

**A DISSERTATION ON STUDY OF
RECONSTRUCTION IN HEAD AND NECK MALIGNANCIES -
EVALUATION OF VARIOUS TREATMENT OPTIONS**

**IN PARTIAL FULFILLMENT OF THE REGULATIONS FOR THE
AWARD OF THE DEGREE OF
MASTER OF CHIRURGIE (M.Ch)**

Plastic and Reconstructive Surgery (Branch III)

August- 2013



**THE TAMILNADU
DR.M.G.R MEDICAL UNIVERSITY
CHENNAI, TAMILNADU**

BONAFIDE CERTIFICATE

This is to certify that the Dissertation entitled **RECONSTRUCTION IN HEAD AND NECK MALIGNANCIES - EVALUATION OF VARIOUS TREATMENT OPTIONS** is the bonafide original record work done by Dr. B. ARUNA DEVI under my direct supervision and guidance, submitted to THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY in partial fulfillment of University regulation for M.Ch. Plastic and Reconstructive Surgery- Branch III.

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I, Dr. B. ARUNADEVI solemnly declare that the dissertation titled **RECONSTRUCTION IN HEAD AND NECK MALIGNANCIES - EVALUATION OF VARIOUS TREATMENT OPTIONS** has been prepared by me. I also declare that this bonafide work or a part of this work was not submitted by me or any other for any award, degree, diploma to any other university board either in India or abroad.

This is submitted to THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY, Chennai in partial fulfillment of the rules and regulation for the award of M.Ch. Plastic and Reconstructive Surgery- Branch III to be held in August 2013.

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ACKNOWLEDGEMENT

I am greatly indebted to our DEAN, PROF.DR.MOHAN M.S., Government Rajaji Hospital, Madurai for his kind permission to allow me to utilize the clinical material from the hospital.

I wish to express my sincere gratitude to PROF.DR. C.BALA SUBRAMANIAN, M.S; M.Ch, Head of the Department of Plastic and Reconstructive Surgery, Government Rajaji hospital , Madurai for his expert guidance and coordination due to which , I could complete this study successfully.

I hereby express my sincere thanks to PROF.DR.R.M.RAJA MUTHIAH, M.S; M.Ch, for his expert, valuable guidance and supervision of my study in all aspects.

I sincerely thank my associate professors Dr.S.Gnanasekaran, Dr.P.Parthasarathy, and assistant professors Dr.V.Ravichandran, Dr.P.Suresh, Dr.S.Aram, Dr.V.Jeyakodish, Dr.K.Raja for their valuable suggestions and help to complete my study.

I express my heartfelt thanks to our postgraduates Dr.S.Lakshmibai, Dr.R.Gunasekaran, Dr.K.Sethuraja, Dr.E.R.Srinivas, Dr.G.Arun, Dr.T.Tirumalaisamy, Dr.C.Senthilkumar for their cooperation and help in the study.

I thank my family for their support in my work.

I owe my sincere thanks to all patients, surgery department and surgical oncology department for their cooperation.

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Introduction

The intricate anatomy of head and neck region provides challenge to reconstructive surgeon to restore form and function after cancer management. The aesthetic aspect of face has to be considered in reconstructive options. Surgery is the oldest treatment for cancer. Although various other modalities of treatment are available, surgery is the best modality in the cure of cancer. Also surgery helps in immediate reconstruction and rehabilitation of cancer patients. Both function and form have to be improved after reconstruction with minimal donor site morbidity. Reconstruction can be immediate or delayed. Immediate reconstruction is necessary for coverage of vital structures. Also it is easy to perform in soft pliable tissue. Delayed reconstruction is performed in scarred, often irradiated bed and also the tissue requirement is increased. So delayed reconstruction is considered only in cases of doubtful clearance of tumor, infection in cases of tumor necrosis, inability of patient's condition for lengthy procedure. After determining the tissue defect, the reconstructive options are considered. The reconstructive ladder has to be considered for reconstruction. But in complex defect of head and neck reconstruction, for optimal function, following the reconstructive escalator, free flap can be used. The other options like tissue expander and vacuum assisted closure can be considered where-ever possible. But

for best form and function, multiple stages may be required in head and neck reconstruction.

In head and neck reconstruction losses have to be replaced in kind. In oral cavity lining, cover, support has to be considered for mucosa, skin and bone loss. Likewise in nose lining, cover, support has to be considered for mucosa, skin and cartilage loss.

Aim of the study

In head and neck reconstruction, multiple stages are needed to restore form, function and aesthetics.

The aim of the study is to consider

- The causative factors in head and neck malignancy.
- Age and sex incidence of various malignancies in the head and neck region.
- Tumor types in various sub sites of head and neck region, stage of tumor and management of tumor.
- Tissue defect and options for reconstruction.
- Complications and comorbidity in treatment outcome.
- Secondary procedures needed for outcome.

Review of literature

Historical Perspective:

1906- Crile⁽¹⁾ radical neck dissection

1906- Tansini used pedicled latissimus dorsi myocutaneous flap for post mastectomy defects.

1951- Edgerton (2) introduced the concept of primary reconstruction

1963- McGregor (3) used laterally based forehead flap

1965- Bakamjian (4) introduced the deltopectoral flap

1976- Quillen (5) and Barton reintroduced pedicled latissimus dorsi myocutaneous flap

1979- Ariyan (6) described pectoralis major myocutaneous flap

1979- McCraw and Dibbell (7) used superior trapezius myocutaneous flap

1980- Mathes and Nahai used inferior trapezius myocutaneous flap

Along with the local and regional flaps, the advent of microvascular free flaps forms wide armamentarium for head and neck reconstruction.

Goals of reconstruction

The goals of treatment in head and neck malignancy are

- Tumor ablation
- Restoration of form
- Restoration of function

Scope of the problem

Head and neck cancer can have major impact on patient's self-perception, basic function like speech and deglutition. Most of the cancers are preventable. Sunlight is the main factor in cutaneous malignancy. Alcohol and tobacco are the main causative factors in oral cavity carcinomas. Tobacco in any form like smoking (beedi, cigar, cigarettes, pipes), reverse smoking of chuttas in to oral cavity, snuff, chewing of pan, betel nut causes oral cavity and upper aero-digestive cancer. Other causes of cancer are sharp tooth, spices, poor oral hygiene, precancerous lesions, siderophenic dysphagia. The precancerous lesions include leukoplakia, erythroplakia, lichen planus, submucous fibrosis. Immunosuppression following transplant predisposes to skin and oral cavity cancer.

Surgical anatomy

These include various sub site namely scalp, face, neck, oral cavity, pharynx and larynx.

Scalp and forehead:

Scalp and forehead are considered as a single unit with five anatomic layers namely skin, subcutaneous connective tissue, galea, loose areolar tissue and pericranium. Exception between scalp and forehead is that the scalp is usually hair bearing and contains a galeal layer, whereas the forehead has the frontalis muscle.

Scalp is supplied by paired arteries in subcutaneous connective tissue layer traversing towards vertex with rich inter communications. The arteries are supratrochlear, supraorbital, superficial temporal, posterior auricular and occipital arteries (fig.1). Based on single dominant pedicle (example- superficial temporal artery) whole scalp survives because of rich inter communications. Hence in scalp flaps, the design of flap has to include at least one main artery for survival of flaps.

Face: The aesthetic units of face like forehead, nose, periorbital, labial, cheek, auricular and temporal (fig.2) have to be considered in reconstruction with preservation of function. Lid and nose reconstruction needs lining, cover and support.

Lid is composed of bilamellar structure between skin and conjunctiva with orbicularis oculi in anterior lamella; levator and muller muscle in posterior lamella; tarsofascial layer between lamella (fig.3). Upper and lower eyelids rest on globe. This relationship has to be maintained in reconstruction for blinking, corneal wetting and tear flow.

Zide divided cheek into three overlapping zones: suborbital; preauricular; buccomandibular. Jackson classified it into five zones- lateral, lower, malar, superomedial, nasolabial. The cheek boundaries are lower border of mandible, nasal sidewall, zygomatic arch and preauricular fold.

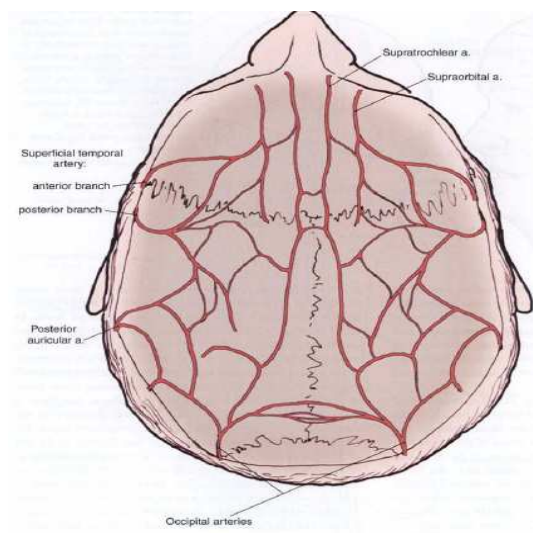


Fig.1

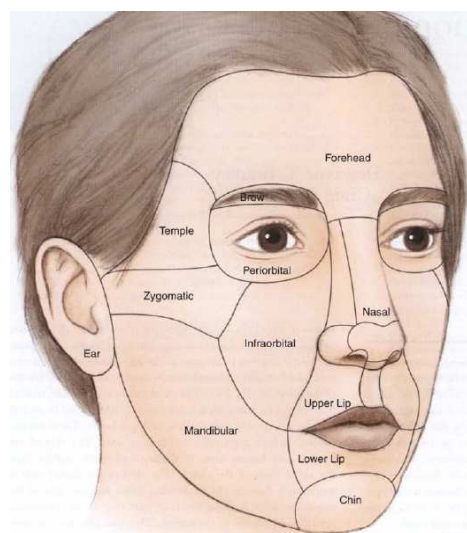


Fig.2

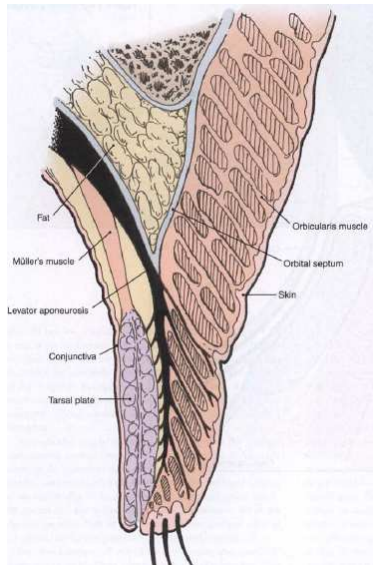


Fig.3

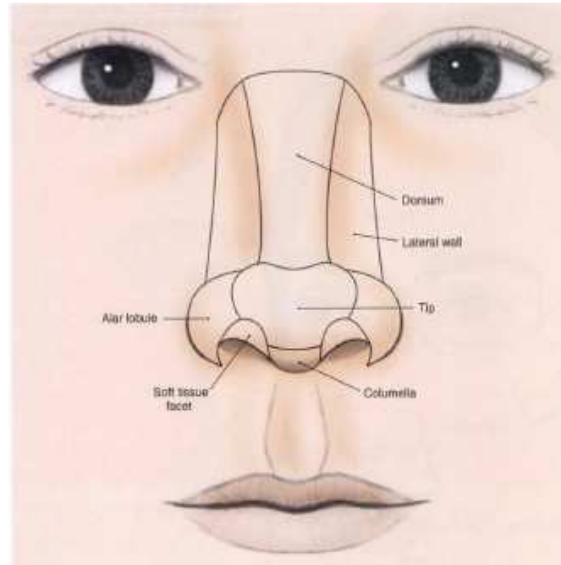


Fig.4

Nose:

Nose is covered by external skin, supported by a mid layer of bone and cartilage and lined primarily by mucoperichondrium. Aesthetically, the nose is a central facial feature with subunits dorsum, tip, columella, and the paired sidewalls, alae, and soft triangles (fig.4). Functionally, the nose must have unobstructed breathing.

