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# A review of nasolabial flaps for intra-oral defects

K. L. MUTIMER and M. D. POOLE

*Department of Plastic Surgery, The Radcliffe Infirmary, Oxford*

Summary—The nasolabial flap has been used in 23 patients for reconstruction of moderate size intra-oral defects. Versatility in design of the flap is allowed by the numerous blood vessels supplying the nasolabial skin. Flap vascularity was reliable, there being no cases of total loss and three cases (12%) of partial necrosis. Recurrence of tumour occurred in 8.7% of cases and in those operated in the first instance for recurrence, there was no further local disease. There were minor problems of intra-oral hair growth, donor site distortion and obstructive sialadenopathy. However, because of its simple elevation, proximity to the defect and versatility, we believe that the nasolabial skin flap is a useful procedure for closure of selected intra-oral defects.

With the advent of musculocutaneous flaps and microsurgical free tissue transfers, intra-oral reconstruction has entered an area of sophistication whereby defects of any size or complexity can be corrected. However, at times these techniques appear inappropriate. Either the defect seems too small or the patient's age and medical status do not permit a lengthy anaesthetic and surgical procedure. The nasolabial skin flap represents available local tissue that, in the right circumstances, often circumvents these problems.

This flap was first described in the works of Susruta (Pers, 1967) of 600 BC. Variations since have included a full thickness cheek flap tunnelled through a buccal incision as described by Thiersch in 1868. Esser (1918) was the first to describe a flap consisting of skin only, which subsequently required a second procedure to divide the pedicle and inset the flap. The first one-stage, de-epithelialised nasolabial flap was described by Wallace (1966) for the closure of a palatal defect. In order to avoid the bulk of the de-epithelialised pedicle in the tunnel and to provide more mobility, a one-step arterialised island flap was designed (Rose, 1981).

Although many variations have been described, there are few large clinical series reported. Cohen and Edgerton (1971), in their 14 cases, reported minimal complications and a general satisfaction with this procedure. This paper presents our experience with the tunnelled nasolabial flap for intra-oral reconstruction.

## Materials and methods

Twenty-three patients had 25 nasolabial flaps to reconstruct intra-oral defects in the period from 1981 to 1986. A retrospective review was carried out using hospital in-patient and out-patient charts. In addition, 15 (65%) of this group were reviewed at a special clinic. There had been seven deaths prior to the study and one patient was lost to follow-up.

In this study, there were 13 females and 10 males with an age range of 46 to 95 years, and an average age of 67 years on presentation. In all but one case, the underlying pathology was intra-oral squamous cell carcinoma. The average postoperative follow-up time was 26.4 months with a range of 3 to 72 months (Table 1).

## Results

In the majority of cases, the tumour was located in the region of the floor of the mouth (52%) and the buccal area of the cheek (26%) (Fig. 1). Other areas of application included the mandibular and maxillary alveolus, the retromolar zone and the buccal surfaces of both lips. In ten patients, the resection

**Table 1**

| *Patient data* | *No* |
|---|---|
| Males | 10 |
| Females | 13 |
| Age (yrs.) | |
| Av. | 67 |
| Range | 46–95 |
| Follow-up (mnths) | |
| Av. | 26 |
| Range | 3–72 |

