A Clinical Study on Reconstruction of Lip Defects

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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.5

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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.1

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.2,3

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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.5

Critical land mark structures - White roll, philtral columns, mucosa - vermilion junction, and commissure are aligned
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, postcancrum 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)7
- 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
- Suprathyroid 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 intraliesional 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
• Oral aperture: Normal interincisal distance measurement ≥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).
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
- Postcancrum 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 check 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 price 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 or the depressor anguli oris lower lip or the innervated levator anguli oris flap 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 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.

REFERENCES

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### Table 1: Distribution surgical procedures

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Cases</th>
</tr>
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<tbody>
<tr>
<td>WLEs</td>
<td>9</td>
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<tr>
<td>Neck lymph node dissections</td>
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<tr>
<td>Lip switch, Estlander flaps</td>
<td>4</td>
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<tr>
<td>Fujimori gate flaps</td>
<td>2</td>
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<tr>
<td>Bilateral inferiorly based nasolabial flaps for upper lip</td>
<td>1</td>
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<tr>
<td>Converse &quot;over and out&quot; flap for commissure</td>
<td>1</td>
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<tr>
<td>Folded forehead flap</td>
<td>1</td>
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<tr>
<td>Cervical skin advancement flap for lower lip</td>
<td>1</td>
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<tr>
<td>Bilateral perialar crescent excisions and cheek advancement</td>
<td>1</td>
</tr>
<tr>
<td>Schuchardt's principle flap</td>
<td>1</td>
</tr>
<tr>
<td>Central Abbe flap</td>
<td>1</td>
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<tr>
<td>SSG</td>
<td>2</td>
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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  |
Sivamuthu, et al.: Lip Defects Reconstruction of Various Causes


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ALGORITHMS

**ALGORITHM FOR UPPER LIP RECONSTRUCTION**

- **Defect Size**
  - Up to one third of the lip
    - Central Defect → Perialar Crescentic excision
    - Vermilion Infact → Nosalabial Flop
    - Lateral Defect → Primary Closure
  - One third to two thirds of the lip
    - Central Defect → Abbe Flap with Perialar crescentic excisions of Karapandzic flap
    - No commissure or Philtrum involvement → Abbe Flap Bilateral innervated Levator anuli Oris flap
    - Commissure involved → Exflander Flop
    - Commissure and Philtrum involved → Exflander Flop with Contralateral Perialar crescentic excision
  - Greater than two thirds of the lip
    - Sufficient adjacent Cheek tissue → Central defect
      - Ipsilateral Bernard - Borow's
    - Insufficient adjacent Cheek tissue → Lateral Defects
      - Total Loss of Lip
      - Bilateral innervated Levator anuli Oris flap with Central Abbe from Lower lip

**ALGORITHM FOR LOWER LIP RECONSTRUCTION**

- **Defect Size**
  - Up to one third of the lip
    - Close Primarily
    - Sufficient lip tissue → Karapandzic (First Choice) Estlander (Second Choice)
    - Insufficient lip tissue → Abbe Karapandzic
  - One third to two thirds of the lip
    - Bernard - Burrow's
    - Innervated Depressor Anguli Oris flap
  - More than two thirds of the lip
    - Total Loss of Lower lip → Bilateral Innervated Depressors anguli Oris flap
    - Insufficient adjacent Cheek tissue → Distant / Free Flap