#### COMPARISON OF VISOR FLAP APPROACH WITH LOWER LIP SPLIT APPROACH IN RESECTION OF ORAL CANCERS

By DR. VYSHNAVI.V



### DISSERTATION SUBMITTED TO SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, KOLAR

In partial fulfillment of the requirements for the degree of

### MASTER OF SURGERY IN OTORHINOLARYNGOLOGY

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2021







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I hereby declare that this dissertation entitled "COMPARISON OF VISOR FLAP APPROACH WITH LOWER LIP SPLIT APPROACH IN RESECTION OF ORAL CANCERS" is a bonafide and genuine research work carried out by me under the guidance of **Dr. S.M AZEEM MOHIYUDDIN,** MBBS, MS(ENT)., FICS., FACS., MNAMS., SEKHSARIA FELLOWSHIP IN HEAD AND NECK SURGERY Professor, Department of Otorhinolaryngology and Head and Neck Surgery, Sri Devaraj Urs Medical College, Tamaka, Kolar in partial fulfilment of University regulation for the award "MASTER OF SURGERY IN OTORHINOLARYNGOLOGY". This has not been submitted by me previously for the award of any degree or diploma from the university or any other university.

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Dr. VYSHNAVI.V









#### **LIST OF ABBREVIATIONS**

| HNSCC |   | Head and neck squamous cell carcinomas |
|-------|---|--|
| OC    | ] | Oral Cavity                            |
| BM    | ] | Buccal Mucosa                          |
| GBS   | ] | Gingivobuccal Sulcus                   |
| CT    | ] | Computed Tomography                    |
| HPR   |   | Histopathological report               |
| LN    | ] | Lymph Node                             |
| RT    | ] | Radiotherapy                           |
| CT    | ] | Chemotherapy                           |
| IMRT  | ] | Intensity Modulated Radiation therapy  |
| MRND  |   | Modified radical neck dissection       |
| SOHND |   | Supraomohyoid neck dissection          |
| PMMC  |   | Pectoralis major myocutaneous flap     |
| SCC   |   | Squamous cell carcinoma                |
| NAD   |   | No abnormalities detected              |









#### **ABSTRACT**

**BACKGROUND:** In India head and neck cancers account for 30-35% of all malignancies, and about 50% of these are oral cancers. Buccal mucosa and lower gingivobuccal sulcus are usually affected in our patients due to the habit of tobacco quid chewing.

Early cancers of the oral cavity can be resected by both Lip split and without splitting the lower lip by raising the soft tissues of the face off the mandible like a visor thereby accessing the oral cavity -Visor approach. Anteriorly placed oral cancers can also be addressed by visor approach, thereby avoiding the conventional lip split and providing a better cosmetic result. Also, in tumors present close to the angle of mouth, it is advisable to avoid splitting the lip as it may result in avascular necrosis post operatively. Lip-split approach for oral cancers can compromise vascularity of lower lip and can predispose to lip necrosis when lip split approach is used during composite resection. So, surgical approaches that preserve function, minimize complications, maximize cosmetic outcome should be utilized appropriately in patients depending on size and site of the tumor.

The Visor flap approach has been tried for accessing oral cavity tumors without splitting the lower lip to reduce morbidity and preserve aesthetics. In this technique, the soft tissues of the face are elevated along with the neck flap without splitting the lower lip (like the visor of a helmet). Visor flap can also be used when a microvascular free tissue transfer is done for the reconstruction of the surgical defect.

In our study we intend to compare resection of lateral tumors of oral cavity by conventional lower lip split approach and visor approach avoiding the lip split with regard to the following variables: time taken for surgery, adequacy of exposure of primary tumour and resection margins, adequacy of access for reconstruction, and post-operative complications if any.

#### **OBJECTIVES:**

- To perform a neck dissection and lower lip split approach for composite resection of oral cavity malignancy in 33 patients (Group A) and document the time taken for surgery, adequacy of exposure of primary tumour and resection margins, adequacy of access for reconstruction, and post-operative complications if any.
- To perform a neck dissection and Visor flap approach for composite resection of oral
  cavity malignancy in 33 patients (Group B) and document the time taken for surgery,
  adequacy of exposure of primary tumour and resection margins, adequacy of access
  for reconstruction, and post-operative complications if any.
- To compare visor flap approach with lower lip split approach with regard to the above variables.

#### **METHODOLOGY:**

Following an informed written consent 66 patients, after fulfilling the inclusion criteria of the study, undergoing surgery for T2 and T3 staged oral cavity cancers under Department of Otorhinolaryngology and Head and Neck Surgery of R.L.Jalappa Hospital and Research , Tamaka, Kolar from December 2018 till May 2020 will be included in this study. The patients will be segregated into two groups. Following a neck dissection for all these patients, Group A will undergo composite

resection of oral cancer by lip split approach and Group B will undergo composite resection of oral cancer by visor approach without lower lip split.

#### **RESULTS:**

Our study included T2(58%)and T3 (42%) staged squamous cell carcinoma of the oral cavity. The T4 tumors were excluded to avoid the risk of positive bone margin in visor flap approach which was relatively new to this institution. In our study, majority of the patients were elderly women in the age group of 46-60 years. This can be explained by the fact that the women in this rural area are addicted to chewable carcinogens like tobacco quid(sometimes kept overnight in the cheek), areca nut, betel leaves etc while the men are more addicted to smoking tobacco.

56% of our patients had no palpable lymph nodes and 44% of patients presented with palpable neck nodes. The nodal status did not affect the approach or resection of the primary tumor in both groups. 75.8% patients in Group A and 87.9% patients in Group B showed well differentiated tumour on histopathology.

In our study, there was no significant difference in both the two groups with respect to adequacy of exposure. However, in group B, we noticed an inadequate exposure in 3 cases(9%). In our study, we have used Pectoralis major myocutaneous flap, supraclavicular flap, submental flap and radial forearm free flap for reconstruction of the defect following excision of the primary tumour. However Bulky PMMC flaps owed to difficult access for reconstruction as seen in one patient in Group A and 3 patients in Group B. Compared to Group A, we have used more of supraclavicular flap in Group B to aid in better reconstruction as the exposure is limited in visor

approach.

The mean time taken for excision of primary tumor and reconstruction in Group B was more than in Group B. Close margins were marginally more frequent in Group A -particularly anterior margin. However other margins in both groups were comparable. Salivary leak was the most common complication in both the groups.

#### **CONCLUSION:**

- 1. Oral cancer has a high prevalence in developing countries and requires aggressive multimodality treatment resulting in functional and aesthetic deficits.
- 2 With the improving diagnostic facilities and therapeutic options, head and neck surgeons are faced with the challenge of minimizing morbidity and ensuring better quality of life while simultaneously improving the loco regional control.
- 3. The midline lower lip split to access the oral cavity malignancies for surgical resection remains the gold standard but also has limitations with regard to aesthetic appearance and vascularity of lip, particularly in lesions situated close to oral commissure.
- **4.** A visor flap approach (non lip-split) for resection of oral cancers and few of its modifications provide a better aesthetic appearance and competence of oral commissure. And also ensures better vascularity for lower lip.
- 5. The frequency of surgical complications encountered both by lip split approach and visor flap approach is almost similar. However the operating time may be longer and access for suturing a bulky flap for reconstruction may be limited.
- **6.** Having been used less frequently few surgeons may find the visor flap approach more time consuming and difficult. However this is a subjective perception and can be minimized as more is gained in this approached.

- 7. The adequacy of resected margins and outcome of surgery with regards to healing remains similar between the two approaches-lower lip split and visor flap approach.
- **8.** Visor flap approach for resection of oral malignancies is a reliable and effective option especially if the tumor is situated to close to oral commissure.

**<u>KEYWORDS</u>**: Lip split approach, Visor flap approach, Oral squamous cell carcinoma, resection margins, post operative complications.







