Modified Graft–Stent Vestibuloplasty Approach for Rehabilitation of Loss of Sulcus

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Abstract Skin graft vestibuloplasty has long been popularized in increasing the depth of the vestibule. An unusual case of vestibuloplasty for correction of vestibule depth due to previous surgery is presented. Conventional methods of graft-stent fixation are traumatic, effortful and carry substantial risk. An altered method for rehabilitation of the present case by using graft-vestibuloplasty is described with underlying physiology of the process.

Keywords Vestibuloplasty · Skin graft · Vestibule

Introduction

The significance of the oral vestibule is often underappreciated in composite craniomaxillofacial surgeries or reconstruction. The subsequent deficiency results in considerable incompetence of the labial mucosa. Preservation of oral vestibular height, width, and volume is essential for aesthetic appearance and functional competence. Results of traditional vestibuloplasty techniques are unpredictable when the recipient bed is compromised in the setting of trauma or irradiation. In certain conditions vestibuloplasty operations are required to improve the functional vestibular sulcus and to replace non-healthy mucosa to restore the form and function of the vestibule [1].

Vestibuloplasty operations can be done either by submucosal dissection or by lowering the vestibular sulcus with or without grafting. Grafting vestibuloplasty has the advantages of covering the raw periosteal surface and

accelerating wound healing while allegedly maintaining greater sulcus depth [2]. Although different kinds of autogenous grafts have been introduced, skin is the preferred material in mandibular vestibuloplasty mainly because of the limitation of available graft material and reduced morbidity of the donor site. Free tissue transfer provides an innovative alternative in the management of the intractable and obliterated oral vestibule [2, 3]. It can be performed successfully, providing excellent results predictably. Vestibuloplasty operations usually include the use of a prefabricated stent to carry and secure the graft in the desired position [2, 3]. The placement of a stent, however, is now considered as a complicating factor and discussed widely.

This article aims to present a case report of a modified approach to the problem of stent retainer in a vestibuloplasty with a split skin graft and retained using stent.

Case Report

A 52-year-old man was referred to our center from his general surgeon for dental evaluation and possible corrective surgery. The chief complaint of the patient was incompetence of lower lip and subsequent drooling of saliva along with altered function such as speech and chewing for past 3 months. The patient's past medical history revealed previous surgery for urethral stricture corrected with oral mucosal graft taken from lower labial and buccal mucosa 6 months back. Clinical intraoral examination showed high buccal attachments on the dentate mandible with periodontally compromised teeth. The lower lip bridged from the superior border of the alveolar crest and only a small line of attached mucosa forming the sulcus of mandibular anterior vestibule area was seen.

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Lower lip was fibrotic on palpation. Patient was not comfortable with his mouth opening (Fig. 1). Radiographic evaluation revealed adequate residual alveolar bone which is a pre-requisite for a vestibuloplasty. Physical and laboratory findings of the patient were within normal limits. A final diagnosis of wound contraction from previous surgery was arrived. With the patient's vital parameters, it was concluded that there was no contraindication for surgery under general anesthesia and under antibiotic cover, an anterior skin grafting vestibuloplasty in the mandible was planned with a split skin graft from thigh (Fig. 2a).

Prior to the surgery, impression compound material was kneaded to a dough stage and adapted to suit the mandibular anterior buccal vestibule (Fig. 2b). The operation was performed under general anaesthesia after fiber-optic naso-tracheal intubation and a split-thickness dermis graft was harvested from the ventral surface side of the thigh in a routine manner. Through a circumvestibular incision, mandibular anterior labio-buccal and supra-periosteal dissections were accomplished and the vestibular sulcus was deepened according to standard procedure (Fig. 3). The skin graft was adapted to the prepared bed by maintaining uniform finger pressure for a 4-min period and sutured at labial and alveolar ends (Fig. 4). The prepared impression compound used to secure the graft in position by means of intermittent sutures. Patient was prescribed with Ibuprofen 400 mg with paracetamol 500 mg twice daily and serratio-peptidase for 5 days. Cold applications for a day were advised to control swelling for a day. The patient was fed using a nasogastric tube in order to prevent food impaction onto the dermis graft till the 6th postoperative day.

Fig. 1 Pre-operative view of the lower labial vestibule. Note the periodontally weak anterior teeth and high attachment of the sulcus

Fig. 2 a The donor site graft preparation. b Previously constructed impression compound shaped to anterior mandibular labial vestibule

Fig. 3 Operative view of the lower labial vestibule. The flap is being raised and the whole vestibule being created to desired depth

On the 6th day, after removal of sutures (Fig. 5), as the patient has to maintain this present state for a longer period (4 weeks), a simple prosthetic appliance (Fig. 6a) was designed for better patient comfort and oral hygiene that is usually associated with impression compound. This custom made stent was made of clear acrylic to secure the split skin graft and prevent re-attachment.

Fig. 4 Immediate postoperative view of the lower labial vestibule. The graft in place at the vestibule secured by the impression compound and sutures

Fig. 5 6th day postoperative view of the lower labial vestibule. The graft in place at the vestibule earlier secured by the impression compound and sutures. Note the good adaptation of the graft, healing of the recipient site

Construction of the Stent

A rubber base impression was made to record the proper sulcus depth. Once the cast was ready, the sulcus depth to be maintained is marked with the help of a stable straight Guttapercha Point in the patient mouth and transferred into the cast. The retentive part of the appliance consists of an Adam's clasp in the molar and premolar region as shown in the figure (Fig. 6b).

The functional part of appliance was fabricated with heat cure resin with a 19 gauge clasp mesh within it, extending from labial sulcus of 36–46 to provide strength and to maintain the appliance in proposed sulcus depth. By this appliance, the patient himself will be able to remove and replace it back, unlike impression compound, to maintain good hygiene, till epithelialization is achieved.

