

## Original Article

# Fan flaps for Cheiloplasty (lower lip reconstruction): A two year experience

Rajan T. M. Sheeja, Varughese Saramma, S. Jagadeesh

Department of Plastic Surgery, Medical College, Calicut, India

**Address for correspondence:** Sheeja Rajan TM. C/o Dr. M.C Rajesh, House No.321/33/5352, Near Express Ghar Flats, Chevayur, Calicut, Kerala, India. E-mail: rajshee@sify.com

### ABSTRACT

**Aim:** To evaluate the fan flaps done during the past two years with regard to applicability, reliability, functional perspective and complications.

**Materials and Methods:** All the fan flaps done were reviewed by inspecting case records and directly following up the patients (at periodic intervals). The indications, applicability to defect size, postoperative aesthetic and functional results and drawbacks were noted.

**Results:** Eight fan flaps were done during this period. All were done for squamous cell carcinoma affecting lower lip. All the flaps survived. Two early cases of Gilles fan flap developed significant microstomia. Later flaps with neurovascular preservation maintained sensations with good commissural competence. Nakajima fan flaps gave good overall results.

**Conclusions:** The fan flaps, especially the Nakajima modification with neurovascular preservation are safe and reliable flaps for lip reconstruction in terms of form and function.

### KEY WORDS

Cheiloplasty oral circumference advancement, commissure competence, innervated flaps

### INTRODUCTION

Lips have important aesthetic and functional roles in the body which make their satisfactory reconstruction a surgical challenge to head and neck surgeons. Most of the development in cheiloplasty occurred in the last 200 years with innervated flaps being described only within the last 25 years. Fan-shaped orbicularis oris musculocutaneous flaps have been the mainstay of lip reconstructions with modifications being added periodically.

Lip is a very common primary site for squamous cell carcinoma in India. We use the fan flaps frequently when confronted with suitable lower lip defects. This is an attempt to evaluate eight cases of such flaps done in

our centre over the past two years.

### MATERIALS AND METHODS

Fan flaps done during the period of January 2003 to December 2005 were retrospectively reviewed. The site of lesions on the lower lip, postexcisional defect size and oral circumference skin laxity were evaluated as was the postoperative course of all the patients. A critical analysis was made of the merits and demerits of fan flap and its modifications in each case.

### RESULTS

Between January 2003 and December 2005, eight patients underwent fan flap reconstruction for freshly created

lower lip defects. The ages ranged from 57 to 63 years. Five patients were males and three females.

All patients had squamous cell carcinoma of lower lip, five had well differentiated and three had moderately differentiated carcinoma. None showed evidences of premalignant changes or second primaries in the rest of the oral cavity. All lesions were in the mid 1/3 of the lower lip. Excision was done with 2 cm margin. Commissure was not involved in any of these cases. Postexcisional defects ranged from one-half to whole length of lower lip. All patients had good marginal clearance on histopathologic examination. Nevertheless, they are on periodic follow-up for signs of recurrences.

Among the eight cases, two of our early cases were the standard Gilles oral circumference advancement flaps [Figures 1 and 2]. For the next case we applied the

Karapanazic principle for neurovascular preservation. With the aim of commissure preservation, we shifted to McGregor's rectangular modification for the next two cases [Figure 3]. We improvised further by Nakajima flap for the last three cases with preservation of motor and sensory innervations in the flap. Vermilion reconstruction was not attempted for the Gilles and Karapanazic flaps, but was done in the McGregor and Nakajima flaps with a buccal mucosal transposition flap (from wound edge) for unilateral cases [Figure 4 and Table 1]. The latter reconstruction waived the need for the classical tongue flap construction of vermilion, described with such flaps. There were no instances of flap necrosis, either total or partial.