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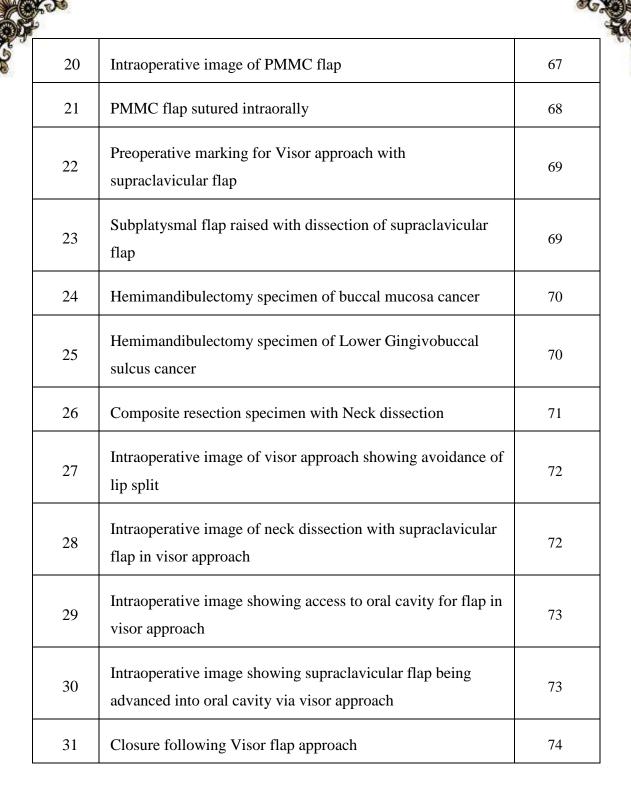








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### INTRODUCTION

### AIMS & OBJECTIVES

## REVIEW OF LITERATURE

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# SUMMARY

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#### INTRODUCTION

Head and neck cancers are the sixth most prevalent cancer across the globe but is the most common group of malignancies in India. In India head and neck cancers account for 30-35% of all malignancies, and about 50% of these are oral cancers. 60% to 80% of these patients present with advanced disease as compared to 40% in developed countries.<sup>1</sup>

As our institution is a high volume tertiary care centre in management of Head and Neck cancer from the past two decades draining a majority of the geographical region. Majority of patients in this region present with cancers of buccal mucosa or lower gingivobuccal sulcus. Buccal mucosa and lower gingivobuccal sulcus are usually affected in our patients due to the habit of tobacco quid chewing.<sup>2</sup> As majority of patients present with locally advanced disease, it is difficult to identify the epicentre of the tumor. Therefore, these tumors are called lower gingivobuccal sulcus cancers and nicknamed as "Indian oral cancers".

The heterogeneous nature of oral cavity tumours, the functional and cosmetic sequelae of their management and the frequent medical co-morbidities that co-exist in this patient group demand that treatment options should be considered by a multidisciplinary team before reaching a final decision.

Surgery is the first line of treatment. T2 lesions require surgery alone, however T3 tumours which are advanced tumors require adjuvant treatment in the form of Radiotherapy or Radiotherapy+Chemotherapy.

The type of surgical access used depends on the size and location of the tumour. So does the surgeons comfort and experience with the surgical procedure. Lower Lip split approach remains the Gold standard approach for resection of oral cancers as it has been a time tested approach. Proponents of the lip split approach cite better access and three dimentional assessment of soft tissue involvement than other techniques.

Early cancers of the oral cavity can be resected by both Lip split and without splitting the lower lip by raising the soft tissues of the face off the mandible like a visor thereby accessing the oral cavity -Visor approach. Anteriorly placed oral cancers can also be addressed by visor approach, thereby avoiding the conventional lip split and providing a better cosmetic result. Also, in tumors present close to the angle of mouth, it is advisable to avoid splitting the lip as it may result in avascular necrosis post operatively.

Lip-split approach for oral cancers can compromise vascularity of lower lip and can predispose to lip necrosis when lip split approach is used during composite resection. So, surgical approaches that preserve function, minimize complications, maximize cosmetic outcome should be utilized appropriately in patients depending on size and site of the tumor.<sup>3</sup>

The Visor flap approach has been tried for accessing oral cavity tumors without splitting the lower lip to reduce morbidity and preserve aesthetics. In this technique, the soft tissues of the face are elevated along with the neck flap without splitting the lower lip (like the visor of a helmet). Visor flap can also be used when a microvascular free tissue transfer is done for the reconstruction of the surgical defect. This approach also preserves orofacial functions like speech and swallowing immediately after surgery and reduces the duration between surgery and post-operative radiotherapy. Addressing the lateral tumors of the oral cavity by visor approach has not been adapted by many surgeons. However in our study we intend to compare resection of

lateral tumors of oral cavity by conventional lower lip split approach and visor approach avoiding the lip split with regard to the following variables: time taken for surgery, adequacy of exposure of primary tumour and resection margins, adequacy of access for reconstruction, and post-operative complications if any.

#### **OBJECTIVES OF THE STUDY**

- To perform a neck dissection and lower lip split approach for composite resection of oral cavity malignancy in 33 patients (Group A) and document the time taken for surgery, adequacy of exposure of primary tumour and resection margins, adequacy of access for reconstruction, and post-operative complications if any.
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  taken for surgery, adequacy of exposure of primary tumour and resection
  margins, adequacy of access for reconstruction, and post-operative
  complications if any.
- To compare visor flap approach with lower lip split approach with regard to the above variables.

#### **REVIEW OF LITERATURE**

#### **HISTORY OF CANCER:**

The oldest description of cancer dates back to 3000-1500 BC. Carcinoma in Greek means a crab. Its Latinized form is "cancer". Cancer is a term used to characterize abnormal growth of cells, which invade normal tissue and spread to organs.

Roudolf Virchow, the "founder of cellular pathology" provided the pathologic basis for the study of cancer, which gave us a better understanding of the disease process. This in turn laid the basis for the development of cancer surgery. The excised specimen should be examined & a precise diagnosis can be arrived at. More importantly, the pathologists report regarding the completeness of tumour excision. It was John Hunter (1728-1793) who suggested that if a tumour had not involved surrounding tissues & was "mobile", then it could be treated by surgery. He thus laid the foundation for surgical oncology.

Billroth from Germany, Hadley from London and Halsted from Baltimore, were the three surgeons, who later contributed substantially to cancer surgery. Their work led to removal of entire the tumour along with regional lymph nodes. Oral cavity cancer surgery was based on Halsted's principles i.e. in which he recommended that "the tumour and its lymphatic drainage should be removed". Later it was expanded to remove all this tissue en-bloc along with intervening tissue.

Sir Henry T. Batlin, a surgeon from St. Bartholomew's Hospital, London, in 1885 A.D, performed wide excision of head and neck cancers with mandible and lymphatics of upper neck. He, along with Kocher, emphasized the advantage of

excising metastatic neck nodes. However, en-bloc radical neck dissection was first described by George Crile in 1906 A.D. His classic report provides the basis for the technique of radical neck dissection as it is practiced today. <sup>6</sup>

Neck dissection was first described by George Crile in 1906. Composite resection was later popularized by Hayes Martin. Resection of the primary tumour can be achieved by transoral resection for small tumour or by raising a lower cheek flap for larger tumors. Later neck dissection became more selective and specific by preserving important non lymphatic structures like spinal accessory nerve, internal jugular vein and sternocleidomastoid. This is due to predictable pattern of lymphatic drainage.

The first "commando" operation, was performed by Grant Ward in 1932 A.D. This en bloc excision of the primary within the oral cavity including portion of the mandible combined with the radical neck dissection was being performed regularly since 1942. The term composite resection (previously known as COMMANDO operation) has been credited to Hayes Martin. It is a surgical procedure where in the primary tumour in oral cavity, oropharynx is removed in continuity with a segment of mandible along with a neck dissection.<sup>3</sup>

Stephan Ariyan in 1979 A.D described the pectoralis major myo-cutaneous flap based on the pectoral branch of the thoracoacromial artery. This is the "work horse" of the head and neck reconstruction surgery.

With the advent of antibacterial chemotherapy, better wound management, diagnostic tools, advances in pathology, improved surgical techniques and micro vascular free

tissue transfer for reconstruction, development in anaesthesia and transfusion techniques, the prognosis of cancer surgery improved significantly Roux in 1836 was the first to describe lower lip split approach to access oral cavity and oropharynx. This approach has been the gold standard in composite resections. Though lower lip split approach provides good exposure of oral cavity tumors, it leaves a prominent scar on face, and has a higher rate of orocutaneous fistula formation at the tripointer region.<sup>3</sup>

Lower lip split which is usually done in midline, is not feasible in patients where the primary tumour is close to angle of mouth as it results in reduced vascularity of lower lip leading to necrosis. Similar lip necrosis can result after lower lip split in post radiation patients. Therefore in patients with tumour close to angle of mouth, an incision has to be dropped from angle of mouth to connect the neck incision.

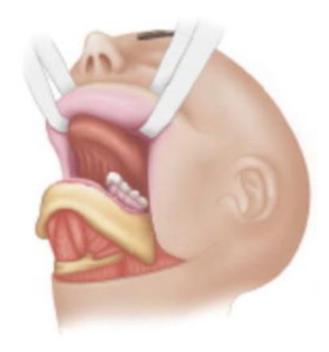


Fig 1: Visor approach

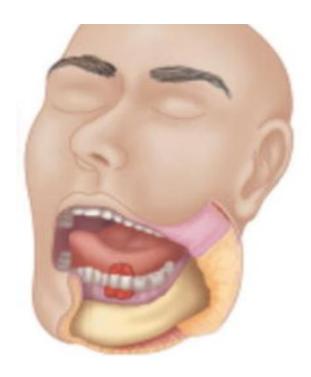


Fig 2: Lip Split approach

#### **HISTORY OF NECK DISSECTION:**

Radical neck dissection, as described by Crile<sup>7</sup>, is the most comprehensive surgery to remove the lymphatics of the lateral neck. However, the morbidity of this operation is quite significant in terms of shoulder dysfunction<sup>8</sup> and venous obstruction due to removal of the internal jugular vein. With an intention to preserve the non involved structures ,the concept of "functional neck dissection" was developed by Suarez<sup>9</sup>, and popularized by Boca<sup>10</sup>, became popular in the 1970s and 1980s. After patterns of lymphatic spread of mucosal head and neck cancers were described by Lindberg and Shah, the concept of selective neck dissection came into existence.