Oral cavity:

It extends from lip to junction of hard and soft palate superiorly; circumvallate papillae in tongue inferiorly and anterior tonsillar pillars laterally.

The subsites are lip, buccal mucosa, alveolus, retromolar trigone, palate, floor of mouth, anterior two-third tongue (fig.5).

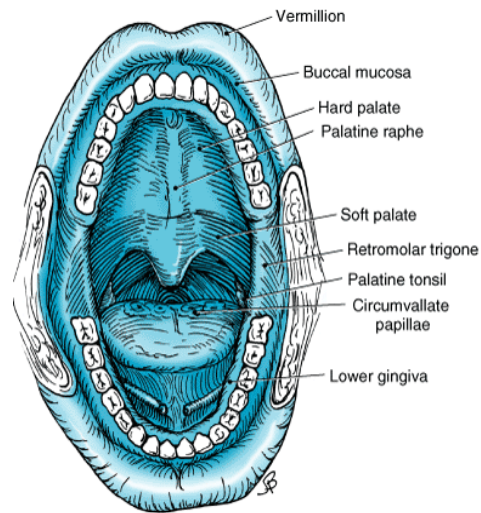


Fig.5

Lip:

Upper and lower lip forms separate units. Lip extends from nasal base superiorly to mental crease inferiorly. Laterally melolabial crease separates it from cheek. Philtrum in upper lip has aesthetic significance.

Lip has 4 components namely mucosa, vermilion, muscle and skin. Vermilion is thin layer of nonkeratinized epithelium; devoid of sebaceous glands and hair follicles. The color of vermilion is from the underlying dense capillary network.

Orbicularis oris close the mouth. The muscles of facial expression are elevators (levator labii superioris alaeque nasi, levator labii superioris, zygomaticus

major and minor, levator anguli oris and risorius); depressors (depressor labii inferioris, depressor anguli oris and mentalis). Neurovascular, lymphatic, and glandular structures mainly run between the muscular and submucosal layers.

Upper and lower labial arteries from facial artery are the principal blood supply present posterior to orbicularis oris 2mm above vermilion. This knowledge helps in elevation of cross lip flap.

The lymphatic drainage of lip is to submandibular and submental nodes. Upper lip and lateral lower lip drain in to submandibular chain and central lower lip drain in to submental nodal area.

The function of lip is facial expression, speech and food retention.

Buccal mucosa:

Mucosal lining from pteregomandibular raphe to lip and alveolar mucosa is buccal mucosa. Stenson duct opening is seen opposite second maxillary molar.

Anterior two-third tongue:

The oral tongue is a muscular structure with overlying nonkeratinizing squamous epithelium. The posterior limit of the oral tongue is the circumvallate papillae. Lateral aspect is the most common site of malignancy. Neck dissection

like bilateral supra omohyoid dissection has to be done in clinically negative neck as occult metastasis is high (60%).

Floor of mouth:

Floor of mouth extends from the anterior tonsillar pillar posteriorly to the frenulum anteriorly and from the inner surface of the mandible to the ventral surface of the oral tongue. The ostia of the submaxillary and sublingual glands are contained in the anterior floor of mouth. The muscular floor of mouth is composed of the sling like genioglossus, mylohyoid and hyoglossus muscles; which serve as a barrier to spread of disease. Invasion into these muscles can lead to tongue hypomobility and poor articulation. Neck dissection like bilateral supra omohyoid dissection has to be done in clinically negative neck as occult metastasis is high.

Retro molar trigone:

This is the tissue posterior to the posterior inferior alveolar ridge and ascends over the inner surface of the ramus of the mandible. This area is difficult to treat.

Palate:

It extends from inner superior alveolar ridge to hard and soft palate junction. It is an uncommon sub site in oral cavity malignancy.

Alveolus:

Mucosa covering maxilla and mandible teeth bearing area is alveolus. It is an uncommon sub site and the reconstruction frequently involves free bone and soft tissue transfer.

Neck:

The cervical lymph nodes draining the head and neck region are divided in to various levels (8).

- Level I- submental and submandibular
- Level II- upper deep jugular
- Level III- middle deep jugular
- Level IV- lower deep jugular
- Level V- posterior triangle
- Level VI- anterior triangle

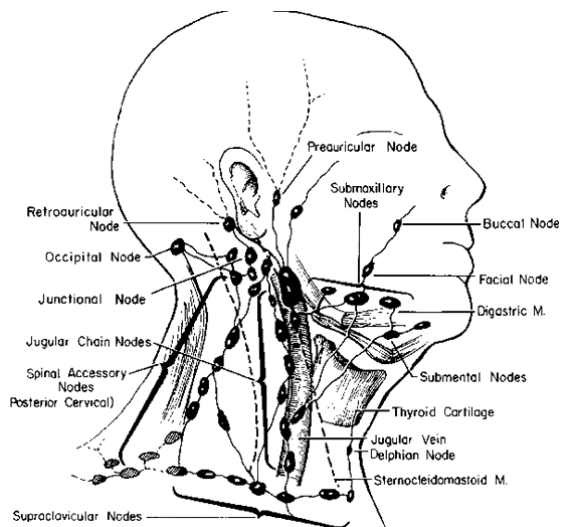


Fig.6



Fig.7

The anatomical boundary for the neck node level sub sites are:

Level	Boundary			
	Superior	Inferior	Anterior (Medial)	Posterior (Lateral)
IA	Symphysis of mandible	Body of hyoid	Anterior belly of contralateral digastric muscle	Anterior belly of ipsilateral digastric muscle
IB	Body of mandible	Posterior belly of muscle	Anterior belly of digastric muscle	Stylohyoid muscle
IIA	Skull base	Horizontal plane defined by the inferior body of the hyoid bone	Stylohyoid muscle	Vertical plane defined by the spinal accessory nerve
IIB	Skull base	Horizontal plane defined by the inferior body of the hyoid bone	Vertical plane defined by the spinal accessory nerve	Lateral border of the sternocleidomastoid muscle
III	Horizontal plane defined by inferior body of hyoid	Horizontal plane defined by the inferior border of the cricoid cartilage	Lateral border of the sternohyoid muscle	Lateral border of the sternocleidomastoid or sensory branches of cervical plexus
IV	Horizontal plane defined by the inferior border of the cricoid cartilage	Clavicle	Lateral border of the sternohyoid muscle	Lateral border of the sternocleidomastoid or sensory branches of cervical plexus
VA	Apex of the convergence of the sternocleidomastoid and trapezius muscles	Horizontal plane defined by the lower border of the cricoid cartilage	Posterior border of the sternocleidomastoid muscle or sensory branches of cervical plexus	Anterior border of the trapezius muscle
VB	Horizontal plane defined by the lower border of the cricoid cartilage	Clavicle	Posterior border of the sternocleidomastoid muscle or sensory branches of cervical plexus	Anterior border of the trapezius muscle
VI	Hyoid bone	Suprasternal	Common carotid artery	Common carotid artery

Pathology

Craniofacial skeletal tumors

The craniofacial skeletal tumors are benign and malignant. Benign tumors are of developmental. Although benign tumors are common than malignant type; they are locally destructive. For this locally aggressive tumor like ameloblastoma, resection of bone is done followed by reconstruction. Malignant tumors require skeletal and soft tissue reconstruction. Microvascular osseo myocutaneous flaps are used for reconstruction.

Salivary gland tumors

Most of major salivary gland tumors are benign, parotid (80%). 80% of minor salivary gland tumors are malignant. Malignant and recurrent benign salivary gland tumors need reconstruction. Facial nerve reconstruction and facial reanimation have to be done if nerve was removed in surgical resection.

Tumors of skin

The tumor may be non melanotic or melanoma. Non melanotic types are squamous cell carcinoma, basal cell carcinoma. They are ulcerative, ulcero proliferative, nodular.

Risk factors:

Host: skin phenotype, syndromes, predisposing lesions, immunologic factors, chronic wounds and scar.

Environment: UV radiation- UV B, UV A; ionizing radiation; chemicals- arsenic, polycyclic aromatic hydrocarbons (9)

Syndromes: Genetic disorders that reduce protection against sun exposure increase carcinoma risk like Xeroderma pigmentosum; gorlin syndrome (10); albinism; epidermodysplasia verruciformis; porokeratosis.

Predisposing lesions:

Congenital: Nevus sebaceous of Jadassohn; xeroderma pigmentosum

Acquired: Actinic keratosis⁽¹¹⁾(AK); Leukoplakia

Nevus sebaceous of Jadassohn: This congenital lesion occurs in scalp and face in adolescence. Well circumscribed yellowish plaque can change in-to BCC.

Xeroderma pigmentosum: This autosomal recessive disorder patient has 1000 times predisposition to skin malignancy as they are incapable to repair sun damaged skin. 5-FU, retinoids, enzymes like T4 endonuclease V and surgical excision are the modalities of treatment.

Actinic keratosis (11): Presents as red; scaly; rough lesion. It is the collection of neoplastic keratinocytes at epidermis. If it extends to papillary or reticular dermis it is called SCC. Biopsy is diagnostic. Matrix metallo proteinase (MMP-1) measurement predicts predisposition to SCC. There are many histologic variants: hypertrophic, atrophic, bowenoid, lichenoid. 2% or 5% topical 5-FU application effectively cures AK. Surgery and irradiation are other forms of treatment.

Leukoplakia (12): In Greek, it means white patch. It is present in oral or vulvar mucosa.

Immune Response:

Natural killer cells and T lymphocytes are responsible for tumor regulation. Langerhan's cell of skin present antigens to the lymphocytes. Helper T cells produce interferon and interleukin-2 (IL-2) to stimulate Natural killer cells. Tumors produce IL-10 and IL-4 to evade T cells. Sun exposed skin has altered immune response. Transplant recipients and HIV patients have higher incidence of malignancy.

Chronic wounds and scars:

In 1828, Jean-Nicolas Marjolin characterized malignant degeneration of chronic wounds. SCC is the most common form. Although any chronic ulcer forms malignancy, burns scars mainly predispose to malignancy.

Ultraviolet radiation:

UV B causes photochemical damage to cutaneous DNA, damage to DNA repair mechanism and suppression of cell mediated immunity. UV A, and ionizing radiation are co carcinogenic to UV B. They cause mutations in tumor suppressor gene *p53*.

Prevention:

Sunscreens (13), clothing, education, chemo prevention- green tea with poly phenolic anti-oxidants/ aloe/ retinoids/ vitamin A in actinic keratosis patients are all various preventive measures to reduce incidence of cutaneous malignancy.

Basal cell carcinoma:

BCC occurs in areas of trauma, ulcers and burns. The altered stromal cells incite epidermal pluripotent cells to become malignant.

Tumor biology:

Origin of BCC is in pluripotent cell in epithelium with cell cycle of 217 hours (14). But the slow growth and small size is due to the fact that only the outer cells of tumor are dividing. BCC has predilection for growth along tissue planes, periosteum, nerves and embryonic fusion plane like nasolabial fold.