Patient was advised to use this stent for next 4 weeks to allow complete healing of the recipient site. Patient was followed up for 6 months with no recurrence of the stricture of lower lip. Healing at the donor site was also satisfactory (Fig. 7).

Fig. 6 **a** The custom made stent made out of clear acrylic to keep the graft in position and for easy maintenance of cleanliness. **b** Picture shows the constructed stent in position intra-orally

Fig. 7 Postoperative follow-up at 1 month. Note the colour of the graft, complete healing with no evidence of inflammation and depth of the newly created sulcus

Discussion

Numerous techniques of vestibuloplasty have been advocated in literature. They range from mucosal advancement or submucosal vestibuloplasty and secondary epithelialization or re-epithelialization vestibuloplasty. These are indicated for cases with sufficient mucosa with insufficient bone [2]. In the present scenario, there was loss of mucosa and submucosa owing probably due to removal of excess

oral tissues. This has caused fibrosis, causing strictures and loss of suppleness.

From literature, skin graft vestibuloplasty dates back to 1916 by Moskowitz and has been modified over the years [2–6]. Starshak and Sanders commented that proper graft fixation by stent makes the difference between success and failure. Poor adaptation may impede survival by secondary hemorrhage or hematoma formation in the recipient site [4].

Vascularization and healing of skin graft in oral cavity occurs in a two-phase process. The first phase is plasmatic imbibition. During the initial 48 hours, capillary action draws a plasma-like fluid from the underlying recipient bed. A fibrin network forms between the graft and the recipient bed, which helps to secure the graft in place [6]. After this period, blood flow begins in the graft and excess fluid is carried away to the systemic circulation. The second phase is termed inosculation of blood vessels. Vascular buds that proliferated during the first 48 hours provide a mechanism for entry of blood to the graft. By day 4–7, true circulation is established. At the same time, lymphatic channels are re-established [6]. Our present observation of reduction of swelling in the first post surgical week in this case is partially explained by this phenomenon [6].

Thus, survival of the graft depends upon the presence of a vascular recipient bed and fixed contact of the graft with the tissues of the recipient bed. Poor adaptation of the graft to the bed, fluid collections (such as hematoma) underneath the graft, movement, pressure or infection will prevent proper contact and jeopardize the survivability of the graft [5–8].

Split-thickness skin grafts consist of epidermis and a variable thickness of dermis. Placement of split thickness graft in oral cavity poses problems. The thinner the skin graft, the more the graft will contract in the first few months after transplantation. Conversely, thicker grafts contract more immediately upon harvest but less over time. The thinner, the skin graft, the more likely it is to survive because it does well during the plasmatic imbibition phase of healing and because it is more rapidly vascularized. The thinner the skin graft, the less likely it is that adnexal structures will be transplanted with the graft. The thinner the skin graft, the more rapidly the donor site is likely to heal. Thus, a thin skin graft that has been atraumatically removed and placed in a well-prepared donor site and which is well-stabilized during the initial healing phases is best-suited to the purpose of attempting to reconstruct the denture bearing platform [6]. Best surgical acumen is essential to select the correct thickness of the graft. In the present case, haemostasis was observed immediately after

placement of graft. Subsequently at the follow-up period, no instance of sub-graft hemorrhage or hematoma formation was noted. The skin graft was firmly attached to the recipient bed and within 10 days it appeared to be healed clinically with little inflammation evident at the base of the vestibular sulcus.

Intraoral fixation of the skin graft can be accomplished either by use of conventional suture and stent [2–4]. Sutures impede healing and can be one of the many causes of poor attachment of the graft to the recipient site. Stent that are voluminous will create good adaptation, but their bulkiness will impede healing. On the contrary, stent that not bulkier will not help in proper adaptation of the graft to the recipient site. In the present case, a voluminous but lighter material, the dental impression material was employed to ensure tight contact of the graft to the recipient site. When shifted to a custom made stent at the 6th day, true vascularization of the graft would have occurred. This enabled the stent to maintain the healing tissues in position.

In the present case, we have used advantages of both the techniques and achieved clinical success. Initial good adaptation with voluminous, less bulkier and less traumatic material (Impression compound) and latter maintenance with stent that aid in healing by easier maintenance of the oral hygiene.

References

1. St-Hilaire H, Mithani SK, Rodriguez ED (2009) Microsurgical salvage of the intractable oral vestibule. *Plast Reconstr Surg* 123(1):331–338
2. Ou CT, Chen SL, Yuh MJ, Choi KL (1988) Stent fixation in maxillary vestibuloplasty—a palatal pin method. *Chin Dent J* 7(4): 154–161
3. Mayer DM, Swanker WA (1950) Buccal inlay skin grafts for denture retention. *Plast Reconstr Surg* 6(6):479–482
4. Starshak TJ, Sanders B (1980) Vestibuloplasty. In: Starshak TJ (eds) *Preprosthetic oral and maxillofacial surgery*, 2nd ed. CV Mosby Co, St. Louis, pp 165–213
5. Yaman Z (1998) Fibrin sealant fixation of a skin graft in mandibular vestibuloplasty. Case report. *Aust Dent J* 43(4):213–216
6. Smith RA, Karas N, Pogrel MA, Gordon NC, Goldman K, Silva R, Whalen M (2000) Soft tissue surgery in the oral and maxillofacial region. *J Calif Dent Assoc* 28(9):668–680
7. Donoff RB (1976) Biologic basis for vestibuloplasty procedures. *J Oral Surg* 34(10):890–896
8. Hillerup S (1987) Preprosthetic mandibular vestibuloplasty with split thickness skin graft. A two-year follow-up study. *Int J Oral Maxillofac Surg* 16(3):270–278