In selective neck dissection, only the "at risk" lymphatic groups are removed. This concept has now been combined with elective neck dissection, where the operation is done in the context of the clinically negative neck.

#### **ORAL CAVITY - ANATOMY**

The oral cavity extends from the skin vermilion junction of the lips to the junction of the hard and soft plate above and to the line of circumvallate papillae below.

The anterior boundary of the oral cavity extends from the vermilion border of the lips to the oropharynx posteriorly. The oropharyngeal isthmus is formed by the junction of the hard and soft palates superiorly, the anterior tonsillar pillars laterally, and the line of the circumvallate papillae inferiorly.

The anatomical sites within the oral cavity as described by the American Joint Committee for Cancer staging <sup>11</sup> are :

- Lip
- Buccal mucosa
- Lower alveolar ridge

- Upper alveolar ridge
- Retromolar trigone
- Floor of mouth
- Hard palate
- Tongue (Anterior 2/3rd)

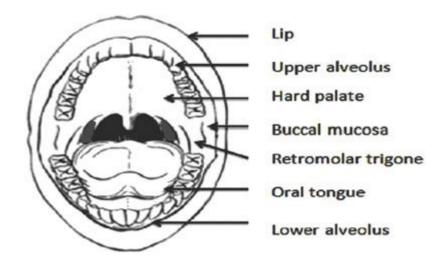


Fig 3: - Oral cavity - subsites

**Lip:** The lip begins at the vermilion border of the skin. The vermilion surface is that portion of the lip that comes into contact with the opposing lip. It is divided into an upper and lower lip, which join at the commissures of the mouth.

**Buccal mucosa:** This mucous membrane lines the interior surface of the cheek and lips and extends from the posterior line of contact of the opposing lips to the retromolar trigone posteriorly, that is, at the pterygomandibular raphe. It connects with the gingival mucosa (gingivobuccal sulcus) superiorly and inferiorly.

**Lower alveolar ridge:** Mucosa lining the alveolar process of the mandible from line of insertion in buccal sulcus to floor of mouth mucosa. Posteriorly up to the ascending

ramus of the mandible.

**Upper alveolar ridge:** Mucosa lining the alveolar process of the maxilla, extending from the line of attachment in the upper gingivo-buccal sulcus to the hard palate. Posterior margin extending up to superior end of pterygopalatine arch. <sup>12</sup>

**Retromolar gingiva** (**Retromolar trigone**): This triangular area is situation posterior to the last molar tooth and extends superiorly to the maxillary tuberosity. It overlies the ascending ramus of the mandible and is bounded laterally by the buccal mucosa and medially by the mucosa of the anterior tonsillar pillar.

Floor of the mouth: This horseshoe-shaped area extends from the lingual surface of the alveolar ridge to the ventral surface of the anterior two thirds of the tongue. This is a semilunar space over the base of tongue muscles i.e. over the base of tongue muscles i.e. mylohyoid and hyoglossus muscles, extending from the inner surface of the mandibular alveolar ridge to the ventral surface of the tongue. Lower part of anterior pillar of the tonsil forms the posterior boundary. It is divided into two sides by the frenulum of the tongue and contains opening of the submandibular and sublingual salivary gland ducts.

**Hard palate:** Area between the two-upper alveolus, lined by mucous membrane, formed by palatine process of maxilla. It extends from the inner surface of the superior alveolar ridge to the posterior edge of the palatine bone.

Anterior 2/3rd of the tongue: It is the freely mobile part of the tongue that extends from the tip anteriorly to the line of circumvallate papillae posteriorly. Inferiorly it

extends up to the junction of the floor of the mouth at the under-surface of the tongue. Descriptively, it can be divided into the dorsum, lateral border, ventral surface, and tip.

## ORAL CAVITY – BLOOD SUPPLY

Branches of external carotid artery provide blood supply to oral cavity. Lingual arteries provide blood supply to the tongue. The lips, buccal mucosa and alveolar ridges receive its blood supply from facial arteries, internal maxillary and inferior alveolar arteries. Palate and upper alveolus are supplied by greater palatine arteries.

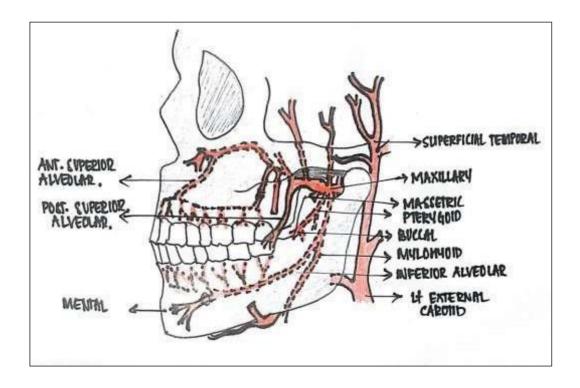


Fig 4: Blood supply of oral cavity

## ORAL CAVITY – NERVE SUPPLY

The main sensory supply to the oral cavity is via the second and third divisions of the trigeminal nerve. The second division of this nerve supplies the hard palate and upper gingiva via the greater and lesser palatine nerves. The third division is the sensory supply to the lower portion of the buccal mucosa and the inferior gingiva via the inferior alveolar nerve. The lingual nerve, also a branch of the third division, supplies the anterior two thirds of the tongue. Motor supply to the oral cavity is derived from the 5th, 7th, and 12th cranial nerves. The fifth cranial nerve supplies the muscles of mastication including the masseter and both internal and external pterygoids. The seventh cranial nerve supplies the lip musculature and helps in maintaining oral competence. The 12th cranial nerve innervates all the intrinsic and extrinsic muscles of the tongue.

They may be involved by the cancer, causing neurologic deficit, or may be a conduit for tumor spread to the base of the skull. In addition, identification and preservation of these nerves during tumor resection may be vital if adequate rehabilitation is to be obtained.

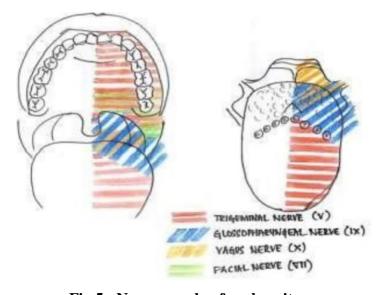


Fig 5 : Nerve supply of oral cavity

## **HISTORY OF LYMPHATIC SYSTEM:**

Gaspero Aselli, professor of anatomy and surgery from Italy made the first description of lymphatic systems in 1662. William Hunter, William Cruikshank, and William Hewson in London precisely described the anatomy and physiology of the lymphatics in 1786 in their monograph by Cruikshank. <sup>12</sup>

Sappey, further described the anatomical understanding of the lymphatic system. During this time, Virchow and other researchers advocated that lymph nodes were a barrier to cancer spread and that cancer progressed sequentially from a primary tumour to regional lymph nodes and then to systemic sites. Radical surgical procedures, including Crile's radical neck dissection, were developed in response to this belief.

#### **DEVELOPMENT OF LYMPHATIC SYSTEM:**

The First evidence of lymphatic system in intrauterine life is appearance of structures known as lymph sacs which are closely related to veins. First to appear is jugular lymph sacs which are two in number. Others are two posterior lymph sacs, one retroperitoneal lymph sac and one cisterna chyli. According to Sabin (1916) lymph sac develops as outgrowth of endothelium of veins and lymph vessels sprout in a radiating manner and primary connections with veins are lost.<sup>13</sup>

According to Huntington (1911) and McClure (1915) all lymph vessels are originally formed as clefts in the mesenchyme exactly as blood vessels. Lymph nodes develop as aggregation of cells in mesenchymal strands surrounded by plexus of lymph vessels. Around each nodule vessels are transformed to lymph s

## **LYMPH NODE GROUPS:**

#### Level I:

- Contains the submental (Ia) and submandibular (Ib) triangles.
- It is bounded by the anterior belly and the posterior belly of the digastric muscle, and the hyoid bone inferiorly, and the body of the mandible superiorly.

#### Level II:

- Extends from the level of the skull base superiorly to the hyoid bone inferiorly and contains the upper jugular lymph nodes.
- In anterior triangle of neck (from a vertical line dropped from angle of mandible to posterior border of sternocleidomastoid). It is further divided into IIa(anterior) and IIb(posterior) by spinal accessory

#### Level III:

 Contains the middle jugular lymph nodes from the hyoid bone superiorly to the level of the lower border of the cricoid cartilage inferiorly, midline to posterior border of sternocleidomastoid.

### Level IV:

 Contains the lower jugular lymph nodes. It extends from the level of the cricoid cartilage superiorly up to the clavicle inferiorly in anterior triangle of neck (IVa and IVb).

#### Level V:

Contains the lymph nodes in the posterior triangle, which are bounded by the
anterior border of the trapezius muscle posteriorly, by the posterior border of
the sternocleidomastoid muscle anteriorly and by the clavicle inferiorly.

• It is divided into Va and Vb by inferior belly of omohyoid.

#### Level VI:

 Contains the lymph nodes of the anterior central compartment from the hyoid bone superiorly to the suprasternal notch inferiorly. On each side, the medial border of the carotid sheath forms the lateral boundary.

