

# A Clinical Study on Reconstruction of Lip Defects

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## Abstract

**Introduction:** Lips constitute the most important unit of the lower face having esthetic and functional roles, a delicate sensory apparatus, maintains oral competence, and determines facial expressions. Reconstructive lip surgery aims restore basic function, maintain sensation, and avoid cosmetic deformity.

**Aim:** To select a treatment protocol based on an algorithmic approach and evaluates the esthetic and functional outcomes of various surgical procedures for lip defects.

**Materials and Methods:** A total of 21 cases of lip defects resulting from various causes were studied. Their etiologies, reconstructive options, complications, and outcome in terms of functional and esthetics restoration were analyzed. An algorithmic approach to lip reconstructions was formulated and favored.

**Results:** Local flaps had excellent cosmetic and functional results, regional flaps gave satisfactory results, and distant flaps gave poor results.

**Conclusion:** For optimum results, use of local flaps and innervated myocutaneous flaps are advocated. Frozen section studies may help in ensuring adequate excisional margins and good long-term results.

**Key words:** Abbe Estlander flap, Esthetic units, Innervated myocutaneous flaps, Lip cancer, Lip switch, Nasolabial flaps, Perialar crescent excision, Vermilionectomy, Wide local excision

## INTRODUCTION

Lip cancer and trauma are the two most common causes of lip defects. Other causes are infectious disease, vascular anomalies, clefts, vasculitis, and congenital nevi.<sup>1</sup>

Lip cancer is the most common oral malignancy (30%). Squamous cell carcinoma is the most common neoplasm of the lip. Basal cell carcinoma, melanoma, salivary gland carcinoma are others causes. Lower lip is the site of approximately 95% of all lip cancers with the upper lip only 5% of cases. Commissures are involved in <2% of cases.<sup>2,3</sup>

Prolonged sun exposure (ultraviolet radiation) is the main cause. Factors of less significance are tobacco use, poor oral hygiene, alcoholism and syphilis.<sup>4</sup>

Male to female ratio 6:1 for all lip cancers. Most lip cancers are low grade and grow slowly with a propensity for lateral than vertical spread.<sup>5</sup>

Lymphatic drainage of upper lip and lateral part of lower lip is to the submandibular lymph nodes. The central third of lower lip drains to submental nodes. Cervical metastasis is seen in <8% of patients at the time of presentation. For and adequate cancer resection a 10 mm margin is generally preferred.

Traumatic lip injury occurs from human and dog bites and road traffic accidents (RTAs). The goal is to preserve all the lip tissue and reapproximate the wound edges with minimum tension.<sup>6</sup>

Critical land mark structures - White roll, philtral columns, mucosa - vermilion junction, and commissure are aligned

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first with key sutures. Muscle first, mucosa next, and skin last. When the defect includes more than 1/3 of the lip, primary closure is not possible. Local and regional flaps are used.

### Aim

To evaluate the esthetic and functional outcomes of various surgical procedure for lip defect.

## MATERIALS AND METHODS

Prospective observational study was conducted in the Department of the Plastic Reconstruction and Faciomaxillary Surgery, Madras Medical College. Institutional Ethics Committee approval and patients informed consent was obtained. Reconstruction of lip defects of various causes. Reconstruction of lip defects of various causes: Lip defects resulting from tumor ablation, traumatic lip defects, vascular anomalies, postcancerum oris defects were included in the study. Patients with tumor excision with involvement of margin, traumatic lip defects closed primarily were excluded.

### Investigations

- Biopsy: Wedge biopsy from the edge of the growth
- Fine needle aspiration cytology (FNAC): Of the regional lymph nodes
- Computed tomography scan: To rule out bony involvement of mandible and maxilla
- Magnetic resonance imaging scan: To rule out infiltration of infraorbital or submental nerves.