The aggressiveness of BCC (15) is due to

Type 4 collagenase in morpheaform BCC

Breached membrane continuity.

Reduced amyloid production.

Increased actin microfilaments.

Increased tumor fibroblast.

Epidemiology:

BCC occurs in light skinned people exposed to sun light (Australians). Majority of cases occur in head and neck region (85%). Nose (16) is the common site. There is male preponderance to this tumor.

Clinical types:

Superficial: (10%) The lesion is erythematous, scaly with thread like border. It has to be differentiated from actinic keratosis, scc in situ, eczema and fungal infection. Biopsy helps in diagnosis.

Nodular: (50%) The lesion is nodular with telangiectatic vessel on the surface. It gradually enlarges; ulcerates with elevated white rolled edges and is called rodent ulcer.

Pigmented: (5%) Brown pigments due to melanin present in lesion. Blue or black lesion is due to intense coloring. Melanoma is the differential diagnosis.

Morpheaform or sclerosing: (2%) The lesion is firm plaque with ill-defined border with induration. It is difficult to differentiate from scar.

Fibroepithelioma of Pinkus: The lesion is pinkish papule like amelanotic melanoma.

Histologic types (17): The subtypes are

Superficial-15%

Nodular-50%

Micro nodular

Infiltrative-15-20%

Morpheaform -5%

BCC have peripheral pallisading of large basophilic cells, nuclear atypia and retraction from surrounding stroma. The stroma has type IV collagen with fibroblast. Nodular subtype has tumor cells in dermis as round mass, cyst or micro cyst. Micro nodule has diameter of less than 15 micro cm. The superficial type has basophilic buds extending from epidermis. Infiltrative type has tumor cells in irregular outline without pallisading as spikes. Morpheaform has collagenous stroma with cords of tumor cells.

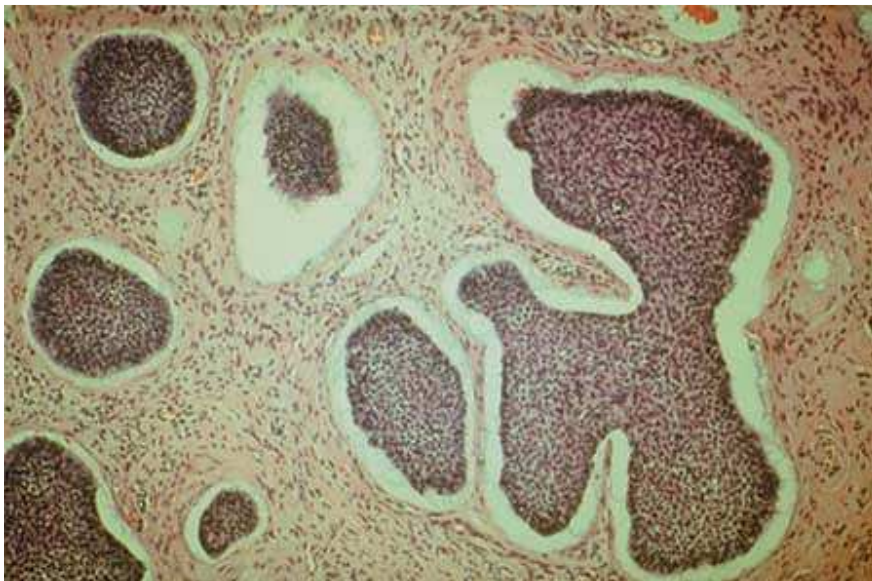


Fig.8

Treatment:

Surgical: This is by primary surgical excision or Mohs micrographic surgery.

Destructive: Electrodesiccation and curettage, cryosurgery, pulsed CO₂ laser.

Medical: 5-FU, intralesional interferon, radiotherapy.

Primary surgical excision:

This is one stage treatment with primary closure or local flaps. Cure rate of 90% (18). 5±3 mm clearance is for primary tumor and 9±5 mm for recurrent tumors.

Recurrence: Tumor of less than 2 mm does not recur. 23% recurrence occurs in lesions of greater than 30 mm. Cystic, infiltrative and sclerosing type have high recurrence rate. Ear, eye have high predilection for recurrence.

Mohs micrographic surgery: This is a tissue sparing surgery.

1936- Fredrick Mohs (19)- chemo surgery: 20% zinc chloride is applied to tumor and tissue fixation in situ was done. Excision of tumor and horizontal section made for frozen section examination. It is time consuming; laborious; zinc chloride paste application is painful; inflammatory response obscures histological examination; inflammation needs delayed repair.

1970- Theodore Tromovitch and Samuel Stegmen- popularized fresh tissue technique. Under local anesthesia, initial curettage of lesion is done followed by mapping of size and shape done. Tangential excision of tumor with minimal normal margin excised and mapped. Horizontal frozen section from deep and peripheral margins mark tumor tissue. These areas are further excised, mapped, examined.

The advantages are tissue preservation, high cure rates and low morbidity.

The indications are

- Primary tumors at ear, eye, nose, paranasal region with high recurrence rates
- Tumor with ill defined border or arising from scar
- Tumors with high incidence of recurrence like morpheaform, microcystic adnexal carcinoma and dermatofibrosarcoma protuberans.
- Signs of aggressiveness
- Large tumors
- SCC with perineural invasion
- Eye lids where tissue preservation is essential
- Recurrent tumors

Electrodesiccation and curettage: This is indicated for only small tumors and superficial tumors.

Cryosurgery: Zacrian formulated guidelines for cryosurgery. The indications for cryosurgery are nodular ca, tumors with well defined borders, tumors over bone or cartilage, tumors over nose or eye lid, recurrent tumors after radiotherapy, lentigo maligna, elderly patients and palliative. The contraindications are cold intolerance, morpheaform or sclerosing BCC, eyelid margin, lip vermilion and large tumors.

The complications are edema, pigment loss and long period of morbidity.

Pulsed CO₂ Laser: High energy short pulsed CO₂ laser is indicated in superficial BCC (3 passes on tumor and 4mm of surrounding skin). Laser is not useful in deep tumors.

Medical treatment: 5-FU is indicated in premalignant lesion like actinic keratosis. Radiotherapy is reserved for high risk elderly patients. Alfa-2 interferons are used to treat BCC, melanoma, condyloma, cutaneous lymphoma and kaposi's sarcoma.

Second tumors: The estimated risk is 35% at 3 years and 50% at 5 years. It is of same histological type as first tumor.

Metastatic tumors: Metastatic BCC incidence is less than 0.1% to lymph node, lungs and bones. Metastasis is by both lymphatic and hematogenous spread.

Squamous cell carcinoma

Squamous cell carcinoma may arise from normal skin or from premalignant lesions like actinic keratosis, scar and leukoplakia. They may be present as ulcer, ulcero proliferative, nodular, verrucous or papillomatous type. The in-situ lesion is called Bowen's disease.

Tumor biology:

SCC arises from basal layer of epidermis and mucous membrane with cell cycle of 50.2 hours (20) and hence faster growth of tumor.

Histology:

Histology shows irregular mass of squamous cells proliferating downwards to dermis with varying degree of differentiation (fig.9). Size, shape, hyperchromasia, keratinization, mitotic figures determine tumor grade. In 1921 Broders proposed 1-4 grades with >75%, >50%, >25%, <25% of differentiated cells. Undifferentiated tumors must be analyzed by immunohistochemical assays. Perineural invasion in histology predicts eight fold increase of SCC metastasis.

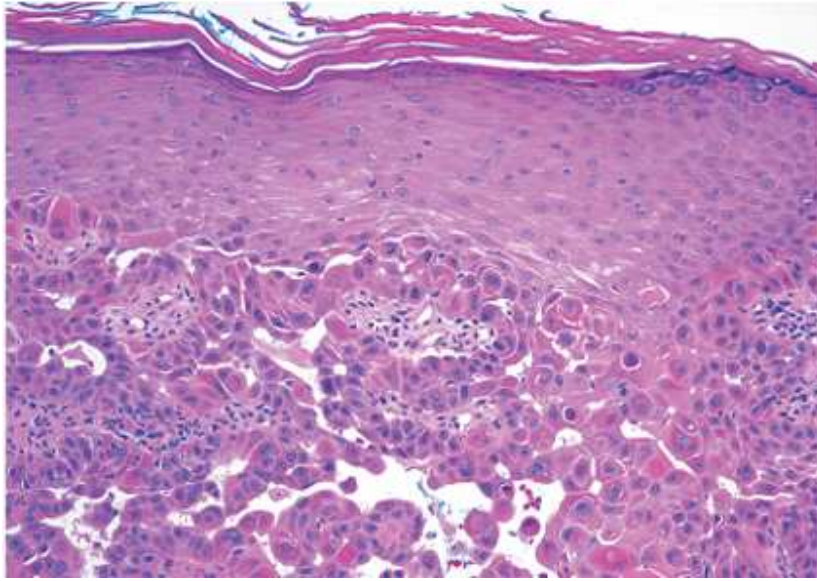


Fig.9

Treatment:

Wide local excision with precise margin control is the treatment of choice. Tumor of less than 2 cm can have 4 mm clearance. Tumor of > 2 cm needs 1cm clearance.

Metastasis:

Head and neck SCC has 10-20% risk of lymph node metastasis. Patient with lymph node metastasis need multimodality treatment like regional lymphadenectomy, wide local excision, radiotherapy and systemic chemotherapy.

Recurrence: Recurrence of SCC depends on tumor grade, depth of tumor invasion, perineural invasion by tumor.

SCC variants (21):

Marjolin ulcer: Aurelius Cornelius Celsus- first described SCC in old burn scar. In 1827- Marjolin described tumor from chronic wounds.

Verrucous carcinoma: Occurs without predisposing cause or precancerous lesion as exophytic growth in oral mucosa of older individuals. It is radio-resistant. Surgical management is the cure and recurrence at different site as second or third primary is common.

Malignant melanoma:

Malignant melanoma arises from the melanocyte cell of skin. The American Cancer Society ABCD guidelines for diagnosis are

A- asymmetry

B- border irregularity

C- color change

D- increase in diameter

The types of melanoma are superficial spreading, nodular, lentigo maligna, acral lentiginous, amelanotic melanoma. TNM classification stages the tumor. Breslow thickness and Clarke's invasion are prognostic factors. Surgery with elective lymph node dissection is the treatment of choice.

Other skin malignancies:

Adnexal carcinomas- merkel cell carcinoma, meibomian gland carcinoma, eccrine carcinoma, dermatofibrosarcoma protuberans, Kaposi sarcoma, cutaneous T cell lymphoma

Diagnosis

- Biopsy- edge wedge biopsy
- Fine needle aspiration cytology of lymph node- aspiration after clinical palpation or ultrasound / CT guided can be done
- Computed tomography (CT) (22)- best choice for evaluating bony involvement. Mandible involvement can be diagnosed clinically; x ray; panorex; bone scan; CT scan. In CT two patterns can be found- erosive due to pressure with bone destruction defect of sloping edge; invasive with irregular defect.

Lymph node metastasis can be diagnosed with 91% accuracy by clinical and CT evaluation. Lymph node involvement is diagnosed by round rather than oval node of greater than 1cm diameter, extracapsular spread, 3 or more contiguous node of 8-15 mm and node with central necrosis

- Magnetic resonance imaging (MRI) is useful for better soft tissue delineation in difficult areas.
- Positron-emission tomography- the radionuclide (F-18) fluorodeoxyglucose (FDG) is taken-up by rapidly dividing cells. It is useful in follow-up after surgery or radiotherapy to detect local recurrence.
- Triple endoscopy- for diagnosing synchronous lesion, bronchoscopy; pharyngoscopy; upper GI scopy has to be done especially in high risk patients and symptomatic patients.

