

*A DISSERTATION ON*  
*STUDY OF*

**RECONSTRUCTION OF  
SOFT TISSUE INJURIES  
OF THE FACE**

In partial fulfilment of the  
regulations for the award of degree of

**MASTER OF CHIRURGIE  
(M.Ch.,) Degree  
BRANCH – III – PLASTIC SURGERY**



**THE TAMILNADU  
DR.M.G.R MEDICAL UNIVERSITY  
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**AUGUST 2013**

## **CERTIFICATE**

This is to certify that this dissertation entitled  
**“RECONSTRUCTION OF SOFT TISSUE INJURIES OF THE FACE”**  
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The Tamilnadu Dr.M.G.R. Medical University, Chennai, in partial  
fulfillment of the requirement in the award of degree of **MASTER  
OF CHIRURGIE IN PLASTIC SURGERY, Branch – III**, for the  
**August 2013** examination is a bonafide research work carried out  
by her under our direct supervision and guidance during the years  
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## **DECLARATION**

I solemnly declare that this dissertation **“RECONSTRUCTION OF SOFT TISSUE INJURIES OF THE FACE”** was prepared by me under the able guidance and supervision of our Professor & HOD, Department of Plastic & Reconstructive Surgery, Thanjavur Medical College and Hospital, Thanjavur between August 2010 and March 2013.

This is submitted to The Tamilnadu Dr.M.G.R Medical University, Chennai, in partial fulfillment of the requirement for the award of **MASTER OF CHIRURGIE, M.Ch., PLASTIC SURGERY,** degree examination held in August 2013.

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# 1. INTRODUCTION

Facial injuries themselves are rarely life threatening but are indicators of the energy of injury. The etiology of facial soft tissue trauma varies considerably depending on age, sex and geographic location. The true incidence is difficult to estimate because minor injuries go unreported and do not seek medical attention. The incidence of facial injuries is high in developing countries like India, than the developed. In Tamilnadu particularly in districts in & around Thanjavur the incidence is high.

In the U.S , three million patients present to the emergency with facial injuries,accidental falls being the most common cause accounting for 48-51% ,16% due to non-fall impact with structures such as door, wall, window, 16-32% due to assault, RTA contributed 50%, sport injuries 8%, dog bite 9%. Other causes account for the remainder including occupational injuries and human bites.

Mechanism of injury for facial injuries varies from place to place depending on the degree of urbanization, socioeconomic status and cultural background. In rural areas domestic violence contribute to majority and in metropolitan areas Road traffic accidents contribute the main cause.Alcohol consumption is a major factor for those between the ages of 30 and 50 years.

In this dissertation, I have analysed the various parameters associated with facial soft tissue injuries – mode of injury, site of injury and different methods of reconstruction. Historical and recent advances have enabled repair of most soft tissue injuries to the face, provided the nature of injury is carefully considered and a thoughtful reconstructive plan is used.

## **2. AIM OF STUDY**

The aim of my study is to collect patients with soft tissue injuries of face presented to our Department of Plastic and Reconstructive surgery, Thanjavur Government Medical College and Hospital, Thanjavur and analyse

- The demographics of the injured population
- Socio economic status
- Alcohol influence
- Mode of injury
- Site of injury
- Anatomic region of the defect
- Reconstructive procedures – primary and secondary
- Rate of wound infection
- Hospital stay



### 3. REVIEW OF LITERATURE

Written history shows medical treatment for facial injuries more than 4000 years ago. Physicians in ancient India were using skin grafts for reconstruction as early as 800 BC.

Progress in plastic surgery moved glacially for hundreds of years and only during 19<sup>th</sup> and 20<sup>th</sup> centuries this speciality forged ahead both scientifically and within the medical fraternity.

In the late 1800s and early 1900s, world war with awful injuries was the driving force behind most plastic surgery developments.

Never before had physicians been required to treat so many extensive facial and head injuries. Shattered jaws, blown off noses, lips and gapping skull wounds caused by modern weapons required innovative restorative procedures.

Aesthetic surgical procedures also developed during the 19<sup>th</sup> century with efforts of American plastic surgeon John Orland Roe.

Jacques Joseph (September 6<sup>th</sup>, 1865 – February 12<sup>th</sup>, 1934) propagated that aesthetic surgery is not frivolous but very serious endeavour and treating the psychology of the patient is as important as treating his disease, undoubtedly makes him the revered 'Father of modern aesthetic surgery'.

The world's first partial facial transplant on a living human was carried out on 27, November 2005 by Bernard Devauchelle, an oral and Maxillofacial surgeon, and Jean - Michel Dubernard in Amiens, France.

The first full facial transplant in the world was done on 20, March 2010 by a team of 30 Spanish doctors on a man injured in a shooting accident.

**EAR RECONSTRUCTION** is first referred in Indian ancient medicine text – The Sushruta Samhita , where cheek flap was used for repair of ear lobule in 900 BC.

- In 1597 Tagliacozzi an Italian has described repair of both upper and lower ear deformities with hairless pedicled retroauricular flaps. He also described medial arm flap for auricular reconstruction and postauricular wedges to maintain ear projection.
- In 1845 Dieffenbach repaired middle third ear defect with an advancement flap and described the use of mastoid flap folded on itself.
- In 1920 Gillies described use of carved costal cartilage buried under the mastoid skin and separated it from the head and cervical flap.
- In 1958 Converse described the “tunnel procedure” for correcting upper and middle helical defects using cartilage grafts.
- Crikelair described banner flap of supraauricular skin based on the auriculocephalic sulcus to reconstruct upper third auricular defects.

- Brent and Nagata advanced ear reconstruction with autologous costal cartilage graft in correction of congenital defects. Brent was first to report successful use of tissue expansion
- In 1980 - Pennington et al performed the first successful clinical ear reimplantation.
- Lanvers et al reported prelaminated flaps, by building cartilage frame work of ear on radial free forearm flap and transferred by microsurgical technique to the recipient area.

## **LIP RECONSTRUCTION**

- ❖ 1000 BC – The first written description of lip reconstruction using local and regional flaps – Passages from the Sushruta Samhita.
- ❖ Tagliacozzi published illustrations describing the use of pedicled tissue transfers from the forearm for lip reconstruction.
- ❖ Louis further advanced the field with his wedge excision and primary closure techniques for small lip lesions.
- ❖ 1834 – Dieffenbach developed the cheek advancement flap technique based on inferolateral pedicle.
- ❖ 1838, Sabitini introduced the Cross lip (Lip-switch) flap transfer which was later developed by Abbe and Estlander.

- ❖ 19<sup>th</sup> century – Bernard and Von Burrow introduced the bilateral full thickness triangular cheek advancement flap after excision of Burow`s triangles for 80% lip defects.
- ❖ In 1920 – Sir Harold Delf Gillies stated the following principles of lip reconstruction: ‘Restoration is designed from within outwards. The lining membrane membrane must be considered first, then the supporting structures and finally the covering’. And he designed the fan flap for lower lip reconstruction.
- ❖ Karapandzic modified the Gillies fan flap with neurovascular pedicle for functional restoration of the oral sphincter.
- ❖ 1974 – Hari and Ohmori performed the microvascular free tissue transfer for lip reconstruction in 1974.

## **NOSE RECONSTRUCTION**

In Ramayana, Lakshmana had cut off the nose of Ravana’s sister as a form of punishment. The kings who ruled the world also followed the same form of punishment by dismembering a part of the body for traitors and spies.

- ❖ 2000 BC - Nose reconstruction operations were probably performed in ancient India, when amputation of the nose was a form of punishment.
- ❖ 800 BC – The great Indian surgeon utilized skin grafting for nose reconstruction.
- ❖ 600 BC – The first evidence of nose reconstruction (Rhinoplasty) was recorded.

- ❖ 500 BC – Sushruta first described nasal reconstruction in his text Sushruta Samhita Circa.
- ❖ 1597 – Tagliacozzi wrote the reconstruction of the nose by borrowing tissue with the “flap” from the arm.
- ❖ The Venetian adventure, Nicolo Manuzzi has given a detailed manuscript about the Moghul empire of the 17<sup>th</sup> century, wherein there is an accurate description of the “Indian Rhinoplasty” technique .

## **SCALP AND FOREHEAD**

### **Anatomy:**

Scalp and the forehead have 5 distinct anatomical layers; skin, subcutaneous tissue, galea or muscle, loose areolar tissue and pericranium. The galea aponeurotica is part of a broad fibromuscular layer that envelopes the forehead and scalp and serves as the central tendinous confluence of the occipitalis muscle posteriorly and frontalis muscle anteriorly. The galea is continuous with the temporo-parietal fascia and also with the subcutaneous musculo-aponeurotic system (SMAS) of the face. The scalp is supplied by arteries from anterior to posterior; the supratrochlear, the supraorbital, superficial temporal, posterior auricular and the occipital arteries. The scalp is drained by veins that accompany the arteries and also through diploe of the cranium to the dural sinuses via emissary veins. Lymphatics are located

principally in the subdermal and subcutaneous level. The muscles of the forehead are innervated by frontal branches of the facial nerve.

## **RECONSTRUCTION OF THE SCALP**

### ***Scalp defects < 3cm***

- Primary closure is possible. Galeal scoring parallel to the axis of the defect relieves tension. Larger defects - scalp flaps, pin wheel flaps, skin grafts (full thickness or split thickness), tissue expansion, free tissue transfer.

### ***Scalp defects 3 – 6cm***

- Rotation advancement flaps. Primary and secondary defects can be closed primarily.

### ***Scalp defects 6 – 9cm***

- One large flap based on a major pedicle can be used, but the secondary defect may require skin grafting. Flaps used – bucket handle flap, Orticochea flap, tissue expansion, free tissue transfer.

### ***Scalp defects > 9cm***

- Free tissue transfer offers a one step solution for resurfacing large scalp defects. Flaps used – Latismus dorsi muscle flap, rectus abdominus, Serratus anterior muscle flap, anterolateral thigh flap.

## **FOREHEAD RECONSTRUCTION**

Small defects of the forehead can be closed primarily. Local flaps should be used for defects upto 40% like rotation advancement flaps, V-Y advancement flaps, 'H' flap and tissue expansion may also used.

## **EYE LID**

### **Anatomy:**

**Eye lid** – three layered structure with skin on the outside, mucosal lining on the inside and structural elements bridging the space in between. Anterior lamella is composed of skin, subcutaneous tissue and orbicularis oculi. Orbicularis oculi has three concentric oval portions; innermost pretarsal portion, middle preseptal and outermost orbital separating the anterior and posterior lamella is the tarsofascial layer, which arises from the orbital rim and begins proximally as the proximal septum. Orbital septum fuses with the lid retracting membrane in the upper eyelid, is the levator palpebrae aponeurosis and in the lower eyelid, is the capsulopalpebral fascia. Tarsal plates are dense cartilaginous structures that provide vertical support and rigidity to the eyelid. The tarsal plates become confluent along the medial and lateral margins forming the palpebral ligaments or the canthal tendons. lacrimal gland composed of two lobes; main orbital lobe and small palpebral lobe is situated in the lacrimal fossa of the superolateral orbit and upper lateral eyelid. The process of blinking distributes the trilaminar fluid across the globe medially where it reaches the puncta and drainage system.

Both the upper & lower eyelids contain canaliculi at their medial aspect. They dilate along their course into ampullae that are enveloped by deep fibres of orbicularis. The canaliculi empty into the lacrimal sac – dilated origin of the nasolacrimal duct which directs flow inferiorly into the nasal cavity through the inferior meatus of nose.

## **RECONSTRUCTION OF EYELIDS**

### **Principles:**

- ❖ Thorough evaluation of the defect and function of the lid
- ❖ Components that have been compromised as well as those that remain viable including skin, muscle, tarsus and conjunctiva should be properly identified and documented.
- ❖ Thorough ophthalmologic examination including visual acuity, field testing and schirmer test should be documented.
- ❖ The eyelids are the focus of much aesthetic attention. Transverse incisions will help to camouflage scars and symmetry with contralateral structures should be preserved whenever possible.
- ❖ Vertical incisions should be avoided so as to avoid contracture and eyelid distortion.
- ❖ Debridement of non-viable tissue should proceed and when doing so reconstructive goals must be kept in mind.



- ❖ Approximation of lid margins should be achieved with alignment of all layers for good functional and aesthetic outcome.
- ❖ Suture materials and knots should be placed to avoid direct contact with surface of cornea and globe.
- ❖ The principles of reconstructive ladder should be applied.

## **METHODS OF RECONSTRUCTION**

### **UPPER EYELID RECONSTRUCTION : *Zone I***

- The upper eyelid is taller in height, more lax, more mobile and is the major facilitator of closure
- Partial thickness defects that measure less than 50% of lid length closed primarily with tissue advancement. Partial thickness defects that measure more than 50% of lid length reconstructed with a full thickness skin graft from the contralateral upper eyelid.
- Full thickness defects
  - < 25% - Primary closure with canthotomy and cantholysis, local tissue advanced.
  - 25% - 75% - Hughes sliding tarso-conjunctival flap, levator recession, composite graft, Cutler-Beard advancement flap from the lower lid.
  - 75% - Lower lid switch flap

## **LOWER EYE LID RECONSTRUCTION – *Zone II***

- Lower eyelid is shorter in height, less mobile and contributes only minimal to closure but most important in its contribution to passive corneal coverage.
- Partial thickness defect
  - < 50% - primary closure with local tissue advancement
  - >50% - Full thickness graft from opposite upper eyelid  
Myocutaneous Fricke transposition flap from ipsilateral upper eyelid.  
Bidpedicled myocutaneous Tripiier flap.
- Full thickness defect
  - < 50% - Primary closure with canthotomy and cantholysis, Local Tissue advancement, Hughes tarso-conjunctival flap with skin graft.
  - 50% - 75% - Hughes tarso-conjunctival flap with skin graft.
  - >75% - Composite graft with cheek advancement, cervico facial Flaps.

## **MEDIAL CANTHAL RECONSTRUCTION – *Zone III***

Medial canthal zone is the most anatomically and physiologically complex of the periocular zone. The lacrimal papilla, puncta, canaliculi, plica semilunaris, caruncula lacrimalis and tripartite insertion of the medial canthal

tendon are all located within this square centimeter of tissue. Routine lacrimal stenting by silicone tube intubation and measures to ensure medial canthal tendon support are recommended in zone III. Defects of the anterior layer are reconstructed with a medially based myocutaneous flap from the upper eyelid, other local flaps such as V-Y glabellar flap and healing by secondary intention.

#### **LATERAL CANTHAL RECONSTRUCTION - *Zone IV.***

Reconstruction in zone IV requires canthal support procedure or canthopexy. Complete disruption requires canthoplasty. Reconstruction of superficial component of the defect requires cheek advancement flap or full thickness skin graft.

#### **RECONSTRUCTION OF PERIOCCULAR DEFECT – *Zone V***

Zone V defects are defined as those outside of, but contiguous with Zones I – IV. Zone V defects should be reconstructed with attention to the proper functioning and appearance of the lips and canthi in all 4 of the periocular zones. Adjuvant procedures like lateral canthoplasty /canthopexy should be performed. Cervico-facial flap may also be used.

## **THE CHEEK**

The cheeks represent the largest surface area of the face and frame the central facial units. Zide has divided the cheek into three overlapping zones, Suborbital, preauricular and buccomandibular. Similarly Jackson has divided the cheek into five areas; lateral, lower, malar, superomedial and alar base – nasolabial.

### ***Anatomy***

The cheek is bounded by the preauricular fold laterally, the zygomatic arch and lower eyelids superiorly, the nasal sidewall and nasolabial fold medially and the mandibular border inferiorly. The sensory innervation is provided by Maxillary and mandibular division of the trigeminal nerve and also by the anterior cutaneous nerve of the neck and greater auricular nerve (cervical plexus). Motor innervation of the superficial facial muscles is by the facial nerve. Facial nerve is located deep to the Parotid masseteric fascia and is protected by the superficial lobe of the parotid gland anterior to the ear. The masseter and temporalis muscles are innervated by the trigeminal nerve. Arterial supply of the cheek is by the branches of the external carotid artery-facial artery, superficial temporal artery and transverse facial artery. Venous drainage follows the arteries. Lymphatic drainage is by the parotid and submandibular nodes.

### ***Reconstructive options***

- The simplest method of closure is by healing by secondary intention. Primary closure is the method of choice if excessive tension and distortion of surrounding tissues can be avoided. The scars are ideally placed along minimal skin tension lines or within natural skin contours such as nasolabial or preauricular folds.
- Full thickness skin grafts exhibit less secondary contraction and have additional advantage of better colour match if harvested from the neck, preauricular / post auricular skin or upper back.
- ***Local flaps***

Advancement flaps – are useful for reconstruction of superomedial defects, particularly in elderly patients with significant skin laxity. V-Y advancement flaps are an excellent choice for closure of defects that lie along the medial cheek and alar base.

Transposition flaps – such as banner flaps, bilobed flaps and rhomboid flaps are useful for closure of most medium to large defects of the cheek. These flaps transfer lax skin to repair the defect while donor site is closed primarily.

Rotation Flaps – Cervico facial cheek rotation flaps are useful for repair of moderate to large defects of the upper medial region using loose preauricular and neck skin. Cervico pectoral flaps use the excess skin of the neck and chest to cover lower lateral cheek defects.

- ***Local composite flaps*** -Pectoralis major flaps, Trapezius flaps.

- *Tissue expansion*
- *Microsurgical reconstruction* is an important option for complex defects involving multiple tissue layers like radial forearm flaps, parascapular flap, rectus abdominis flap and anterolateral thigh flap, Fibula osteocutaneous flap.

## **THE EAR**

### *Anatomy*

The external ear is composed of auricle or the pinna, external auditory canal and lateral surface of the tympanic membrane. The auricle is typically oriented at an anteroposterior rotational angle of 15-20°. The height corresponds to the height of the nose.

The pinna is formed by a complexly convoluted frame of delicate elastic cartilage that is surrounded by a fine skin envelope. Ear lobule consists of fibrofatty tissue and no cartilage.

Helix forms the prominent auricular rim. Antihelix forms the prominence anterior to helix and has 2 crurae – superior and inferior. Triangular fossa is the space between the superior and inferior crura of antihelix. Scaphoid fossa is the space between helix and antihelix. Concha is a deep cavity posterior to external auditory meatus. Antitragus is present posteroinferior to the tragus separated by the intertragic notch. Lobule is present inferior to the antitragus. The pinna is attached to the temporal bone by fibro cartilaginous tissue.