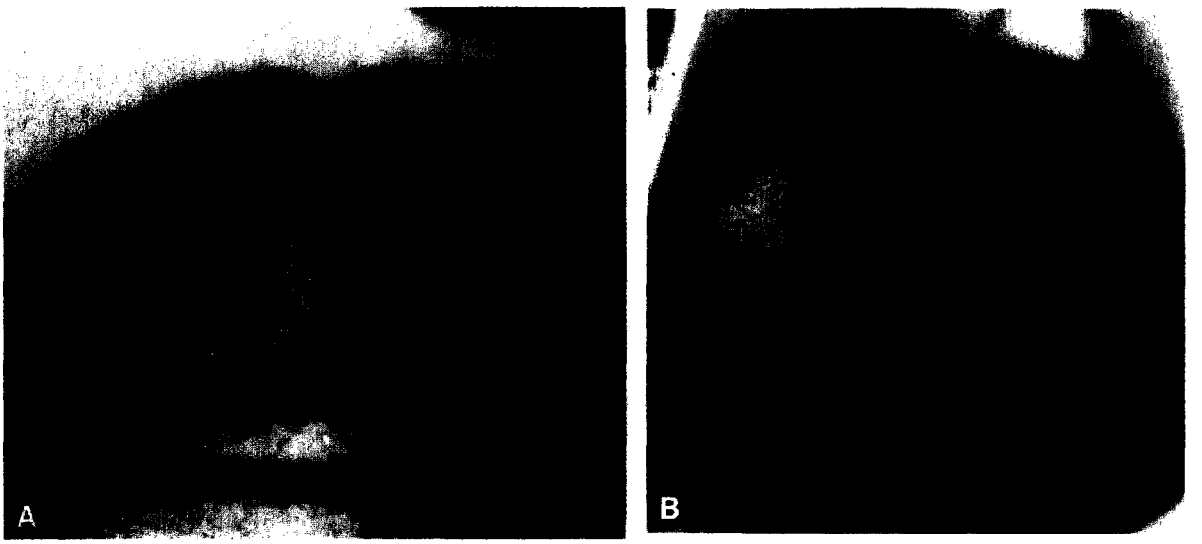


**Fig. 1**

Figure 1—*Patient 12* (Table 2) (A) nasolabial skin used for floor of mouth reconstruction and (B) *Patient 21* (Table 2) Buccal mucosa.

**Table 2** Patient population and outcome

| *Patient* | *Indication* | *Area of coverage* | *Complication* |
|---|---|---|---|
| 1. 67 yr. M. | Recurrent SCC | Floor of mouth<br>Bilateral flaps. | Flap avulsed 2nd. Stage<br>Partial flap loss. Death. |
| 2. 78 yr. M. | Recurrent SCC | Floor of mouth | None |
| 3. 83 yr. F. | Recurrent SCC | Floor of mouth | None |
| 4. 65 yr. F. | Recurrent SCC | Retromolar area | None |
| 5. 68 yr. M. | Recurrent SCC | Floor of mouth | Obstructive sialadenopathy |
| 6. 83 yr. F. | Recurrent SCC | Floor of mouth | Obstructive sialadenopathy<br>Second intraoral lesion |
| 7. 48 yr. M. | Recurrent SCC | Buccal mucosa | None |
| 8. 55 yr. F. | Recurrent SCC<br>Tethered lip sulcus | Floor of mouth | Partial necrosis<br>None |
| 9. 95 yr. F. | Recurrent SCC | Lower alveolus | None<br>Death |
| 10. 62 yr. M. | SCC | Buccal mucosa | None<br>Death. Lung Metastases |
| 11. 50 yr. F. | SCC | Buccal mucosa | Local Recurrence |
| 12. 46 yr. F. | SCC | Floor of mouth | None |
| 13. 78 yr. M. | SCC | Floor of mouth | None |
| 14. 68 yr. F. | Recurrent SCC | Buccal mucosa | None |
| 15. 74 yr. M. | SCC | Lower alveolus | None |
| 16. 75 yr. M. | SCC | Upper alveolus | Infection |
| 17. 81 yr. F. | SCC | Upper alveolus and lip | None |
| 18. 63 yr. F. | SCC | Floor of mouth | None |
| 19. 76 yr. M. | SCC | Floor of mouth | Obstructive sialadenopathy |
| 20. 46 yr. M. | SCC | Tongue and floor of mouth | Partial necrosis. Death. Lung metastases |
| 21. 54 yr. F. | SCC | Buccal mucosa | None<br>Death. Lung metastases |
| 22. 76 yr. F. | SCC | Buccal mucosa | Local Recurrence<br>Death. Lung metastases |
| 23. 62 yr. F. | Adenoid cystic carcinoma | Buccal mucosa | None<br>Death. Lung & Bone mets. |

and reconstruction was performed for a local recurrence of tumour or a new, second lesion in an area of dysplastic change which had been previously treated with surgery and/or radiotherapy (Table 2). Five of the ten were initially treated in our unit.