All our cases were evaluated postoperatively based on criteria like (1) mouth opening (2) oral competence (3) feeding problems (4) sensations (5) cosmesis (6) speech



**Figure 1:** Preoperative case of squamous cell carcinoma lip



**Figure 2:** Same patient as figure 1 with Gillies fan flap reconstruction



**Figure 3:** McGregor flap (Bilateral). Immediate postop



**Figure 4:** Nakajima flap with buccal mucosa for vermilion reconstruction

**Table 1: Comparison of the functional results of fan flaps**

Case No.	Flap type	Mouth opening	Sphincter competence	Commissure definition	Sensations	Social acceptance
1	Gilles (B/L)	++	+++	Shifted	+	+++
2	Gilles (B/L)	+	+++	Shifted	+	+
3	Karapandzic (B/L)	++	+++	Shifted	+++	++
4	McGregor (U/L)	+++	+++	Shifted	++	+++
5	McGregor (B/L)	++	+++	+++	+	+++
6	Nakajima (B/L)	+++	++++	+++	++++	+++
7	Nakajima (U/L)	++++	++++	+++	++++	++
8	Nakajima (B/L)	+++	++++	+++	++++	+++

+: Poor, ++: Satisfactory, +++: Good, ++++: Excellent

(7) flap bulk (8) donor site morbidity (9) social acceptance (10) cancer clearance.

## DISCUSSION

Lips are essential organs for normal life, playing a significant role in consumption, continence, communication and cosmesis. Such delicate aesthetic and functional requirements pose exceptional demands on reconstructive techniques.

Requirements of an ideal reconstructive option would be (1) matching skin cover (2) oral lining (3) vermilion colour match (4) labial sulcus depth (5) commissure definition (6) adequate stomal diameter (7) competent oral sphincter (8) sensations maintained and (9) respect of aesthetic units.

Lip reconstruction is not a new concept. Earliest references to fan flaps date back to 200 years ago. The first oral circumference advancement flap was designed by Von Bruns in 1857. The fan flap that Gilles reintroduced and popularized in 1920 was a denervating reconstruction that gave form but no function.<sup>[1]</sup> In 1974, the Karapandzic principle was introduced, modifying the former into an innervated orbicularis oris myocutaneous flap.<sup>[2]</sup> We attempted both these reconstructions in our early cases. Though results were good for defects less than one-third of the lip length, the microstomia became progressively severe with enlarging defects. Another principle disadvantage was the distortion of the commissure.

McGregor suggested a rectangular modification of the Gilles' flaps in 1983 with the aim of full thickness lip defects even up to entire lip.<sup>[3]</sup> He had described lip shave and vermilion reconstruction with a ventral tongue flap with his fan flap. The addition of a tongue flap adds yet another stage to the reconstruction adding to the

morbidity.<sup>[4]</sup> In an attempt to obviate the need for a tongue flap which might be more suited in a Western setting, we have employed a simple superiorly based buccal mucosal transposition from the defect edge to the flap mucocutaneous interface for a very satisfactory vermilion reconstruction.

Nakajima, Yoshimura and Kami, in 1984 proposed a modification for McGregor's flap, based on the facial artery instead of the labial artery.<sup>[5]</sup> In addition to giving a more robust vascularity we found that preservation of motor and sensory innervation to this flap gives very good oral sphincter competence and sensation with good commissural definition and mouth opening. Cosmesis along with the vermilion reconstruction is excellent with the suture lines confined to and masked by the nasolabial and mental creases. Preservation of buccal sulcus is yet another merit of fan flaps. Though other innervated composite tissue transfers have been described by Tobin,<sup>[6]</sup> Nikola, Sadove *et al.*, the fan flaps still enjoy more popularity worldwide owing to their reliability and simplicity.

## CONCLUSION

We conclude that the orbicularis oris fan flaps, especially the ones with neurovascular preservation are an excellent reconstructive option for cheiloplasty. Techniques ignoring neuromuscular anatomy give poorer results. Classical Gilles and Karapandzic flaps cause progressive microstomia and commissure distortion. Among the fan flaps, the Nakajima modification gives the best overall results with reestablishment of oral competence, adequate oral aperture and motion and normal anatomic proportions.

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