A simple sandwich technique using buttons combined with a tie-over technique for an intraoral split-thickness skin graft

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Abstract: A simple sandwich technique using buttons to compress grafted tissue combined with a tie-over technique for intraoral split-thickness skin grafts (STSGs) is introduced. This technique yielded an excellent engraftment rate (90.5%) and no instances of total graft failure were recorded. This simple sandwich technique for STSGs is readily applicable and inexpensive, and the present results show that it would be potentially useful for repair of defects in the oral cavity.

Introduction

Split-thickness skin grafts (STSGs) are a traditional option for repair of superficial defects in the oral cavity [1]. The principle is simple and less time-consuming than the use of local, regional and free flaps. To achieve successful survival of skin grafts, regeneration and restoration of blood supply to the skin by immobilization is critical during the postoperative period.

The use of skin grafts for repair of oral cavity defects tends to be disadvantageous in terms of survival due to the irregular form of the defect, constant mobility, and accumulation of saliva and blood between the skin and the wound bed. Although tie-over bolus techniques using various bolsters such as gauze and silicone sheets or rubber tubes have been described [2,3], immobilizing the skin using the tie-over bolus technique alone is difficult for large defects. Another method for skin immobilization is the sandwich technique, in which skin is sandwiched between intra- and extraoral stents such as dentures, soft liners and eye patches [4]. However, these stents have proven difficult to adapt to irregular and uneven wound beds. The present study was designed to investigate a simple sandwich technique for intraoral STSGs using buttons to compress the grafted tissue combined with a tie-over technique.

Materials and Methods

Study design and patients

The study population comprised all patients who had undergone repair of intraoral defects after surgery for oral squamous cell carcinoma using the present sandwich technique for STSGs between January 2015 and October 2019 at Kyushu Dental University Hospital, Japan. Patients with buccal or lingual-oral floor defects were included, as were patients treated using the sandwich technique with buttons combined with a tie-over technique. The exclusion criteria were cancer recurrence, previous maxillofacial surgery, or previous chemotherapy and/or radiation.

The medical records of those patients who met the inclusion criteria were reviewed, and data for the variables were collected. All patients provided informed consent before the surgical operation. The protocol of this study was approved by the institutional review board at Kyushu Dental University (19-23). All procedures were performed following the tenets of the 1975 Declaration of Helsinki, as revised in 2008.

Surgical procedures

Sandwich technique for buccal defects

All operations were performed by three experienced surgeons. After resecting the tumor, the STSG was harvested from the thigh or inguinal area and placed on the wound bed of the defect with interrupted sutures at the graft edge. The surface of the skin graft was processed using the pie-crust technique (Fig. 1A). Polyethylene buttons that had been sterilized with ethylene oxide gas were placed directly with tie-over sutures to compress the grafted skin (Fig. 1B). These round, smooth-surfaced buttons were originally intended for sewing, and not for medical use. The number and size of the buttons was selected in accordance with the defect size. Other buttons were placed extraorally on the cheek, and tied together to create a transbuccal structure with 2-0 nylon suture (Fig. 1C). The conventional tie-over technique using gauze was then applied (Fig. 1D). The bolster dressing was left in place for 14 days, during which nasal gastric feeding was continued.

Sandwich technique for lingual and oral floor defects

After using the same procedure to apply the buttons to grafted skin, buttons were placed on the unaffected side of the tongue. Other buttons were placed extraorally on the submental skin. After applying this sandwich technique between two or three pairs of buttons, a conventional tie-over technique was performed (Fig. 1E).

Evaluation of graft survival

The button technique was evaluated in terms of graft survival using visual inspection of clinical photographs by two researchers within 30 days of grafting. Successful engraftment was defined as 0% to <30% necrosis of the grafted skin. Partial or total necrosis was defined as 30% to <80% and 80% to 100% graft necrosis, respectively. Mouth opening in the postoperative period was evaluated in cases of buccal excision at 6 months after surgery. Trismus was defined as an interincisal distance of <30 mm.

Results

Patient characteristics

Between 2015 and 2019, a total of 21 patients (12 men, 9 women) underwent this technique. Patient age ranged from 43 to 87 years (mean, 67.8 years). The most common clinical category as classified by the UICC 7th edition was T2 (10 cases, 47.6%), followed by T1 (7 cases, 33.3%), Tis (2 cases, 9.5%), and T3 (2 cases, 9.5%).

