Reconstruction of the lower lip

IAN A. McGREGOR

West of Scotland Regional Plastic and Oral Surgery Unit, Canniesburn Hospital, Bearsden, Glasgow, Scotland

Summary — A modification of the classic Gillies fan flap as used in reconstructing full thickness defects of the lower lip is described. The method is suitable for defects involving part of the width of the lip up to defects of the entire lip. It can also be used in association with a “lip-shave” when there is pre-malignant change in the vermilion generally in addition to the focus of frank squamous carcinoma.

Squamous carcinoma of the lower lip is a common tumour; as a result, resection of part or all of the lower lip is frequently required. Of the methods used to reconstruct the resulting defect the ones most often used are either modifications of the Bernard procedure (Bernard, 1853) or make use of the fan flap principle (Gillies & Millard, 1957). In preparation for each of these reconstructions excision is carried beyond the strictly pathological requirements for removal of the tumour in order to create a geometrical shape which will facilitate the carrying out of the method selected.

In the Bernard procedure (Fig. 1) the defect is created in the form of a V which may vary in breadth depending on the lateral extent of the tumour, in the extreme case extending from angle to angle. To reconstruct this defect, tissue is advanced from each side of the V to meet in the mid-line and the resulting redundancy of the upper lip is excised as a dog-ear along the naso-labial fold. In the fan flap (Fig. 2) the defect is created as a rectangle, on one or other side of which a flap is designed with the outline of a fan, encircling the angle of the mouth and centred on the angle. Rotation-advancement of this flap reconstructs the lip.

Although modified and improved versions of the Bernard procedure have recently been described (Webster et al., 1960, Fries, 1973) it is generally recognised that even in its modified form it tends to leave the patient with a tight lower lip and a corresponding redundancy and overhang of...
Figure 4—A clinical example of the modified single fan flap, following excision of squamous carcinoma of lower lip and deep lip-shave of remaining red margin, showing the steps of the technique, used in association with tongue flap to reconstruct the vermilion as shown in Fig. 9B. The squamous carcinoma with the premalignant vermilion and the combined defect outlined (A). The defect with the fan flap cut (B), rotated (C) and sutured (D), with tongue flap in position (E). The final result (F).
the upper lip. The fan flap is free of this defect and generally gives better results. In its classic form (Gillies & Millard, 1957) it does have certain unsatisfactory aspects though many of these have been eliminated in the bilateral neurovascular fan flap modification, described by Karapandzic (1974).

One problem does however remain whether the fan flap is used in its classic form or in the neurovascular modification. Many patients with a frank squamous carcinoma of the lower lip have associated pre-malignancy of the adjoining red margin, the carcinoma merely representing the most neoplastically advanced area which has arisen on a background of multifocal actinically induced pre-cancerous change. Such a patient, if he is to be treated adequately, requires to have his vermillion prophylactically stripped in the form of a lip shave at the same time as the resection of his carcinoma. It is the combined defect left following formal resection of the carcinoma and lip shave of the adjoining vermilion, angle to angle, which is not readily dealt with by a fan flap in either form.

The purpose of this paper is to describe a further modification of the classic fan flap which is capable of coping with this combined defect and which also, used bilaterally, can reconstruct the entire lower lip. The method works most effectively when the post-excisional defect extends to the angle of the mouth.

The technique

The full thickness defect of the lip is designed almost as a square (Fig. 3), usually consisting of half of the lip, and for reconstruction a vertical full thickness cheek flap, approximately rectangular in shape, is outlined on the cheek immediately lateral to the lip defect. The width of this rectangle is made to equal that of the vertical width of the lip defect and its length to the vertical width of the defect plus the width of the flap. The reasons for these dimensions become apparent when the flap is transferred (Fig. 4).

If this rectangular flap is compared with the classic fan flap it will be seen that part of the rectangle outlined on the cheek corresponds to the back-cut of the classic flap. The similarity between the two flaps extends also to the fact that the narrow pedicle of the rectangular flap contains within it the superior labial vessels. It is in the transfer that the differences between the two flaps appear.

When the classic fan flap is rotated into position the resection margin of the flap is sutured to the resection margin of the residual lip and as the flap advances with rotation the angle of the mouth rolls round along with the flap. In contrast, the pedicle of the rectangular flap stays put, providing a static pivot point around which the rectangle, initially vertical, rotates 90° to take up a horizontal position and fill the lower lip defect. At completion of the transfer the angle of the reconstructed lip remains in its original position. The flap is sutured in its new position in layers and the secondary defect, which corresponds to the site and shape of the upper half of the rectangular flap before its transfer, is closed by bringing its upper outer angle downwards and medially towards the angle of the mouth.

In order to make the transfer easier to understand and show how the flap fits the defect it has been described as a rectangle but the formality of this geometrical pattern is not slavishly followed in practice. The angles left when the flap is transferred tend to round off into curves and the angles of the flap itself can be correspondingly rounded in construction so that curve will fit curve (Fig. 5). Rounding off of the angles in this way has the advantage also of reducing the amount of advancement required to close the secondary defect of the cheek. The shape of the square resected from the lip can also be tailored on occasion to take account of the groove between the lip and chin prominence so that the resection line runs along the line of the groove (Figs. 6 and 7). On occasion also excision of the tumour extends a little across the mid-line so that the defect is rectangular rather than strictly square. Once the surgeon has gained experience in knowing how his flap will lie, once transferred, the flap itself can also be tailored to fit such modified defects.