Twenty-five nasolabial flaps were used to reconstruct the intra-oral defects. Nineteen were performed as a two-stage procedure and six in a single stage. Inferiorly based flaps were most commonly used. This reflected that the most prevalent sites requiring reconstruction were the floor of mouth (Fig. 1A) and buccal mucosa (Fig. 1B). In addition, this orientation was used in 90% of cases in males in order to avoid problems with buried or transferred hair.

The size of the flap elevated was dependent upon donor area. Commonly a flap of 6 by 4 cm was easily raised, particularly in the elderly age group. Of the 25 flaps, none was completely lost from ischaemia. There were three partial tip necroses (12%). One of these occurred in a patient who had previously undergone several surgical procedures and radiotherapy for persistent local disease, including a neck dissection on the same side as the inferiorly based flap. In the other two cases, both were inferiorly based flaps that had a simultaneous neck dissection on the same side as the pedicle. One flap was partially avulsed at the second stage procedure as a division and inset of the pedicle was attempted (Table 3).

There was no incidence of gross infection involving the transferred flap nor its recipient site. However, two single-stage de-epithelialised procedures developed minor infected inclusion cysts in the transbuccal tunnel which required correction. Three patients were inconvenienced initially by tightness and puckering of the donor site. All claimed that this settled satisfactorily with time.

Of the ten patients operated on in order to salvage a recurrence or a new second lesion, all remained free of local tumour. Local tumour recurrence occurred in two patients following excision and nasolabial flap reconstruction (8.7%). One of these recurrences occurred in a 76-year-old female whose histopathology revealed a close margin of excision of the tumour in a background of leukoplakia. This was present in all surgical margins. The recurrence became clinically obvious 6 months after the surgery. The second case was a 50-year-old female with a squamous cell carcinoma of the floor of mouth whose histopathology showed dysplastic changes at the surgical margins. The recurrence developed 18 months later and was treated further surgically.

Obstructive sialadenitis occurred in three patients thus presenting the problem of a palpable submandibular mass. All three cases had had tumours situated in the floor of mouth (25%). Only one required surgical intervention, at which the involved gland was found clear of tumour. The other two were followed closely and settled with time. Of the other six floor of mouth tumours, five had a node dissection previously or at the time of the current surgery.

The presence of intra-oral hair, transferred with the flap, was found in three patients, all of whom were males. This problem was managed usually by regular de-epilation when attending outpatient clinics. Sensation was tested subjectively and objectively by sharp pin-prick in the 15 patients seen. No patients, when asked, thought they had any sensation of either temperature or tactile nature. When tested with sharp pin-prick, 12 had no feeling and the remaining three had a diminished response. Surprisingly, this lack of feeling was only a problem in one patient who complained that food became fixed to the flap. This sometimes resulted in an unpleasant odour.

The donor site appearance was very acceptable to most patients. Only two of the 15 were dissatisfied, one of whom covered his scars with a beard. The other was unhappy with the tethering effect of the de-epithelialised pedicle when she spoke. Dentures were worn by only 17% of the patients postoperatively. Most found that, in spite of attempts, they were unstable and uncomfortable.

There were seven deaths (30%) in this series, five of which occurred from distant tumour metastases. There was no evidence of local tumour disease at the time of death in any of these. One patient died at 97 years of age and one was lost to follow-up.

## Operative technique

After the surgical defect has been created, the design of the flap is determined by its location.

**Table 3** Complications

| | |
|---|---|
| Partial flap loss | 3 |
| Avulsion of part of flap | 1 |
| Recurrence | 2 |
| Intraoral hair | 3 |
| Donor site distortion | 2 |
| Obstructive sialadenopathy | 3 |
| Infection | 2 |

Defects situated on the palate or upper alveolus are more easily closed with a superiorly based flap. When this design is used for males, care is taken to avoid including hair-bearing skin in the flap. This is a limiting factor of the flap length in males. For problems of the lower alveolus, floor of mouth and buccal mucosa the inferiorly based flap rotates more easily without kinking of the pedicle. In some circumstances retromolar and tonsillar defects can be closed if the flap is situated more laterally. This, however, causes distortion of the cheek donor site and is thought to be stretching the technique to the limit (McGregor and McGregor, 1986).