#### **Level VII:**

 Contains the lymph nodes inferior to the suprasternal notch in the superior mediastinum.

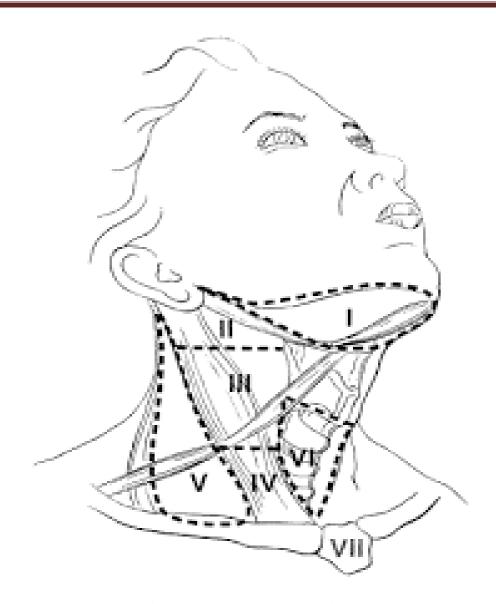


Fig 6: Lymph node groups in neck

# **ORAL CAVITY CANCER:**

# **EPIDEMIOLOGY:**

Oral cancer is a serious and growing problem in many parts of the globe. Oral and pharyngeal cancer, grouped together, is the sixth most common cancer in the world. Though man has been trying to conquer malignant diseases, cancer still remains a major cause for death and morbidity. It is estimated that about nine million new cancers are diagnosed every year in the world. Worldwide estimate of oral cancer

detection each year is 4,05,000 cases with 2/3rd occurring in developing countries. 14

There is a wide geographical variation (approximately 20-fold) in the incidence of this cancer. The areas characterised by high incidence rates for oral cancer (excluding lip) are found in the South and Southeast Asia (e.g. Sri Lanka, India, Pakistan and Taiwan), parts of Western (e.g. France) and Eastern Europe (e.g. Hungary, Slovakia and Slovenia), parts of Latin America and the Caribbean (e.g. Brazil, Uruguay and Puerto Rico) and in Pacific regions (e.g. Papua New Guinea and Melanesia) The estimated number of new cancers in India is about seven lakhs, and about 3.5 lakhs people die of cancer every year. 15

According to the cancer registry of Kidwai Memorial Institute Of Oncology, Bangalore, Karnataka, on an average, about 5000 new cancers are registered per year <sup>16</sup>. Oral cancer ranks among the top three in India. Age adjusted rates of oral cancers in India is 20 per 100,000 population and accounts for over 30% of all cancers in the country. <sup>17</sup> In the western world the tongue and floor of the mouth are the most common sites for primary squamous cell carcinoma in the oral cavity.

However, in India the buccal mucosa and lower alveolus are the most frequently encountered primary sites. Carcinoma of buccal mucosa accounts for 40% of oral cancers in South East Asia.18 85% cases occur >50 years of age, except in developing countries where onset is earlier due to tobacco/ pan chewing habits. Floor of mouth cancer accounts for 18-33% of oral cancers and seen more frequently in men in 6th-7th decade. 22-39% of oral carcinomas arise in the tongue, most commonly in middle 1/3rd and in the lateral aspect. Retromolar trigone incidence in oral cancers is 6 - 7%

and is more common in males. Incidence of carcinoma in Maxillary alveolus is 3.5 - 6.5% & hard palate is 1 - 3%.

Oral cancers are more common in males except in hard palate carcinomas where precedence in females is more due to reverse smoking. Mandibular cancers account for 7.5 - 17.5 % of oral cancers. <sup>18</sup>

The risk of developing oral cancer increases with age and the majority of cases occur in people aged 50 or over. Also, oral cancers is linked to social and economic status and deprivation, with the highest rates occurring in the most disadvantaged sections of the population.

However, in Kolar region carcinoma of buccal mucosa is the most common malignancy. <sup>19</sup> It is more prevalent in women due to addiction to tobacco quid chewing. In India, patients present in advanced stage and both buccal mucosa and lower alveolus will be involved making it difficult to identify the epi-centre or starting point of tumour. Such tumours involving the buccal mucosa and lower alveolar complex have been nick named "Indian oral cancer" and are high volume disease.

# **ETIOLOGY:**

The cause of oral cancer is yet to be completely understood. Many life style, environmental, and genetic factors are implicated as important etiologic agents in the development of oral cavity cancer. The vast majority of these cancers arise in susceptible persons after prolonged exposure to known environmental carcinogens.

#### 1) Smoking:

Tobacco-in the form of cigarette smoking, pipe, or cigar smoking-has been implicated with a specific dose-response relationship; that is, the risk rises in a linear fashion with the amount of tobacco smoked.<sup>20</sup>

• Risk increases with the amount smoked and with the total cumulative lifetime smoking years. Tobacco is smoked commonly in the form of bidi, a type of cheap cigarette made by rolling a rectangular dried piece of tendu leaf (Diospyros melanoxylon). The length varies from 4 cm to 7.5 cm. As compared with cigarette smoke, bidi smoke has high content of several toxic agents such as carbon monoxide, ammonia, hydrogen cyanide, phenol and carcinogenic hydrocarbons.

Smokeless tobacco is becoming increasingly popular among the youth of North America, particularly snuff dipping and chewing tobacco. An association between cancer of the oral cavity and smokeless tobacco has been confirmed.

In addition, certain other tobacco-related habits are associated with a high incidence of oral cavity cancers like reverse chutta smoking, clove-flavoured cigarette, various forms of pipes (wooden, clay, metal), the hookah (the Hubble bubble or water pipe), cheroots (or chuttas) and dhumtis.

Tobacco may be used in raw or as processed mixtures and as a pyrolised form. The

raw forms are used with lime and with areca nut (Mawa-smokeless tobacco).

Khaini is a mixture of freshly powdered tobacco and slaked lime; a quid of the mixture. It is kept for hours in the lower gingivolabial sulcus and sucked, which is risk factor for khaini cancer (squamous cell carcinoma of the lower lip). The processed forms, for example zarda, gutkha, and Manipuri tobacco are industrial products. The pyrolised (roasted) forms of tobacco (mishri, bajjar, etc) are used as dentifrice. Oral use of snuff is also practised in specific areas. Brings about hyperacetylation and hypomethylation of histones which silences tumor suppressor genes.<sup>21</sup>





Fig 7: Carcinogen ( cigarette and beedi smoking)

### 2) **Spirits:**

The consumption of alcohol is linked to the development of cancer in the upper aerodigestive tract, particularly the oral cavity and oropharynx. The exact mechanism is unclear, but it is thought to be due to a combination of a local toxic effect on the mucosa and the systemic effect from the associated dietary deficiencies, hepatic damage, and a possible alteration in the patient's immunity. It appears to act synergistically with tobacco, causing a disproportionate increase in cancer as the alcohol and tobacco consumption increases. Brings about hypermethylation of histones.<sup>22</sup>

- 3) **Sharp teeth:** Dental trauma and poor oral hygiene
- 4) **Radiation**-induced cancer following high-dose therapeutic radiation is occasionally seen, with the radiation acting as a double-edged sword, curing and at the same time potentially inducing cancer. <sup>23,24</sup>

#### 5) Septic and decayed teeth

6) **Syphilis:** The syphilitic infection becomes manifested as an endarteritis with interstitial glossitis and atrophy of the overlying mucosa

#### 7) Spices

8) **Betel quid chewing habit**: - The quid consists of a betel leaf wrapped around an areca nut, which is high in tannin, quick lime and tobacco. Oral cancer develops at the site where quid is habitually kept. Smoking along with betel

quid chewing enhances the risk of oral cancer by 20 to 30 times. This is the most common risk factor for oral cancer in our region.



Fig 8a



Fig 8b
Fig 8a and 8b showing pan masala

### 9) Snuff dipping and other tobacco products



Fig 9: Other tobacco products

10) **Genetic factors**: - Sporadic tumors are usually the result of a multi-step process of accumulated genetic alterations. These alterations affect the epithelial cell behaviour by the loss of chromosomal heterozygosity. This leads to a series of events progressing to the eventual stage of invasive squamous cell carcinoma. The corresponding genetic alterations are reflected in the clinical and microscopic pathology from hyperplasia to invasiveness of the tumor. Over expression or under expression of p53, p16 and other genes may predispose to development of cancer and recurrence following treatment. Overexpression of c-erbB-2 has shown correlation with nodal disease and metastasis and worsened survival.

