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Comparison of radial forearm free flap, pedicled buccal fat pad flap and split-thickness skin graft in reconstruction of buccal mucosal defect

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Summary There are a variety of methods to reconstruct the mucosal defect after the ablation of buccal cancer. We used the radial forearm free flap (RFFF), pedicled buccal fat pad flap (PBFPF) or split-thickness skin graft (STSG) to reconstruct the buccal mucosal defect in our series respectively and compared the mouth-open width among these methods. We found there was no significant difference in the change of mouth-open width between the Group STSG and Group PBFPF. However, the negative effect on the mouth opening was significantly less ($p < 0.05$) in Group RFFF when compared with the Group STSG or Group PBFPF. In conclusion, reconstruction with radial forearm free flap for buccal mucosal defect carries more chances to preserve the original mouth-open width than with pedicled buccal fat pad flap or split-thickness skin graft among the selected patients who undergo tumor resection for T2 or T3 buccal cancer.

Introduction

There are various kinds of surgical procedures available for reconstruction of buccal mucosal defect after wide resection of buccal cancer, such as split-thickness skin graft, mucosal graft, regional tongue flap, pedicled buccal fat pad flap,[1,2] pedicled temporoparietal fascial flap[3] and distant free flap. The choice option for reconstruction depends on the size of the buccal defect and the preference of the surgeons. However, limitation of mouth opening or even trismus may develop after

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the reconstructive procedures following ablation of buccal cancer, especially among patients with somewhat extent of submucosal fibrosis in buccal area. This study is aimed to compare the width of mouth-open after reconstruction either with split-thickness skin graft, pedicled buccal fat pad flap or radial forearm free flap for patients who underwent wide resection of buccal cancer.

Patients and methods

From January 2002 to June 2004, there were 37 patients who underwent primary surgical treatment for cure of buccal cancer in Chang Gung Memorial Hospital at Kaohsiung, Taiwan. All procedures about tumor extirpation were carried out solely by the first author (C.Y.C.). The buccal defect was reconstructed either with split-thickness skin graft (STSG), pedicled buccal fat pad flap (PBFPF) or radial forearm free flap (RFFF). The STSG was harvested from medial thigh with the thickness of 12/1000 in. to reconstruct the buccal defect. The pedicled buccal fat pad flap was designed as previously reported[2] to cover the buccal defect. Nonetheless, the RFFF was performed by plastic surgeon immediately after tumor extirpation to act as the inner lining of buccal defect. The option of reconstructive procedure depended on the choice of the patient after being well explained. Patients who had previously been treated with radiotherapy or surgery were excluded in the study. For avoiding the potential scar contracture and limitation of the mouth opening following surgery, all patients were advised to start mouth-open exercises after discharge from hospital. This study was approved by the Institutional Review Board of our hospital.

The mouth-open width was defined as the midline distance between the lower margin of the upper gum and the upper margin of the lower gum. The mouth-open width was measured preoperatively and at least 6 months postoperatively. The clinical data including age, gender, primary tumor (T) and histology were obtained from clinical records retrospectively. The TNM status was classified according to 1997 AJCC (American Joint Committee on Cancer) system. The age, type of reconstruction and mouth-open width were obtained for analysis. We categorized the patients into three groups. The patients who underwent reconstruction with STSG, PBFPF or RFFF were assigned as Group STSG, Group PBFPF or Group RFFF accordingly. The Student's *t*-test was used to study the statistical difference of the variables such as the age and mouth-open width among these groups. The statistical significance was considered if p value was less than 0.05.

Results

There were 37 patients enrolled in this study. Of the 37 patients, 35 were male and 2 were female with a mean age of 50.2 years (ranged 29—77). Group STSG consisted of 10 male patients with a mean age of 46.6 (ranged 29—61). Seven cases were classified as T1 and three cases as T2. All cases were reported to be squamous cell carcinoma. Group RFFF consisted of 11 male patients with a mean age of 53.5 (ranged 40—77). Six cases were classified as T2 and five cases as T3. The histology revealed that five cases were verrucous carcinoma and six cases were squamous cell carcinoma. Group PBFPF consisted of 2 female and 14 male patients with a mean age of 50.1 (ranged 38—66). Nine cases were classified as T1 and seven cases as T2. The histology revealed that two cases were verrucous carcinoma and 14 cases were squamous cell carcinoma (Table 1). There was no significant difference in age among these groups ($p > 0.05$).

The mean preoperative and postoperative mouth-open width in Group STSG was 5.4 (ranged 6—4.1) cm and 4.0 (ranged 5.2—2.3) cm respectively. The reduction of mouth-open width changed from 9.6% to 44% (mean ± SD = 24.5 ± 12.95%). The mean preoperative and postoperative mouth-open width in Group RFFF was 5.7 (ranged 6.3—3.5) cm and 5.2 (ranged 5.9—3.2) cm respectively. The reduction of mouth-open width changed from 4.8% to 9.8% (mean ± SD = 7.4 ± 1.40%). The mean preoperative and postoperative mouth-open width in Group PBFPF was 5.1 (ranged 6.1—2.5) cm and 3.6 (ranged 5.6—1.6) cm respectively. The reduction of mouth-open width changed from 5% to 45.5% (mean ± SD = 33.1 ± 15.72%). The change of mouth-open width showed no significant difference between Group PBFPF and Group STSG ($p = 0.384$). However the change of mouth-open width was significantly less in Group RFFF than that of Group PBFPF ($p < 0.001$) and Group STSG ($p = 0.003$) respectively (Table 2).

In Group STSG, none of these cases underwent postoperative radiotherapy. In Group RFFF and Group PBFPF, there were three patients and two patients who underwent radiotherapy after surgery respectively. In Group RFFF, no significant damage of pterygoid muscles was noted during operation and all radial forearm free flaps survived completely after the surgery. However, the flaps in two of the group RFFF were found to be bulky