Staging

On the basis of TNM classification, clinical stage of tumor can be determined. T for tumor; N for nodal status; M for metastasis determines the stage. Staging aids in treatment planning, choice of therapy and prognosis estimation. N, M stage is the same in head and neck malignancy whereas T stage differs according to sub site.

Tumor stage of oral cavity:

T₁: Tumor size less than 2 cm

T₂: Tumor size 2-4 cm

T₃: Tumor size larger than 4 cm

T₄: Tumor invasion of adjacent tissues.

Nodal stage:

N₀: No node

N₁: Ipsilateral single node of up to 3 cm

N_{2a}: Ipsilateral single node of 3-6 cm

N_{2b}: Ipsilateral multiple nodes of up to 6 cm

N_{2c}: Bilateral nodes of up to 6 cm

N₃: node of greater than 6 cm

Metastasis stage:

M₀: No metastasis

M₁: Distant metastasis

Stage group:

0: T_{IS}, N₀, M₀

I: T₁, N₀, M₀

II: T₂, N₀, M₀

III: T₃, N₀, M₀; T₂, N₁, M₀; T₁, N₁, M₀; T₃, N₁, M₀

IV: T₄, N₀, M₀; T₄, N₁, M₀; Any T, N₂, N₃, M₀; Any T, any N, M₁

Neck management:

The traditional radical neck dissection involves removal of level I-V nodes, spinal accessory nerve, internal jugular vein and sternocleidomastoid muscle. Modified radical neck dissection spares one or more of muscle, nerve, vein to reduce morbidity. Selective neck dissections have been done to limit morbidity and to target occult metastasis.

N₀ neck – supra omohyoid neck dissection.

N₊ neck – N₁ - supra omohyoid neck dissection.

N_{2,3} – modified radical neck dissection / supra omohyoid neck dissection.+ radiotherapy .

Reconstruction

The various modalities for head and neck reconstruction are from primary suturing to free flap. After considering the defect, to achieve form and function the reconstructive option is selected.

Primary closure:

It is possible to close the defect primarily after tumor resection by surgery or Mohs micrographic surgery in small tumors with adjacent loose tissues.

Skin graft:

Full thickness graft has good aesthetic cover in face although restricted by reduced take and limited donor size. Inlay graft can be used in buccal mucosal defect. Although aesthetically poor, recurrence can be easily detected.

Local flaps:

The design depends on available lax local tissue. The sites of laxity are glabella, temple, nasolabial, mandibulomasseteric area. The plane of elevation is above facial muscles in sub dermal layer in face; sub platysmal in neck; sub frontalis in forehead; sub galeal in scalp. The aesthetics of facial sub unit has to be considered in reconstruction of face.

The flaps are of two types: flaps that rotate about a pivot point (rotation, transposition, island and interpolation flaps) and advancement flaps (single-pedicle advancement, V-Y advancement, Y-V advancement, and bipedicle advancement flaps).

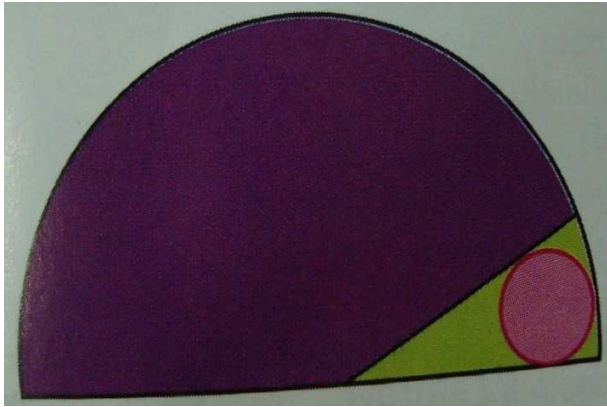


Fig.10

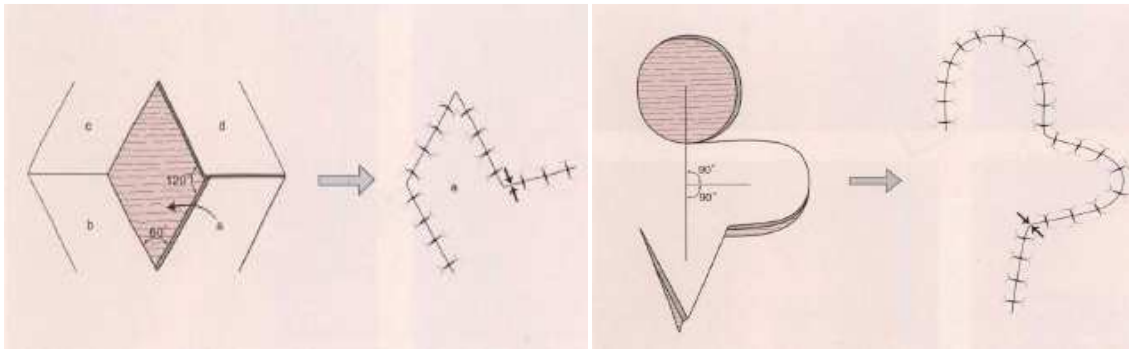


Fig.11

Fig.12

In head and neck reconstruction, local flap without donor morbidity is selected for aesthetic considerations.

Regional flap:

The flaps useful in head and neck reconstruction are forehead flap and pectoralis major myocutaneous flap.

Forehead flap:

McGregor described a flap based on the superficial temporal vessels. The flap was folded and tunneled through the cheek to enter the oral cavity just below the level of the zygomatic arch; at a second stage the pedicle was divided and

Pectoralis major (23) and deltopectoral flap:

Type V muscle supplied by thoracoacromial artery. DP flap has dominant blood supply from intercostals perforators.

A line drawn between the acromion and the xiphoid and perpendicular line drawn from midclavicular point to reach the line marks the axis of the pedicle of the flap. DP flap based on II, III and IV perforators is raised. Skin paddle marked and lower border incised including rectus. Cutaneous paddle islanded along with muscle except proximally preserving the pedicle.

On either side of pedicle, musculocutaneous flap raised to reach the donor site in head and neck region. This flap is easy to harvest and is the work-horse flap for head and neck reconstruction.

FREE FLAP:

In head and neck reconstruction, the preferred free flaps are radial forearm flap, scapular, parascapular, ALT and vascularised fibula flap. Of which RFF is the best option for head and neck reconstruction.

Free radial forearm flap:

- It is a type B fasciocutaneous flap harvested from the forearm of the non-dominant hand based on the radial artery and the venae comitantes or the cephalic vein
- First described by yang et al in 1981 from China

Anatomy:

- Radial artery arises from the brachial artery 2-2.5 cm. below the cubital fossa.
- The artery lies in the lateral intermuscular septum between the Brachioradialis and FCR.
- Proximal 2/3rd is deep between the muscle bellies of Brachioradialis and FCR and the distal 1/3rd is superficial lying between their tendons

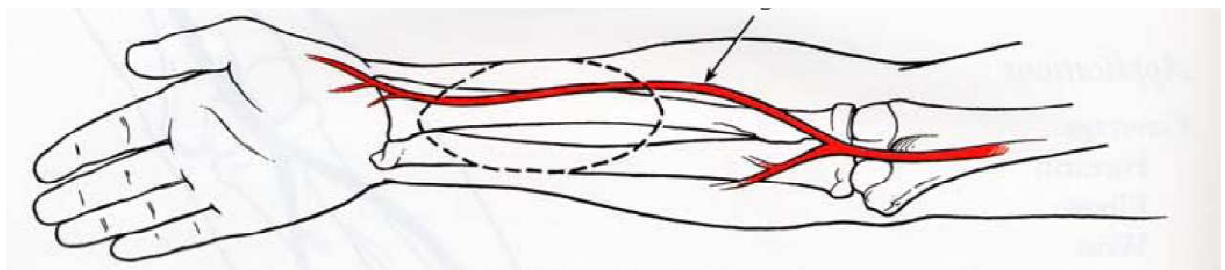


Fig.13

- Radial artery gives 9-17 septocutaneous perforators.

- The periosteal supply to the radius is provided by the attachment of the lateral intermuscular septum to the radius.
- Two system of veins
 - Superficial- Cephalic (diameter- 2.5mm)and Basilic veins
 - Deep – Venae comitantes (diameter1.5mm) of radial artery.
- Can be harvested as sensate flap (24) by including medial or lateral cutaneous nerve of forearm.

Advantages: Has thin pliable skin. Used in head and neck reconstruction.

Contraindications: Allen's test positive / equivocal, chemotherapy infusion on that hand/ forearm, major injury/ # at the forearm.

Surgical technique: Radial artery course is marked from cubital fossa to radial styloid. Vein is also marked. Flap according to defect is marked with distal margin 3cm proximal to wrist; ulnarly over FCU; laterally and proximally according to defect. With proximal incision cephalic vein dissected up to cubital fossa and distal and radial incision made .Distally vein and radial artery ligated. Subfascial elevation of flap done along with artery and vein. Pedicle harvested according to requirement.

SUBSITE RECONSTRUCTION

Scalp reconstruction:

The defect size determines the reconstructive options available.

Less than 3 cm: The options available are

- Primary closure
- Skin graft
- Scalp flap ± galeal scoring: galeal incisions of 1-2 cm apart are made
- Pericranial and galeal flap + SSG

Defect of 3-6 cm: Rotation flap ± galeal scoring

Defect of 6-9 cm:

- Transposition flap with SSG for donor area
- Pedicled flap
- Free flap

Defect greater than 9 cm (25): Free flaps

The free flaps useful in scalp reconstruction are LD, rectus abdominis, serratus anterior, ALT, omental flap. The recipient artery is superficial temporal

artery and to reach vein in neck interpolation vein graft may be needed. VAC and tissue expanders are used in appropriate places.

Forehead reconstruction:

Primary closure if possible has to be done.

Lateral defect are closed easily than the central defect.

For defect up to 40% local flaps preserving hair line are used.

For larger defect free RFF or groin flap is ideal.

Tissue expander is a reconstructive option to be considered.

Eye lid reconstruction:

The primary goal is protection of cornea for vision and secondary goal is aesthesis.

The principles of reconstruction (26)are

- Evaluation of the defect and function of the lid.
- Components of defect- identified and documented.
- Preoperative ophthalmologic examination.
- Aesthetic attention in eyelid
- When approximating lid margins, alignment of all layers must be achieved.
- Suture material- avoid direct contact with the surface of the cornea

- Reconstructive ladder in reconstructive options
- Non keratinising mucosal epithelium for lining.
- Apposition of lid to globe for tear film movement.
- Upper lid protects cornea and mobility of it essential. Supple thin skin for upper lid excursion. Lower lid has dam effect preventing epiphora.

Upper eyelid (27):

Defect up to 25% can be sutured primarily with or without canthotomy.

Defect of 25%-75% -flaps like cutlerbeard and hughes are used

Defect greater than 75%- lid switch with cheek advancement flap

Lower eyelid:

Defect up to 50%- primary closure with or without canthotomy; Hughes flap.

Defect of 50%-75% - Hughes flap.

Defect of > 75%- cheek flap with nasal or palatal mucosa for lining.

Other flaps like glabellar flap, forehead flap, nasolabial flap, island postauricular flap and free first web space flap of foot can be used.