Skin of pinna is thin with less subcutaneous tissue and adherent to the underlying cartilage. The posterior or medial surface of ear has more subcutaneous tissue loosely attached to the framework. The cartilage is closely adherent to the perichondrium and receives nourishment from overlying perichondrium. It is a single piece of elastic cartilage with crus and valleys. It is present in upper two-thirds of pinna. The auricle is connected to the scalp by 3 extrinsic muscles. They are anterior, superior and posterior auricular muscles. They have become vestigial and have no function.

### **Blood supply**

Auricle is highly vascular and has intercommunication between

- Posterior auricular artery - branch of External Carotid artery
- Superficial temporal artery - Terminal branch of External carotid artery
- Occipital artery - branch of External carotid artery

Venous drainage is by corresponding veins.

### **Lymphatic drainage**

Lymphatics from ear drain into preauricular, postauricular, parotid nodes and subsequently in upper deep cervical nodes – Level (II).

### **Nerve supply**

The greater auricular nerve supplies most of the auricle from posterior to anterior aspect of lobule, helix and antihelix. **The auriculotemporal nerve** is a branch of mandibular division of the trigeminal nerve and supplies tragus, helical

crus, skin superior to auricle. **Lesser occipital nerve** supplies skin posterior to auricle. **Vagus nerve** supplies posterior external auditory canal. **Facial nerve** supplies cavum concha.

## **CLASSIFICATION OF ACQUIRED AURICULAR DEFECTS**

### *Based on amount of loss*

- Partial loss
- Total loss

### *Based on component loss*

- *Skin*
- *Cartilage*
- *Both*

### *Based on area*

- *Upper third*
- *Middle third*
- *Lower third*
- *Combination*

## **ANAESTHESIA**

Procedures can be done under either general anaesthesia or local anaesthesia. Regional anaesthesia requires infiltration of local anaesthesia – 1% lidocaine with 1:200,000 dilution of epinephrine around greater auricular nerve,



auriculotemporal nerve, posterior auricular nerve and vagus in concha and external auditory canal. Type of anaesthesia is decided depending on the age, type and duration of procedure.

## **RECONSTRUCTIVE OPTIONS**

Gillies principles and ladder of reconstruction are to be followed. There are various options of ear reconstruction.

- Primary closure
- Skin grafts.
- Composite grafts
- Local and regional flaps
- Replantation.

### ***Primary***

- Simple laceration involving skin only can be closed in a single layer
- In complex laceration involving full thickness, layered closure is done.
- Small skin defects of helical rim can be closed by undermining and advancement.
- Small defects <1.5cm involving helix and antihelix may be amenable to primary closure by converting to wedge excision.

### ***Skin grafts***

- Skin grafts are useful in skin loss in lateral and medial surface when perichondrium is intact.
- Contralateral postauricular skin can be harvested as full thickness skin graft.
- Defects between 1.5 – 2 cm involving helix and antihelix can be reconstructed by using composite graft.

### ***Local and Regional Flaps***

- Local flap provide good colour and texture match.
- Preauricular, postauricular, retromandibular and cervical skin have been used.
- Temporal fascial flap is a well vascularised flap available in the vicinity for reconstruction.

## **OPTIONS AVAILABLE FOR RECONSTRUCTION BASED ON SITE OF INJURY**

### **HELICAL DEFECTS**

#### ***UPPER THIRD DEFECTS***

##### ***Defects <2cm:***

- Antia Buch's chondrocutaneous advancement flap.
- Composite flaps.

##### ***Defects >2cm:***

- Staged tube flap from postauricular skin – Eave's procedure.
- Converse tunnel flap.
- Crikelair banner flap.

- Cartilage framework covered with temporoparietal fascia with skin grafting.

### ***MIDDLE THIRD DEFECTS***

- Composite grafts.
- Staged tubed Post auricular flap
- Bipedicled flap
- Antia Buch's chondrocutaneous advancement flap.
- Converse tunnel procedure.
- Dieffenbach procedure.
- Cartilage graft with temporoparietal fascial flap with skin grafting.

### ***LOBULE DEFECT***

- Pre-auricular flap
- Post-auricular flap
- Gavello's flap
- Two flap technique of Converse
- Wynn method
- Nelaton and Ombredanne method
- Double cross skin flap of Fadi Steilati

### ***Subtotal or total loss of Pinna***

- Replantation (the size should not be more than 5mm)
- Staged reconstruction
- Single staged reconstruction using cartilage or alloplastic framework with temporoparietal fascia and skin graft.
- Prosthesis implantation.

## ***COMPLICATIONS***

- Hematoma/Seroma
- Perichondritis
- Flap necrosis
- Keloid formation

## **SURGICAL TECHNIQUES**

### ***Antia Buch`s chondrocutaneous advancement flap***

Totally freeing the entire helix from scapha by an incision in helical sulcus that extends through the cartilage but not through the skin on ear`s medial surface. Posteromedial auricular skin is undermined dissecting just superficial to perichondrium until entire helix hangs on chondrocutaneous component of loosely mobile skin and it can be mobilised and suturing is done. Extra length can be gained by V-Y advancement of crus of helix.

### ***Postauricular skin flap***

It can be raised inferiorly based, based on posterior auricular artery at the lower auricular pole. Communication with superficial temporal artery through superior auricular artery is used to raise superiorly based postauricular flap.

Useful in upper, middle-third reconstruction

### ***Bipedicled flap***

It is raised in the postauricular mastoid skin. It may be used as a tubed flap also. It is useful in helical rim reconstruction in middle third as a staged procedure.

### ***Tubed flap***

Cervical skin or post auricular mastoid skin may be used as tubed flap. Fine calibre tubing can be done and it is useful in staged reconstruction of helical rim.

### ***Dieffenbach technique***

In the first stage postauricular flap is advanced and sutured to the anterior layer of defect. Cartilage graft is fixed whenever necessary. In second stage flap is divided and turned to cover the posteromedial aspect of defect. The donor area is skin grafted. Disadvantage of this procedure is retroauricular sulcus is not preserved.

### ***Converse tunnel procedure***

The auricle is pressed on the mastoid region and the defect is marked. Incision is made along the markings. The anterior edge of mastoid skin is sutured to anterior ear skin flap. The posterior edge of mastoid skin is sutured to posterior ear skin flap. Cartilage graft may be fixed if necessary. In second stage elevation is done after 3 months. Skin graft is applied over the raw area.

### ***Temporoparietal fascial flap***

The Temporoparietal fascia is the most superficial layer beneath the Subcutaneous fat and above the deep temporal fascia in the temporal region and is continuous with the superficial musculo aponeurotic system inferiorly and the galea superiorly. It is supplied by the superficial temporal vessels which is present between the two layers of fascia. Temporoparietal fascial flap is harvested

through an incision extending from the preauricular region either in a lazy S, Y or T fashion from the tragus to temporoparietal region. The flap is raised just below the hair follicle but superficial to deep temporal fascia depending upon on the amount of flap required. The flap is raised, transposed covering the cartilage graft and sutured to the periphery of cutaneous defect. A skin graft is applied over temporoparietal fascial flap.

### ***Subtotal and total loss of pinna***

Replantation is ideal but complex staged reconstruction based on Brent or Nagata technique as for congenital microtia may be necessary.

Non microsurgical techniques such as composite grafting with or without fenestration of the cartilage may be useful. Composite grafts survive of the uniqueness of the enriched dermal plexus of vessels in the postauricular skin when compared to other areas.

When post auricular skin is not available and severely scared. It is ideal to go for temporoparietal fascial flap with skin cover.

### ***Microvascular transfer***

Microsurgical replantation is a challenging procedure but allows single staged reconstruction and more naturally appearing pinna.

Important prerequisite include short ischemia intervals, appropriately preserved amputated parts and availability of microvascular facilities. The problems associated were venous congestion for which leech therapy is given.

Prelaminated flap by building cartilaginous ear on forearm can be transferred to the position of the ear as free flap by microsurgical technique.

## ***LOBULE RECONSTRUCTION***

### ***Gavello's Method***

A bilobed flap is outlined based anteriorly. The flap is raised, posterior flap folded under anterior flap and flap sutured to the lobule defect.

### ***Ombredanne technique***

A Postero-inferior flap is raised. The superior end is sutured to the lower margin of the lateral surface. Later inferior end of flap is detached, folded under the superior portion of the flap and sutured to medial surface after 3 weeks.

### ***Wynn Method***

A horizontal incision made in retroauricular region. Extensive undermining of the skin of retroauricular region and neck skin is made. The undermined posterior skin is folded and closed superiorly to lower margin of ear lobe.

### ***Two flap technique of Converse***

Flaps to reconstruct the lobule defect are elevated from the posteromedial aspect of the pinna and in retroauricular region. The two flaps are sutured to each other to form new lobule.

### ***Double cross skin flap technique***

It is a single staged reconstruction based on inferiorly based preauricular skin and superiorly based postauricular skin. The preauricular skin flap is used to reconstruct the anterior part of the lobule and postauricular flap folded posteriorly to form the posterior aspect of the pinna.

### ***ALLOPLASTIC RECONSTRUCTION***

Alloplastic implants are made of silicone, MEDPOR are available in various shapes easily sterilisable which can be implanted underneath appropriate soft tissue coverage. Advantages are easy availability, near normal shape, short operating time, no donor site morbidity. Disadvantages are infection and extrusion.

## **THE NOSE**

The nose is three dimensional structure which naturally attracts the gaze of the onlooker because it is in the centre of the face. The reconstruction has to permit unobstructed airflow for normal breathing, speech and smell. Nasal reconstruction is based on the principle of restoration of anatomic structural layers.

### ***Anatomy***

The nose is divided into three main layers: External soft tissue and skin, The Osseocartilaginous framework (Structural support), The mucosal lining (inner lining)



The skin of the dorsum and sidewall is thin, smooth and mobile whereas the skin of the tip and ala is thick and stiff with sebaceous glands.

Muscles comprise 4 principal elevators

1. Elevators - Procerus, Levator Labii superioris alaque nasi.
2. Depressors - Alar nasalis, Depressor Septi Nasi
3. Compressor - Transverse nasalis.
4. Dilators - Dilator Naris anterior and posterior.

Superiorly, the paired nasal bones are attached to the frontal bone. Superolaterally they are connected to the lacrimal bones and inferolaterally they are attached to the frontal process of the maxilla. Posterosuperiorly, the bony nasal septum is composed of the perpendicular plate of ethmoid. Posteroinferiorly lies the Vomer, which in part forms the choanal opening into the nasopharynx. The floor comprises the premaxilla and palatine bones.

The cartilaginous septum extends from the nasal bones in the midline above to the bony septum in the midline posteriorly, then down along the maxillary crest. It assumes a quadrangular shape.

Below the upper lateral cartilages lie the lower lateral cartilages. The paired lower lateral cartilages swing out from the medial attachments to the caudal septum in the midline, called the medial crura, to an intermediate crus area. They finally flare out superolaterally as the lateral crura. These cartilages are frequently mobile, in contradiction to the upper lateral

cartilages. The upper lateral cartilages are sandwiched between the nasal bones and lower lateral cartilages in an inferior plane. The osseocartilaginous framework provides structural integrity & projection, create contour & definition and buttress the soft tissues.

### **Blood supply:**

1. Branches from the internal carotid – Ophthalmic artery – anterior and posterior ethmoidal arteries.
2. Branches from the external carotid - facial, sphenopalatine, greater palatine, superior labial and angular arteries.
3. Maxillary artery – infraorbital – to supply the dorsum and lateral side wall.

### **Venous drainage**

Veins in the nose essentially follow the arterial pattern to drain finally into the jugular system. They are significant for their direct communication with the cavernous sinus and for their lack of valves; these features potentiate the intracranial spread of infection.

### **Nerve supply**

The sensation of the nose is derived from the first 2 divisions of the trigeminal nerve-Ophthalmic and maxillary divisions and their branches. **The parasympathetic supply** is derived from the greater superficial petrosal branch of the cranial nerve VII.

## **Lymphatic drainage**

Lymphatics arise from the superficial mucosa and drain posteriorly to the retropharyngeal nodes and anteriorly to the submandibular lymph nodes (Level – IB) and upper deep cervical nodes (Level II).

## **Aesthetic subunits of the nose**

It was described by Burget and Menick. The subunits are areas of characteristic skin quality, contour and border outline. They are:

- (1) Dorsum (2) Tip (3) Columella (4) Sidewall – right (5) Sidewall- left
- (6) Right ala (7) Left ala (8) Right soft triangle and (9) Left soft triangle.

## **Surgical importance**

If greater than 50% of a subunit is involved, excision of the entire subunit before reconstruction is recommended. This subunit principle is a tool, not a rigid rule and should be modified to fit the individual needs of the patient. The nose from the nasion (nasofrontal junction) to the columella-labial junction ideally occupies one third of the face in the vertical dimension. From ala to ala to ala, it should ideally occupy one fifth of the horizontal dimension of the face.

The **Nasofrontal Angle** between the frontal bone and is usually 120° and slightly more acute in males than in females. The **Nasofacial Angle**, or the slope of the nose compared with the plane of the face, is approximately

30-40 °. The **Nasolabial angle** between the columella and philtrum is about 90-95 ° in males and 100-105 ° in females.

## **Planning**

Preoperative planning is the most important aspect of a successful reconstruction. The defect is defined in terms of size, depth, orientation and location on the nose using suture material packs as a template for 3-D reconstruction. In delayed reconstructions, this requires recreation of the original defect by releasing contractures and excising the scars and returning structures to their normal positions.

## **Classification of defects**

### **I) Zones:**

- 1) Upper third zone
- 2) Middle third zone
- 3) Lower third zone

### **II) Layers**

- 1) Inner lining
- 2) Osteocartilagenous supports
- 3) Outer cover

### **III) Size and Depth**

- 1) Small and superficial
- 2) Large and Deep

## **Principles of reconstruction**

- 1) Establish a goal and visualize the end result

- 2) Create a plan: Use the ideal or contralateral, normal as a guide. A template of the contralateral normal is made to create a mirror image of the true defect or subunit.
- 3) Recreate the defect.
- 4) Replace like tissue with like tissue.
- 5) Replace the missing tissue exactly to avoid overfilling or underfilling of the defect.
- 6) Apply 'Sub unit principle' whenever possible.
- 7) There should be no distortion of anatomical landmarks.
- 8) Choose ideal donor materials.

**Skin** – thin, conform to underlying subcutaneous architecture, matching the face in colour and texture.

**Support** – It must extend from nasal bone superiorly to alar margin inferiorly and from the tip anteriorly to the maxilla posteriorly. This reconstruction should support the repair against gravity, shapes the overlying cover and underlying lining and braces the repair against later scar contraction.

**Lining** - should be of good vascularity to support the positioning of early Cartilage grafts and supple enough to conform to the shape of the overlying support grafts, yet thin enough so that they neither stuff airway inside nor distort the external shape outside.

- 9) Ensure a stable platform

10) In a composite facial wound, lip and cheek defects are repaired before the nose.

## **Surgical techniques**

### **COVER**

#### **I) Small and superficial defects**

1. Size of the defect less than 1.5cm
2. Cartilage framework is intact.

#### *The choices are*

1. Healing by secondary intention in non-critical areas and concave surfaces.
2. Primary suturing – if the defect is less than 0.5cm in dorsum and sidewalls.
3. Full thickness skin grafts harvested from supraclavicular and post auricular areas.
4. Split skin grafting used as temporary dressing
5. Composite chondrocutaneous grafts < 5mm harvested from helix, ear lobe for reconstruction of alar rim and columella.
6. Local Flaps
  - a. Banner Flaps for upper third defects.
  - b. Esser's bilobed flap for alar and tip defects

- c. Dorsal nasal flaps with or without glabellar extension as a rotation-advancement flap (Miter flap) for Lower third dorsal defects.
- d. Glabellar flap – Gillies for upper third defects
- e. Superiorly based single staged nasolabial flap for alar and sidewall defects.
- f. Islanded perforator flaps based on facial artery for alar rim defects.

## **II) Large and deep defects**

The size of the defect is >1.5cm and it requires support and lining replacement.

### ***The choices are***

- 1) Two stage nasolabial flap – for alar defects.
- 2) Forehead flap – median (seagull flap), paramedian, oblique (supratrochlear artery off-midline), islanded flap, Gillies up and down flap, Converse's scalping forehead flap.
- 3) Fronto temporal flap (Meyer) – for tip, Columella and alar defects.
- 4) Retroauricular temporal flaps - Washio.
- 5) Temporoparietal fascial flap.
- 6) Reversed superficial temporal artery post auricular compound skin and cartilage flap.

- 7) Distant flap – upper arm (Tagliacozzi flap), cervical, deltopectoral, abdominal tube pedicle flaps, Trapezius musculocutaneous islanded flap.
- 8) Free flap – radial free forearm flap, retroauricular flap, auricular microvascular transplant.

Distant flaps have poor color texture match. Hence they are more suitable for lining rather than cover. The forehead flap is mainstay of reconstruction for larger nasal defects including subtotal and total nasal defects. This reconstruction is done in two stages. Menick described a 3 stage procedure, wherein thinning of the flap is done in the second stage without dividing the pedicle, to provide better cosmetic results.

## **SUPPORT**

Cartilage grafts are harvested from septum, conchal cartilage and costal cartilage. Ideally, support framework should be placed prior to flap division. Otherwise the shape of the tissue becomes distorted permanently by scar. 'L' shaped strut of the septal cartilage is to be maintained for midline support.

## **LINING**

Ideally, the lining should be thin, supple and vascular. Failure in nasal reconstruction is often due to shortage of lining, as the unlined nose will distort because of scar contraction.



**The choices are:**

- 1) Local hinge-over flaps
- 2) Prelaminated skin graft and cartilage of the forehead flap, radial forearm flap.
- 3) Intranasal flaps like Vestibular skin bipediced flap, contralateral composite chondromucosal septal flap, and septal mucoperichondrial flap with or without cartilage based on a septal branch of the superior labial artery, Mucoperichondrial flap based on anterior ethmoidal vessels.
- 4) Full thickness skin grafts.
- 5) Folded forehead/nasolabial flap.
- 6) Facial artery myomucosal flap.

## **THE LIP**

The lips are the primary aesthetic feature of the lower central face, with functional requirements that include bilabial speech, damming effect, kissing and facial animation. Upper lip functions like a curtain while the lower lip functions like a dam for the saliva. The hallmark of lips is the vermilion. Reconstruction of lip defects is simple in the sense of possibility; Reconstruction of lip defects is simple in the sense of possibility; but complex to reproduce a natural – appearing and a dynamic structure.

### ***Anatomy***

Upper lip is situated between the melolabial crease on either side and the base of the nose superiorly and centrally. Lower lip is bounded inferiorly by the

mental crease and on either side by the melolabial crease. The lip consists of four basic components Skin and Subcutaneous tissue, Muscle, Mucosa and Vermilion. Each of these structures has unique characteristics that must be considered during the planning for reconstruction.