The syndromes that are characterized by mutagen sensitivity, including Xeroderma pigmentosum, Ataxia telangiectasia and Fanconi's anaemia have been associated with oral cavity cancers. These genetic markers may include inducibility of cytochrome p450 enzyme system. <sup>25</sup>

#### 11) Industrial chemicals

- 12) **Viral infections:** Herpes simplex virus and the Human papilloma virus (subtype 16)
- 13) **Fungal infections:** High rate of malignant transformation in chronic hyperplastic candidiasis are noted .There may be some form of T-cell immunologic defect that allows the Candida to invade the epithelium.
- 14) **Immune status**: Immune deficiency due to low cell mediated immunity.
- 15) Social status: Related to social habits and low socio-economic status
- 16) **Occupation**: Employment in textile industries
- 17) **Nutritional factors:** Plummer-Vinson syndrome. Mucosal atrophy with an increased incidence of oral leukoplakia and squamous cell carcinoma of the oral cavity. Other nutritional factors, such as riboflavin deficiency, may contribute to the cause
- **18) Exposure to sunlight:** The ultraviolet spectrum in sunlight can cause thymidine dimer formation, resulting in C to T base transitions.

#### 19) Liver cirrhosis

## **PREMALIGNANT CNDITIONS:**

**1. Leukoplakia** is defined as "a white patch or plaque that cannot be characterized clinically or pathologically as any other disease"

Leukoplakia has been clinically divided into several varieties.

#### Pindborg and associates 27 describe two varieties:

- Homogenous leukoplakia, which is characterized by a white patch, the surface
  of which may be smooth or wrinkled and which may be traversed by small
  cracks or fissures, and
- Speckled or nodular leukoplakia, which presents as white patches or nodules on an erythematous base.

#### According to Sugar L and Banoczy J:

- Leukoplakia simplex White, homogeneous keratinised lesion, slightly elevated, shows lowest frequency of malignancy.
- Leukoplakia verrucosa White, verrucous lesion with wrinkled surface,
   exhibits the highest rate of association with carcinoma.
- Leukoplakia erosiva White, lesion with erythematous areas, erosions,
   fissures, exhibit the highest rate of association with carcinoma.

#### **According to Burkhardt (microscopic types):**

- Plain form, corresponding clinically to leukoplakia simplex.
- Papillary endophytic, corresponding clinically to erosive leukoplakia.
- Papillomatous exophytic, corresponding clinically to verrucous leukoplakia.
- Proliferative verrucous leukoplakia: It is high-risk type of leukoplakia.

It has a tendency to be extensive or multifocal. Verrucous carcinoma evolves from this form of leukoplakia. They are associated with a high risk for malignant transformation and dysplasia.  $^{26}$ 

Rates of malignant transformation ranges from less than 1% to 17.5%. <sup>26</sup>



Fig 10: Imaging showing Leukoplakic patch on left buccal mucosa

**2. Erythroplakia** is defined as "a lesion which presents as a bright red, velvety plaque, which cannot be characterized clinically or pathologically as any other recognizable condition."

About 40-60% of erythroplakia exhibits either carcinoma or severe epithelial dysplasia.



Fig 11: Image showing erythroplakiac patch

## 3.Melanoplakia

**4. Oral Submucous fibrosis:** It is a chronic disease of the oral mucosa characterized by inflammation and progressive fibrosis of the lamina propria and deeper connective tissues.<sup>27</sup>



Fig 12: Image showing oral submucous fibrosis

5. Sideropenic dysphagia

**6.Oral lichen planus:** Oral lichen planus is a white, lacy, striated lesion of unknown

etiology most commonly occurring on the buccal mucosa. Rate of malignant

transformation is about 4%. <sup>28</sup>

7.Discoid lupus erythematosus

8. Hyperkeratosis

9.Dyskeratosis

10. Congenital Syphilis

**TUMOUR BIOLOGY OF ORAL CANCERS:** 

Epithelial malignancies represent the sequela of accumulated molecular changes that

begin during the gradual progression from normal mucosa to dysplasia and to invasive

carcinoma.

Understanding the function of molecular events involved in the pathogenesis of

squamous cell carcinoma have provided a foundation for development of new

methods for screening, prevention, and therapy. Progress in understanding the

molecular biology of Head & Neck Squamous cell carcinoma has been made possible

through advances in technology that have permitted detection and mapping of

deoxyribonucleic acid (DNA) sequences and genes throughout the human genome.

The development of a tumor involves three phases <sup>29</sup>:

Initiation

Promotion

Progression

Genes that allow for uncontrolled cancer cell growth fall into two classes: protooncogenes and tumor suppressor genes. Proto-oncogenes have the potential to become
oncogenes, confer a survival advantage, and drive cancer progression. Mutations of
proto-oncogenes and tumor suppressor genes can occur through a wide variety of
mechanisms. There are point mutations that can result in missense or nonsense
mutations, duplications, translocations, insertions, and deletions. Interestingly, in
HNSCC, transversion mutations, where the purine guanine was substituted for the
pyrimidine thymidine, were observed much more frequently in smokers. <sup>30,31</sup>

# **CARCINOGENESIS**<sup>32</sup>

Oral carcinogenesis is a molecular and histological multistage process featuring genetic and phenotypic molecular markers which involves enhanced function of several protooncogenes, oncogenes and/or the deactivation of tumor suppressor genes, resulting in the overactivity of growth factors and its cell surface receptors, which could enhance messenger signaling intracellularly, and/or leads to the increased production of transcription factors.

Tumor development represents the loss of the normal signalling mechanisms involved in controlled cell growth. Loss of cancer cell ability to undergo apoptosis (programmed cell death) allows the accumulation and clonal expansion of cells that otherwise might have died if their cell death machinery were preserved and functional. Tumor growth represents the sum of cell proliferation minus cell death.

Carcinogenesis involves DNA damage and the progression of mutated cells through the cell cycle called as initiation and promotion.

Around 6-10 independent genetic mutations are required for the development of malignancies in head and neck. Overexpression of mitogenic receptors, loss of tumor suppressor proteins and expression of oncogene-derived proteins that inhibits apoptosis and over expression of proteins that derive the cell cycle, allow the unregulated cell growth. Genetic mutation occurs as a result of DNA damages especially 9p, 3p, 11q, 8p, and 17p region. Rate of p53, p16 mutation is greater in smokers, which contributes to oral cancer and shows high incidence of recurrence after any treatment. A reduction in tumor suppressor activity by the gene and the development of mutations in p53 have been associated with smoking and an increased risk for oral carcinoma development.

## **CERVICAL LYMPH NODE METASTASES:**

The probability of having cervical metastatic disease at presentation highly depends on the site of the primary tumor. Metastatic spread may be regarded as the single most important characteristic feature of a malignant tumour.

Breach of the basement membrane, which separates the epithelial and mesenchymal compartments, represents the first step in tumor cell invasion. Destruction of type IV collagen, laminin and proteoglycans as evident in squamous cell carcinoma of the head and neck, permits the local and regional movement of the tumor cells <sup>33</sup>. This is accomplished by the elaboration of a variety of hydrolases which degrade one or multiple components of the basement membrane some of which have been implicated in head and neck cancer progression. These include the urokinase-type plasminogen activator and several members of the collagenase family.

Some of the enzymes which have been implicated in the spread of head and neck cancer include the urokinase-type plasminogen activator and several members of the collagenase family such as type I and IV collagenases and the stromelysins synthesized either by the tumor cells or in the surrounding fibroblasts.

#### Various mechanisms are:

- Regulation of protease expression
- The MMP-9 gene and regulation of its expression
- The urokinase gene and regulation of its expression
- Regulation of transcription factor activity and/or expression by signal transduction pathways
- Role of growth factors in the activation of signaling pathways in head and neck cancer.

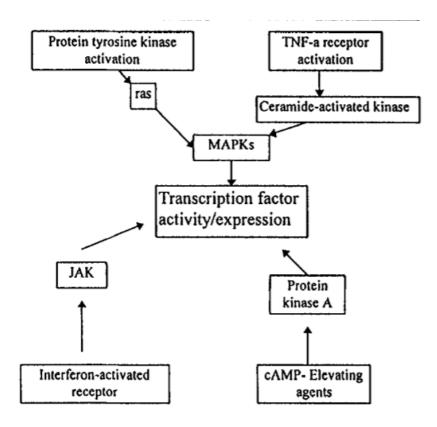


Fig: Cellular signalling pathways

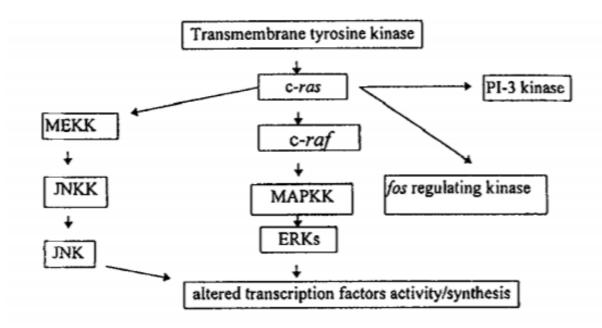


Fig 13: RAS-Dependent signalling pathways

Lympho-hematogenous spread occur by tumour cells invading blood vessels within the lymph node or by invading small lymphatic-venous communication. Once the tumour cells arrive at draining lymph node, they can proliferate, die, remain dormant or enter the blood circulation through blood vessels in the node. The patients with clinically positive nodes in the ipsilateral neck are at risk for contralateral lymph node metastasis. This shunting occurs mainly through anastomotic channels decussating in the midline at the submental and submandibular triangles.

