One stage reconstruction of the floor of the mouth with a subcutaneous pedicled nasolabial flap


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Abstract Background: Nasolabial flaps have been recognised as versatile flaps for a variety of defects in the face, nose, lip and the oral cavity. Random pattern inferiorly based nasolabial flaps (NLF) have been utilised for covering small defects on the anterior floor of the mouth, but usually require a second stage procedure to divide the flap base. A subcutaneous pedicled inferiorly based nasolabial flap can provide a one stage repair of moderate sized defects of the floor of the mouth after de epithelialisation of the base of the flap.

Aim: To evaluate the feasibility of a single stage reconstruction of intermediate sized defects in the oral cavity with an inferiorly based pedicled NLF. The study includes the indications of use of the flap, flap design, technique, and the complications rate. The incidence of secondary procedures and the final functional and the aesthetic results will also be evaluated.

Materials and methods: A group of 20 patients presented with (T1–2) squamous cell carcinoma of the oral cavity have been treated at the Department of Surgery, National Cancer Institute, Cairo; in the period between January 2008 and September 2010. The pathology was confirmed with an incision biopsy and all metastatic work were carried out confirming that all patients were free from distant metastasis at presentation. Preoperative assessment also included assessment of the stage of the disease, the flap design and patient fitness for general anaesthesia. All patients underwent surgical excision combined with reconstruction of the defect with a subcutaneous inferiorly based pedicled NLF. The proximal part of the flap was routinely de epithelialised before it has been tunnelled through the cheek so a one stage procedure could only be required.

Results: The mean age of the patients was 62.3±6 years, range (52–69 years). All patients were diagnosed with squamous cell carcinoma. The anterior floor of the mouth constituted 40% of the defects, the lateral floor of the mouth 20% and the inner surface of the cheek 40%. There was no reported major complication; and only one patient suffered a reactionary haemorrhage that
Introduction

The naso-labial flaps are very useful and versatile local flaps, with robust vascularity that can be readily elevated without a delay [1]. The flap can be superiorly based to reconstruct defects on the cheek, side wall or the dorsum of the nose, alate of the nose, columella and the lower eye lid. Inferiorly based flaps can be used to reconstruct defects in the upper lip, anterior floor of the mouth and the lower lip. The flap can be turned over and used as a lining of the nose and the lip [2].

The functional integrity of the floor of the mouth is important in tongue mobility and also the articulation, deglutition, and control and disposal of saliva. Various surgical options are available for the reconstruction of intraoral soft tissue defects. For smaller defects of the oral mucosa in different anatomic locations of the oral cavity the nasolabial flap is a very useful and simple alternative to other pedicled flaps and free flaps [3]. Nasolabial flaps are very suitable for small sized oral defects as it provides a safe, simple and an effective method of reconstruction of such defects [2]. More frequently bilateral random NLFs are required depending on the site and size of defects. The flaps are tunnelled through the cheek, interdigitated and sutured to the defect [5]. Division of the pedicle and insetting is usually carried out 3 weeks later. This technique works best in edentulous mouth where the loss of the teeth and the alveolar resorption that follows leave a shallow floor of the mouth [4]. The base of the flap should be maintained at just above the level of the angle of the mouth to ensure that the branches of the facial artery as well as the inferior labial artery are preserved. Placing the flap above this level also ensures that the flap enters the oral cavity above the sump area and so minimises the fistula formation [6].

The flap however; can be carried on a subcutaneous pedicle as a one stage repair of many oral and oropharyngeal defects. The development of one stage procedure enhanced the value of the flap significantly particularly in the edentulous patients [8]. The rich anastomosis between the facial vessels and the deep perforators of the infraorbital and the transverse facial vessels assures an abundant blood supply to the flap [7]. Division of the facial artery at the level of the mandible for example during radical neck dissection is not usually a limiting factor because of such rich vascular connections [11]. A liberal arc of rotation can bring the flap to most points of the oral cavity and lateral pharynx with ease [10].

However, there are several limitations and disadvantages to the flap use. The presence of teeth in the symphyseal region makes the distant required for the flap to reach the defect considerably long. The possibility of biting through the flap pedicle is a deterrent factor, that the flap use is best restricted to the edentulous patients [2].

With regard to the flap design the length of the flap raised in the face is strictly limited above by the presence of the eye and the need to avoid ectropion when the secondary defect is closed. In males the flap is equally limited below by the commencement of the beard area at approximately the level of the angle of the mouth. These limitations would certainly have implications on the width of defects that the flap can cover in the floor of the mouth [2].

In the present study we study the feasibility of a single stage reconstruction of the oral cavity with an inferiorly based pedicled NLF. We will evaluate the flap design, technique, and the complications rate. We will also assess the incidence of secondary procedures and the final cosmetic and functional results.