### Treatment

#### *Pre-operative assessment*

- Confirmation of complete tumor resection
- Recovery from associated injuries
- Optimum timing with respect to anesthetic risk
- Oral hygiene should be optimized.

#### *Pre-operative planning*

- Analysis of the defect
- Assessment of the available replacement tissue
- Design of the reconstruction.

#### *General principles*

- Motor and sensory innervation of each specific flap is preserved by careful dissection of the neurovascular pedicles
- The oral sphincter is reconstructed whenever possible
- Reconstruction is performed in esthetic units (Burget and Menick, 1985)<sup>7</sup>
- Meticulous attention to flap design as the cover and lining requirements may differ
- To select a treatment protocol based on an algorithmic approach to the problem for improving the outcome.

## Procedures

### *In cancer patients*

- Wide local excision (WLE) with 1.5 cm margins of clearance was done in 9 cases
  - Neck dissection was done in 5 cases
  - Supraomohyoid block dissection 2 cases
  - Suprahyoid block dissection 2 cases
  - Modified neck dissection in 1 case
  - Intraoperatively, tumor clearance was given priority with 1-1.5 cm margin. Reconstruction of the post excision defect was proceeded primarily.
- One patient underwent total vermilionectomy and reconstruction with V-Y musculomucosal advancement flap
- One patient, a post radiotherapy recurrent carcinoma of lower lip had wide spread disease involving floor of the mouth bases of the tongue and mandible and was referred to cancer chemotherapy unit
- One patient developed cardiorespiratory arrest during the surgery of WLE and neck dissection and succumbed later.

### *Upper lip reconstruction*

- Bilateral inferiorly based nasolabial flap – 1 case
- WLE (partial thickness) and covered with split-thickness skin graft (SSG) – 1 case.

### *Lower lip reconstruction*

- Reconstruction using inferiorly based nasolabial flap as unilateral Fujimori gate flap – 2 cases
- Reconstruction using cervical skin advancement – 1 case.

### *Commissure*

- Right angle of mouth was reconstructed using a converse “Over and out” flap – 1 case
- Left angle of the mouth, both lips 15% and left cheek reconstructed with ipsilateral folded forehead flap – 1 case
- Left commissure and upper lip using a lower lip Abbe Estlander flap.

### *In trauma cases*

- In defects <25% of total lip length wound debridement and primary repair was done in the acute setting. Wound debridement was kept to a minimum
- In defect >25% debridement and skin to mucosa approximation was done in the acute setting. Planned reconstruction was later done as a secondary procedure after the wound has settled well.
- Two lower lip defects were reconstructed with Estlander flaps from the lateral upper lip
- One case of upper lip defect was reconstructed using a lip switch flap from the lateral lower lip

- One case of blast injury of the lips and tongue was debrided and primarily repaired resulting in a central deficiency of both the lips and scarring. After recreating the defect, upper lip was reconstructed using bilateral perialar crescent excision and cheek advancement. The lower lip was reconstructed using the Schuchardt's principle
- One patient with post human bite nasal tip and columella and minor lip defect declined lip reconstruction and underwent nasal reconstruction
- One case of post human bite partial loss of lower lip dry vermilion underwent wound debridement and SSG
- Another case of post human bite central upper lip defect underwent wound debridement and skin to mucosa approximation awaits secondary reconstruction (Table 1).

#### Low Flow Vascular Anomalies

Low flow vascular anomalies were subjected to pre-operative sclerotherapy using intralesional injection of 1% sodium tetradecyl sulfate 3-4 doses in 3 weeks intervals. After sufficient fibrosis, lesions were excised and primary repair done.

#### Infectious Diseases

One case of polycystic ovarian disease central upper lip defect was reconstructed using a central Abbe flap from lower lip.

#### Choice of suture material

For a three-layered closure mucosa is closed with chronic suture, muscle with vicryl/polydioxanone suture and skin with monofilament nylon/prolene.