The level I, II and III were at highest risk for metastasis from oral cavity cancer. Thus, first echelon of lymph nodes for oral cavity lies in level I, particularly level Ib (submandibular) for buccal mucosa and lower alveolar complex. The relative risk of nodal metastasis depends on site, size, thickness, histological features and the immunological and biological factors of the primary tumour.<sup>33</sup> Poorer the

differentiation the more likely the tumour metastasises early. The tumour with infiltrative margin is more likely to metastasise than those with pushing margin.

| LYMPH NODE GROUPS | PRIMARY SITES  |
|-------------------|--|
| LEVEL 1A          | Floor of mouth, anterior 2/3 tongue, anterior part of mandibular ridge, lower lip.                           |
| LEVEL 1B          | Oral cavity, anterior nasal cavity, soft tissue of the mid face, submandibular gland.                        |
| LEVEL 2           | Oral cavity, Anterior Nasal cavity, Nasopharynx, Oropharynx, Hypo<br>pharynx, Supra glottic larynx, Parotid. |
| LEVEL 3           | Oral cavity especially tongue, Nasopharynx, Oropharynx, Hypo pharynx, Supra glottic larynx, thyroid.         |
| LEVEL 4           | Hypopharynx, Thyroid, Larynx, Cervical oesophagus.   |
| LEVEL 5           | Nasopharynx, Oropharynx, Cutaneous structures of the posterior scalp and neck.                               |
| LEVEL 6           | Thyroid gland, Glottic and subglottic Larynx, apex of Pyriform fossa,  Cervical oesophagus.                  |

### **EVALUVATION OF CERVICAL LYMPH NODES:**

A proper evaluation of cervical lymph nodes is important as it influences the staging of the disease, the choice of treatment modality and functional outcome. The assessment of cervical lymph nodes depends on history, clinical examination and radiology. History should include symptoms of upper aero digestive dysfunction. Social history should contain a detailed history regarding alcohol and tobacco consumption.

Clinical examination remains the most important method of assessing regional lymph nodes. Physical examination should include careful inspection of the mucosal surface of oral cavity, Oropharynx, indirect laryngoscopy, posterior rhinoscopy and palpation of the neck. The neck palpation should be from behind the patient using both hands for palpation. Each side of the neck should be palpated separately. The sequential examination starts first from submental and submandibular triangles. Then the neck anterior to sternocleidomastoid is palpated from above downward, till clavicle, along the supraclavicular fossa and upwards along the anterior border of Trapezius.

In addition the parotid region, the posterior auricular region, the facial nodes should also be examined. Some nodes in the neck are difficult to palpate. The retropharyngeal and Para pharyngeal nodes are almost impossible to detect unless they are very large. The patients with short neck are more difficult to examine for staging. Area deep to sternomastoid should be given special attention and must be palpated by insinuating the fingers below the muscle.

The clinical examination of the neck has a variable reliability. Ali and co-workers, in their review of 266 specimens from radical neck dissections found a false positive rate of 20% and false negative rate of 21 % <sup>34</sup>. Clinically the lymph nodes bigger than 1cm in areas like submandibular and submental become palpable whereas lymph nodes in other deeper parts of the neck are palpable when they attain a size of 1.5 cm.

Ultrasonography (USG) is more sensitive than clinical examination in detecting metastatic nodes. Malignant nodes show a heterogeneous appearance with a solid and cystic image, round shape, clustering and speckled calcifications on USG. This investigation will also demonstrate the relationship of metastatic nodes to major vessels in the neck <sup>35</sup>. Individual parameters of B Mode when used alone were not found to be very effective in differentiating benign and malignant lymph nodes. However features of B-Mode combined together as well as color Doppler ultrasound, help in the detection of reactive lymph nodes and can be used as a diagnostic tool with good accuracy. However, they cannot be used as a diagnostic method for metastatic or tubercular nodes and cytopathology/histopathology remains the gold standard in such situations.

# Features of malignancy in USG:

- size: larger-more likely malignant
- shape: round, long axis/short axis <2
- echogenicity: predominantly hypoechoic although metastastic lymph nodes from papillary thyroid carcinoma tend to be hyperechoic due to the intranodal deposition of thyroglobulin

- heterogenous echotexture
- loss of central fatty hilum/thinning of hilum
- eccentric versus concentric thickening of cortex
- presence of microcalcifications
- necrosis: cystic/coagulative
- ill-defined capsular margins: invasion

FNAC is helpful in the assessment of palpable node in the evaluation of a patient with an unknown primary tumour. The nature of histology may help in the search for primary tumour. In the case of a clinically palpable node in the presence of proven primary disease, FNAC may not be sufficiently reliable.

USG-FNAC proved to be a quick (10-20 min) and safe <sup>36</sup> (no complications) method. Although some reports of seedling of tumour cells along the needle tract are present, this is a rare finding and has never occurred with thin aspiration needle. Aspiration can be obtained from the lymph nodes as small as 5 mm36. It has been shown that USG-FNAC has a very high specificity (100%) and sensitivity (73%). The specificity and sensitivity of USG - FNAC is better than CT or MR imaging. The sensitivity of USG- FNAC can be enhanced by P53 mutational assays. Another technique to increase the accuracy of USG- FNAC is to select the sentinel node for aspiration. The sentinel node is the first site for metastases. The technique involves injecting around the primary tumour site with TC-99m labelled sulphur colloid. The localization of the sentinel node is performed by planner scintigraphy and gamma probe. Dye technique is easier to perform and is also fairly effective but not as sensitive as radioisotope study.

Computerized tomography scan (CT scan) is more accurate than clinical examination in detecting metastatic lymph nodes. It is particularly important in the necks that are difficult to examine, for restaging and for inaccessible areas such as retropharyngeal space. The rapid advances in imaging technology have enhanced the ability to identify the metastatic disease in head and neck. CT and MRI have significantly improved the accuracy of detecting occult metastasis.

#### C.T. Scan criteria to define a node as metastatic node includes:

- Spherical lymph nodes
- Peripheral enhancement
- Central necrosis (Low attenuation areas) <sup>34</sup>
- Clustering of three or more lymph nodes.
- Scattered calcification.

Area of Drainage.

MRI differentiates nodes from surrounding tissues rather more clearly than CT scan <sup>36</sup>. However, limitations of CT and MRI in the assessment of small lymph node and inability to ascertain with confidence the presence or absence of metastases in any one lymph node makes CT and MRI not universally acceptable. The metastatic nodes can be demonstrated with radio isotopes like Gallium Citrate, technetium labelled DMSA. These agents do not label normal lymph nodes. But all these investigations suffer from a low sensitivity and specificity and inability to detect nodes less than 2 cin size by which time they are usually clinically palpable <sup>37</sup>
Positron Emission Tomography (PET) will assess the metabolic activity of cervical nodes using 18 fluorodeoxyglucose (18 FDG). The role of PET is confined to the

detection of the occult primary and in the assessment of residual and recurrent disease following surgery and irradiation <sup>37</sup>.

Single Photon Emission Computed Tomography (SPECT) gives three dimensional isotopic images and can detect tumour more than 4 mm in size. Immuno SPECT using TC-99 labelled monoclonal antibodies can detect tumour measuring 2 mm. These techniques depend on the uptake of radionuclide into tumour which is often related to high blood flow which explains overlap in the detection of inflammatory disease. Although the expense of PET prohibits wide spread usage, these techniques will be used to detect occult recurrences, occult primaries or distant metastases <sup>48</sup>. PET has high incidence of false positive nodes, some of these can be eliminated by PET-CT i.e. superimposition of PET with CTscan. Ideally it has to be done after three months of surgery to reduce the false positive rate because of inflammatory changes following surgery.

# TNM CLASSIFICATION 11 - AJCC 8th EDITION

#### **Primary Tumour (T)**

- TX Primary tumour cannot be assessed Tis Carcinoma in situ
- TI Tumour<2cm, < 5 mm depth of invasion (DOI) DOI is depth of invasion.
- T2 Tumour < 2 cm, DOI > 5 mm and < 10 mm or tumour > 2 cm but < 4 cm,
- and < 10 mm DOI T3 Tumour>4 cm or any tumour> 10 mm DOI
- T4 Moderately advanced or very advanced local disease

T4a - Moderately advanced local disease (lip) Tumour invades through cortical bone or involves the inferior alveolar nerve, floor of mouth, or skin of face (i.e., chin or nose) (oral cavity) Tumour invades adjacent structures only (e.g., through cortical bone of the mandible or maxilla, or involves the maxillary sinus or skin of the face)

Note: Superficial erosion of bone/tooth socket (alone) by a gingival primary is not sufficient to classify a tumour as T4.