Completion of the transfer leaves a lip devoid of vermillion along the free border of the flap, the free border consisting of a cut edge—skin, muscle and mucous membrane.

It would clearly be possible to close this defect and provide a "red margin" by advancing the mucous membrane lining the flap and suturing it to the skin. Indeed this was the method used when the flap was first employed (Fig. 8). When pathological considerations permitted an attempt was also made to leave a fringe of mucosa and at the same time sculpture the original resection to leave a rounded edge which would better mimic the roundness of the normal red margin. The result
An alternative and altogether preferable method of providing a red margin is to use a tongue flap (Fig. 9) and it is in exploiting the tongue flap to reconstruct the red margin in this context that the major virtue of the reconstructive method becomes apparent. When a tongue flap is used it is technically easier to use it to resurface the margin of the entire lip and not merely the margin of the flap. The effect is to bridge the central vertical skin suture line, eliminating the likelihood of a marginal notch at that point, producing instead a lip margin which extends smoothly from angle to angle.

In this way the method gives the surgeon freedom, indeed it provides a positive inducement, to carry out a lip shave coincidentally with resection of the carcinoma, making the resection as
a single specimen, the lip shave prophylactic and the resection, hopefully, therapeutic.

The method can also be applied to the defect of the entire lower lip (Fig. 10), viewing the defect as having two parts, each consisting of half of the lip and each reparable by a fan flap. The bilateral flaps meet in the mid-line and are there sutured together (Fig. 11). A tongue flap to provide a red margin completes the reconstruction (Fig. 12).

The subsequent management of the tongue flap used to reconstruct vermilion has already been fully described elsewhere (McGregor, 1966) and needs no further discussion.

Like both the classic and the neurovascular fan flaps, the modified version just described makes use of the naso-labial area of skin availability to close the secondary defect. From this it follows that the method works most readily and gives the best cosmetic result when this area of availability is present in good measure. The indication of its adequacy is a well-marked naso-labial fold. Such a fold usually goes with a thin face. The fat, unlined, face is a bad subject for the method. Difficulty in the transfer, with tension in the suture lines is to be anticipated in such a patient. The same is of course true also of the other lip reconstruction methods and indeed of any flap raised on such a face.
Fortunately it is a facial configuration relatively rarely met with in the age group which usually develops lip carcinoma.

Discussion

The method has the immediately obvious disadvantage of denervating the flap, both its motor and sensory supply. This disadvantage it shares with the classic fan flap and it is this disadvantage which the neurovascular fan flap of Karapandzic has eliminated. In the case of the single flap the remaining lip has full sensation and movement, and patients do not seem unduly concerned about their absence in the flap. Recovery of both sensory and motor function does slowly take place in nearly all patients.

In the case of the double fan flap these deficits are more significant though the absence of motor activity has not resulted in drooling and the lack of sensation has, rather surprisingly, not been spontaneously commented upon by the patients. Good recovery of sensation has been found to occur slowly. More unexpectedly, remarkably effective motor recovery has also taken place in many patients, though still more slowly. When one considers the amount of disruption of both the sphincteric and the dilator components of the muscle complex responsible for lip movement, and even more the changes in direction of muscle fibres which must accompany the 90 degree rotation of the flaps, the extent and effectiveness of the functional reintegration which takes place is astonishing (Fig. 13).

A less obvious deficiency of the method is cosmetic. Not foreseeable and not entirely explicable, is a tendency for the concavity of the skin surface of the normal lip to be replaced in the flap by a degree of fullness creating a slight convexity. This has not concerned the patient but it is usually present. It may be that the flap tends to be made broader than is desirable; it may be that some subsequent contraction of the flap substance occurs. Regardless, its presence does constitute a cosmetic defect, albeit a minor one.

The need to manage the tendency to scaling of the tongue flap has been discussed previously in discussing that element of the reconstruction. It results from the fact that tongue mucous membrane has a parakeratotic sequence of maturation rather than the orthokeratotic maturation characteristic of the epithelia normally exposed to a dry environment. Exposed to a dry environment such mucosa retains its original type of maturation, and as a result the cells at the surface tend to remain adherent, giving rise to the scaling seen clinically. Such scaling in this way does tend to diminish with time.

The main virtue of the method lies in the freedom it gives the surgeon to carry out a prophylactic lip shave as part of his therapeutic strategy. The need for this will doubtless vary in different parts of the world but wherever the Celt has migrated and taken with him his susceptibility
to solar damage the need for prophylactic lip shave (Spira and Hardy, 1964) in managing lower lip cancer is frequent. Even when he remains in his native environment the problem of actinic multifocal pre-malignancy of the lower lip vermilion is a regularly recurring one, both as a presenting lesion or as a background to invasive squamous carcinoma. The combination of resection of the squamous carcinoma and stripping of the remaining vermilion as a lip shave is undoubtedly required more often than it is carried out (Barton et al., 1964). The technique which has
been described should at least encourage such a proper excisional approach to the overall pathological problem since it provides a reconstruction capable of coping with the resulting defect.

An added virtue of the method is the fact that it can be extended to cope with defects of the entire lower lip.

References


The Author

Ian A. McGregor, ChM, FRCS, FRACS(Hon), Consultant Plastic Surgeon and Director, West of Scotland Regional Plastic and Oral Surgery Unit, Canniesburn Hospital, Bearsden, Glasgow, Scotland.

Requests for reprints to: Mr I. A. McGregor, Canniesburn Hospital, Bearsden, Glasgow, Scotland.