Materials and methods

Flap design and dimensions

The inferiorly based NLF is outlined on the cheek side ipsilateral to the oral defect created by the resection of cancer. The base of the flap should be maintained at just above the angle of the mouth and the apex may extend to the inner canthus (Fig. 1). The medial border lies in the Para nasal sulcus above and in the nasolabial fold below. The flap relies on the subcutaneous as well as the dermal vascular plexus so the dissection should remain just superficial to the facial muscle. The flap width and length are judged to fill the defects without tension and permit safe closure of the donor site. The flap is raised from superior to inferior direction till the selected point of passage of the subcutaneous pedicle through the cheek is reached.

The point of entry into the mouth can be varied slightly to bring the skin bearing tissue directly to the defect. A liberal tunnel is created through the cheek to avoid constriction of the pedicle and the flap is delivered into the defect beneath its nearest border. The part of the flap that will be buried through the cheek tunnel is marked then the flap is pulled out and that part is deepithelialised and the hair follicles are removed conservatively. The flap is then returned to the defect and inset with a single layer of sutures. Tension should be avoided especially along the long axis of the flap. The donor site is closed by undermining and advancing the lateral cheek superiorly then
inferiorly over the base of the pedicle to avoid distortion and compression of the pedicle.

Patients and methods

The study included 20 patients suffered from a variety of oral defects as a result of resection of T1–2 squamous cell carcinoma. Patients presented at the surgical department, NCI in the period between January 2008 and September 2010. Patients were prospectively evaluated for suitability for nasolabial flap reconstructive technique by measuring the potential defect size, site and depth. All the defects were either small or medium sized (2–4 cm in width), partial thickness and affected different areas of the oral cavity, i.e. anterior floor of mouth, lateral floor of mouth, inner cheek and oral commissure.

Patients were diagnosed with squamous cell carcinoma by preoperative open biopsy and were assessed for the evidence of metastasis in the lung or the liver by X-ray chest and abdominal ultrasound. Neck CT was routinely used to evaluate the presence of neck node metastasis.

Preoperative staging was based on the TNM classification adopted by the world health organisation classification of tumours [27]. Bleeding and coagulation profiles, ECG, liver and kidney function tests were routinely requested for all patients prior to surgery.

The reconstructive technique, procedure and the flap design were thoroughly discussed with the patients in the pre assessment clinic. Also, pre operative photos were routinely taken immediately prior to surgery. An informed consent was signed by the patient and countersigned by the reconstructive surgeon undertaking the procedure. The study was then approved by the Institute Ethics Committee.

The technique of anaesthesia, the flap design, and the duration of operation all were recorded. Postoperatively, the flap was monitored for the colour changes, temperature and the capillary filling time. The postoperative complications and the length of hospital stay were documented.

Postoperative photos in addition to an independent surgical opinion were used to assess the final cosmetic results as well as the functional results of the reconstruction (Figs. 2–5). Three outcome measures (speech, chewing and deglutition) were used for the assessment of function and subjectively evaluated. Two aesthetic outcomes (donor site morbidity and the cosmetic match) compared with the contra lateral side of the face were also subjectively evaluated (Figs. 6 and 7).

Results

A total of 20 consecutive patients were subjected to single stage reconstruction with pedicled nasolabial flaps reconstruction for a variety of oral defects. All defects were due to the excision of T1–2 squamous cell carcinoma of the oral cavity. The male to female ratio was 3:2 and the mean age was 62.3 ± 6 years and the range was 52–69 years. The anterior floor of the mouth defects constituted 40% of patients, the lateral floor of the mouth 20% (including the alveolar margin) and the inner surface of the cheek 40% (including the oral commissure).

An inferiorly based pedicled NLF was performed in all patients where the proximal part was de epithelialised and buried through a tunnel in the cheek into the oral cavity. The mean operative time was 45 ± 10.5 min and the range was 36–62 min. The flap was used in conjunction with neck dissection in 40% of cases and the facial artery was ligated in 10% of cases with no effect on the flap blood supply. No single patient required a blood transfusion and all patients were discharged next morning. There were no reported major complications, and only one patient required re exploration 4 h after surgery for reactionary haemorrhage with no effect on the viability of the flap. This patient was known to suffer from a low platelet count preoperatively that resulted in a haematoma after operation. There was no reported total or partial flap loss including that patient who was explored on the day of surgery for a reactionary haemorrhage.

There were no reported cases of wound infection; however one case suffered from a delayed wound healing over the de epithelialised part of the flap and required revision of the scar 3 months later. There were no scar contraction however there was one case of ectropion and that was due to extending the upper limit of the flap to the inner canthus. There was no incidence of orocutanous fistula or other major donor site morbidity. The procedure was carried out as a single stage procedure in the majority of cases; only four patients required a revision surgery for the flap adjustments and correction of a dog ear in the donor site, and release of tongue 8–12 weeks after surgery.

All patients were followed up for an average of 18 months postoperatively, range (12–23 months). There was no single
case of tumour recurrence underneath the flap or distant metastasis.