T4b - Very advanced local disease Tumour invades masticator space, pterygoid plates, or skull base and/or encases the internal carotid artery

## Regional Lymph Nodes (N)

- NX Regional lymph nodes cannot be assessed
- N0 No regional lymph node metastasis
- NI Metastasis in a single ipsilateral lymph node, 3 cm or smaller in greatest dimension ENE(-)

N2 - metastasis in a single ipsilateral node larger than 3 cm but not larger than 6 cm in greatest dimension and ENE(-); or metastases in multiple ipsilateral lymph nodes, none larger than 6 cm in greatest dimension and ENE(-); or in bilateral or contralateral lymph nodes, none larger than 6 cm in greatest dimension, and ENE(-)

N2a - metastasis in a single ipsilateral node larger than 3 cm but not larger than 6 cm in greatest dimension, and ENE(-)

N2b - metastasis in multiple ipsilateral nodes, none larger than 6 cm in greatest dimension, and ENE(-)

N2c - metastasis in bilateral or contralateral lymph nodes, none larger than 6 cm in greatest dimension, and ENE(-)

N3 - metastasis in a lymph node larger than 6 cm in greatest dimension and ENE(-); or metastasis in any node(s) and clinically overt ENE(+)

N3a - metastasis in a lymph node larger than 6 cm in greatest dimension and ENE(-)
N3b - metastasis in any node(s) and clinically overt ENE(+)

# Distant metastasis (M)

- MX Distant metastasis cannot be assessed
- M0 No distant metastasis
- M1 Distant metastasis

# Histological Grade (G)

- GX Grade cannot be assessed
- G1 Well differentiated
- G2 Moderately differentiated
- G3 Poorly differentiated

# Residual tumour(R)

- Rx Presence of residual tumour cannot be assessed
- R0 No residual tumour
- R1 Microscopic residual tumour
- R2 Macroscopic residual tumour

# **Staging:**

| Stage 0    | T0    | N0    | M0         |
|------------|-------|-------|------------|
| Stage I    | T1    | N0    | M0         |
| Stage II   | T2    | N0    | M0         |
| Stage III  | Т3    | N0    | M0         |
|            | T1    | N1    | M0         |
|            | T2    | N1    | M0         |
|            | Т3    | N1    | M0         |
| Stage IV A | T4a   | N0    | M0         |
|            | T4a   | N1    | M0         |
|            | T1    | N2    | M0         |
|            | T2    | N2    | M0         |
|            | Т3    | N2    | M0         |
|            | T4a   | N2    | M0         |
| Stage IV B | Any T | N3    | M0         |
|            | T4b   | Any N | <b>M</b> 0 |
| Stage IV C | Any T | Any N | M1         |

AJCC staging of oral cavity squamous cell carcinoma

## **THERAPEUTIC MODALITIES FOR ORAL CANCER** 38

The factors that influence the choice of initial treatment are those related to the characteristics of the primary tumour (tumour factors), those related to the patients (patient's factors) and those related to the treatment delivery team (physician factors).

### A) PHYSICIAN FACTORS: -

- Surgery
- Radiotherapy
- Chemotherapy
- Combined modality treatment
- Dental
- Rehabilitation services
- Prosthetics
- Support services
- Photodynamic therapy
- Immunotherapy
- Gene therapy

Most therapies other than surgery are not known to be effective against large tumours. Therefore, the most promising results may be obtained with therapy of nonmetastatic tumours in an adjuvant setting after surgical removal of the primary tumour.

## B) TUMOUR FACTORS:

- Site
- Size (T stage)
- Location (anterior versus posterior)
- Proximity to bone (mandible)
- Lymph node metastasis 40
- Previous treatment
- Histology (type, grade, depth of invasion)

## C) PATIENT FACTORS:

- Age
- General medical condition
- Tolerance
- Occupation
- Acceptance and compliance with regards to treatment
- Life style (smoking, drinking, tobacco chewing)
- Socio-economic consideration

## **MANAGEMENT OF CERVICAL METASTASES:**

The most important prognostic factor for tumor behavior and outcome in squamous cell carcinoma (SCC) of the oral cavity is the presence of neck lymph node metastases at diagnosis, which can decrease the 5-year survival rates to lower than 50%. <sup>39-43</sup> The most common malignant tumor type in the oral cavity is squamous cell carcinoma. Oral squamous cell carcinoma is frequently associated with poor prognosis <sup>44,45</sup>. Even T1 and T2 lesions carry a high risk of cervical lymph node metastasis. Therefore, management of oral cancer remains controversial, especially for treatment of N0 neck patients. More than 30% of Oral squamous cell carcinom patients with clinically N0 neck exhibit occult metastasis <sup>46,47</sup>. Cervical lymph node metastasis is the most significant independent prognostic factor, as it reduces the rate of survival by 50% 53. Thus, appropriate treatment of cervical lymph nodes is essential for loco-regional control of the disease.

Hence, although the neck may be clinically negative (N0) all five levels in the neck should be treated by surgery or radiotherapy. In patients with palpable neck disease (N1, N2, N3), non-palpable spread may be present anywhere in the neck and correct approach for such patients is to completely encompass the disease i.e. full neck dissection. This usually involves surgery, although radiotherapy may have a place for small N1 (less than 3 cm) node <sup>37</sup>.

Both elective neck dissection and a "watchful-waiting" policy of the neck have their supporters among head and neck surgeons. Recently, some studies have indicated that this watchful-waiting policy may not be safe, because delayed cervical metastases have an increased incidence of extracapsular spread, involvement of multiple node

levels, and reduced survival. 48,49

### **EVOLUTION OF NECK DISSECTION**

- A. 1906 The en bloc cervical lymphadenectomy known as the RND was developed by Crile.
- 1. Spinal accessory and hypoglossal were preserved
- 2. IJV removed
- B. Blair and Brown encourage the removal of the SAN.
- C. 1945 Dargent and Papillon advocate the preservation of the SAN in clinically N0 necks.
- D. 1950 Martin popularizes the RND explaining that "Any technique that is designed to preserve the SAN should be condemned unequivocally."
- E. 1963 Suarez indicates that based on his necropsy specimens which had lymphatics only within the fibro fatty tissues, a complete cervical Lymphadenectomy could be accomplished while sparing the Sternocleidomastoid muscle, the IJV, and the SAN.
- F. 1967 1980 Bocca and Pignataro popularize Suarez's version of neck dissection and coined the terms functional, conservative, and conservation neck dissection.
- G. 1969 1981 Roy and Beahrs, Carenfelt and Eliasson proposed the Preservation of CN XI in clinically positive necks.
- H. 1972 Lindberg's classic study indicates consistent patterns of Lymphatic drainage for carcinomas in various locations of the upper Aero-digestive tract.
- I. 1990 Shah's work confirms that of Lindberg's in a review of over 1000 neck dissection specimens.
- J. 1986 1991 Byers, Medina, and Spiro report their results with Selective neck dissection.

# **NECK DISSECTION:**

Neck dissection is an important part of the surgical treatment of head and neck squamous cell carcinoma (HNSCC).

The following are the main goals to be achieved by the skin incision:

- Allow adequate exposure of the surgical field.
- Assure adequate vascularization of the skin flaps.
- Protect the carotid artery if the sternocleidomastoid muscle has to be sacrificed.
- Include scars from previous procedures (e.g., surgery, biopsy, etc.).
- Consider the location of the primary tumor.
- Facilitate the use of reconstructive techniques.
- Contemplate the potential need of postoperative radiotherapy.
- Produce acceptable cosmetic results.

## **CLASSIFICATION OF NECK DISSECTION**

**A. Comprehensive neck dissections** – consists of radical neck dissection and three modifications, but always refers to a procedure in which all of groups I - V are removed.

#### 1. Radical neck dissection:

Involves the removal of all lymphatics from the inferior border of the mandible and line joining angle of the mandible to the mastoid tip, to the clavicle between the lateral border of the sternohyoid and the anterior border of the Trapezius. The deep margin of resection is the fascial carpet of the scalene muscles and the levator scapulae. The sternocleidomastoid, the internal jugular vein, and the spinal accessory nerve are removed with the specimen. Traditionally, this was the only surgical method of treating the neck but with the development of the more limited, less morbid modifications this is no longer indicated in the N0 neck. Many surgeons no longer advocate this approach in N+ necks unless the metastatic nodes involve the muscle, vein, or nerve.

### 2. Modified Radical Neck Dissection:

Based on the work of Suarez as well as that of Bocca and Pignataro it indicates that an en bloc removal of the cervical lymphatics can be accomplished by stripping the fascia from the Sternocleidomastoid and internal jugular vein. No lymphatic communication was ever noted between these structures and the cervical lymphatics. These studies point out that both the spinal accessory and the hypoglossal nerve do not follow the aponeurotic compartments, but rather run across them; however, their conclusion was that if the tumor did not directly involve the nerves,

they could be spared. From the above information and a desire to minimize the shoulder dysfunction associated with spinal accessory nerve sacrifice came the development of the modified radical neck dissection.

### 3. Type I Modified Radical Neck Dissection

Accomplishes the removal of the same regions of lymphatics as in the radical neck dissection, but the spinal accessory nerve is spared. It is used less commonly in the N0 neck, but would be a reasonable choice with neck disease that involved the Sternocleidomastoid or jugular vein without involving the spinal accessory nerve.

### 4. Type II Modified Radical Neck dissection

Involves the same dissection as in the radical neck, but the spinal Accessory nerve and internal jugular vein are spared. It is indicated in N+ necks with metastatic involvement of the Sternocleidomastoid, but without involvement of the nerve and vein.