Skin is typical of facial skin – intermediate thickness and rich in sebaceous and sweat glands. It is hair bearing with hair being mostly vellus in women and children. In men, the direction of growth of the hair should be considered in lip switch flaps. The subcutaneous tissue is of significant amount to produce the bulk of lip tissue. The ‘white roll’ marks the mucocutaneous junction; whose reconstruction is of utmost importance in plastic surgery. Skin meets the vermilion at the ‘red line’.

### ***External landmarks***

#### ***Upper lip:***

1. Philtrum - central dimple, lateral columns.
2. Cupid’s bow.
3. The white roll.

The philtral columns are musculocutaneous that diverge slightly in their course from base of the columella to the vermilion border. White roll is another ridge formed by the orbicularis muscle. The decussation of the orbicularis fibres results in the formation of dimple and columns.

### ***Lower lip:***

1. Mental crease.

### **The Muscles**

#### **1. *Orbicularis Oris (paired)***

Horizontal (superficial) fibres extend from modiolus to contralateral philtral column which helps in pursing the lip. Oblique (deep) fibres extend from the commissure to anterior nasal spine and nasal floor which helps in eversion of upper lip. It also has attachments to skin at the base of the ala, nasal sill and nasal septum. It is the important muscle for oral competence.

#### **2. *Mentalis (paired)***

They are large pyramidal shaped muscles that originate from the mandible just below the gingival attachment and insert horizontally and inferiorly into the chin pad below the labiomental fold. They are main elevators of the lower lip required for lower lip positioning, lip competence and pushing out the contents in the gingivobuccal sulcus.

#### **3. *Upper lip muscles***

Levator labii superioris, Levator anguli oris, Zygomaticus major and minor – elevators of the lip.

#### **4. *Lower lip muscles***

Depressor anguli oris, Depressor labii inferioris, Risorius, Platysma – depressors of the lip.

**Modiolus** is a crossroad of several facial muscles mentioned above and is situated just lateral to the commissure.

### ***Nerve supply – Motor***

Buccal branches of the facial nerve supplies the upper lip muscles.  
Mandibular branch of the facial nerve supplies the muscles of the lower lip.

### ***Nerve supply - Sensory***

Upper lip is supplied by the infraorbital branch of the maxillary division of the Trigeminal nerve. Lower lip is supplied by the Mentalbranch (continuation of the inferior alveolar nerve) of the mandibular branch of the Trigeminal nerve.

### **The Mucosa**

Labial mucosa is distinct from the Vermilion mucosa. It is lined by non-keratinising stratified squamous epithelium rich in minor salivary glands. The plane of dissection in raising the local flaps is between these glands and the Orbicularis muscle.

### **The Vermilion**

It is the junction between skin and the mucosa. It is the visible part of the lip inside the white roll. It has dull appearance with a unique light reflection that is nearly impossible to duplicate. The wet-dry line is the junction of the wet and dry vermilion. The wet vermilion blends with the oral mucosa.

## **Vascular supply**

The main arterial supply is from the superior and inferior labial (coronary) arteries, which are the branches of the Facial artery, a branch of from the external carotid artery. The labial arteries forms a 360° loop allowing for various flap designs. The arteries lie between the Orbicularis muscle and the labial mucosa at the level of the wet-dry line of the vermilion.

They provide numerous perforators through the orbicularis muscle to the overlying skin. The venous drainage of the lips does not follow the arterial supply. A dense venous network coalesces together and drains into the facial vein.

## **Lymphatic drainage**

The upper lip drains primarily to the submandibular nodes (Level Ib). The commissure area drains into the periparotid nodes also which finally drains into the ipsilateral upper deep cervical lymph nodes (Level II). The lower lip- lateral part drains into the ipsilateral, although there can be some crossover in the midline.

## **COSMETIC SUBUNITS OF THE LIP**

1. Upper lip - two lateral units and one central unit (philtrum)
2. Lower lip - single unit.
3. Vermilion.
4. Commissure.

The lips are the focus of beauty. There is no underlying bony or cartilaginous framework. They are extremely sensitive to distortion. They are elastic and hence can be stretched to a remarkable degree.

## **PRINCIPLES OF RECONSTRUCTION**

1. Maintain oral competence.
2. Preserve the sensation of lips.
3. Preserve the continuity of vermilion border.
4. There should be no microstomia.
5. There should be adequate lip appearance
6. A balance in the length of the upper and lower lip is important and whom tissue should be near equally shared by the two lips.
7. Functional reconstruction is not as critical in the upper lip as in the lower lip. A static upper lip can allow for competence if the lower lip is normal.
8. When analysing the lip defect, the most important assessment is the amount of remaining lip vermilion. Vermilion if present, carries with it the orbicularis muscle that can be used to maintain the sphincteric function of the lip.
9. Alignment of the vermilion is a key element in any lip procedure from simple lacerations to complex reconstructions with the flap. Step offs in the vermilion of 1mm are noticeable at conversational distance.

## **CLASSIFICATION OF DEFECTS**

### ***Depending on the site***

1. Upper lip.
2. Lower lip
3. Both.

### ***Depending on the thickness of tissue (Component) lost***

1. Partial thickness - Skin or mucosa
2. Full thickness - Skin , mucosa, muscle

### ***Depending upon the percentage of area lost***

1. Less than  $1/3$  loss
2.  $1/3$  to  $2/3$  loss.
3. More than  $2/3$  loss.

### ***Depending upon the commissure involvement***

1. Commissure involved.
2. Commissure not involved.

### ***Depending on the Vermilion lost***

1. Vermilion loss present
2. Vermilion loss absent

## **RECONSTRUCTIVE METHODS**

The ideal reconstruction is by innervated muscle containing flaps with skin for cover, mucosa for lining and free edge covered by vermillion. The local flaps are the best in lip reconstruction.

### **UPPER LIP**

#### ***PARTIAL THICKNESS DEFECT***

##### **Skin surface defects**

1. The scars can be excised, dermabraded or replaced with local flap (e.g) nasolabial flap. Nasolabial flaps are based inferiorly with a subcutaneous pedicle.
2. The ectropion can be released and skin grafted using full thickness skin graft.
3. For replacing the hair bearing skin in males, a temporal flap based on pedicled superficial temporal artery can be done. Other donor sites for hair-bearing skin flaps are cheeks (advancement flaps), cervical and submental flaps.

##### **Mucosal defects**

The mucosa of the lip consists of the labial surface and the alveolar surface. The scar with or without entropion in the labial surface can be corrected using local flap, free mucosal grafts or skin grafts.

The alveolar surface usually undergoes spontaneous re-epithelialisation.



## ***FULL THICKNESS DEFECTS***

### ***Less than 1/3<sup>rd</sup> defects***

These defects can be closed primarily by a ‘V’ shaped excision or triangular wedge resection (Louis procedure) and suturing in 3 layers using 3/0 vicryl for muscle and mucosa and 5/0 prolene or ethilon for skin by simple suturing. The defects also can be closed by a ‘M’ plasty. These procedures can be done because of the elasticity of the lips.

### ***1/3 rd to 2/3 rd defects***

These defects can be repaired using Lip switch procedures like Abbe flap, Estlander flap or Gilles fan flap (lateral advancement-rotation type). Estlander flaps are used for lateral defects.

### ***More than 2/3<sup>rd</sup> defects***

These defects can be repaired using cheek flaps or distant flaps.

#### **(A) Abbe flap : (Two stage procedure)**

In 1838 Sabitini described the cross lip flap transfer. It was later Popularized by **Abbe** in 1898 and designated as a complete philtral reconstruction for the relief of the bilateral cleft lip deformity. Today it is quite useful and a

versatile means for both lower and upper lip reconstructions. The flap can be taken from either lip and its shape and size are dependent on the defect.

- Typically, the flap is half the width of the defect to allow for symmetric shortening of the upper and lower lip.
- The Maximum width of the flap that can be donated is only about  $1/3^{\text{rd}}$  of the size of the donor lip.
- The height of the flap equals to the height of the defect.

### **B. Estlander Flap: (Two stage procedure)**

For those defects that extend laterally to include the oral commissure, the Estlander flap (lateral lip switch flap) is a useful procedure. This is a lip switch technique similar to the Abbe flap and typically uses a medially based full-thickness upper lip. Oral continence results are excellent, although a second stage often is necessary to correct the typical rounding at the new commissure. The second-stage commissuroplasty is typically performed **12 weeks** after the initial procedure.

### **C. Gillies Fan Flap**

These flaps were given the name “**fan flap**” because their resemblance to the rotational opening of an oriental folding fans.

Upto 80% full thickness loss of upper lip or lower lip. For central defects, bilateral symmetrical flaps are raised.

#### **D. Karapandzic flap**

It is innervated musculocutaneous lip and cheek flaps. This flap provides immediate mobility and normal sensibility with preservation of vegetative functions in a newly formed vermilion-border lip. The orbicularis-buccinator complex with its intact supply forms the new lip which is equal in functional quality to the normal lip.

#### **E. CHEEK ADVANCEMENT FLAPS**

Bernard Von Burrow Reconstruction, Webster's Reconstruction: (Perialar crescentic cheek advancement flap)

#### **Distant flaps**

These flaps are taken from non-lip tissues (e.g) Tongue flap, radial forearm flap – free flap or extra corporeal , forehead flap, bipediced temporal scalp flap, PMMC flap or deltopectoral flap.

#### **LOWER LIP RECONSTRUCTION**

The defects are classified as per the details mentioned above for upper lip reconstruction.

## **Staircase flap**

In 1974, Johanson et al described a technique to reconstruct upto 2/3 lowerlip (both central and lateral) defect by a '**Staircase**' technique.

**The Other flaps** used for lower lip reconstruction are Step ladder flap, Von Bruns flap (Circumoral Advancement – Rotation flap), Bandonean technique, Gate Flap, Steeple Flap, Upper lip angular flap (Cross-lip flap), Depressor anguli oris flap (Mucomyocutaneous flap) and Schuchardt procedure

## **VERMILION RECONSTRUCTION**

### **Type of defect**

1. Linear defect
2. Contour defect – Small, Broad (Whistle deformity) Linear defects are corrected by 'Z' plasty. Small notch deformity can be Corrected by wedge excision and primary closure.

Contour defects can be corrected by Vermilion advancement flap, Vermilion Abbe flap, Mucosal V-Y advancement flaps, Cross lip mucosal flap – uni/bi pedicled, Tongue flap with superior pedicle, Mucosal apron flap, Palatal mucosal full thickness graft, Dermal fat graft and fascia or tendon beneath epithelial surface.

## **COMMISSURE RECONSTRUCTION**

The aim of surgical reconstruction is to give symmetry to the commissure in repose and to permit full mouth opening without webbing.

### **Methods**

Direct advancement of Vermilion flap – Kazanjian and Reopenian, 'Z' plasty, Trilobed mucosal flap, Vermilion and Mucosal flap, Reverse Estlander procedure, Tongue flap (Converse) – Ventrolateral, anterior – based flap, Gillies and Millard back-flip flap.

### **Total lip reconstruction**

- 1) Radial forearm free flap–double islanded with Palmaris sling procedure.
- 2) Forehead flap

## **4. MATERIALS AND METHODS**

### **Materials**

This study was conducted in the department of Plastic and Reconstructive surgery, Thanjavur medical college & Hospital from August 2010 to March 2013. The patients with history of facial soft tissue injuries who were admitted in the emergency ward were included in the study. Patients with severe life threatening CNS injuries, skeletal injuries and other injuries were excluded from the study. All patients with soft tissue injuries of the scalp, cheek, lip, ear, nose and eyelids accounting to 90 cases were included in the study.

### **Methods**

The methods included obtaining a thorough history of mode of injury, site of injury, thorough clinical examination and necessary investigations with appropriate surgical reconstruction. Initial care of trauma patients were done using the algorithmic protocol of ATLS (Advanced Trauma Life Support). Proper preoperative planning was done. Pattern & template were made as per tissue loss. Digital photographs of the patients were recorded preoperatively, intraoperatively and postoperatively.

Immediately after admission patients were given anti-tetanus prophylaxis, wound swab were taken for culture and sensitivity. Thorough wound wash was given using saline and betadine. Any foreign body in the tissue was removed, dead devitalized tissue was excised. Wound debridement was done under regional nerve block in majority of cases and general anaesthesia for some cases. A course of antibiotics was started with Inj. Cefotaxime 1gm IV bid, Inj. Gentamycin 80mg IV bid and Inj. Metronidazole 500mg IV tid for as long as the patient stayed in the hospital after which oral antibiotics were started.

In stable patients with clean uncontaminated wounds primary single staged repair was done or the first stage of the staged reconstruction was done on the day of injury. In patients with contaminated injuries secondary reconstruction was planned.

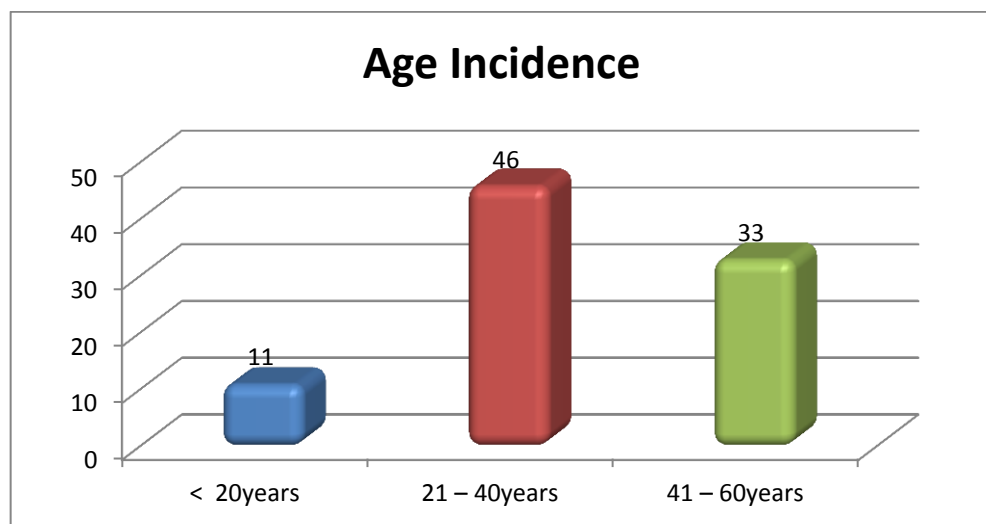
Procedures, outcomes, complications were explained to the patients and informed written consent were obtained from all patients. Cases were followed up after 1 week, and 2 weeks and then monthly for atleast 3 months after the final stage of reconstruction.

## 5. OBSERVATION AND RESULTS

**Table - 1.1 AGE INCIDENCE**

S.No	Age in years	No of cases	Percentage
1	≤ 20	11	12%
2	21 – 40	46	51%
3	41 – 60	33	37%

The data shows that about 51% (n = 46) patients belonged to 21-40 years. 37% (n=33) of patients belonged to 41-60years age group and 12%(n=11) of patients were less than 20years.

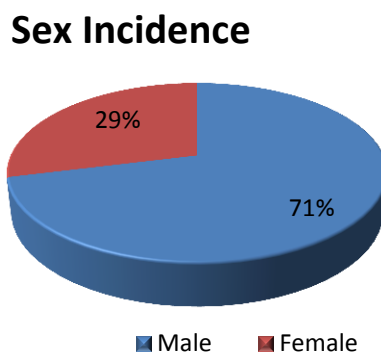




**Table – 1.2 SEX INCIDENCE**

S.No	Male	Female
1	64	26

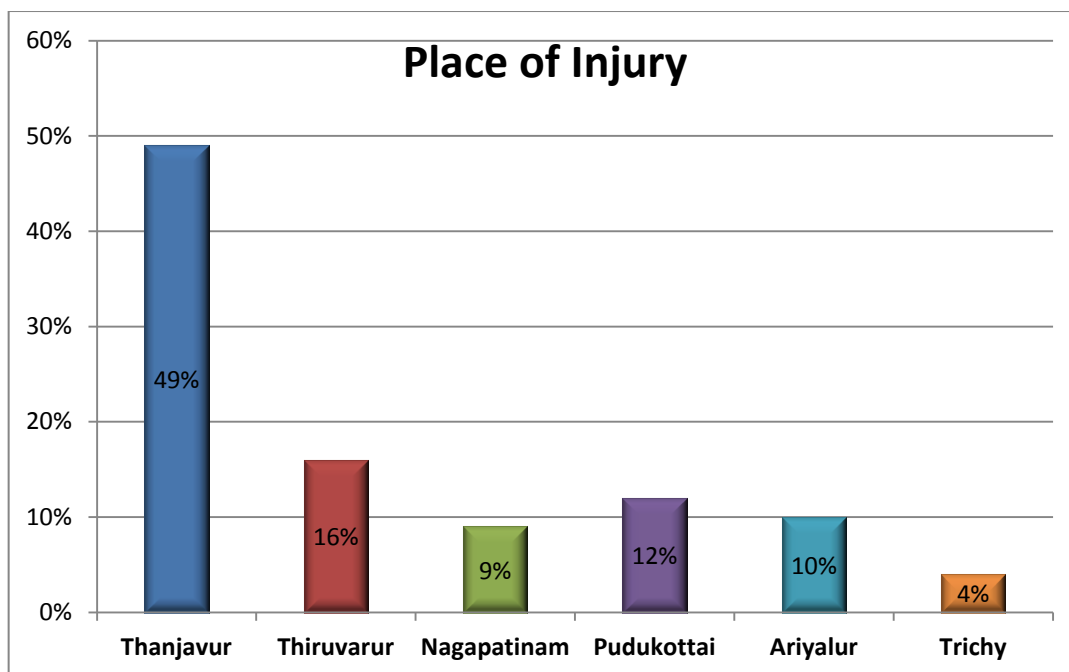
Out of 90 cases 71%(n=64) of patients were males and 29%(n=26) were females.



**Table – 1.3 PLACE OF INJURY**

S.No	District	No. of Patients	Percentage
1	Thanjavur	44	49%
2	Thiruvarur	14	16%
3	Nagapatinam	8	9%
4	Pudukottai	11	12%
5	Ariyalur	9	10%
6	Trichy	4	4%

The chart shows that 49%(n=44) of victims are from Thanjavur district, 16%(n=14) are from Thiruvarur district, 9%(n=8) from Nagapattinam district, 12%(n=11) from Pudukottai district, 10%(n=9) from Ariyalur district and 4%(n= 4) from Trichy district.