Nose reconstruction: Reconstruction has to restore lining, cover and cartilaginous support. Breathing must be unobstructed. Missing tissues must be replaced in the

exact amount. If too little is replaced, adjacent landmarks will be distorted, collapsing underlying cartilage grafts. If too much is resupplied, adjacent landmarks will be pushed outward, distorting the external shape or pushing the lining inward, obstructing the airway.

General Principles of Reconstruction (28):

- Reestablishment of normal appearance and three-dimensional contour.
- Tissues for cover, lining, and support are planned.
- Resurfacing the entire subunit if > 50% of that unit is involved.
- A template of the contralateral normal side is made to create a mirror image of the true defect or subunit.
- Avoid overfilling or underfilling of the defect.
- Choose ideal donor materials for skin, support and lining.
- Ensure a stable platform.
- Composite defects are usually reconstructed in stages. The lip and cheek are repaired before the nose.

For lining, hinge flap; prelamination of graft; intranasal mucosa; skin graft; forehead flap are the options. Auricular and septal cartilage provides nasal support.

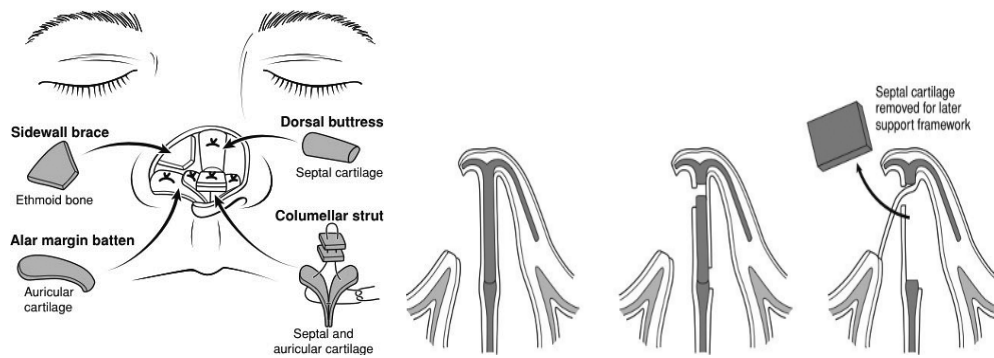


Fig.14

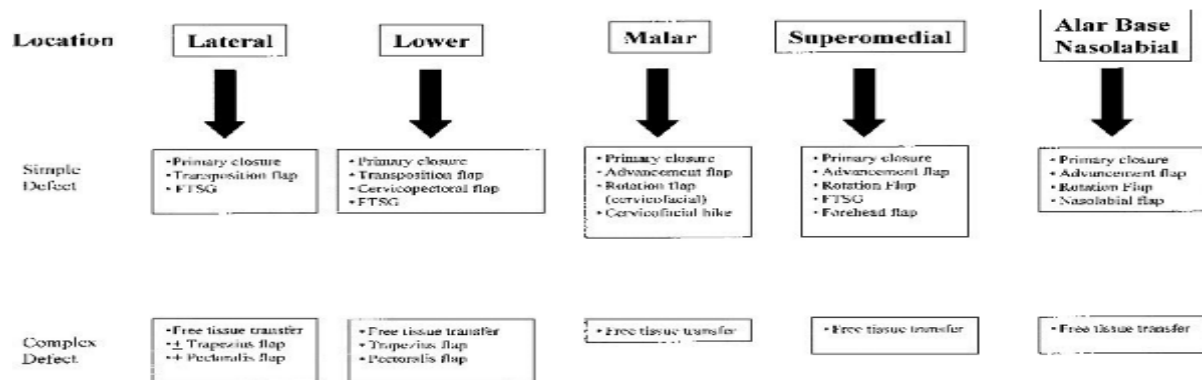
Fig.15

The cover defect (29) may be small (up to 1.5 cm) or large (> 1.5 cm). Small defect can be covered by banner flap, bilobed flap, nasolabial flap. For the large defects nasolabial and forehead flaps are used. The site and size of defect determines reconstructive options.

Cheek reconstruction:

The defect may be simple involving skin and subcutaneous tissue or complex requiring lining, cover, facial nerve reconstruction. Suborbital; preauricular reconstruction can be done by local flaps. Buccomandibular region reconstruction needs regional or free flap. The options available are primary closure, skin graft, local flaps and regional flaps. Tissue expansion and free flaps are other options.

The algorithm for cheek reconstruction (30):



Oral cavity reconstruction:

Reconstruction the oral cavity is a difficult challenge for the plastic surgeon because of the variety of anatomic structures and complexity of functions involved. The goal is restore form and function.

The oral sphincter participates in mastication, speech, and deglutition. It provides a watertight closure during the preparation of the bolus and prevents the escape of saliva. The alveolar ridges directing the flow of saliva and collecting the food during the bolus process. The floor of the mouth is important to allow unrestricted mobility of the oral tongue. The buccal mucosa lines the cheek and is important for mastication and deglutition.

Lip reconstruction:

Lip is the primary aesthetic feature of the lower central face.

Four basic components in reconstruction are:

- the skin and subcutaneous tissue,
- the muscle,
- the mucosa, and
- the vermilion

The functions of lips are oral competence, articulation, deglutition and expression of emotion. The essentials of lip reconstruction are skin cover, lining, stomal diameter, vermilion, oral sphincter competence.

Vermilion reconstruction (31): The options are

- Mucosal advancement flap
- Interpolated cross lip vermilion flap
- Mucosal cross lip flap
- Tongue flap

For lip reconstruction the following options are available depending on site of defect and amount of loss.

- Primary repair: up to one third loss.
- Advancement flap: For central defect- rectangular or step ladder flap (fig.16), Bandoneon flap

- Rotation advancement(fig.17): For lateral defects- gilles, McGregor, Nakajima, Karapandzic neuro-vascular flap
- Cross lip: For two-third loss-Abbe flap lower lip to upper lip for central and lateral defect; estlander flap (fig.18)for lateral defect
- Pedicled flap: defect > than two-third and in total lip defect- forehead; temporoparietal scalp flap like single pedicled or bucket handled; deltopectoral flap
- Free flap: RFF

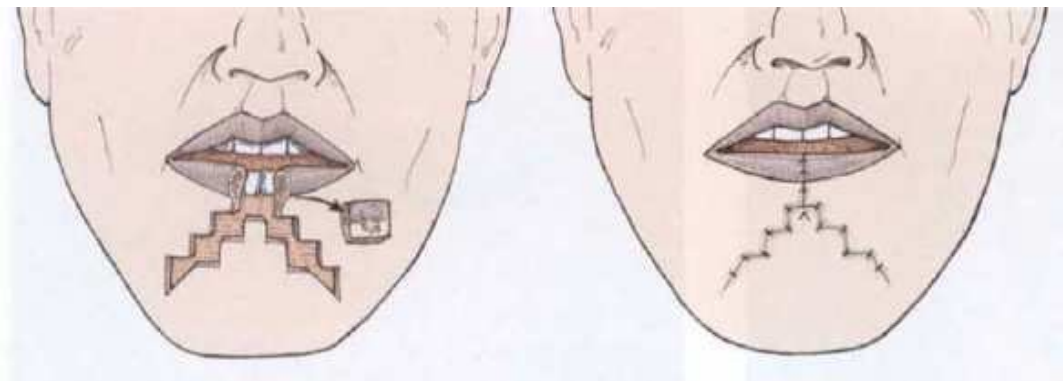


fig.16

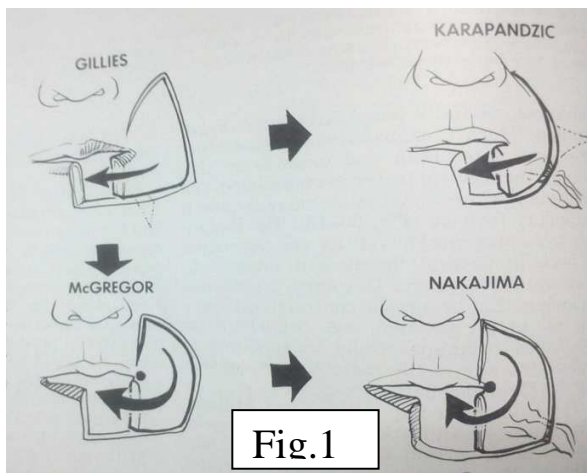


Fig.1

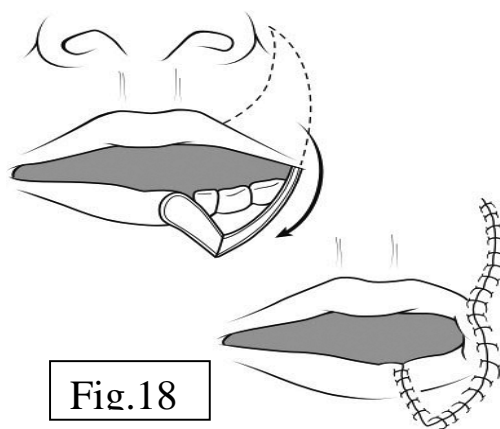


Fig.18

Lip reconstruction can be done with local tissue for up to half to two third loss after which distant flap or free flap are used.

Buccal mucosa:

The radial forearm flap is ideal for buccal defects. Forehead flap and PMMC are pedicled flaps used in reconstruction.

Tongue:

Most difficult structure of the oral cavity to reconstruct. Tongue reconstruction has to restore speech and swallowing. The radial forearm free flap is an ideal choice, if 20% to 30% of the muscle is present for maintenance of some function.

The rectus abdominis myocutaneous flap, the anterior lateral thigh (32), and the scapula/parascapular flap are preferred in glossectomies to add bulk and for deglutition if remnant tongue is less than 20%.

Floor of mouth:

Reconstruction must allow for free mobility of the oral tongue. The nasolabial flap (33) based on the angular artery can be used for defects of the

anterior floor of mouth. Forehead flap, the facial artery musculomucosal flap (FAMM), and the deltopectoral flap are other options.

Free tissue transfer is preferred. The sensate radial forearm flap through neurotomy of the medial or lateral cutaneous nerve to the lingual or other sensory nerves in the neck is the best choice. The anterolateral thigh, the temporalis fascial flap are other options.

Mandible reconstruction:

Mandible is necessary for airway stability, speech, deglutition, and mastication. Aesthetically it is the main component for shape of the lower face. Functional goals to be obtained are maximal opening and maintenance of occlusion. Aesthetic goals include symmetry, preservation of lower facial height, anterior chin projection, and correction of submandibular soft-tissue neck defects.

Classification: Bone loss in terms of central segments (designated C and defined as lying between the two canine teeth), lateral segments (L), and hemimandible segments (H).

Mandible reconstruction options are nonvascularized bone grafts, metal plates, pedicled flaps (34), prosthesis and free flaps. Nonvascularized grafts, like iliac crest, can be used for a short bone gap (<3 cm). Pedicled flaps include the trapezius and pectoralis osteomyocutaneous flaps. The bone available is limited.

Prosthetic mandible has high chance of extrusion. Metal reconstruction plates although don't use donor bone, risk of exposure; infection; risk of plate fracture; preclusion of dental reconstruction and reduced bulk are the disadvantages.

The free vascularised bone flap donor sites include ilium, radius, scapula and fibula. Fibula is the best choice as already described.

MATERIALS AND METHODS

MATERIALS:

The study includes the study of 58 patients who underwent reconstruction for Head and Neck Malignancies at the Department of Plastic surgery, Government Rajaji Hospital, Madurai. The study was from August 2010 to February 2013.