The side of the face from which the flap is raised is usually determined by the proximity of the defect to either side. It is thought that it is safe to design a flap on the same side as a simultaneous neck dissection (Elliott, 1976); however, in our experience 22% (2/9) of flaps so raised had partial necrosis. In this situation it may be prudent to use the contralateral side, if at all possible.

For the inferiorly based flap, the length is determined by the medial canthus and the need to avoid ectropion of the lower eyelid. Whereas the superiorly based flap is limited in length by the beard line in males, width of the flap is dependent upon the degree of laxity of the cheek. If the flap is designed too wide the donor area will be closed with tension, resulting in distortion of facial landmarks. This effect is seen particularly on the alar base and lip (Fig. 2). In the cases where this occurred initially, the distortion improved and resolved with time, particularly after the pedicle was divided and re-inset on the cheek. A width of 3 to 4 cm usually can be elevated without causing these donor site problems. If the defect is wider, bilateral flaps can be used (McGregor and McGregor, 1986).

The actual flap elevation technique has been well described (Georgiade *et al.*, 1969). The flap is raised above the facial muscles, avoiding the parotid duct. A tunnel is made at an appropriate level of sufficient size to accommodate the flap easily without constriction. If a single-stage procedure is planned, the medial incision is made longer than its lateral correspondent. This allows the area of de-epithelialisation to be triangular in shape, thus minimising the tethering effect of the pedicle. Closure of the donor site is also made more easily. The bridge of the pedicle is de-epithelialised before transfer and the flap is then inset into the defect. If the patient has teeth, a temporary bite block may be necessary to avoid damage. In a two-stage procedure the secondary division and insetting is completed at 2 to 3 weeks depending upon the quality of the bed and the amount of initial inset. This can be performed under local anaesthesia if necessary.

**Fig. 2**

Figure 2—*Patient 16* (Table 2) Left Alar base flaring and upper lip distortion.

## Discussion

The need to reconstruct even small defects in order to avoid anatomic distortion and subsequent interference with function of the oral cavity is well accepted. Our experience with the nasolabial skin flap for these purposes has been encouraging. Moderate size defects up to 4 to 5 cm, particularly of the floor of mouth and buccal mucosa areas, are well suited to this technique. If the defect is larger and situated anteriorly in the floor of mouth, bilateral flaps can be used with good results.

The multiple branches passing from the facial, transverse facial and angular vessels to overlying nasolabial skin affords a versatility in flap design (Cormack and Lamberty, 1986). This allows flaps to be based superiorly or inferiorly. Defects of the palate, upper alveolus and upper lip are closed by a superiorly orientated flap as this avoids twisting of the pedicle. Similarly, the reverse is true of lesions of the floor of mouth, lower alveolus and lower lip. The vascularity of the flap in this series proved very reliable. There was a 12% incidence of partial flap