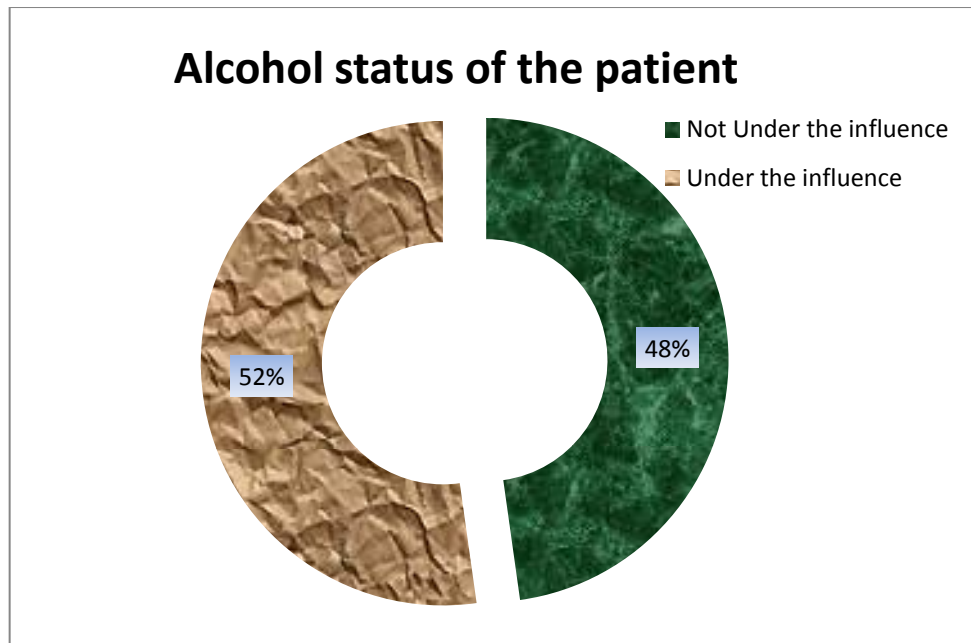


**Table 1.4 SOCIO-ECONOMIC STATUS**

S.NO	Status	No. of Patients
1	Low Socio- Economic	76
2	High Socio- Economic	14

**Table 1.5 ALCOHOL STATUS OF PATIENTS**

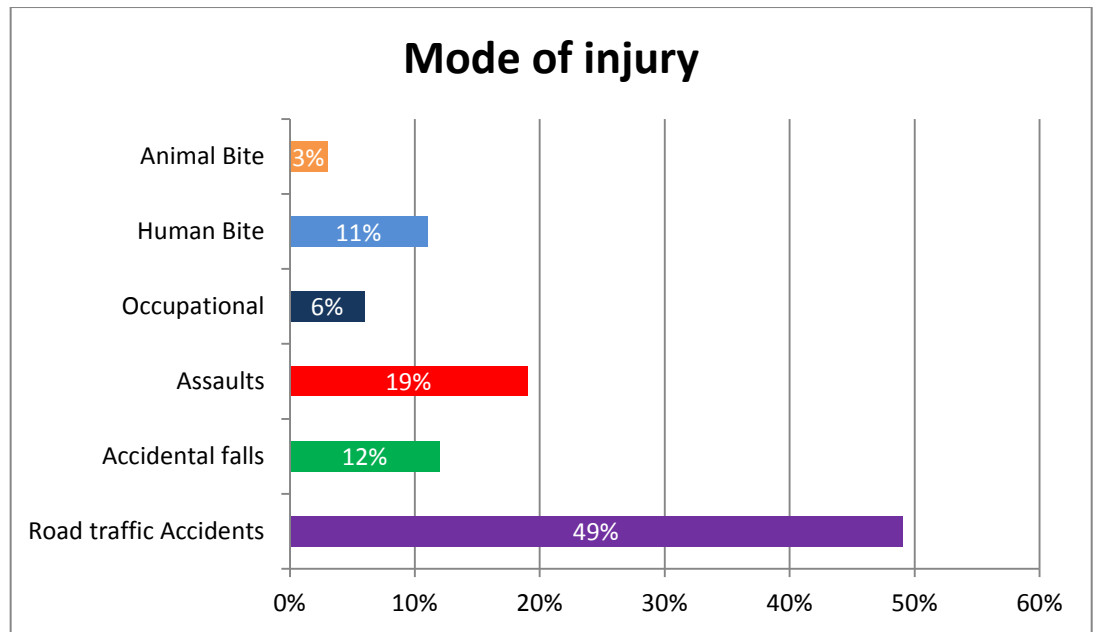
S.No	Under the influence	Not Under the influence
1	47	43



**Table 1.6 MODE OF INJURY**

S.No	Mode of Injury	No of Patients	Percentage
1	Road traffic Accidents	44	49%
2	Accidental falls	11	12%
3	Assaults	17	19%
4	Occupational	5	6%
5	Human Bite	10	11%
6	Animal Bite	3	3%

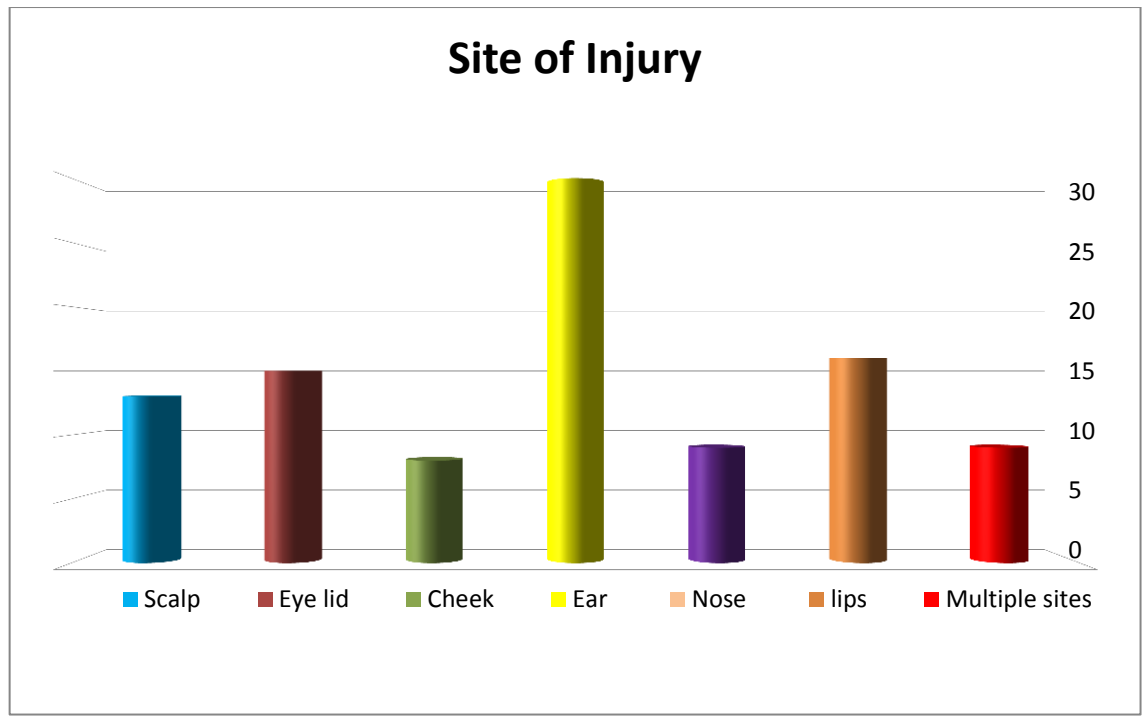
Road traffic accidents were the commonest cause for facial injuries contributing 49%(n=44) and other causes being accidental falls 12%(n=11) , Assault 19%(n=17) Occupational 6%(n=5), Human bite 11%(n=10) and Animal bites 3%(n=3).



**Table 1.7 Site of Injury**

S.No	Site of injury	No of patients	Percentage
1	Scalp & Forehead	12	13%
2	Eye lid	14	15%
3	Cheek	7	8%
4	Ear	27	30%
5	Nose	8	9%
6	Lips	14	16%
7	Multiple sites	8	9%

Ear injuries predominated being 30% (n=27) followed by Eyelid and lip injuries contributing 15% each (n=14each) then the scalp and forehead 13% each (n=12 each), nose 9% (n=8) and cheek 8%(n=7).

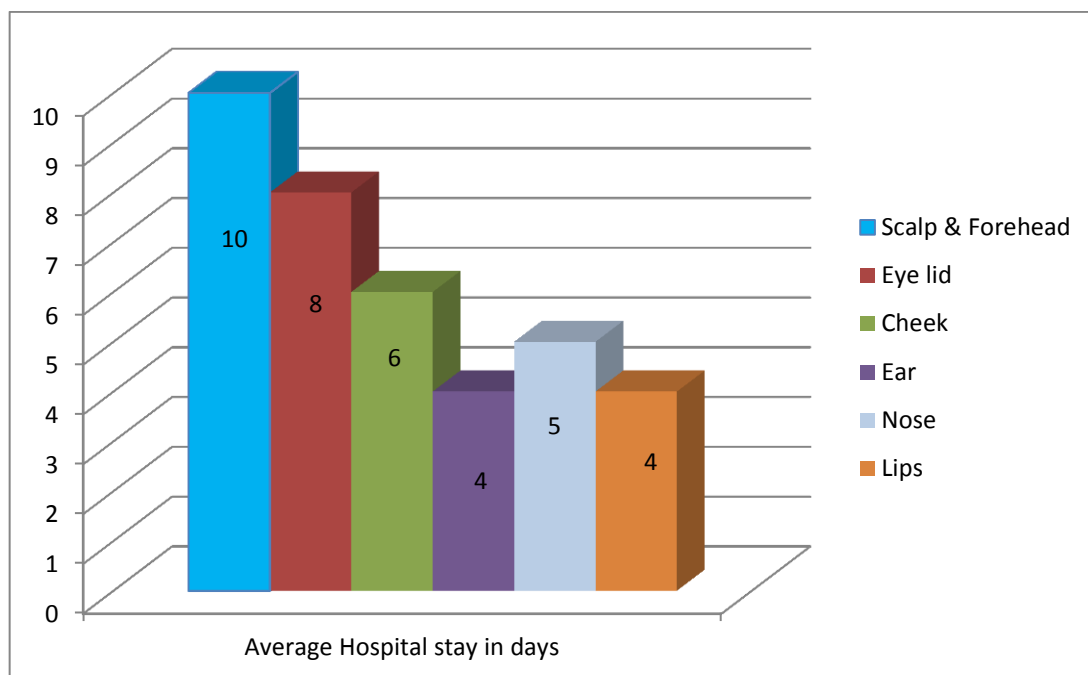


**Table 1.8 AVERAGE HOSPITAL STAY**

S.No	Site of injury	No of days
1	Scalp & Forehead	10
2	Eye lid	8
3	Cheek	6
4	Ear	4
5	Nose	5
6	Lips	4

The average hospital stay for reconstruction of scalp and forehead was 10 days, Eyelid 8 days, Cheek 6 days, Nose 5 days, Ear 4 days and Lips 4 days.

## AVERAGE HOSPITAL STAY



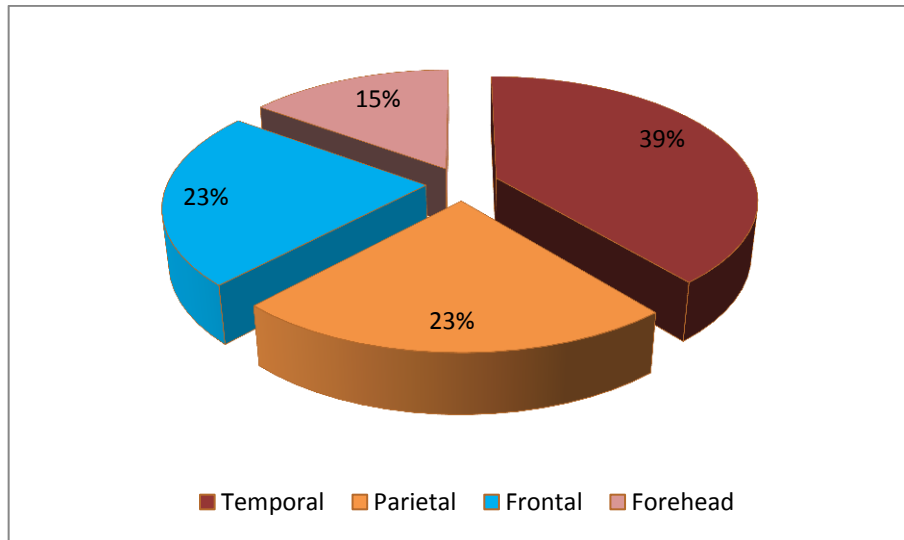
## SCALP & FOREHEAD

**Table 2.1 Region of Defect**

S.No	Region	No of patients	Percentage
1	Temporal	5	39%
2	Parietal	3	23%
3	Frontal	3	23%
4	Forehead	2	15%

Among scalp defects temporal region contributed 39%, Parietal and Frontal regions 23% each and forehead 15%.

### Region of Scalp Defect



**Table 2.2 TIMING OF RECONSTRUCTION**

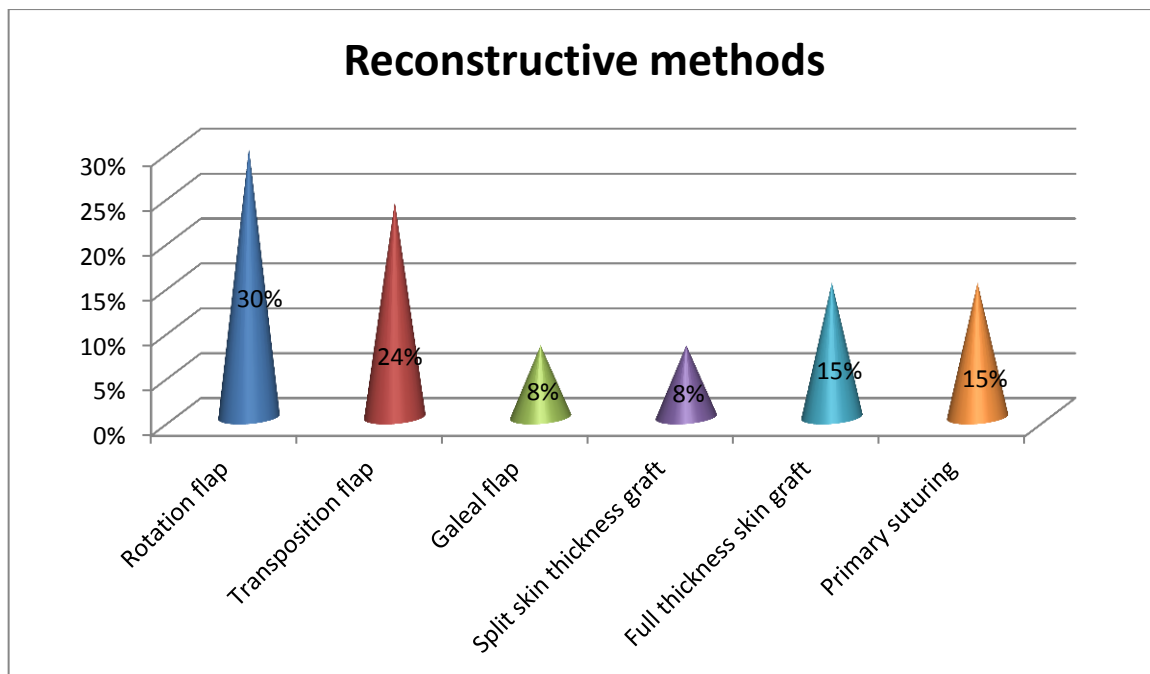
S.No	Reconstruction	No of cases	Percentage
1	Primary	2	15
2	Secondary	11	85

Primary reconstruction was done in 2 cases (15.38%) in the emergency operation theatre and secondary reconstruction was done in 11 cases (84.62%) in elective operation theatre.

**TABLE 2.3 METHODS OF RECONSTRUCTION**

S.No	Procedures	No of cases	Percentage
1	Rotation flap	4	30%
2	Transposition flap	3	24%
3	Galeal flap	1	8%
4	Split skin thickness graft	1	8%
5	Full thickness skin graft	2	15%
6	Primary suturing	2	15%

Rotation flaps were done in 4 cases (30%), Transposition flap in 3 cases (23%), Galeal flaps and Split skin thickness graft in 1 case each (8%), Full thickness skin graft and primary suturing in 2 cases each (15%)



**Table 2.4 COMPLICATIONS**

S.No	Complications	No of Patients
1	Partial flap necrosis	2
2	Wound infection	1
3	Graft loss	1



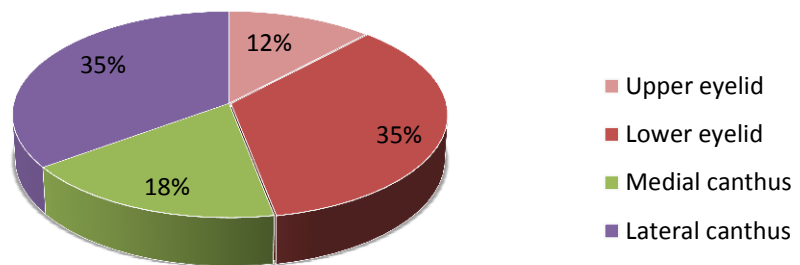
## EYE LID

**Table 3.1 Region of eyelid injury**

S.No	Region of injury	No of cases	Percentage
1	Upper eyelid	2	12%
2	Lower eyelid	6	35%
3	Medial canthus	3	18%
4	Lateral canthus	6	35%

Lower eyelid and lateral canthus were commonly injured in 6 cases each (35%) Medial canthus in 3 cases (18%) and upper eyelid in 2 cases (12%)

### **Region of injury**



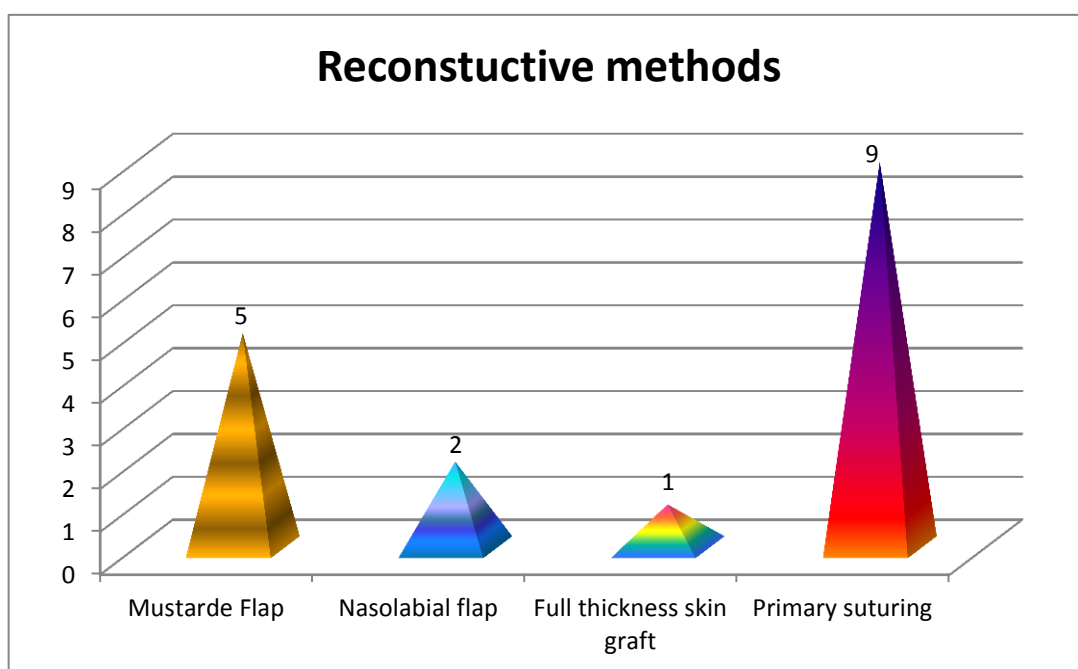
**Table 3.2 TIMING OF RECONSTRUCTION**

S.No	Reconstruction	No of cases	Percentage
1	Primary	10	59%
2	Secondary	7	41%

**Table 3.3 METHODS OF RECONSTRUCTION**

S.No	Methods	No of Paients	Percentage
1	Mustarde Flap	5	29%
2	Nasolabial flap	2	12%
3	Full thickness skin graft	1	6%
4	Primary suturing	9	53%

Eyelid injuries were primarily sutured in 9 cases (53%) and common flaps used was Mustarde Flap in 5 cases (29%), Nasolabial flap in 2cases (12%) and full thickness skin graft in 1 case (6%).