METHODS:

The methods include obtaining history from patients, thorough clinical examination and necessary investigations and appropriate surgical reconstruction.

An informed written consent was obtained from every patient to include in the study. Proper preoperative counseling regarding the nature of the disease, treatment plan, complications and follow-up was done.

All information was entered in a proforma specially designed for this study.

METHODOLOGY:

The patient's name, age, sex, history of presenting illness and its duration was obtained. Past history of chronic medical illness and previous

surgical history noted. Associated co-morbid conditions noted. Personal history like smoking, alcohol consumption, betel nut chewing and diet pattern were obtained.

Detailed physical examination of the tumor, nodal status, metastatic status and donor site evaluation was done.

Basic investigations like blood haemoglobin estimation, urine examination, blood sugar, blood group and renal parameters like urea, creatine were done. X-ray chest was obtained for anesthetic purpose and metastasis work-up. Cardiac evaluation regarding fitness for surgery obtained.

OBSERVATION AND RESULTS:

Table-I
Age incidence

S.No	Age	No	%
1	UP TO 40 yrs	2	4
2	41-50	11	19
3	51-60	26	45
4	61-70	17	29
5	>70	2	3
Total		58	
Range		30-80 yrs	
Mean		58 yrs	
SD		8.96	

The age incidence in skin and oral cavity malignancy are:

Table-II Age incidence in skin tumors

S.No	Age	No	%
1	41-50	1	7
2	51-60	9	64
3	61-70	3	22
4	>70	1	7

Table-III Age incidence in oral cavity malignancy

S.No	Age	No	%
1	UP TO 40 yrs	2	5
2	41-50	8	20
3	51-60	16	39
4	61-70	14	34
5	>70	1	2

The sex incidence of head and neck malignancy are:

Table-IV
Sex incidence

S. no	Sex	No	%
1	Male	25	42%
2	Female	33	58%

The sex incidence in cutaneous BCC and oral cavity SCC are as follows:

Table- V
Cutaneous BCC
Sex incidence

S. no	Sex	No	%
1	Male	4	36%
2	Female	7	64%

Table-VI
Oral cavity SCC
Sex incidence

S. no	Sex	No	%
1	Male	19	49%
2	Female	20	51%

The tumor types in head and neck malignancy and in subsite are:

**TABLE-VII
TUMOR TYPE**

S.NO	SITE	TUMOR	NO
1	SKIN	BCC	11
		SCC	02
		OTHERS	01
2	ORAL CAVITY	BCC	0
		SCC	39
		OTHERS	02
3	NECK	BCC	0
		SCC	1
		OTHERS	2
		TOTAL	58

TABLE VIII-TUMOR IN SUBSITE

		BCC	SCC	OTHERS	TOTAL
SKIN	FOREHEAD	2	0	0	14
	SCALP	0	2	0	
	NOSE	3	0	0	
	CHEEK	5	0	0	
	TEMPORAL	0	0	1	
	PERIORBITAL	1	0	0	
ORAL CAVITY	BUCCAL	0	24	0	41
	LIP	0	11	1	
	TONGUE	0	2	0	
	FLOOR	0	1	0	
	ALVEOLUS	0	0	1	
	PALATE	0	1	0	
NECK		0	1	2	3
	TOTAL				58

The tumor subsite incidence in cutaneous BCC and oral cavity SCC are:

TABLE- IX CUTANEOUS BCC INCIDENCE

SUBSITE	CHEEK	NOSE	FOREHEAD	PERIORBIT
%	46	27	18	9

TABLE- X ORAL CAVITY SCC INCIDENCE

SUBSITE	LIP	BUCCAL	TONGUE	FLOOR	PALATE
%	28	61	5	3	3

TABLE- XI LIP MALIGNANCY INCIDENCE

LIP	UPPER LIP	LOWER LIP
NO & %	2 & 17%	10 & 83%

The management of neck and mandible in head and neck malignancy is:

TABLE-XII NECK MANAGEMENT

S.NO	TYPE	NO
1	RADICAL	6
2	SELECTIVE	14
3	NO SURGERY	38
TOTAL		58

TABLE-XIII MANDIBLE MANAGEMENT IN ORAL CAVITY MALIGNANCY

MANDIBLE DEFECT	NO	MANAGEMENT	NO
HEMIMANDIBULECTOMY	8	RECONSRUCTION PLATE	0
		MICROVASCULAR	0
CENTRAL SEGMENT	1	MICROVASCULAR	0
		FREE BONE	0
		RECONSRUCTION PLATE	1
LATERAL SEGMENT	4	MICROVASCULAR	0
		FREE BONE	0
		RECONSRUCTION PLATE	3

TABLE- XIV Reconstruction in skin malignancy

Reconstructive options	No & %
Local(primary suturing, SSG, flaps)	8 & 57%
Distant	6 & 43%

TABLE- XV RECONSTRUCTION IN ORAL CAVITY MALIGNANCY

	FOREHEAD	PMMC	RFF	OTHERS
BUCCAL	20	2	1	1
LIP	9	0	0	3
TONGUE	0	2	0	0
FLOOR	0	0	0	1
ALVEOLUS	1	0	0	0
PALATE	1	0	0	0

Discussion:

Ω The head and neck malignancy occurs mainly in sixth or seventh decade. BCC occurs mainly in head and neck region with 86% incidence in age range of 40-79 years (35). Oral cavity malignancy occurs mainly in sixth or seventh decade.

In our study head and neck malignancy occurs in age range of 30-80 years with mean age incidence of 58 years and standard deviance of 8.96. Cutaneous malignancy has 64% incidence in 51-60 age groups and oral cavity malignancy has 39%; 34% age incidence in 51-60; 61-70 age groups respectively.

Ω Head and neck malignancy has higher incidence in male with male: female ratio of 4:1⁽³⁵⁾. Contrarily, in our study there is increase in female incidence of head and neck malignancy. Oral cavity malignancy has equal sex incidence and Cutaneous BCC has increase in female sex incidence. The sunlight exposure and non-usage of preventive measures like sunscreens contributes to the increased incidence.

Ω In skin, BCC is the common type and in the oral cavity SCC is the common type of malignancy in head and neck. In cutaneous malignancy, SCC forms only one-fourth the incidence of BCC. In cutaneous BCC, nose (26%) is the most common site followed by cheek (18%)⁽¹⁶⁾.

In our study Cutaneous BCC and oral cavity SCC is the most common presentation. In Cutaneous BCC, cheek (46%) has higher incidence followed by nose (27%).

Ω In oral cavity SCC, the sub site incidence is as follows:

- Tongue- 37%
- Lip- 25-30%
- Floor of mouth- 10-15%
- Buccal mucosa- 5%
- Palate- 0-5%

In our study buccal mucosa (61%) followed by lip (28%) is the incidence in oral cavity malignancy. The use of smokeless tobacco with betel nut, in pan (36) is the main predisposing factor in increased incidence of buccal mucosa carcinoma.

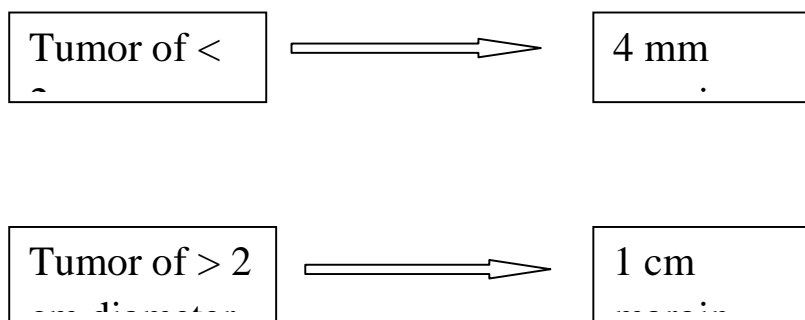
Ω Lower lip⁽³⁷⁾ is the most common site (>90%) in lip malignancy with > 90% being SCC.

83% of lip malignancy is in lower lip and 92% of lip malignancy is of SCC.

Ω The other types of skin malignancy are SCC and merkel cell carcinoma. In oral cavity, one case presents as mucosal melanoma. The neck tumors presented

for reconstruction are nodal secondary, recurrent thyroid carcinoma and salivary gland malignancy.

Ω For Cutaneous malignancy, Mohs micrographic surgery (38) is the best modality of treatment with 99% cure rate for BCC and 95% cure rate for SCC. Surgery is the next best method with cure rate of 95% for both BCC and SCC. For BCC 4mm margin clearance is required. For Cutaneous SCC, surgical management is as follows:



In our cases for BCC 0.5 cm clearance and 2 cm clearance for SCC was given.

Ω For oral cavity malignancy, margin of 1-1.5 cm is recommended. We have 2cm clearance for oral cavity malignancy.

Ω In cutaneous malignancy, lymph node metastasis has poor prognosis. In metastatic cutaneous malignancy, lymph node dissection along with radiotherapy and chemotherapy must be given. Merkel cell carcinoma is an aggressive

cutaneous malignancy which along with 3-5 cm margin clearance needs elective neck dissection.

In our study, all cutaneous malignancy patients had N₀ neck. Merkel cell carcinoma patient underwent modified radical neck dissection. Other patients do not need any form of treatment to neck.

Ω In oral cavity malignancy, N₀ neck patients can be treated with neck dissection or radiotherapy. N₊ neck patients are treated with modified radical neck dissection ± radiotherapy ⁽⁸⁾.

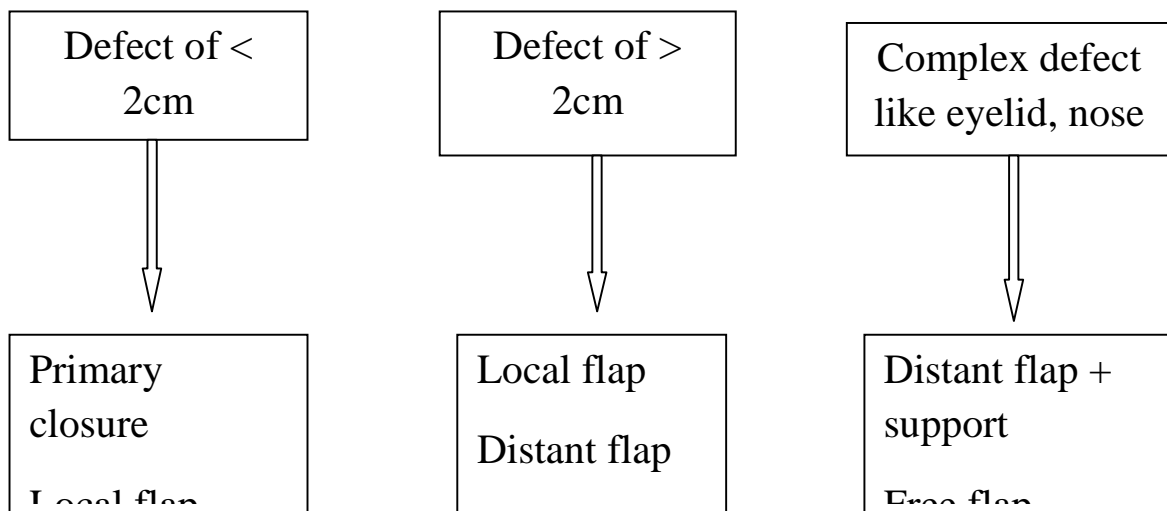
In our study, 4 oral cavity malignancy patients had modified radical neck dissection and 14 patients had selective neck dissection. The remaining 23 patients do not have primary neck dissection.