#### Post-operative care

- Frequent use of mouthwash
- Application of antibiotic ointment/petroleum jelly with nonadherent light absorptive dressings
- Early liquid diet followed by semisolid diet.

#### Follow-up

- At appropriate intervals for return of function
- Physical therapy for avoiding scar contracture
- Detection of early recurrences following tumor ablation.

#### Tests to perform

- Oral competence: Assessed by water holding test<sup>8</sup>
- Oral aperture: Normal interincisal distance measurement  $\geq 40$  mm
- Assessment of cosmetic outcome.

## RESULTS

All patients were followed up for tumor control, improvement in appearance, oral competence, speech and

animation. In 21 cases, 15 are male patients and 6 are female, mean age 49.8 years. Patients with following complaints; tumor related - 9 cases, cosmetic deformity - 21 cases, drooling - 7 cases, speech difficulty - 12 cases. Causes are followed; postsurgical - 13 cases (tumor ablation and vascular anomalies), posttraumatic - 7 cases, postinfective - 1 case. Site: Upper lip - 9 cases, lower lip - 11 cases, and commissures - 11 cases. Percentage of tissue loss and thickness varied from minor to near total loss of the lip. Most of the patients have full thickness loss of the lip. Tumor ablation patients: Squamous cell carcinoma - 9 cases, dysplasia - 1 case, malignant adnexal tumor - 1 case. Well differentiated squamous cell carcinoma was the most common histopathological variant (5 cases) followed by verrucous squamous cell carcinoma (2 cases) and high grade malignant squamous cell carcinoma (2 cases). 2 patients were post radiotherapy residual/recurrent squamous cell carcinoma (Figures 1-6).



Figure 1: Squamous cell carcinoma lower lip and right commissure



Figure 2: Squamous cell carcinoma lower lip and right commissure postsurgery

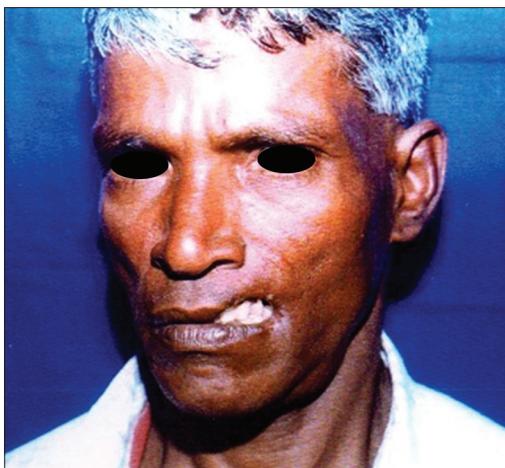


Figure 3: Post human bite upper lip defect



Figure 5: Blast injury: Shattered lips and tongue

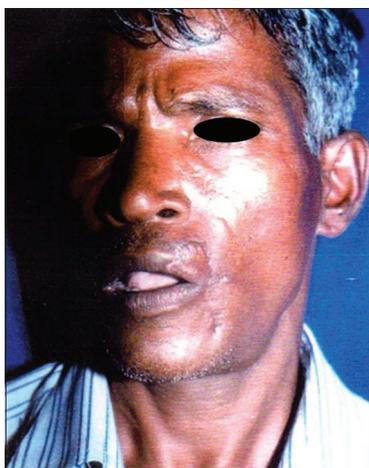


Figure 4: Post human bite upper lip defect postsurgery



Figure 6: Blast injury: Shattered lips and tongue postsurgery

#### Tumor Status

Most cancers were clinically advanced.

- T4: 5 cases
- T3: 2 cases
- T2: 3 cases
- Dysplasia: 1 case.

#### The Nodal Status

- Ipsilateral submandibular lymph nodes: 8 cases
- Submental lymph nodes: 2 cases
- Upper deep cervical: 1 case
- Contra lateral nodes: 2 cases.

None of the patients had detectable metastasis at the time of the presentation.