**Table 3.4 COMPLICATIONS**

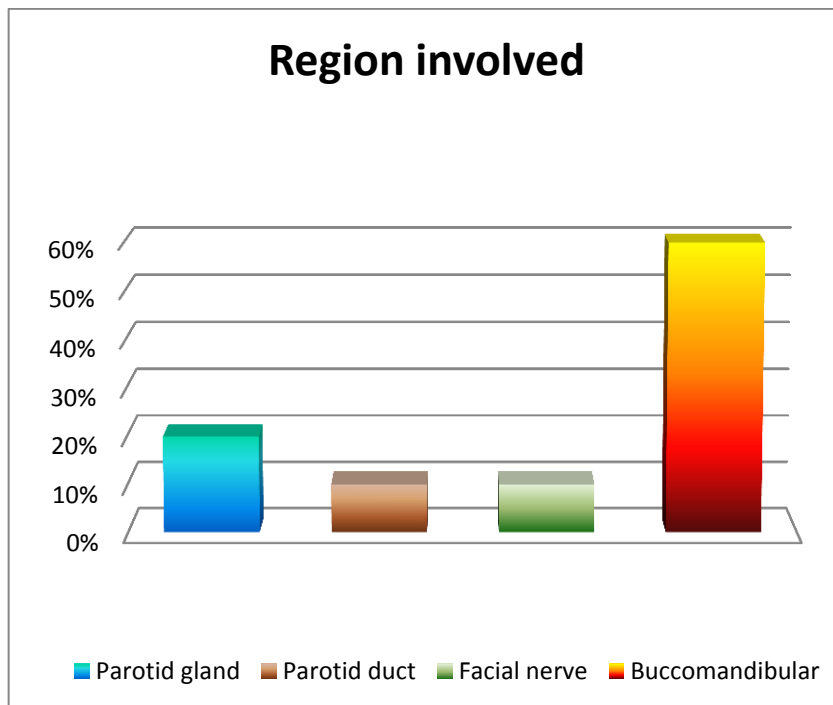
S.No	Complications	No of patients
1	Wound Gaping	Nil
2	Wound infection	2

## CHEEK

**Table 4.1 REGION OF INJURY**

S.No	Region involved	No of patients	Percentage
1	Parotid gland	2	20%
2	Parotid duct	1	10%
3	Facial nerve	1	10%
4	Buccal/Buccomandibular	6	60%

The Buccal zone was commonly involved in 6 cases (60%) Parotid gland in 2 cases (20%) and Parotid duct and facial nerve in 1 case each (10%).



**Table 4.2 TIMING OF RECONSTRUCTION**

<b>S.No</b>	<b>Reconstruction</b>	<b>No of cases</b>	<b>Percentage</b>
1	Primary	5	50%
2	Secondary	5	50%

**Table 4.3 METHODS OF RECONSTRUCTION**

<b>S.No</b>	<b>Procedure</b>	<b>No of cases</b>	<b>Percentage</b>
1	Local Flaps	6	60%
2	Primary Suturing	4	40%

Local flaps like transposition flap, Limberg flap, Cheek advancement flap were used in 6 cases (60%) and Primary suturing was done in 4 cases (40%).

**Table 4.4 COMPLICATIONS**

<b>S.No</b>	<b>Complications</b>	<b>No of cases</b>	<b>Percentage</b>
1	Flap Necrosis	Nil	Nil
2	Wound infection	1	10%

**EAR**

**Table 5.1 SIDE OF THE EAR**

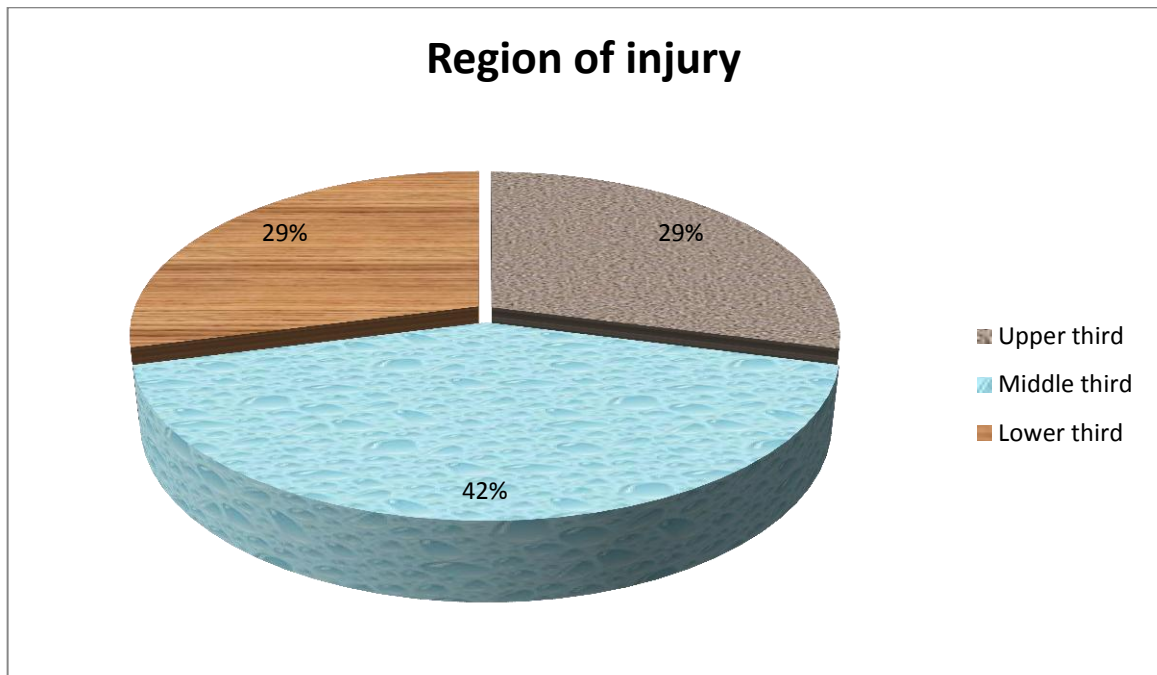
<b>S.No</b>	<b>Side of the ear</b>	<b>No of cases</b>	<b>Percentage</b>
1	Right	15	54%
2	Left	13	46%

In 53.6%(n=15) Right ear was involved and in 46.4%(n=13) Left ear was involved.

**Table 5.2 SITE OF INJURY IN THE EAR**

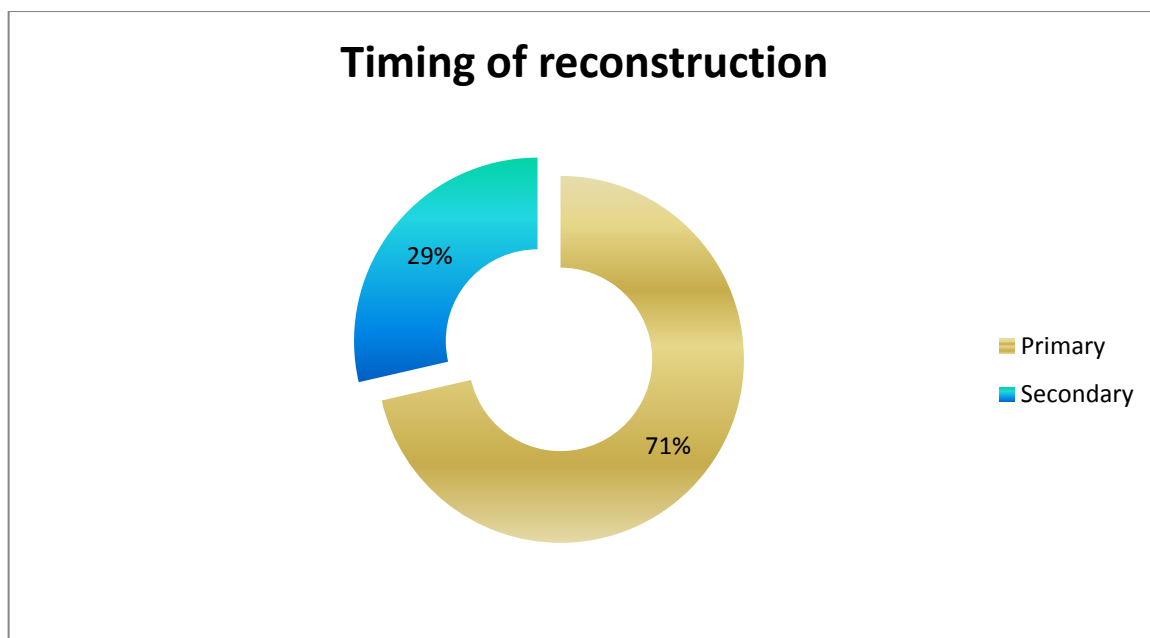
S.No	Region of Injury	No of cases	Percentage
1	Upper third	8	29%
2	Middle third	12	42%
3	Lower third	8	29%

Middle third of the ear was commonly involved in 12 cases (43%) followed by the upper and lower third in 8 cases each (29% each).



**Table 5.3 TIMING OF RECONSTRUCTION**

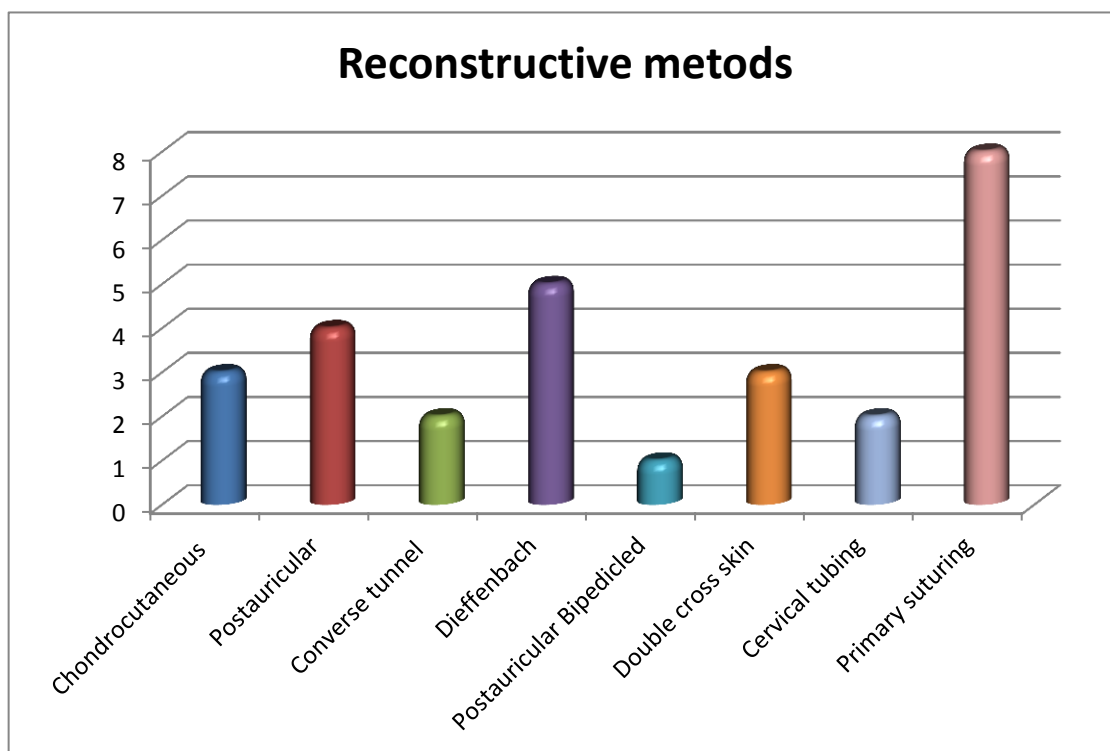
S.No	Reconstruction	No of cases	Percentage
1	Primary	20	71%
2	Secondary	8	29%



**Table 5.4 METHODS OF RECONSTRUCTION**

S.No	Procedures	No of cases	Percentage
1	Antia Chondrocutaneous advancement	3	11%
2	Postauricular flap	4	14%
3	Converse tunnel procedure	2	7%
4	Dieffenbach procedure	5	18%
5	Postauricular Bipedicled flap	1	4%
6	Double cross skin flap	3	11%
7	Cervical Tubing	2	7%
8	Primary suturing	8	28%

Primary suturing was done commonly in 8 cases (28%) followed by Dieffenbach flap in 5 cases (18%), Postauricular flap in 4 cases (14%) Chondrocutaneous advancement and double cross skin flap in 3cases each (11% each), Converse tunnel and cervical tubing in 2 cases each (7% each) and postauricular bipedicle flap in 1 case (4%).



**Table 5.5 COMPLICATIONS**

S.No	Complications	No of cases
1	Flap oedema	2
2	Flap necrosis	2
3	Flap Dehiscence	1
4	Perichondritis	2

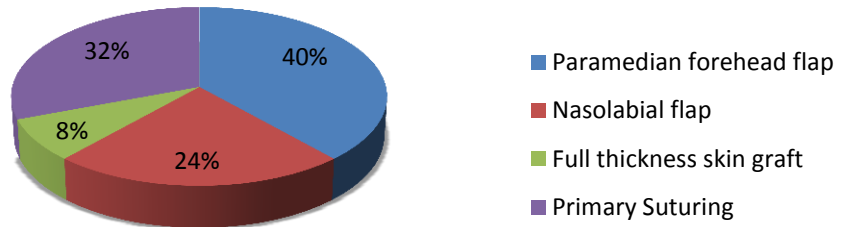
### NOSE

**Table 6.1 METHODS OF RECONSTRUCTION**

S.No	Procedures	No of cases	Percentage
1	Paramedian forehead flap	5	40%
2	Nasolabial flap	3	24%
3	Full thickness skin graft	1	8%
4	Primary Suturing	4	32%

Nose defects were reconstructed with paramedian forehead flap in 5 cases (40%) Nasolabial flap in 3 cases (24%) Full thickness skin graft in 1 case (8%) and primary suturing in 4 cases (32%)

### Procedures



### LIP

**Table 7.1 SITE OF INJURY**

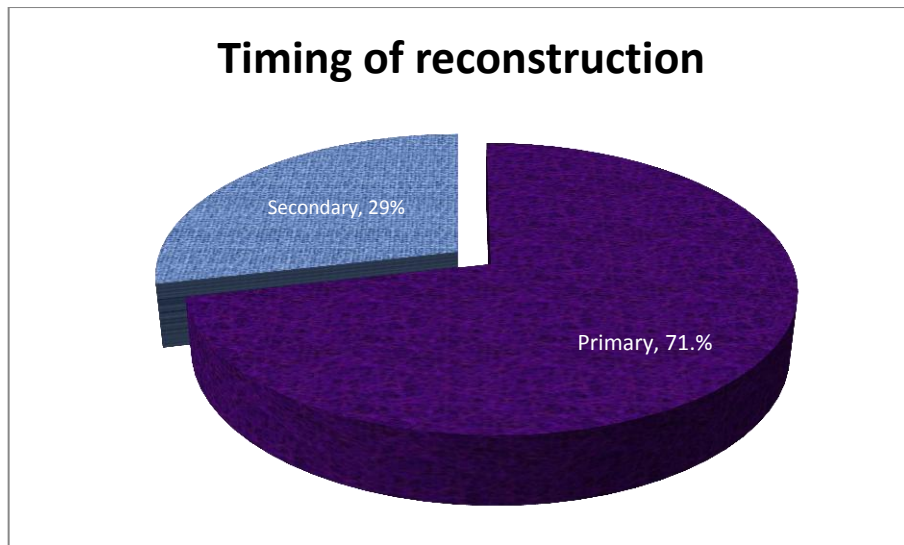
S.No	Site of injury	No of cases	Percentage
1	Upper lip	7	50%
2	Lower lip	7	50%

Both upper and lower lip was equally involved contributing 50% each.