The overall aesthetic results were either very satisfactory or satisfactory in the majority of patients (90%). Two patients were not satisfied by the final aesthetic results, one suffered from ectropion and the other had a donor site wound healing problem. The functional results (deglutition, chewing and speech) were satisfactory in most patients (70%), all were edentulous and all were anterior floor of mouth reconstruction. The rest of the patients (30%) had a temporary chewing problem due to the bulk of the flap which settled down over the course of follow up. All such patients had either lateral floor or alveolar margin defects.

Discussion

Reconstructive options for smaller defects of the oral cavity are ranging from primary closure, secondary healing from mucosalisation, or covering the defect site with split thickness skin grafts. Most of these techniques may result in speech and swallowing problems. The inferiorly based subcutaneous pedicled NLF can be safely utilised for the coverage of similar defects with not much of such problems [26].

The vascular anatomy of the nasolabial flaps is based on the angular artery (a branch from the anterior facial artery), the infra-orbital artery, the transverse facial artery and the infra-trochlear artery. Because of the rich vascular supplies and the free anastomoses between the terminal branches of the supplying vessels of the flap; superior, inferior, medial, and lateral based flaps can be raised [11]. The flap can be used either as a random based or as an axial pattern flap. A subcutaneous pedicled flap can be raised inferiorly in the reconstruction of moderate sized defects in the face and the floor of the mouth [12]. The direction of pull upward and laterally has an effect in holding the tongue up and preventing it from sinking down into the mouth during healing [3].
De epithelialisation of the proximal segment of the flap is proposed for a one stage repair of a variety of significant intraoral defects. The simplicity and easiness of the technique can be particularly useful for edentulous elderly and high risk patients with moderate sized defects on the oral cavity [7,16]. The range of the defects varies from a small 2-4 cm to moderate 4-6 cm in width [19,24,25].

In the current study the flap was used after de epithelialisation of the proximal segment for single stage coverage of variety of defects such as the buccal mucosa, anterior floor of the mouth and lateral floor of the mouth. The mean for the defect size was 3.5 × 4.5 cm in width. The flap success rate was 100% with no total or partial flap loss in spite of re exploration of one patient for the evacuation of a reactionary haemorrhage where the flap was resutured again without any effect on the vascularity. Such results compare favourably with the reported studies [3,22,24,25] where the incidence of partial flap loss was ranged from 5% to 6.5%.

The flap can be used safely when the radical neck dissection is indicated and ligation of the facial artery was undertaken [22]. Others reported no effect of ligation of facial artery even with prior radiotherapy [25]. In the present study all of our patients did not have radiotherapy preoperatively. The flap was used in conjunction with supra omohyoid neck dissection in 40% of cases and the facial artery was ligated in 10% of cases with no effect on the flap blood supply. This indicates the robust vascularity and the reliability of the flap for coverage of a variety of medium sized defects in the oral cavity.

Wound healing complications were reported in only 10% of our patients and a scar remodelling was required in 15% of patients. Our results are in the range of the published studies where wound healing problems ranged from 4% to 11% [16,19,22]. However, and with respect to the purpose of use of the flap in the current study in a single stage reconstruction, the flap did not completely fulfil this purpose in 20% of patients. This could be considered one of the limitations to the flap use for single stage reconstruction since a second stage procedure was required in those patients in spite of de epithelialisation of the base of the flap in all patients.

The utilisation of the flap for reconstructing a variety of oral defects has been well recognised [15,16], with satisfactory function particularly mastication and deglutition [17]. The flap represents a functional and aesthetically satisfactory alternative to reconstruction by micro surgical flaps in cases with decompromised patients who are therefore of poorer surgical risk [19,3]. It can also improve mastication and speech when used in conjunction with micro vascular free tissue transfer for the reconstruction of large combined defects of the tongue and floor of the mouth. In spite of the reliability and the robust vascularity of the flap, the flap still has many limitations. The flap design, size and dimensions are limited to the redundancy of available tissues and the possibility of closing the donor site primarily without deformity [13]. On the other hand, inferiorly based flaps are usually of limited length due to the extension of the flap to the inner canthus [14]. In spite of using the flap in coverage of medium sized defects (average dimensions of 4.5 × 3.5) we encountered one case of ectropion and two cases where a secondary surgery was required for scar remodelling, and a case of scar healing problem. The flap use in younger age group who still has teeth can be still a major limitation to the flap use and that is due to the teeth biting effect and the longer distance the flap has to cover to reach the defect. This further limits the indications of the flap use to old edentulous patients with T1 or early T2 tumours of the oral cavity where the defects are of limited width.

In conclusion and in spite of the above limitations the flap holds its place in the step ladder of reconstructing a variety of oral defects. This was tested favourably in old edentulous patients who are of poorer surgical risk [19,3]. Flattening of the facial contour and the permanent facial scars become barely noticeable in old patients [7].

References