#### Trauma Cases

- Post human bite: 4 cases
- RTA: 2 cases
- Blast injury: 1 case.

#### Vascular Anomalies

- Low flow arteriovenous malformation: 1 case
- Venous malformation: 1 case.

#### Infections

Postcancerum oris defect: 1 case.

Patients underwent regular clinical workup, routine laboratory investigation, and specific investigations. All cancer patients underwent biopsy confirmation of the tumor, FNAC of the enlarged lymph nodes and radiological investigations to rule metastatic spread. Traumatic lip defect cases were evaluated for associated faciomaxillary injuries. All patients were subjected to treatment planning for delineating the defect and arriving at the most appropriate procedures for the given lip defect. Preoperatively, patient is informed about the risk, alternatives and various stages involved and consent obtained. Oral hygiene was optimized preoperatively. Patients were taken up under general anesthesia under prophylactic antibiotic cover.

**Local Control**

- After WLEs 4 cases had excisional margins positive for tumor cells. All cases were referred for post-operative radiotherapy
- One patient developed local recurrence in the post-operative period underwent local excision and post-operative radiotherapy.

**Regional Control**

- All cases were free from residual or recurrent disease in the neck nodes.

**Cosmetic Results**

- Local flap like lip switch had excellent cosmetic results
- Regional flaps such as nasolabial flaps and cheek advancement flaps gave satisfactory results
- Distant flaps like forehead flaps gave poor results.

**Functional Outcome**

- Oral competence and speech were preserved in the local and regional flaps
- Distant flaps had poor functional outcomes
- There was subjective improvement in all cases and the patients were satisfied
- Overall functional outcomes were comparable with cosmetic results.

**Complications****Mortality**

One case of carcinoma right cheek and lips T4 N2b Mo, following excision and supraomohyoid block dissection succumbed in the post-operative period due to cardiorespiratory arrest (Table 2).

**DISCUSSION**

An algorithmic approach to lip reconstruction is favored. The major goals of reconstructions are Oral competence, adequate oral aperture and motion, normal anatomic proportions. Adherence to basic principles gives better results. As a complex reconstructive procedure prior to establishment of adequate margins can certainly compromise the ultimate result, it is appropriate not to perform closure until margins have been adequately examined. Functional reconstructions are best accomplished with innervated myocutaneous flaps of orbicularis oris for both lips<sup>9</sup> or the depressor anguli oris lower lip or the innervated levator anguli oris flap<sup>10</sup> for upper lip. Upper lip reconstructions are more challenging because of the presence of central lip structures and hair bearing skin in the males. As lower

**Table 1: Distribution surgical procedures**

Procedures	Cases
WLEs	9
Neck lymph node dissections	5
Lip switch, Estlander flaps	4
Fujimori gate flaps	2
Bilateral inferiorly based nasolabial flaps for upper lip	1
Converse "over and out" flap for commissure	1
Folded forehead flap	1
Cervical skin advancement flap for lower lip	1
Bilateral perialar crescent excisions and cheek advancement	1
Schuchardt's principle flap	1
Central Abbe flap	1
SSG	2
Sclerotherapy and local excision of vascular lesions	2

SSG: Split-thickness skin graft, WLE: Wide local excision

**Table 2: Distribution of complications**

Oral incompetence	2 cases
Hypoesthesia with mild drooling	4 cases
Microstomia	1 case
Local recurrence	1 case
Partial wound dehiscence	1 case
Distortion of features	1 case

lip is more important for oral competence, local with intact innervations is preferable.

**CONCLUSION**

For optimum result, use of local flaps and innervated myocutaneous flaps is advocated. Use of other tissues/flaps result in esthetic and functional compromise. Frozen section studies may help in ensuring adequate excisional margins and good long-term results. In trauma, after debridement, primary reconstruction can be done if crush injuries, traumatized vascular pedicle or other life – threatening injuries can be excluded.

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## ALGORITHMS