**Table 7.2 TIMING OF RECONSTRUCTION**

S.No	Reconstruction	No of cases	Percentage
1	Primary	10	71%
2	Secondary	4	29%

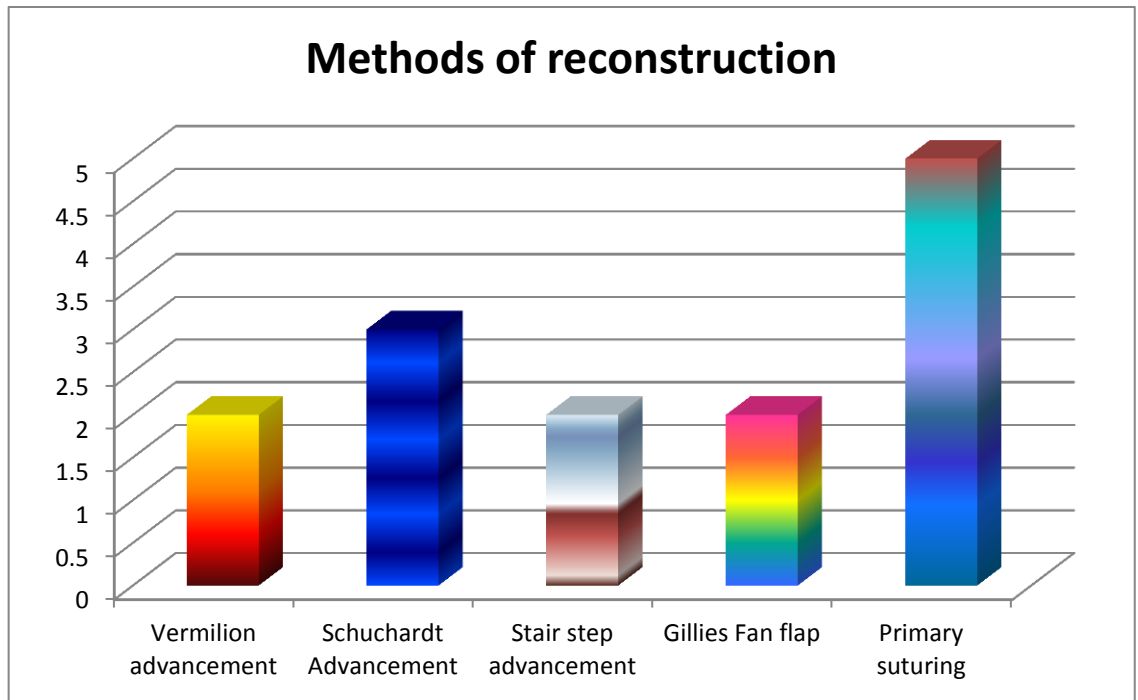




**Table 7.3 METHODS OF RECONSTRUCTION**

S.No	Methods	No of cases	Percentage
1	Vermilion advancement	2	14%
2	Schuchardt Advancement	3	21%
3	Stair step advancement	2	14%
4	Gillies Fan flap	2	14%
5	Primary suturing	5	35%

Lip injuries were primarily repaired in 5 cases (35%), Schuchardt advancement done in 3 cases (21%) and Vermilion advancement, Stair-step advancement, Gillies Fan flap were done in 2 cases each (14% each).



**Table 7.4 COMPLICATIONS**

S.No	Complication	No. of Patients
1	Wound gaping	1
2	Microstomia	2
3	Wound Infection	2

## 6. DISCUSSION

Primary reconstruction of the facial defect improved the self esteem of the patients, reduced the hospital stay as well as the cost of treatment. 47 cases were reconstructed primarily in emergency operation theatre and 43 cases reconstructed secondarily in elective operation theatre.

Most of the patients belonged to the economically productive age group of 21 - 40 years. Males outnumbered the females. Most of the patients came from villages in and around Thanjavur(48.8%) followed by Thiruvarur district(15.5%). Out of 90 cases 76 patients belonged to the daily wages group. 47 patients were under alcohol influence during the injury.

Road traffic accidents contributed to the majority of cases of which the two-wheeler accidents predominated. Other causes were accidental falls, assault with sharps and Occupational injuries like fall of wooden objects during construction works. Human bites were also common, females were the common victims and the assailants were usually under the influence of alcohol. Dog bite was the cause of injury in 3 patients. All 3 cases were actively and passively immunised against rabies.

Out of 90 cases of facial soft tissue injuries 27 cases had ear injuries, the next common site being eyelid and lips(14 cases each) followed by the

Scalp & Forehead (12cases each), Nose (8cases), cheek (7cases) and multiple sites in 7cases.

Among the Ear injuries right ear was commonly injured compared to the left ear. Middle third defects predominated than the upper third and lower third. In 8 cases the ear lacerations were sutured primarily with 5-0 non-absorbable nylon with small suction drains to avoid hematoma. In 5cases with middle third defect reconstruction was done using Dieffenbach flap. In 3cases of upper third defect Antia Buch chondrocutaneous advancement was done. Postauricular flap-superiorly based/inferiorly based was done in 4cases. Cervical tubing was done in stages to reconstruct helical defect in 1case and lower third defect in 1 case. Double cross skin flap was done as a single stage procedure in 3 cases. In 2 cases Converse tunnel flap was done. In 1case the helical defect was reconstructed using bipedicle flap from the post auricular skin in stages. The average hospital stay following reconstruction was 4 days. 2 cases had perichondritis which was managed conservatively with IV antibiotics and analgesics and debridement of necrotic cartilage. 2 cases had flap necrosis and 1case had flap dehiscence.

Lower eyelid and medial canthus were commonly involved. 10cases were reconstructed primarily. In 9cases all layers of the eyelid (inner, middle and outer lamella) were repaired in layers. Everting stitch was placed along the lid margins to facilitate proper anatomical alignment. The suture was left

long and taped down to the cheek to prevent sutures from irritating the cornea. The inner and middle lamella were repaired with 4-0 absorbable vicryl sutures. And skin was sutured with 5-0 non-absorbable nylon. Sutures were removed within 5 days. In 5 cases with lower eyelid defect greater than half the lid width Mustarde cheek rotation flap was done and in 2 cases with total avulsion of lower eyelid nasolabial flap was planned and done. In 1 case of upper eyelid defect full thickness skin graft from contralateral upper eyelid was done. Average hospital stay was 8 days. 2 patients had wound infection which was controlled conservatively with cleaning and dressing and antibiotics according to pus culture and sensitivity.

Out of 14 cases with Lip injuries upper and lower lip were equally involved. 10 cases were reconstructed primarily. In 5 cases lip was primarily sutured in layers after debridement of necrotic tissue. mucosa and muscle (Orbicularis oris) repaired with 3-0 vicryl, Vermilion and skin with 5-0 nylon. White roll was approximated. 3 cases with lower lip defect Schuchardt advancement were done. Stair-step advancement was done in 2 cases with lower lip defect. Gillies fan flap was done in 2 cases. Vermilion advancement in 2 cases. Average hospital stay was 4 days. There was Microstomia in 2 cases in whom Gillies fan flap was done. 2 patients had wound infection which was treated conservatively. 1 patient had wound gapping which was resutured.

Among the scalp injuries, the temporal region defects predominated followed by parietal, frontal and forehead regions. Most of the cases were reconstructed secondarily, using transposition flap in 3cases, rotation flap in 4 cases, Galeal flap in 1case, Split skin graft in 1case and full thickness graft in 2 cases. In 2cases the scalp was reconstructed primarily. Average hospital stay was 10 days. In 2patients there was partial flap necrosis, in 1patient there was graft loss and 1patient had wound infection which was managed with cleaning and dressing and antibiotics according to pus culture and sensitivity.

Out of 8 cases with nose injuries paramedian forehead flap was done in 5 cases in stages to reconstruct lower third defect. In 3 cases nasolabial flap was used. In one case full thickness graft was done. In 4 cases primary suturing was done. Average hospital stay was 5 days.

Out of 10 cases with cheek injuries 1 case had laceration involving the parotid gland and facial nerve. The cut ends of the facial nerve identified and repaired primarily using 7-0 nylon epineural sutures under loupe magnification. In 5 cases the cheek defects were covered with local flaps like transposition flaps, Limberg flap and cheek advancement flap. In 4 cases primary suturing was done. Average hospital stay was 6 days. 1 case had wound infection which as managed conservatively.

All the cases were followed for minimum period of 3 months. The flaps settled well and scar was supple. Patients were advised scar massage.

## 7. CONCLUSION

Facial injuries themselves are rarely life threatening, but are indicators of energy of injury. Road traffic accidents being the common cause for facial and head injuries may be prevented by using helmets.

The economically productive age group of 21-40 years were commonly injured there by decreasing the income of the population. Males outnumbered the females, majority of cases belonged to low socio economic status from villages.

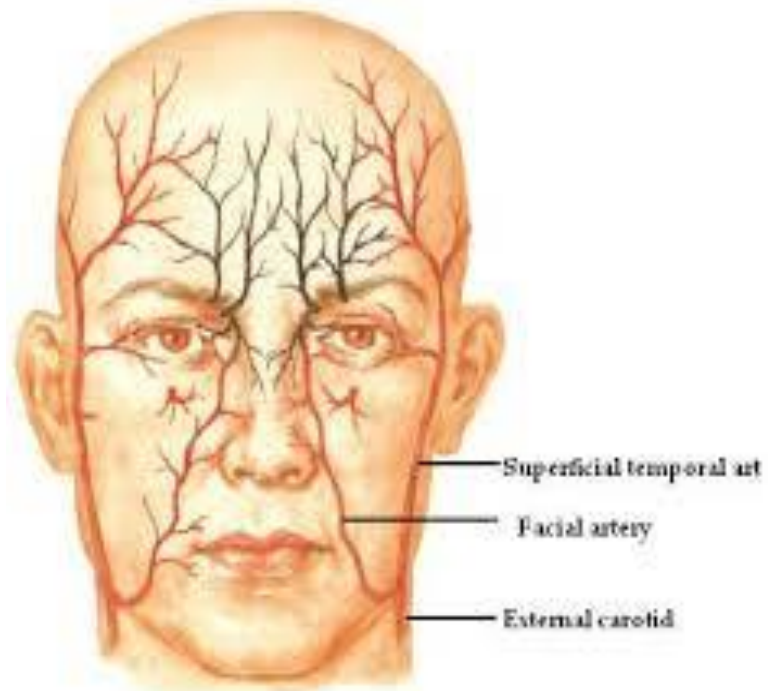
In reconstruction of ear injuries for upper third defects superiorly based postauricular flap was ideal. For middle third defects converse tunnel, Dieffenbach and bipedicle flap gave good results. Double cross skin flap gave good aesthetic results in lobule reconstruction.

Scalp defects managed with rotation flaps gave good aesthetic hair-bearing skin when compared to transposition flaps. Cheek injuries sutured primarily gave equal results as local flaps. Lip injuries sutured primarily and Schuchardt advancement flap gave good aesthetic results. Eye lid injuries when treated primarily gave good aesthetic and functional results. For lower lid injuries both Mustarde and Nasolabial flaps gave good equal results. In nose reconstruction oblique forehead flaps gave good results.

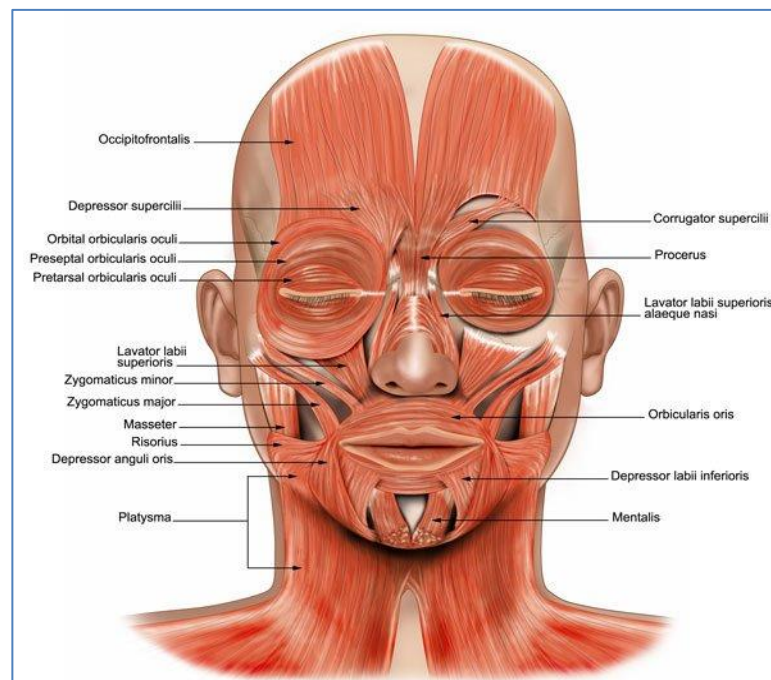
The study concluded that all patients with facial injuries must be referred to trauma centres with Advanced Trauma Life Support. Primary reconstruction should be the mainstay of management and the most important responsibility of the surgeon is to convert the contaminated wound to a clean one and then to perform reconstruction.