The site of the defect was the lingual-oral floor in 12 cases and the buccal mucosa in nine. Graft size ranged from 1,413 to 6,597 mm2 (mean, 2,813 mm2). The donor site was the abdomen in 19 cases and the thigh in two. Six patients had a history of smoking, and one patient had diabetes mellitus.
Successful engraftment was achieved in 19 of the 21 cases (90.5%). Partial necrosis was observed in two cases (9.5%); one buccal defect and one lingual-oral floor defect) (Table 1). The reason for partial necrosis in the patient with the buccal defect was inferred hematoma caused by postoperative bleeding. In the patient with the lingual-oral floor defect, patient cooperation in restricting the mobility of the tongue and nasal gastric feeding could not be obtained. No cases of total graft loss were identified.

Fig. 1  Technique for buccal defects. A) After resecting the tumor, a split-thickness skin is placed on the wound bed of the defect with interrupted sutures at the graft edge. B) Sterilized buttons are applied directly with tie-over sutures to compress the grafted skin. C) Other buttons are placed extraorally on the cheek, and tied together with a transbuccal structure using 2-0 nylon suture. D) A conventional tie-over technique using gauze is performed. E) Technique for lingual and oral floor defects. Buttons were placed on the unaffected side of the tongue. Other buttons were placed extraorally on the submental skin.

Table 1  Graft survival

|                | Engraftment (%) | Partial necrosis (%) |
|----------------|-----------------|----------------------|
| Buccal [n=9]   | 8 (88.9)        | 1 (11.1)             |
| Lingual-oral floor [n=12] | 11 (91.7) | 1 (8.3) |
| Total          | 19 (90.5)       | 2 (9.5)              |

Graft survival

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In cases of buccal excision, trismus was seen in the postoperative period in two of the nine cases (18.2%). In those cases, relapse of the interincisal distance resulted from lack of patient compliance with prescribed mouth-opening exercises. No other complications were seen.

Discussion

The purpose of the present study was to evaluate a sandwich technique using buttons as stents for irregular and uneven wound beds to immobilize the skin in the oral cavity.

The tie-over technique using a bolster is the most popular method for immobilizing intraoral skin grafts. Bolsters such as a parachute stent, eye patch, gauze, sutures, silicone, foam rudder pads, and vinyl polysiloxane have been reported [2-6]. The bolster technique using gauze is the most widely used for STSG because of the ready availability and low cost of the materials. However, according to the shape of the resection needed for oral cancer, the shape of the defect may be irregular and uneven. Furthermore, defects in the oral cavity easily accumulate saliva, blood and debris between the wound bed and grafted skin, and adapting the gauze to an irregular, uneven wound bed can prove difficult. Ancillary techniques are therefore required for skin immobilization.

The sandwich technique is one such ancillary technique that can be used in combination with the tie-over technique to immobilize skin in the wound bed. Sandwich techniques using a parachute stent, eye patch, gauze, sutures, silicone, foam rudder pads, and vinyl polysiloxane have been reported [2-6].

This report describes a novel simple sandwich technique using buttons as stents in the oral cavity. Button bolsters have been previously reported for auricular reconstruction [1]. Unlike other organs, the oral cavity has certain disadvantages for skin grafting due to saliva accumulation, constant mobility and an uneven wound bed. In this setting, buttons do not deform and remain clean [7]. Furthermore, the size and number of buttons can be selected according to the size and form of the defect. The size of the buttons can be adapted to defects that are irregular in form, such as those in the lingual-oral floor. Multiple buttons can be applied to immobilize the skin when the defects are extensive.

Although the STSG is a well-known method for use in the oral cavity, few reports have evaluated this method. The success rate of STSG in the...
oral cavity has been reported to be 33-75% [8]. Other studies have reported total graft failure rates of 9.5-10% for intraoral STSGs [9]. Furthermore, the partial necrosis rate has been reported to be 12.3-57.1% [9,10].

In this series, the button sandwich technique combined with a tie-over technique demonstrated an excellent engraftment rate (90.5%) and no cases of total graft failure were encountered.

The most common reason for graft loss is hematoma at the recipient site [8]. The conventional tie-over bolus technique can immobilize the skin, but cannot completely prevent accumulation of blood and saliva between the skin and the wound bed. The sandwich technique using buttons for intraoral STSG can help the skin graft adapt to the intraoral wound bed by ensuring firm skin immobilization. The present modification offers a simple and effective means of removing blood and saliva from under the skin, and the technique itself is readily applicable and inexpensive.

In conclusion, this study has demonstrated the utility of a simple sandwich technique for STSG combined with a tie-over technique for repair of defects in the oral cavity.

Conflict of interest
The authors have no conflicts of interest to declare.

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