial appearance. Patients generally reported high levels of function on the QLQ-C30 functional scales with all functional scale score means larger than 74 on the 0-100 score range. The lowest scores were reported for Global health status/QL and the highest for Physical Functioning. Scores on the QLQ-C30 were low with the highest scores for insomnia and constipation and the lowest scores for nausea/vomiting and diarrhea. The highest QLQ-H&N35 scores were for dry mouth, teeth, opening mouth, less sexuality and sticky saliva. The lowest scores for this test were felt ill and trouble with social contact. On the five yes/no questions, one(4%) patient reported using a feeding tube, three(12%) used pain killers, five(20%) gained weight, seven(28%) had taken nutritional supplements and eight(32%) lost weight.

Clinician and nonclinician reported outcomes: The physician completed 11-item clinical examination had a mean score of 18.4 which is 64% of the maximum possible score of 29. The majority of findings which had a negative impact on functional outcomes were related to absence of mandibular teeth, xerostomia, trismus, malocclusion and loss of sensation of the lower lip. In Figure 2, clinician and non-clinician esthetic ratings of postoperative and current photographs of patients are summarized. The ratings were significantly lower in the non-clinician group except for jaw deviation, but as seen in figure 3, the decreases in ratings of postoperative vs current photographs were greater among clinicians than nonclinicians. Clinicians rated all features higher than nonclinicians.

Effect of RT: 19 of 25 patients had postoperative RT and there were no significant differences on any of the variables by RT status. Patients who received RT tended to have better function and fewer symptoms on the QLQ-C30 but they tended to have more symptoms than non-RT patients on the QLQ-H&N35. The non-RT patients tended to have their pictures rated more favorably than the RT patients, but the differences were small and not statistically significant(Table 1).

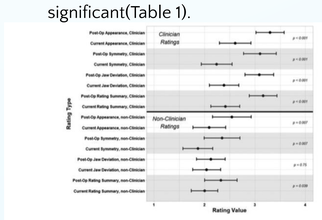

FIGURE 2 Means and 95% CIs of clinician and nonclinician esthetic ratings of postoperative and current patient photographs

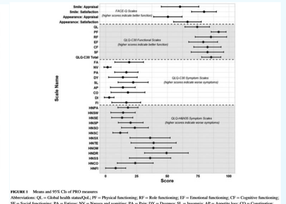

FIGURE 1 Means and 95% CIs of PRO measures

Discussion and Conclusion

Discussion: There are only few studies in the literature that report the QL and functional outcomes after mandibulectomy and reconstruction with FFF. According to our study, to date there have been no studies with more than 14 patients to report such outcomes 18 months after surgery. Our study reviewed a large series of patients over a long period of time at a tertiary care center, who underwent FFF reconstruction following segmental mandibulectomy for oral cancer. We restricted our study to a majority of patients with malignant tumors in the oral cavity. For the physician assessment, we used Rogers clinical questionnaire of 11 items.

Atrophic changes are exacerbated in patients who receive postoperative RT. Soft tissue atrophy may be seen as early as 2 to 4 years after RT(figures 5 and 6). This atrophy leads to progressive decline in function and esthetic appearance. This RT related atrophy along with aging adds to deterioration in all domains of function and esthetics. Thus, these factors have to be considered in assessing function, esthetics, and overall QL in long-term survivors after FFF-reconstruction of the mandible.

On the 11-item functional assessment by physicians, most of the lower scores recorded by clinicians were related to the absence of teeth in the reconstructed lower jaw, reduced mouth opening, and malocclusion. Furthermore, xerostomia in radiated patients and loss of sensation of the lower lip added to functional decline, giving only a 64% functional recovery score by clinicians.

Our findings show that the lowest score on the EORTC QLQ-C30 was the global health status, which tests for QL months to years after surgery. We found that CO and SL were the two factors that patients continuously rated as being a problem, so this may also contribute to their lower QL. These symptoms are reported in the QLQ-C30, which lists global health status and not just related to head and neck or FFF reconstruction. Thus, these can be attributed to natural aging process in a patient recovering from overall cancer treatment.

Physicians rated patients' pictures much higher in both post-op and current photographs, which may be due to the fact that physicians have a more realistic view of post-surgery appearances compared to nonclinicians. Interestingly, patients reported having a high physical function, but physicians scored them to have just 64% of perfect function on the 11-item questionnaire.

The observations of our study highlight several factors, which should be considered for future patients to improve their QL. Absence of lower HNTE and malocclusion were some of the major factors impacting oral function. The issue of xerostomia needs to be addressed with innovative techniques with RT such as intensity modulated proton therapy, In spite of these deficits a majority of patients in this study expressed a higher satisfaction score overall.

Some deficiencies we realized were the fact that normal aging process has to be factored in for all such studies. In addition, patients' perception and level of satisfaction/dissatisfaction is highly variable based on their expectations.

Conclusion: Overall, physicians reported 64% functionality compared to normal. Patients reported overall a high level of functional score on QLQ-C30 but lower scores on H&N35. Esthetic scores were reported to be higher by clinicians than nonclinicians. Patients reported better smile scores than overall facial appearance. All functional and esthetic appearance in radiated patients were lower than in nonradiated patients, but these differences were not statistically significant.