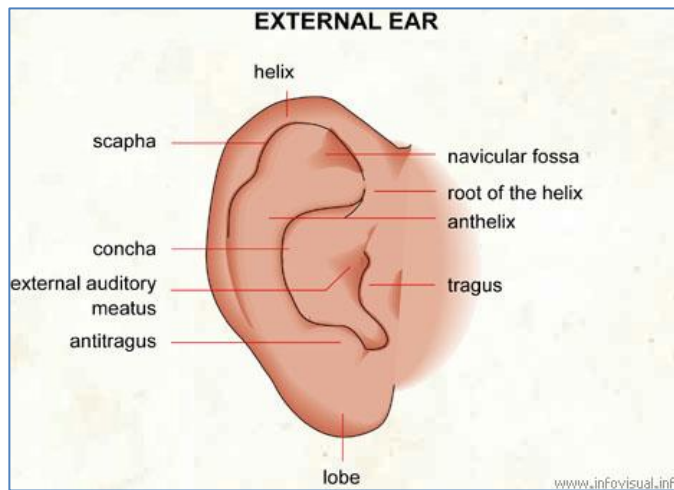
# ANATOMY OF FACE



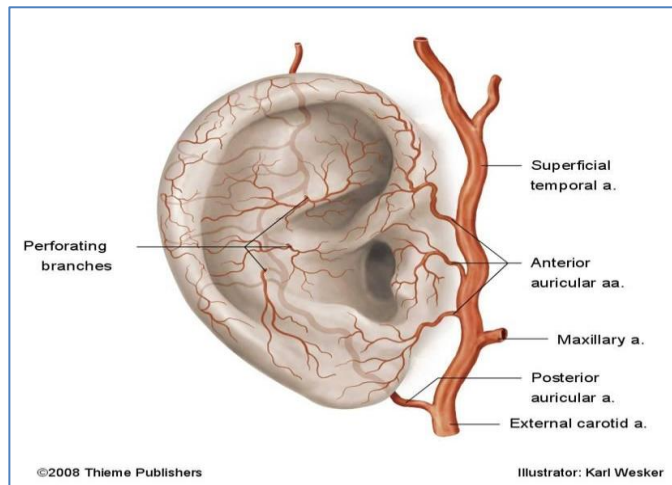
# MUSCLES OF THE FACE



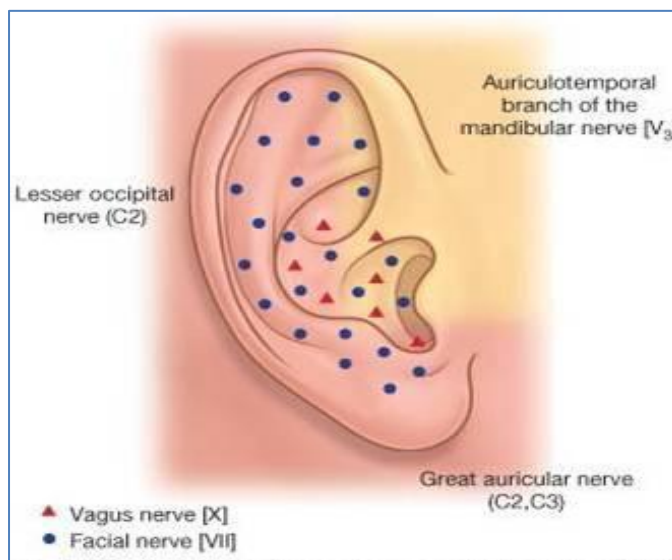
# ANATOMY OF THE EAR



## BLOOD SUPPLY OF THE EAR

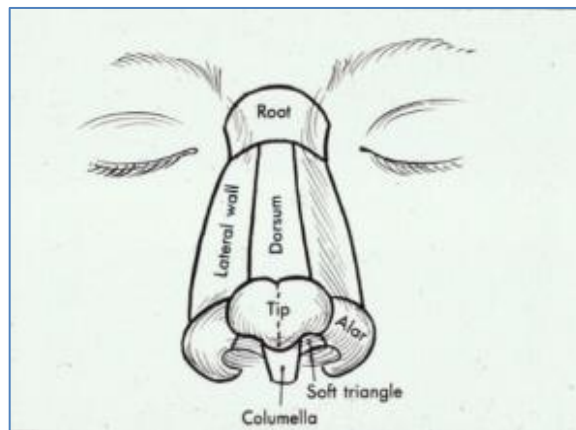


## NERVE SUPPLY OF THE EAR



# ANATOMY OF THE NOSE

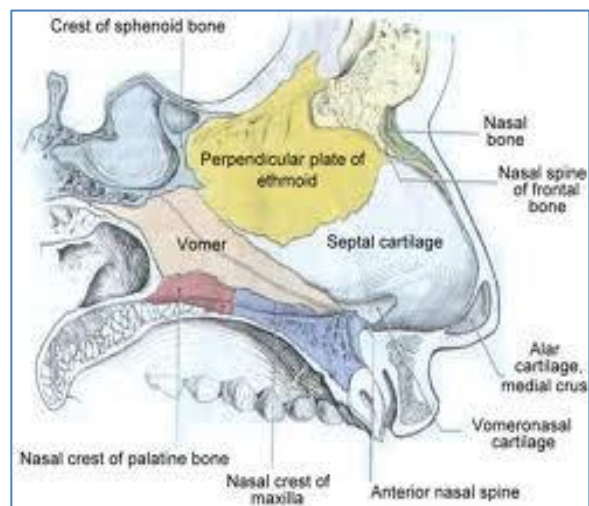
## AESTHETIC SUBUNITS OF NOSE



## OSSEOCARTILAGINOUS FRAMEWORK OF NOSE

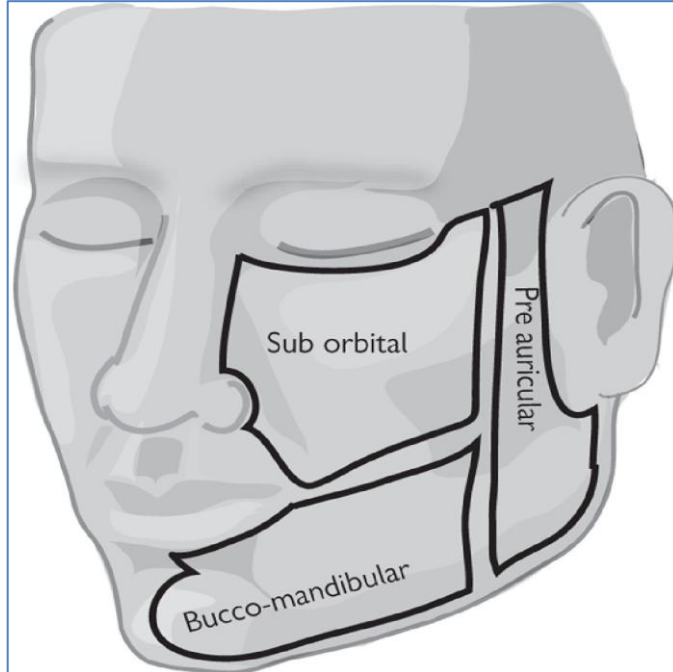


## NASAL SEPTUM

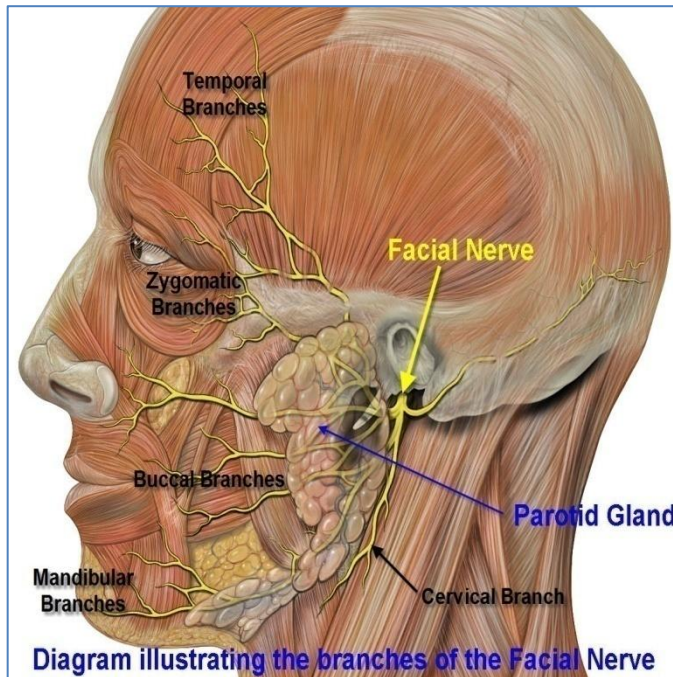


# ANATOMY OF THE CHEEK

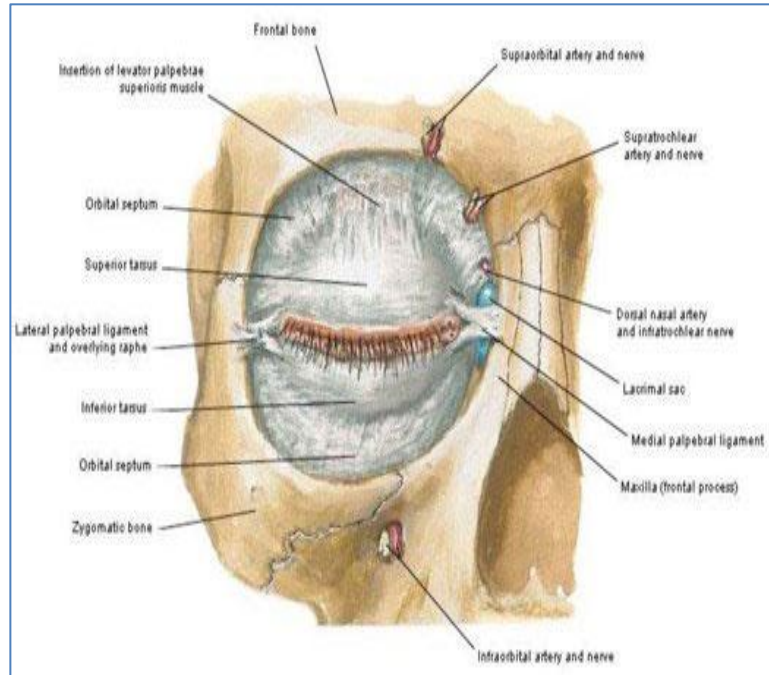
## AESTHETIC SUBUNITS OF CHEEK



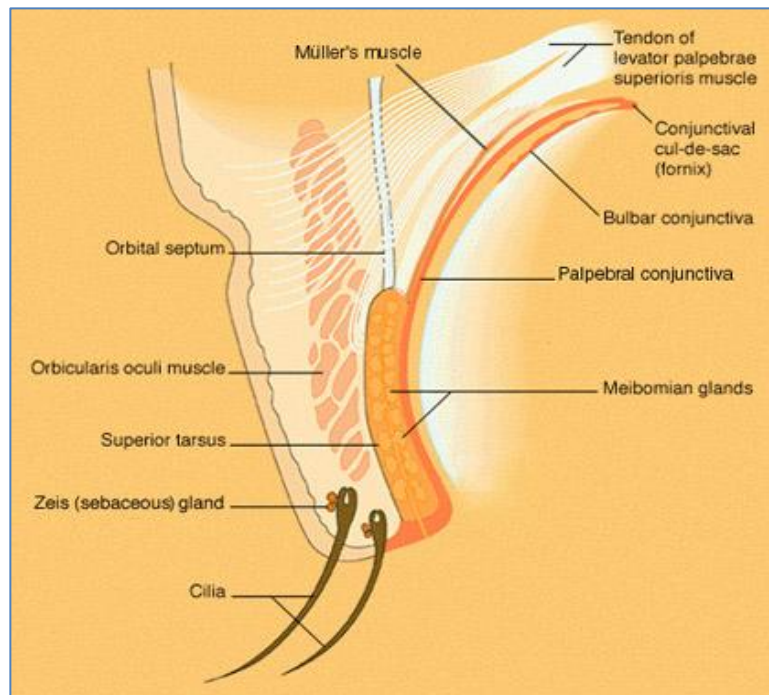
## ANATOMY OF THE PAROTID AND FACIAL NERVE



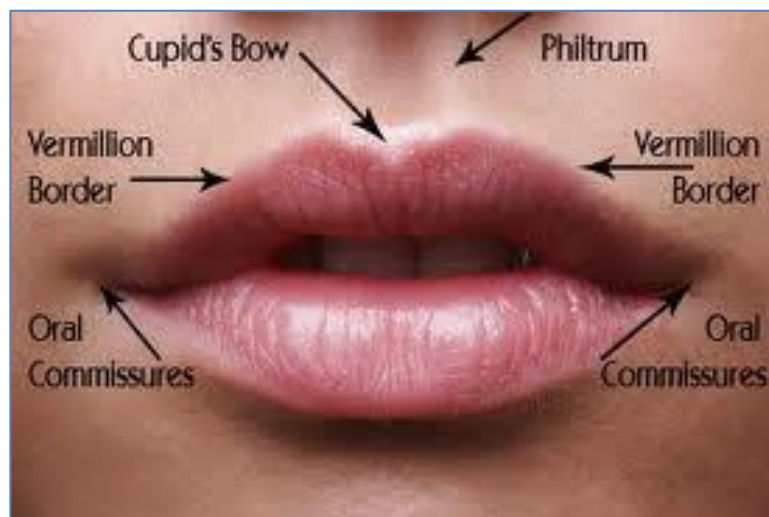
# ANATOMY OF THE EYELID



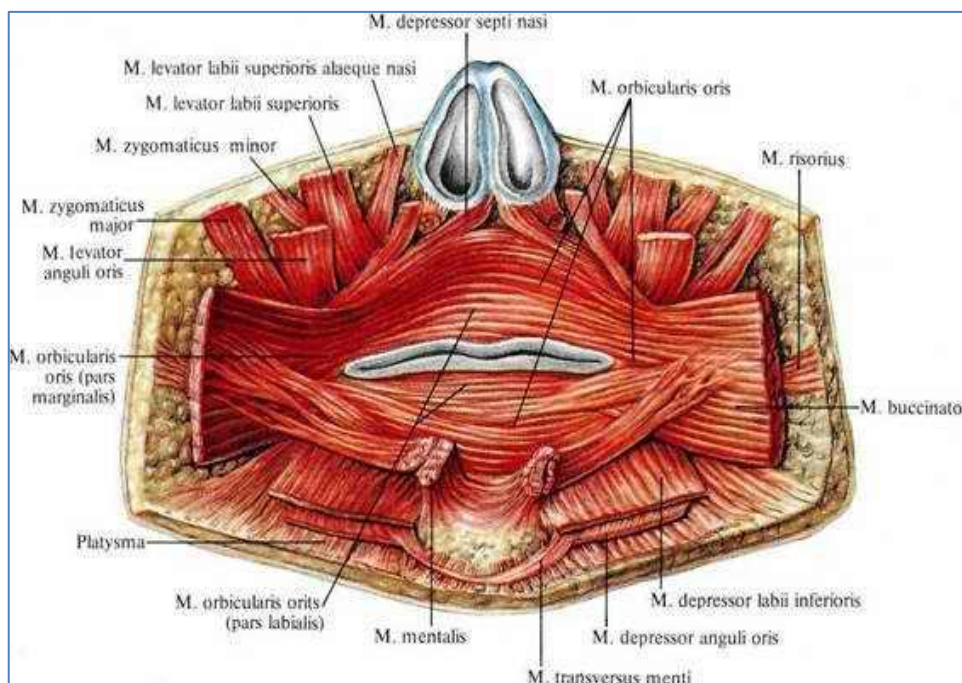
# CROSS SECTIONAL ANATOMY OF THE EYELID



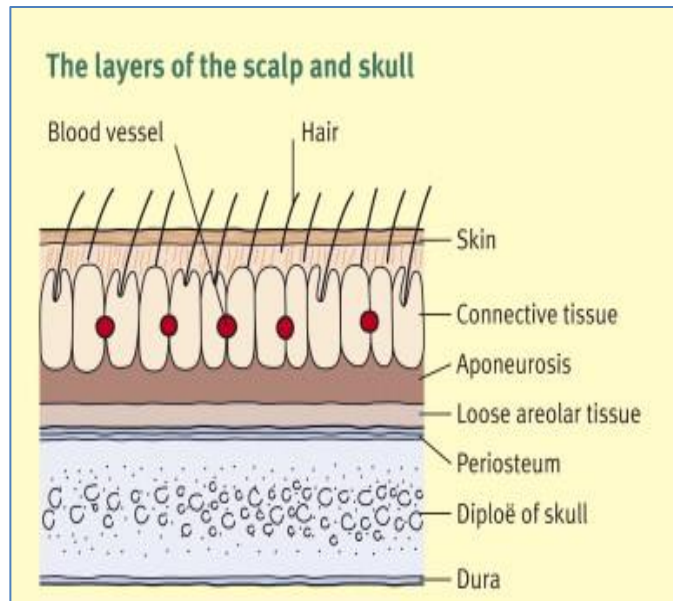
# ANATOMY OF THE LIP



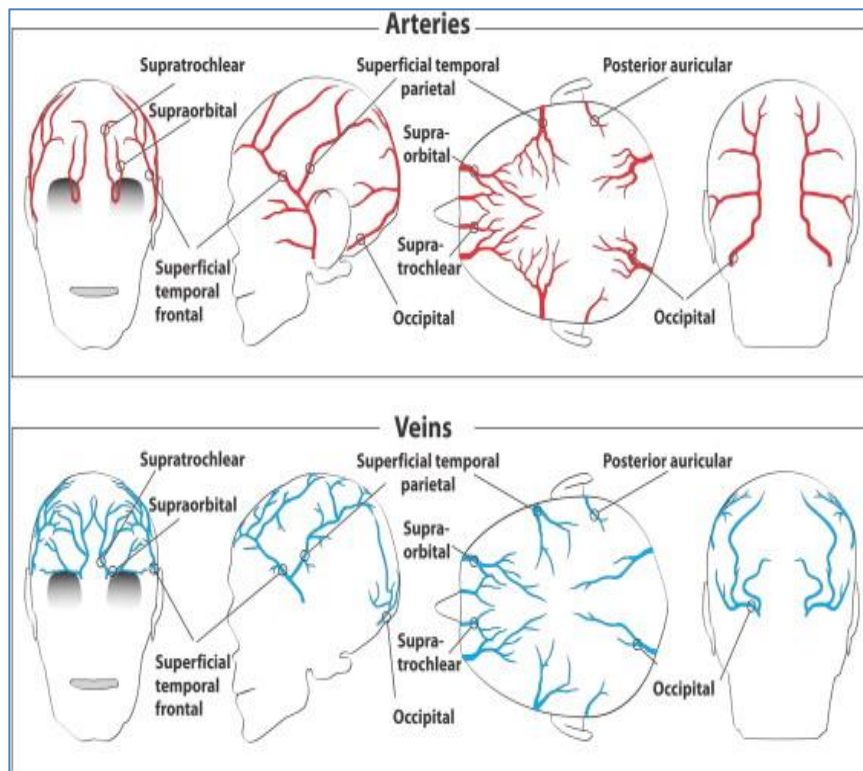
## MUSCLES OF THE LIP



# ANATOMY OF THE SCALP



## BLOOD SUPPLY OF THE SCALP



# EAR DEFECTS AND RECONSTRUCTION

## UPPER THIRD PINNA DEFECT

### CONVERSE TUNNEL PROCEDURE



### SUPERIORLY BASED POST AURICULAR FLAP

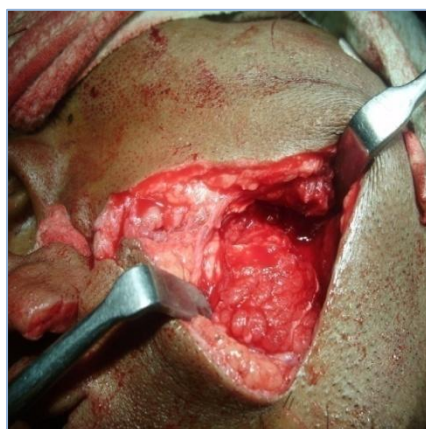




## CHEEK INJURIES



**CHEEK LACERATION WITH PAROTID GLAND AND  
FACIAL NERVE INJURY  
FACIAL NERVE REPAIR & PRIMARY SUTURING**



## COMPLICATIONS OF FACIAL INJURIES

**UPPER EYELID PTOSIS**



**LINEAR SCAR**



**PERICHONDritis**



**KELOID PINNA**



**MEDIAL CANTHAL SCAR**



# UPPER THIRD DEFECT OF PINNA DIEFFENBACH PROCEDURE

CASE 1



CASE 2



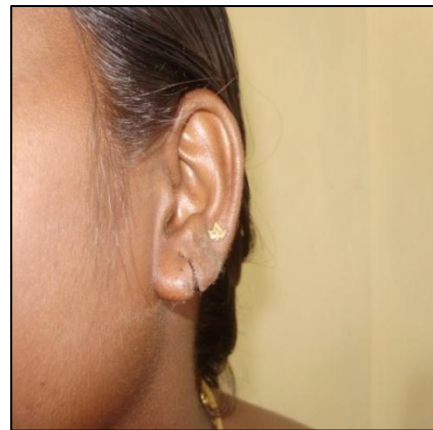
CASE 3



## LOWER THIRD DEFECT – CERVICAL TUBING



## EAR INJURIES



## EYE LID INJURY - PRIMARY SUTURING



## FACIAL INJURIES - VARIOUS PRESENTATIONS

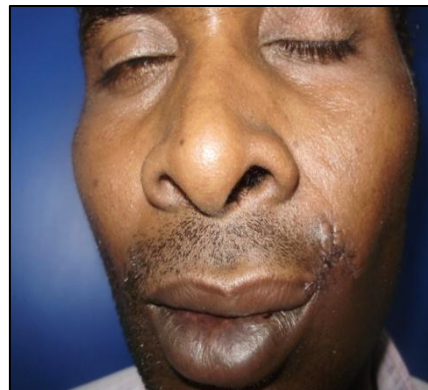


# LIP INJURY – PRIMARY SUTURING

## CASE 1



## CASE 2





**LOWER LIP INJURY - SCHUCHARDT ADVANCEMENT**



**LOWER LIP INJURY - STAIR STEP OPPOSING ADVANCEMENT FLAP**



**LOBULE DEFECT - DOUBLE CROSS SKIN FLAP**



## LOWER EYELID INJURY - MUSTARDE FLAP

### PATIENT 1



### PATIENT 2



## UPPER EYELID INJURY – PRIMARY SUTURING



## LOWER EYELID INJURY - NASOLABIAL FLAP



# LOWER EYELID INJURY NASOLABIAL FLAP(COVER) & BUCCAL MUCOSA(LINING)



## LOWER EYELID INJURY - PRIMARY SUTURING

### CASE 1



### CASE 2



### CASE 3

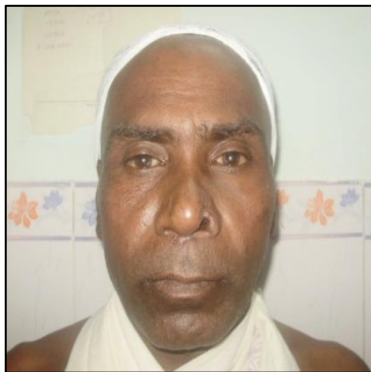


# NOSE DEFECT - NASO LABIAL FLAP

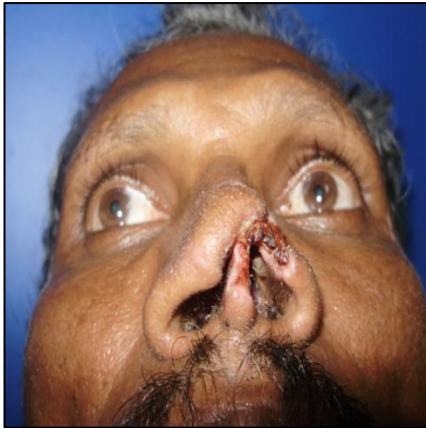
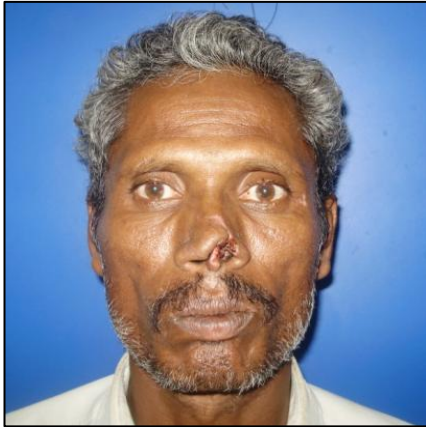
## CASE 1



## CASE 2



## NOSE DEFECT – OBLIQUE FOREHEAD FLAP



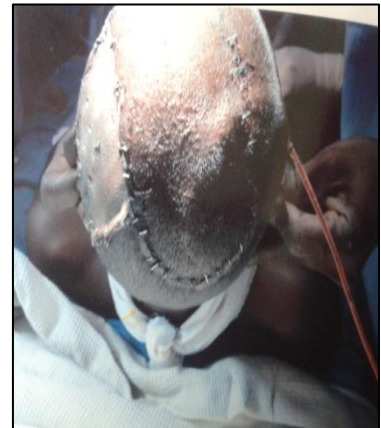


# SCALP INJURIES

## TRANSPOSITION FLAP



## GALEAL FLAP



## ROTATION FLAP



# MIDDLE THIRD PINNA DEFECT

## INFERIORLY BASED POST AURICULAR FLAP



## POST AURICULAR BIPEDICLE FLAP



**DEPARTMENT OF PLASIC & RECONSTRUCTIVE SURGERY  
THANJAVUR MEDICAL COLLEGE AND HOSPITAL,  
THANJAVUR  
RECONSTRUCTION OF SOFT TISSUE INJURIES OF FACE  
PROFORMA**

**NAME :**

**AGE :**

**SEX :**

**IP No :**

**ADDRESS:**

**OCCUPATION:**

**SOCIOECONOMIC STATUS:**

**DATE OF SURGERY:**

**MODE OF INJURY:**

- a) **Road Traffic Accidents**
- b) **Accidental fall**
- c) **Assault**
- d) **Occupational**
- e) **Human bite**
- f) **Animal bite**
- g) **Others**

**ANATOMICAL SITE OF INJURY:**

**I) SCALP & FOREHEAD**

**II) EYELIDS**

- Upper eye lid (Zone I)

- Lower eyelid (Zone II)
- Medial Canthus (Zone III)
- Lateral Canthus (Zone IV)
- Periocular (Zone V)

### III) CHEEK

- Parotid gland/duct injury
- Facial Nerve injury

### IV) NOSE

- Proximal third zone
- Middle third zone
- Distal third zone
  - ❖ Ala
  - ❖ Domal-alar groove
  - ❖ Dome
  - ❖ Colmella
  - ❖ Sill

### V) EAR

- Upper third
- Middle third
- Lower third

### VI) LIP

- Upper Lip - Central / lateral

Partial thickness / Full thickness

<1/3<sup>rd</sup> / 1/3<sup>rd</sup> to 2/3<sup>rd</sup> / > 2/3<sup>rd</sup> size

- Lower Lip      - Central / lateral
- Partial thickness / Full thickness
- $<1/3^{\text{rd}}$  /  $1/3^{\text{rd}}$  to  $2/3^{\text{rd}}$  /  $> 2/3^{\text{rd}}$  size
- Vermilion      - involved / not involved
- Commissure      - involved / not involved

**Diagnosis :**

**Investigations:**

- Urine- Albumin / sugar / Deposits
- Blood - Hb%, Sugar, Urea , Creatinine
- Wound swab for culture & Sensitivity
- X ray Skull / CT Facial bones

**Treatment :**

- Primary / Secondary reconstruction.