Ω For mandible reconstruction, vascularised fibula is the best option for both form and function. 13 patients underwent mandibular resection but only 3 patients had mandibular reconstruction plate. None had bone graft.

The hemi mandibulectomy patient, without mandible reconstruction, had contour deficit, deviation, commissure cant. Although their mouth opening is adequate with only slight restriction. Reconstruction plate patients have loss of bulk but contour maintained.

Ω In cutaneous malignancy, local flaps give better aesthetic outcome. The complex defect like eyelid, nose and merkel cell carcinoma had distant flap.

The options for cutaneous malignancy reconstruction are



Primary closure is possible if surrounding tissue is lax. FTSG can be used in head and neck defect.

In oral cavity malignancy, free flap provides one stage reconstruction for the complex defect. Regional flaps like forehead flap and PMMC flap can also be used. Forehead flap has donor site morbidity while PMMC may be bulky. This is a viable alternative in situation of case load, prolonged operative time in learning curve period for free flap.

Ω The complications noted are

- Immediate- dehiscence, partial or total flap loss.
- Late- recurrence

There is dehiscence in two cases. There is cachexia in one case.

Partial flap loss is present in two cases. There is DM in one case.

Total flap loss is present in three cases. There is HT in one case and one patient is cachectic.

There is recurrence in three cases. One is BCC and others are oral cavity SCC.

Ω Secondary procedures like flap thinning done in two cases. Only two cases underwent commissuroplasty.

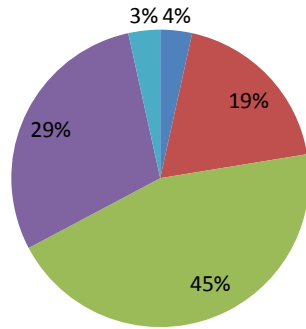
Conclusion:

- Mean age incidence of head and neck malignancy is 58 years with standard deviation of 8.96.
- Cutaneous BCC has higher female sex incidence and oral cavity malignancy has equal sex incidence.
- In head and neck malignancy, BCC is the most common skin tumor and SCC is the most common oral cavity malignancy.
- Cheek is the most common sub site of cutaneous BCC followed by nose and buccal mucosa is the most common oral cavity sub site followed by lip.
- The margin of clearance is 0.5 cm for BCC and 2cm for SCC.
- Except for merkel cell carcinoma patient, other cutaneous malignancy patients do not need any form of treatment to neck.
- In oral cavity malignancy, N₀ stage patient without neck dissection have to be followed up and radiotherapy to be given to the neck.
- Mandible reconstruction with vascularised fibula gives good aesthetic result.
- Local flaps provide aesthetic cover for cutaneous malignancy.
- Although free flap is ideal for oral cavity malignancy, regional flaps are viable alternative.

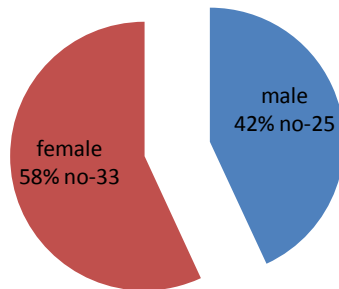
- Comorbidity factors like diabetes mellitus and hypertension control reduce complication rate.
- Secondary procedures like flap thinning, commissuroplasty improves the functional and aesthetic outcome.

AGE INCIDENCE

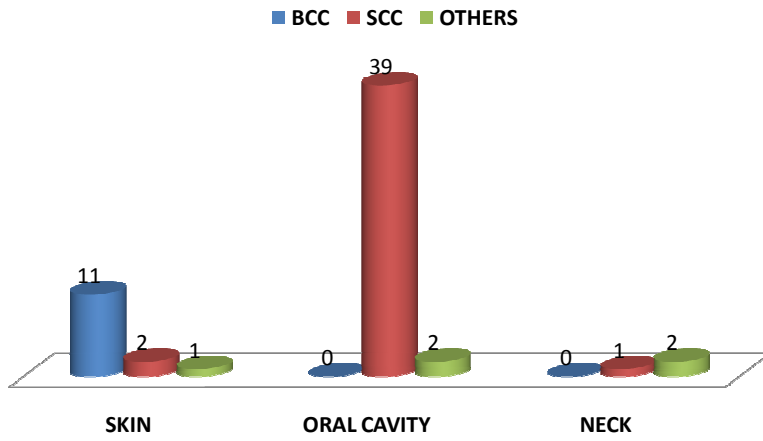
■ UP TO 40 yrs ■ 41-50 ■ 51-60 ■ 61-70 ■ >70



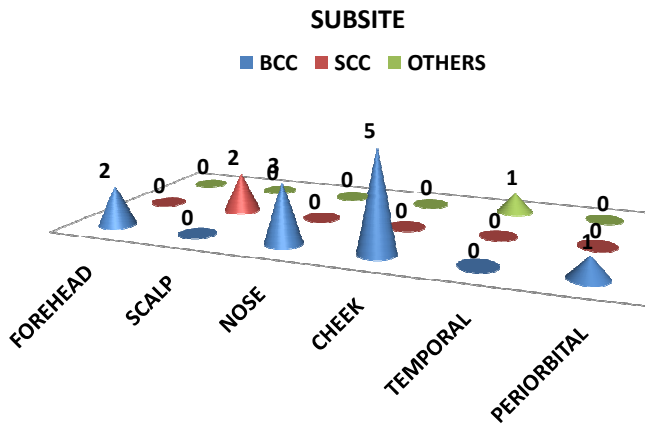
sex incidence



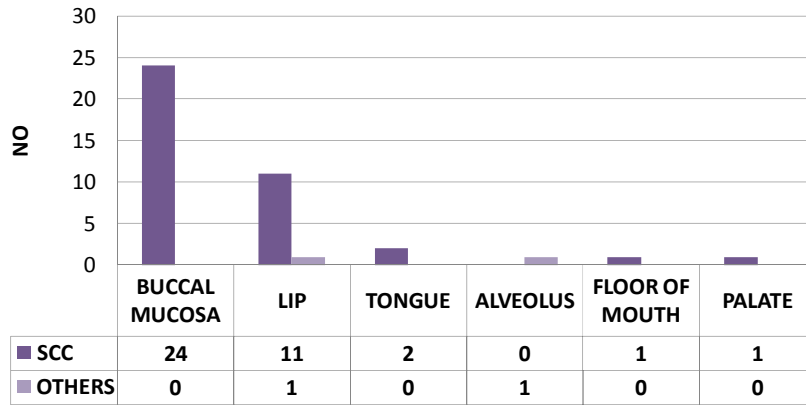
TUMOR TYPE



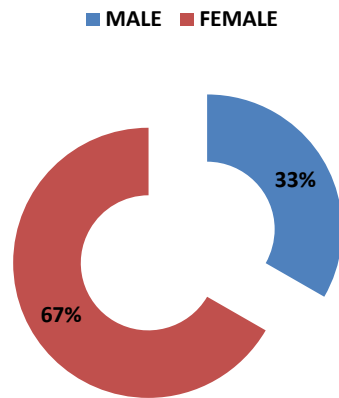
SKIN TUMOR



ORAL CAVITY SUBSITE

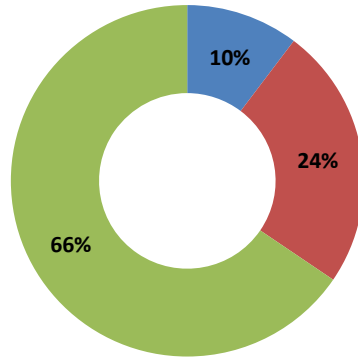


NECK TUMORS

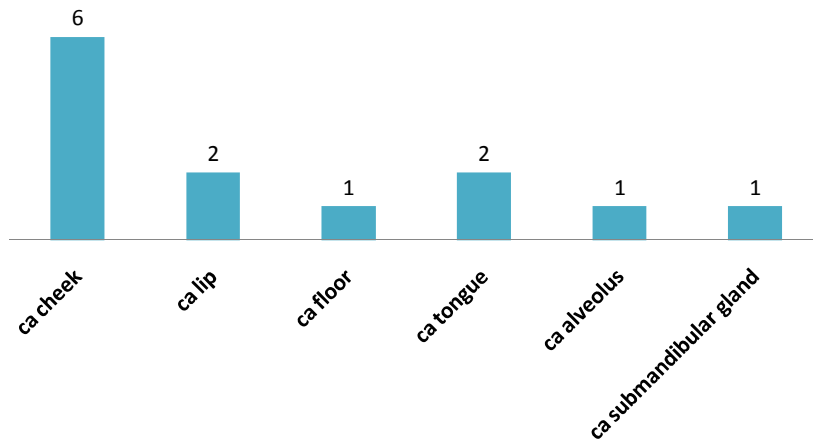


NECK MANAGEMENT

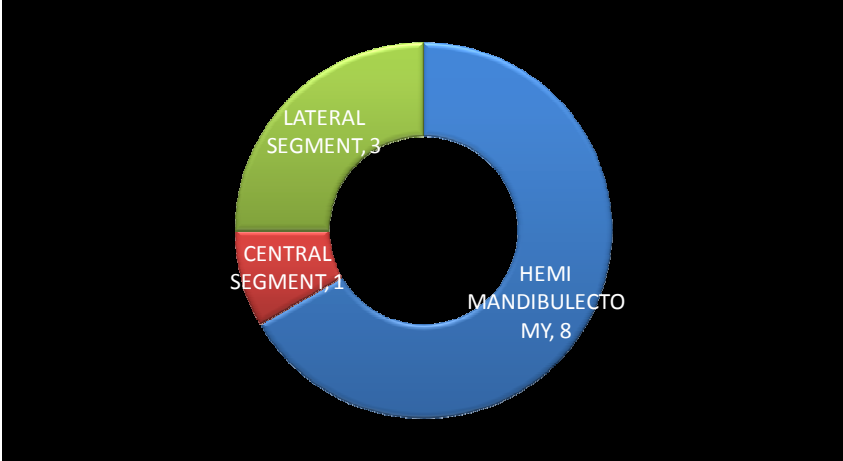
■ RADICAL ■ SELECTIVE ■ NO SURGERY



MANDIBULAR DEFECTS



TYPES OF MANDIBULAR DEFECTS



BCC- PRIMARY CLOSURE



BCC- CHEEK- SSG



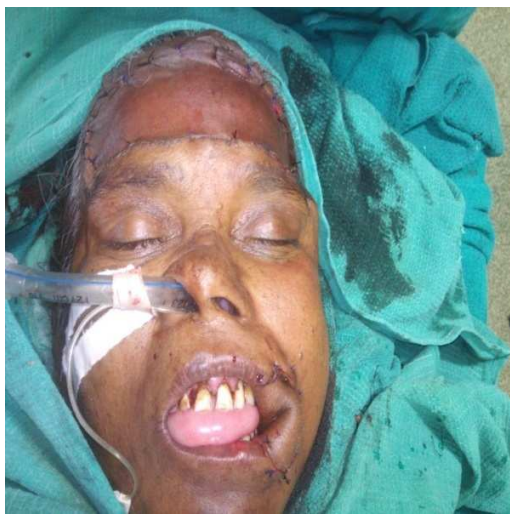
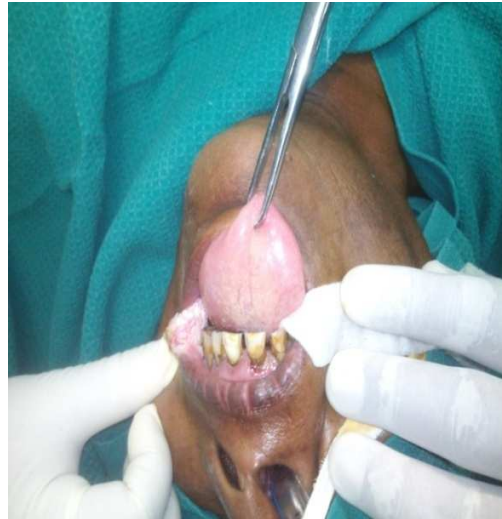
BCC- NOSE- FOREHEAD FLAP