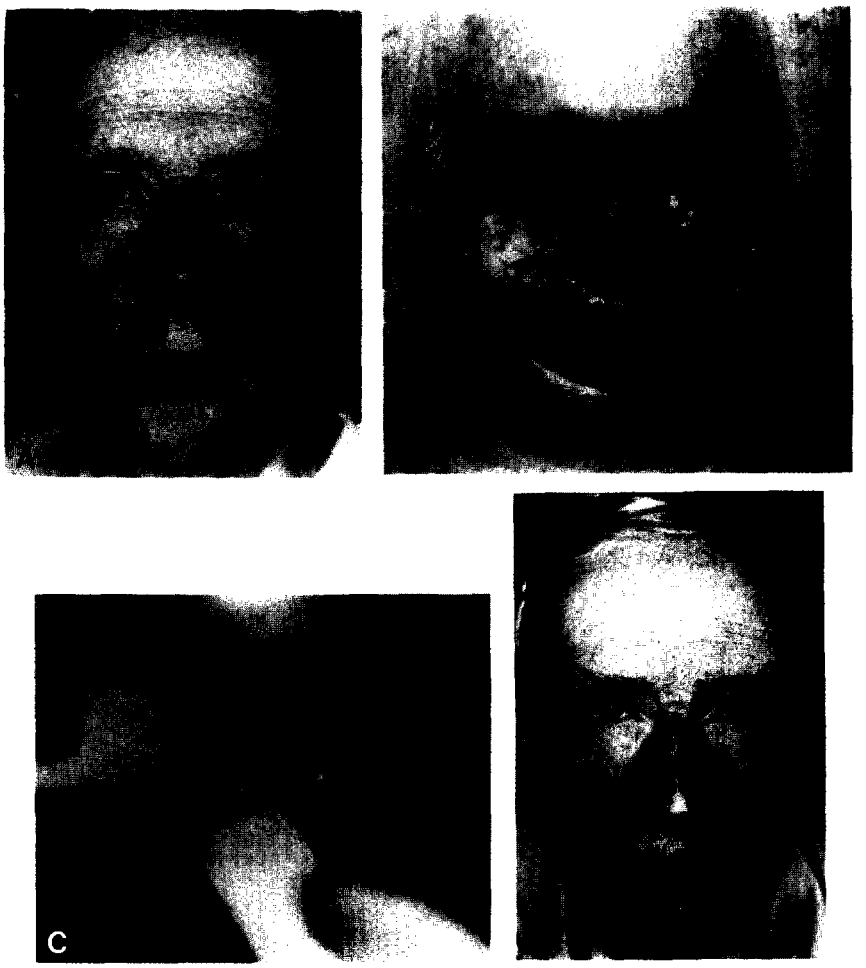


**Fig. 3**

Figure 3—*Patient 2* (Table 2) (A) Preoperative appearance. (B) Preoperative lesion floor of mouth and right side of tongue. (C) Nasolabial flap lines the defect. (D) Postoperative appearance at 12 months.

necrosis. Two of these three occurred in cases that had simultaneous, ipsilateral neck dissections. In spite of its use by others in similar circumstances (Elliott, 1976), it may be safer to avoid this situation. Flap elevation is quick and simple, with minimal donor site deformity and rapid postoperative rehabilitation (Fig. 3). These are factors of importance in many of these patients because of their advanced age and/or poor medical risk.

Both single and two-stage flaps were used successfully. The single-stage procedure offers one less operation but has the potential risk of vascular problems. In defects situated at a distance from the donor site it would seem to offer no advantage but it may be more suitable for juxtaposed defects, in particular those of buccal muscosa. Tethering and puckering of the de-epithelialised pedicle, however, can be a distressing problem of the single-stage procedure. Epithelial inclusion cysts can be troublesome in single-stage procedures as the hair follicles in the male beard extend for quite some depth in the subcutaneous fat. For this reason the single-stage technique is now not used by us in males.

Undoubtedly the biggest disadvantage of this flap is its limited size. Vertically the medial canthus and, in males, the hair line of the beard determine the length. The width is limited by laxity of the cheek and the need to avoid distortion of the angle

of the mouth. Because of this limitation it may be argued that the surgical margins of resection may be influenced by the tissue available for reconstruction. This has not been our experience, provided the flap is carefully selected for closure of only moderate size defects. There was a local recurrence rate of 8.7% in our series. These occurred in patients where there were widespread, microscopic field changes of dysplasia.

Obstructive sialadenopathy occurred in several cases where the flap was used for floor of mouth defects. This proved a worrisome problem as to the aetiology and management of the mass after surgical resection of the primary tumour. Aspiration cytology has proved helpful diagnostically in this situation. Although two-thirds in our group settled without treatment, it may be reasonable to consider a submandibulectomy at the time of primary resection in patients with floor of mouth lesions.

In our experience, few of our patients wear complete dentures after the surgery in spite of multiple attempts and denture modifications. This still proves to be an unsolved problem in intra-oral reconstruction.

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## The Authors

**K. L. Mutimer, FRACS,** Overseas Fellow in Plastic Surgery
**M. D. Poole, FRACS, FRCS**, Consultant Plastic Surgeon, The Radcliffe Infirmary, Oxford.

Requests for reprints to Mr M. D. Poole.

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