**Postoperative period:**

**Complications:**

**Follow up :**

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## MASTER CHART

S.No	NAME	AGE	SEX	IP NO	RESIDENCE	DATE OF SURGERY	MODE OF INJURY	SITE OF INJURY						ANATOMICAL DEFECT	MODE OF RECONSTRUCTION	
								SCALP & FOREHEAD	EYE LID	CHEEK	EAR	NOSE	LIP		PRIMARY RECONSTRUCTION	SECONDARY RECONSTRUCTION
1	Mohan	42	M	1093971	Ariyalur	03.08.10	Human bite	-	-	-	-	+	-	Nose Lower 1/3		Paramedian forehead flap
2	Latha	20	F	1095977	Tiruvarur	10.08.10	Assault	-	-	-	+	-	-	Left ear middle 1/3		Bipedicled flap
3	Senthamarai	30	M	1096297	Pabanasam	10.08.10	RTA	-	-	-	-	+	+	Upper lip less 1/3	Primary Suturing	
4	Ganesan	38	M	1096742	Pattukottai	13.08.10	Human bite	-	-	-	+	-	-	Right ear upper 1/3	Primary suturing	
5	Manimegalai	55	F	1096990	Orathanadu	14.08.10	RTA	-	-	-	-	+	+	Upper lip less 1/3	Primary suturing	
6	Amudha	26	F	1095974	Thirumanoor	14.08.10	RTA	-	-	-	-	-	+	Lower lip middle 1/3		Bilateral Gillies Fan flap
7	Manickam	30	M	1096450	Kumbakonam	14.08.10	Assault	-	-	-	-	-	+	Upper lip middle 1/3		Bilateral Vermilion advancement
8	Loganathan	34	M	1096650	Mannarkudi	14.08.10	RTA	+	-	-	-	-	-	Temporal scalp		Transposition Flap
9	Devi	40	F	1097492	Thiruvayyaru	14.08.10	Assault	-	-	-	+	-	-	Right ear upper 1/3		Postauricular Flap
11	Sathyaraj	25	M	1097328	Pabanasam	17.08.10	RTA	-	-	-	-	+	+	Upper lip < 1/3	Primary suturing	
12	Kathir	32	M	1097863	Nagapattinam	21.08.10	RTA	-	-	-	-	-	+	Lower lip < 1/3	Primary suturing	
13	Raju	55	M	1098405	Tiruvarur	25.08.10	RTA	-	-	-	+	-	-	Left ear middle 1/3	Dieffenbach flap	
14	Ramamoorthy	43	M	1096494	Alakkudi	04.09.10	Accidental	+	-	-	-	-	-	Parietal scalp		Transposition flap
15	Arumugam	60	M	1097222	Sengipatti	18.09.10	RTA	+	-	-	-	-	-	Frontal scalp	Primary suturing	
16	Seetharaman	30	M	1092571	Thanjavur	24.09.10	Assault	-	-	+	+	+	+	Parotid gland	Primary suturing	
17	Indirani	45	F	1102372	Kandarvakotai	05.10.10	RTA	-	-	-	-	-	+	Lower lip	Primary suturing	
18	Murugesan	38	M	1103563	Orathanadu	05.10.10	Accidental	-	-	-	+	-	-	Left ear upper 1/3	Chondrocutaneous advancement	
19	Chellaiyan	26	M	1105809	Pudalur	11.10.10	Assault	-	-	-	-	+	-	Nose lower 1/3	Paramedian Forehead flap	
20	Thangaraj	55	M	1106037	Thanjavur	14.10.10	Assault	-	-	-	-	-	+	Lower lip less 1/3	Primary suturing	
21	Napoleon	22	M	1104363	Mannarkudi	23.10.10	RTA	+	-	-	-	-	-	Forehead		Full thickness skin graft
22	Tamilmani	28	M	1104423	Kodavasal	11.11.10	RTA	-	-	-	+	-	-	Left ear middle 1/3	Dieffenbach flap	
23	Vijaya	31	F	1203226	Ayyampettai	27.11.10	Assault	-	-	-	+	-	-	Right ear lower 1/3	Double cross skin flap	
24	Thangaiyan	40	M	1203896	Ariyalur	29.11.10	Assault	-	-	-	-	+	+	Upper lip < 1/3	Primary suturing	
25	Palanisamy	43	M	1203469	Thiruverumbur	04.12.10	Accidental	-	-	-	+	-	-	Right ear middle 1/3	Dieffenbach flap	
26	Senthil	35	M	1208696	Ammappettai	04.01.11	RTA	+	-	-	-	-	-	Temporal scalp		Split skin graft
27	Rajalakshmi	27	F	1207397	Pattukottai	20.01.11	Assault	-	-	-	+	-	-	Left ear middle 1/3	Post auricular flap	
28	Mannar	4	M	1300482	Peravoorani	25.01.11	RTA	+	-	-	-	-	-	Parietal scalp		Rotation flap
29	Pushpam	55	F	1208721	Karambakadu	01.02.11	Dog bite	-	-	-	+	-	-	Left ear upper 1/3		Postauricular flap
30	Sivalingam	50	M	1302023	Thanjavur	08.02.11	RTA	-	+	-	-	-	-	Right upper eyelid	Full thickness skin graft	

## MASTER CHART

S.No	NAME	AGE	SEX	IP NO	RESIDENCE	DATE OF SURGERY	MODE OF INJURY	SITE OF INJURY						ANATOMICAL DEFECT	MODE OF RECONSTRUCTION	
								SCALP & FOREHEAD	EYE LID	CHEEK	EAR	NOSE	LIP		PRIMARY RECONSTRUCTION	SECONDARY RECONSTRUCTION
31	Panchatcharam	47	M	1304827	Karambakudi	10.02.11	RTA	-	+	-	-	-	-	Left Lower eyelid < 1/3	Primary suturing	
32	Mary	35	F	1307966	Adhanakottai	26.02.11	Assault	-	-	-	+	-	-	Left ear lower 1/3	Double cross skin flap	
33	Sundar	30	M	1307978	Senthurai	26.02.11	RTA	-	-	-	+	-	-	Right ear lower 1/3		Cervical tubing
34	Mangalavalli	60	F	1308973	Kumbakonam	03.03.11	RTA	-	+	-	-	-	-	Right Medial canthus	Primary suturing	
35	Sneha	7	F	1306880	Aduthurai	05.03.11	RTA	+	-	-	-	-	-	Forehead		Full thickness skin graft
36	Vijaya	56	F	1307489	Nedamangalam	07.04.11	Assault	-	-	-	+	-	-	Left ear lower 1/3	Primary suturing	
37	Govindasamy	33	M	1313813	Koradacheri	16.04.11	RTA	+	-	-	-	-	-	Temporal scalp		Rotation flap
38	Ravi	32	M	1324094	Pudalur	31.05.11	Assault	-	-	-	+	-	-	Right ear middle 1/3	Cervical tubing	
39	Pachaiammal	47	F	1333230	Sengipatti	02.06.11	RTA	-	+	-	-	-	-	Right medial canthus	Primary suturing	
40	Rajendran	55	M	1322540	Thirumanur	03.06.11	Assault	-	-	+	-	-	-	Right Facial nerve//Parotid	Primary suturing	
41	Gopi	32	M	1323168	Muthupettai	09.06.11	Accidental	-	-	-	+	-	-	Right ear middle 1/3	Dieffenbach flap	
42	Arul	19	M	1325714	Pappanadu	11.06.11	RTA	-	+	+	-	-	-	Left buccomandibular	Cheek advancement	
43	Muruganandam	27	M	1325198	Orathanadu	16.06.11	RTA	-	-	-	+	-	-	Left ear upper 1/3	Dieffenbach flap	
44	Ramanathan	35	M	1324758	Pudukottai	17.06.11	Human bite	-	-	-	+	-	-	Right ear upper 1/3	chondrocutaneous advancement	
45	Nagavalli	28	F	1303857	Thuvakudi	30.06.11	Assault	-	-	-	+	-	-	Right ear middle 1/3		Postauricular bipedicle flap
46	Indira	22	F	1331252	Peungalur	14.07.11	RTA	+	+	-	-	-	-	Frontal scalp	Primary suturing	
47	Mahadevi	25	F	1331123	Karambakudi	14.07.11	Human bite	-	-	-	-	-	+	Lower lip > 1/3		Stair-Step advancement
48	Chelladurai	28	M	1332375	Peravoorani	30.07.11	RTA	-	-	-	+	-	-	Right ear middle 1/3	Converse tunnel	
49	Saminathan	48	M	1335637	Ayyampettai	09.08.11	Human bite	-	-	-	-	+	-	Nose Lower 1/3		Paramedian forehead flap
50	Dravidamani	55	M	1338709	Ariyalur	11.08.11	Accidental	-	-	+	-	-	-	Parotid gland	Primary suturing	
51	Palaniammal	30	F	1335685	Senthurai	11.08.11	RTA	-	+	+	-	-	-	Left Lateral canthus,cheek	Mustarde flap	
52	Iyyappan	22	M	1336896	Thiruvayaru	11.08.11	Accidental	-	-	-	+	-	-	Right ear middle 1/3	Dieffenbach flap	
53	Saravanan	30	M	1337264	Pabanasam	20.08.11	Human bite	-	-	-	-	-	+	Lower lip > 1/3		Schuchardt advancement
54	Swaminathan	56	M	1338976	Karanthai	25.08.11	Human bite	-	-	-	-	-	+	Right ala of nose		Nasolabial flap
55	Mary	42	F	1338965	Vallam	03.09.11	Assault	-	-	-	-	+	-	Right ala of nose		Nasolabial flap
56	Rajendran	17	M	1342503	Thanjavur	24.09.11	RTA	-	-	+	-	-	-	Left buccomandibular		Limberg flap
57	Sivaraj	44	M	1343210	Punalkulam	27.09.11	RTA	-	-	-	-	+	-	Nose lower 1/3		Paramedian forehead flap
58	Mariammal	30	F	1345239	Thirumayam	08.10.11	RTA	-	-	+	-	-	-	Right buccomandibular	Transposition flaps	
59	Kalaikumar	20	M	1347501	Kandarvakottai	15.10.11	Assault	-	-	-	-	+	-	Dorsum of nose	Full thickness skin graft	
60	Muralidharan	30	M	1347140	Pudukottai	15.10.11	RTA	-	+	-	-	-	-	Left lower eyelid		Nasolabial flap

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S.No	NAME	AGE	SEX	IP NO	RESIDENCE	DATE OF SURGERY	MODE OF INJURY	SITE OF INJURY						ANATOMICAL DEFECT	MODE OF RECONSTRUCTION	
								SCALP & FOREHEAD	EYE LID	CHEEK	EAR	NOSE	LIP		PRIMARY RECONSTRUCTION	SECONDARY RECONSTRUCTION
61	Muruganandam	6	M	1349052	Mannarkudi	03.11.11	RTA	+	-	-	-	-	-	Left temporal		Transposition flap
62	Hemalatha	32	F	1351745	Kumbakonam	12.11.11	Human bite	-	-	-	+	-	-	Right ear lower 1/3	Double cross skin flap	
63	Gopiraj	9	M	1353312	Mayavaram	10.12.11	RTA	+	-	-	-	-	-	Parietal scalp		Galeal flap
64	Prashanth	20	M	1361061	Thirukadayur	07.01.12	Human bite	-	-	-	-	-	+	Lower lip > 1/3	Schuchardt advancement	
65	Murali	21	M	1365265	Vallam	14.02.12	RTA	-	+	-	-	-	-	Left Lower eye lid		Nasolabial flap
66	Shankar	15	M	1369512	Adhanakottai	09.03.12	RTA	-	-	+	-	-	-	buccomandibular		Transposition flap
67	Sammantham	78	M	1372348	Thirumanur	15.03.12	RTA	-	-	-	+	-	-	Left ear lower 1/3	Primary suturing	
68	Radhakrishnan	45	M	1373286	Pudalur	20.03.12	RTA	-	+	-	-	-	-	Left lateral canthus		Mustarde flap
69	Subbaiyan	55	M	1373633	Thiruverumbur	22.03.12	RTA	-	-	-	-	-	+	Upper lip < 1/3	Primary suturing	
70	Moorthy	50	M	1377124	Thanjavur	05.04.12	RTA	-	-	-	--	-	+	Lower lip > 1/3		Stair-step flap
71	Veerasingam	56	M	1376880	Tiruvarur	14.04.12	RTA	-	+	-	-	-	-	Right lateral canthus		Mustarde flap
72	Sebasthian	23	M	1378908	Mayavaram	21.04.12	Human bite	-	-	-	-	-	+	Lower lip > 1/3		Schuchardt advancement
73	Revathy	26	F	1379678	Perungalur	21.04.12	Accidental	-	-	-	-	-	+	Lower lip > 1/3		Gillies fan flap
74	Ramanujam	38	M	1382805	Kumbakonam	05.05.12	RTA	-	-	-	+	-	-	Left ear middle 1/3	Chondrosutaneous advancement	
75	Asokan	47	M	1379078	Thanjavur	08.05.12	RTA	-	-	+	-	-	-	Buccomandibular		Local Flap
76	Sakthivel	29	M	1401597	Kandarvakottai	28.08.12	RTA	-	-	-	-	-	+	Lower lip < 1/3	Vermilion advancement	
77	Ganesan	40	M	1405450	Ayyampettai	15.09.12	Assault	-	-	-	+	-	-	Left ear upper 1/3	Converse tunnel	
78	Kalaiarasi	29	F	1413589	Nedamangalam	25.10.12	Accidental	-	-	-	+	-	-	Right ear upper 1/3		Postauricular flap
79	Sivakumar	30	M	1413678	Kodavasal	30.10.12	RTA	-	-	-	-	+	-	Left ear middle 1/3		Converse tunnel
80	Nagaraj	43	M	1414777	Ariyalur	30.10.12	Human bite	-	-	-	-	-	+	Upper lip < 1/3		Vermilion advancement
81	Karthick	22	M	1415001	Vallam	03.11.12	RTA	-	+	-	-	-	-	Right medial canthus	Primary suturing	
82	Mohan	50	M	1423986	Sengipatti	06.11.12	RTA	-	-	+	-	-	-	Left buccal	Primary suturing	
83	Sivasankaran	43	M	1420804	Nagapattinam	24.11.12	Human bite	-	-	-	-	+	-	Right ala of nose		Nasolabial flap
84	Kalaivani	25	F	1421325	Mannarkudi	06.12.12	RTA	-	+	-	-	-	-	Left lower eyelid	Primary suturing	
85	Ayyammal	35	F	1430036	Thanjavur	03.01.13	Assault	-	-	-	+	-	-	Right ear lower 1/3		Cervical Bipedicled flap
86	Vasanthamary	60	F	1426670	Pattukottai	12.01.13	RTA	+	-	-	-	-	-	Temporal scalp		Rotation flap
87	Chelladurai	45	M	1431670	Orathanadu	07.02.13	RTA	-	+	-	-	-	-	Right lateral canthus		Mustarde flap
88	Selvam	23	M	1433854	Thanjavur	07.02.13	RTA	-	+	-	-	-	-	Right lateral canthus		Mustarde flap
89	Rajamannar	58	M	1437112	Ariyalur	23.02.13	RTA	-	+	-	-	-	-	Left lateral canthus		Mustarde flap
90	Siva	4	M	1432424	Kumbakonam	25.02.13	RTA	+	-	-	-	-	-	Frontal scalp		Rotation flap



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1. INTRODUCTION Facial injuries themselves are rarely life threatening but are indicators of the energy of injury. The etiology of facial soft tissue trauma varies considerably depending on age, sex and geographic location. The true incidence is difficult to estimate because minor injuries go unreported and do not seek medical attention. The incidence of facial injuries is high in developing countries like India, than the developed. In Tamilnadu particularly in districts in & around Thanjavur the incidence is high. In the U.S , three million patients present to the emergency with facial injuries,accidental falls being the most common cause accounting for 48- 51%,16% due to non-fall impact..

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