BCC- EYELID- POST AURICULAR FLAP



BUCCAL MUCOSA CARCINOMA- FOREHEAD FLAP



BUCCAL MUCOSA CARCINOMA- PMMC FLAP



BUCCAL MUCOSA- FREE RADIAL FOREARM FLAP



BUCCAL MUCOSA- SSG



LIP- ABBE FLAP



LIP- FOREHEAD FLAP



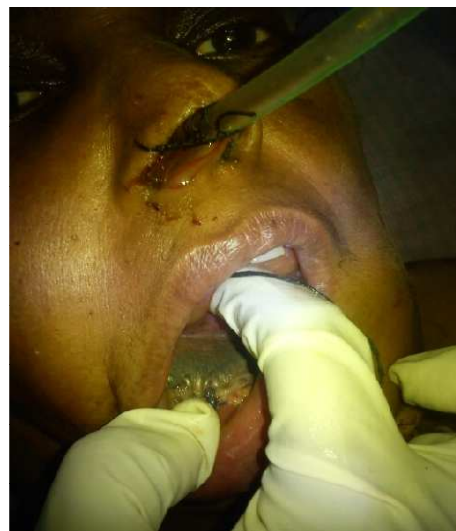
LIP- HEMIMANDIBULECTOMY- LOCAL FLAP



**BUCCAL MUCOSA- SEGMENTAL
MANDIBULECTOMY- RECONSTRUCTION PLATE**



FLAP NECROSIS



RECURRENCE



SECOND FLAP



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TUMOR:

PREDISPOSING LESIONS:

NODE:

MANDIBLE:

METASTASIS:

DIAGNOSIS:

INVESTIGATIONS:

TUMOR MANAGEMENT:

TISSUE DEFECT:

RECONSTRUCTION :

COMPLICATIONS:

FOLLOWUP:

SECONDARY SURGERY:

MASTER CHART

N	Na	Age	I.P	Diag	Site	D.O.S	surgery	Nec	Mandibl	Reconst	compli	seconda
o	me	/se	no	nosis				k	e	ruction	s	ry
			50							B/L		
1	Mr s.V	51/ F	26/9	BCC	forehead	13/08/10	excision	nil	nil	rotation flap	Reurrence	
2	Mr s.P	55/ F	30/4	BCC	nose L-Alae	20/08/10	excision	nil	nil	Forehead flap		
3	mr .V	70/ M	15/3	BCC	Forehead	16/09/10	WLE	nil	nil	SSG		
4	Mr s.C	55/ F	28/7	BCC	Zygomatic	8/10/2010	excision	nil	nil	Limberg flap		
5	Mr .A	60/ M	22/5	SCC	Lower lip	8/11/2010	WLE	nil	nil	Forehead flap		
6	Mr s.N	48/ F	00/9	SCC	Lower lip	19/11/10	WLE	nil	nil	Forehead flap		
7	Mr .L	64/ M	59/10	SCC	Floor of mouth	30/11/10	WLE	mod	central	primary	wound	
8	Mr .G	55/ M	81/38	SCC	Lower lip	2/12/2010	WLE	SOH	L- hemi	L- Forehead flap		
9	Mr .M	52/ M	88/20	BCC	L-Cheek	3/1/2011	excision	nil	nil	Primary closure		
10	Mr s.R	65/ F	98/35	SCC	L-buccal	27/01/11	WLE	SOH	nil	L- Forehead flap		
11	Mr s.D	67/ F	62/10	BCC	R-Nasolabial region	19/02/11	WLE	nil	nil	R- Forehead flap		flap thinning
12	Mr s.K	70/ F	87/12	SCC	R-Lower	3/3/2011	WLE	nil	nil	R- Forehead		

1 3	Mr .S	50/ M	12 35	3 SCC	lip R- buccal	4/3/2 011	WLE	SOH	Segmen tal mandib ulectom y	R- Forehea d flap/ Plate fixation	d flap
1 4	Mr .V	58/ M	90 30 0	node	neck	13/03 /11	excisio n		nil	primary closure	
1 5	Mr s.N	42/ F	92 29	BCC	L- Eyelid	14/03 /11	excisio n	nil	nil	post auricula r retoaric ular flap	
1 6	Mr .A	64/ M	21 76	SCC	R- buccal	16/03 /11	WLE	nil	nil	R- Forehea d flap	
1 7	Mr s. M	55/ F	24 15	merk al cell carci nom a	R-Pre auricul ar region	21/03 /11	WLE	mod ified radi cal	nil	R- PMMC flap	distal flap necros is/ recurr ence
1 8	Mr .M	55/ M	10 14 6	SCC	R- palate	11/4/ 2011	WLE	nil	nil	R- Forehea d flap	
1 9	Mr s.A	45/ F	42 59 6	Ca thYRO id recur rent	thyro id	28/04 /11	thyroid ectomy and WLE	radi cal- mod ified	nil	Deltopectoral flap	
2 0	Mr s.A	63/ F	24 07 8	SCC	L- commi ssure	11/5/ 2011	WLE	nil	nil	L- Forehea d flap	
2 1	Mr s.S	60/ F	20 12 1	SCC	R- Lower lip	19/05 /11	WLE	nil	nil	R- Forehea d flap	
2 2	Mr .V	70/ M	25 72 1	SCC	L- buccal	7/6/2 011	WLE	nil	nil	L- Forehea d flap	
2 3	Mr s. M	60/ F	32 14 1	SCC	L- buccal	16/06 /11	WLE	SOH	Segmen tal mandib ulectom y	plate & screw/ L- Forehea d flap	
2 4	Mr .B	58/ M	30 92 8	malig nant mela	R- upper	20/06 /11	WLE	nil	nil	R- Forehea d flap	

				nom a	alveola r										
25	Mr s.S	49/ F	44 90	SCC	R- upper lip	8/8/2011	WLE	nil	nil	R- Forehead flap cheek advance ment					
26	Mr .R	60/ M	48 77	BCC	L- Cheek	19/08/11	excision	nil	nil						
27	Mr s.A	60/ F	40 13	SCC	L- lower lip	29/08/11	WLE	SOH	L- hemi mandib ulectom y	L- Forehead					
28	Mr s. M	30/ F	59 23	SCC	L- lower lip	21/10/11	WLE	SOH	L- hemi mandib ulectom y	local flap					
29	Mr .P	51/ M	68 38	SCC	L- buccal	3/11/2011	WLE	SOH	L- hemi mandib ulectom y	L- PMMC flap					
30	Mr .S	45/ M	68 95	SCC	tongue	11/11/2011	WLE	mod ified radi cal	R-hemi mandib ulectom y	R- PMMC flap	flap necros is				
31	Mr s.P	60/ F	69 69	SCC	R- Cheek recurr ent	14/11/11	WLE	SOH	R-hemi mandib ulectom y	R- PMMC flap					
32	Mr s.P	57/ F	72 34	SCC	Scalp	16/11/11	WLE	nil		Transposition flap					
33	Mr s.D	50/ F	73 28	Adeno carci nom a	R-sub mandi bular gland	5/12/2011	excision	mod ified radi cal	R-hemi mandib ulectom y	R- PMMC flap	flap necros is	DP flap			
34	Mr s.S	60/ F	82 16	BCC	nose	31/01/12	excision	nil		forehead flap					
35	Mr s. M	63/ F	81 61	SCC	L- buccal	23/01/12	WLE	SOH	nil	L- Forehead flap					
36	Mr .B	50/ M	78 14	SCC	R- buccal	14/01/12	WLE	nil		R- Forehead flap					
37	Mr s.P	65/ F	10 99	SCC	R- buccal	25/01/12	WLE	SOH	R- segment al	R- Forehead flap					

									mandib ulectom y				
3 8	Mr .s.A	53/ F	88 80	SCC	R- Lower lip	2/3/2 012	WLE	nil	nil	Abbe flap			
3 9	Mr .s.A	80/ F	64 22	SCC	R- buccal	7/3/2 012	WLE	SOH	nil	R- Forehea d flap			
4 0	Mr .R	55/ M	10 98 6	SCC	L- buccal	22/03 /12	WLE	SOH	L- segment al madibul ectomy	L- Forehea d flap/ Plate fixation			
4 1	Mr .V	60/ M	13 46 7	SCC	L- buccal	3/4/2 012	WLE	nil	nil	L- Forehea d flap			
4 2	Mr .s.C	60/ F	19 57 2	SCC	Lower lip	12/4/ 2012	WLE	nil	nil	forehea d flap		flap thinning	
4 3	Mr .s.A	50/ F	27 35 2	SCC	L- buccal	9/5/2 012	WLE	SOH	nil	L- Forehea d flap			
4 4	Mr .N	65/ M	27 01 2	SCC	L- buccal	22/05 /12	mucos al excisio n	nil	nil	SSG	Recurr ence		
4 5	Mr .s. M	67/ F	34 76 9	BCC	Nose- R Alae	6/6/2 012	excisio n	nil	nil	R- Forehea d flap			
4 6	Mr .P	65/ M	30 56 2	SCC	R- buccal	15/06 /12	WLE	SOH	nil	R- Forehea d flap			
4 7	Mr .S	55/ M	30 20 9	SCC	tongue	10/7/ 2012	WLE	L- mod ified radi cal	L-hemi mandib ulectom y	L- PMMC flap			
4 8	Mr .S	45/ M	40 11 5	SCC	L- buccal	13/07 /12	WLE	nil	nil	L- Forehea d flap			
4 9	Mr .s.J	50/ F	51 81 9	SCC	L- buccal	17/08 /12	WLE	SOH	nil	forehea d flap			
5 0	Mr .s. M	52/ F	53 21 7	SCC	R- buccal	22/08 /12	WLE	SOH	nil	R- Forehea d flap	Recurr ence		

51	Mr s.M	40/ F	59 93 1	Aden o carci nom a	R- upper lip	24/08 /12	WLE	nil	nil	R- Forehea d flap	distal flap necros is	
52	Mr s.A	65/ F	53 69 0	SCC	R- buccal	30/08 /12	WLE	nil	nil	R- Forehea d flap		comissu roplasty
53	Mr .R	75/ M	53 72 0	BCC	R-Pre auricul ar region	7/9/2 012	excisio n	nil	nil	SSG		
54	Mr .A	58/ M		SCC	R- buccal		WLE	nil	nil	free Radial forearm flap	flap necros is	forehea d flap
55	Mr s.P	60/ F	91 25 2	SCC	scalp	24/12 /12	WLE	nil	nil		Rotatio n flap	
56	Mr s.P	70/ F	90 89 7	SCC	R- buccal	27/12 /12	WLE	nil	nil	R- Forehea d flap		
57	Mr .S	61/ M	97 02 3	SCC	R- Lower lip	17/01 /13	WLE	nil	nil	Abbe flap	flap dehiscenc	
58	Mr .S	64/ M	96 76 0	SCC	R- buccal		WLE	nil	nil	forehea d flap		