### 5. Type III Modified Radical Neck dissection - "Functional Neck Dissection"

It is similar to the radical neck dissection with preservation of all three above mentioned non lymphatic structures. The indications for this procedure are controversial. In Europe, this operation is popular in the treatment of hypo pharyngeal and laryngeal tumors with N0 neck. Molinari, Lingeman, and Gavilan propose this procedure for N1 necks when the involved nodes are mobile and no greater than 2.5 to 3cm. Bocca proposes this operation for any neck that has indications for a radical neck dissection as long as the nodes are not fixed.

### **B.** Selective Neck Dissections

This type of dissection arose from the work of Shah, Lindberg and Byers who identified the pathways of lymphatic spread in the head and neck. Only those regions with high risk for metastasis are removed. Types of selective neck dissection:

- **a. Supraomohyoid** (anterolateral) neck dissection Levels I, II, and III are removed sparing the Sternocleidomastoid, IJV, and CNXI. This is indicated in the treatment of oral cavity lesions.
- **b. Lateral neck dissection** Levels II, III, and IV are removed sparing the Sternocleidomastoid, IJV, and CNXI. This is indicated in tumors of the larynx, Oropharynx, and hypopharynx when the neck is N0, although some advocate this approach with the N1 neck with nodes limited to level II.
- c. Posterolateral neck dissection Levels II, III, IV, and V are removed sparing the Sternocleidomastoid, IJV, and CNXI. This is useful in the treatment of skin tumors with metastatic potential located in the posterior scalp or neck such as melanomas, squamous cell carcinomas, and Merkel cell carcinomas

#### C. Extended neck dissections –

Describes any of the above dissections that include the removal of additional structures or other groups of lymph nodes. Selective neck dissection (SND), which involves selective removal of nodal groups most at risk for metastasis with preservation of all nonlymphatic structures, has gradually gained acceptance in the clinically N0 neck and has demonstrated regional control and survival rates similar to those of more extensive neck dissections.

Although SND has been accepted by many as appropriate for use in the clinically node-negative neck, its use in patients with clinically obvious (palpable) metastatic disease remains extremely controversial; however, extension of the indications for its use in this setting seems logical. In the absence of factors that would alter normal lymphatic flow in the neck, such as previous neck surgery, radiotherapy, or the presence of massive obstructive adenopathy, the rationale behind the operation, which like its more radical counterpart seeks to remove the lymph nodes involved by or at risk for involvement by head and neck cancer, remains valid.

Elective neck dissection: This is the neck dissection done in N0 cases where metastasis is expected. Elective Selective neck dissection: This is done as a staging procedure e.g.; Supraomohyoid neck dissection

# **SURGICAL APPROACHES TO ORAL CAVITY:**

A variety of surgical approaches are available for resection of primary tumours of the oral cavity. The choice of a particular approach will depend on factors such as the size and site (anterior/posterior) of the primary tumour ,its depth of infiltration and proximity to the mandible or maxilla. Factors such as trismus, dentition, size of the oral aperture and the size and mobility of the tongue also influence selection of the surgical approach.

The various surgical approaches are:

- Peroral approach
- Lower cheek flap approach
- Visor flap approach

- <u>Upper cheek flap approach</u>
- Mandibulotomy approach

The **peroral approach** can be safely used for small, anteriorly located, and easily accessible tumors of the oral tongue, floor of mouth, gum, cheek mucosa, and hard or soft palate. When the peroral approach does not offer adequate exposure, the visor flap or cheek flap approaches (upper or lower) become necessary.

The **lower cheek flap approach** requires a midline lip splitting incision that is continued laterally into the neck for exposure and neck dissection. This approach provides excellent exposure for nearly all tumors of the oral cavity except those of the upper gum and hard palate. Mandible resection (marginal or segmental) and reconstruction require the lower cheek flap approach in most instances. The lower cheek flap approach is required for marginal or segmental mandibulectomy of tumors adjacent to the body of the mandible.

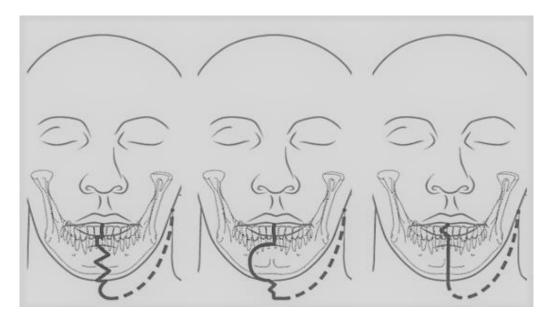


Fig 14: Varients of lower lip split incisions

Visor flap approach: The oral cavity is exposed via a single transverse skin incision extending from the mastoid process on one side to that on the other, along an upper neck skin crease. The visor flap requires another incision in the gingivobuccal and gingivolabial mucosa with division of all the soft tissues lateral to the mandible, permitting elevation and retraction of the visor flap to expose the oral cavity. Although the exposure provided by the visor flap approach is satisfactory for tumors of the anterior oral cavity, it is inadequate if the primary tumor of the oral cavity extends posteriorly. The benefit of this approach is that it avoids a lower lip—splitting incision but produces permanent numbness of the chin because the mental nerves need to be transected for adequate mobilization of the flap. It also may cause sagging of the lower lip and drooling because of a loss of support and sensation. Thus its usefulness is limited.

The **upper cheek flap approach** is required for resection of larger tumors of the hard palate and upper alveolus, particularly if they are posteriorly located.

**Mandibulotomy** or mandibular osteotomy is an excellent mandible-sparing surgical approach designed to gain access to the oral cavity or oropharynx for resection of primary tumors otherwise not accessible through the open mouth or by the lower cheek flap approach. The mandibulotomy can be performed in one of three locations:

- (1) lateral (through the body or angle of the mandible)
- (2) midline
- (3) paramedian

Surgical resection of the mandible becomes necessary when a primary malignant

tumor of the oral cavity directly extends to the gingiva over the alveolar process or infiltrates into the mandible. If the tumor extends directly from the alveolar process of the mandible or if contiguous tumor infiltration to the lingual or lateral cortex of the mandible is present, a segmental mandibulectomy becomes necessary.

**Marginal mandibulectomy** can be performed to resect the alveolar process, the lingual plate of the mandible, or a combination of the alveolar process and the lingual plate of the mandible for tumors of the anterior oral cavity .Marginal mandibulectomy also can be performed for lesions adjacent to alveolar process of the body of the mandible , adjacent to retromolar trigone, anterior aspect of the ascending ramus of the mandible.

**Reverse marginal mandibulectomy** is indicated in patients who have soft tissue disease such as fixation of prevascular facial lymph nodes to the lower cortex of the mandible.

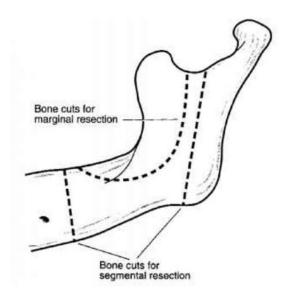


Fig 15: Bone cuts for marginal and segmental resection.

# **RECONSTRUCTION** 50:

The aim of oral cancer treatment is not only the preservation of life but also to give some quality of life (QOL) by allowing better facial aesthetics and oral function than if no reconstruction was used. Reconstructive surgery following resection for oral cancer is considered when there is a functional or aesthetic loss of structures in oral cavity.

Flaps are segments of tissue that retain some form of blood supply, which allows it to be living tissue, when transferred. Grafts do not have an intact blood supply or drainage, i.e., skin grafts and bone grafts, and have to re-establish a blood supply and drainage from the recipient bed.

Reconstruction of the surgical defect after resection of a primary oral cancer can be accomplished by the following:

- (1) primary closure
- (2) split thickness skin graft
- (3) vascularized cutaneous free flap
- (4) regional myocutaneous flap
- (5) microvascular free flap.

The various flaps used are:

- Buccal, Palatal, Periosteal Mucous membrane flaps
- Tongue flaps
- Posteriorly based lateral tongue flap
- Posteriorly based bilateral tongue flap
- Anteriorly based ventral tongue flap

- Masseter flap
- Nasolabial flap
- Medial based deltopectoral flaps Forehead flap
- Sternocleidomastoid myo-cutaneous flap Trapezius
- Platysma myo-cutaneous flap
- Pectoralis major myocutaneous flap
- Latissimus dorsi myo-cutaneous flap
- Costochondral grafts
- Osteo-myocutaneous flap- fifth rib with pectoralis major myo-cutaneous flap
- Spine of scapula with trapezius
- Free osteo-cutaneous groin flap
- Free osteo-cutaneous fibula flap
- Scapular Osseo-cutaneous flap
- Radial forearm flap
- Radial forearm free osteo-cutaneous flap
- Free fibula and osseo-integrated implants

Larger the tumour volume – larger will be the defect and it is a challenge for a surgeon to reconstruction. Whenever possible, immediate single stage reconstruction is preferred over delayed reconstruction, when the former can be achieved with acceptable success rates and low morbidity. Immediate restoration of the mandible prevents the development of muscle contracture and restores mandibular form. Delayed reconstruction interferes with the radiotherapy and later healing.

The bone to mucosa relationship of the periosteum of the alveolar ridge and gingival mucosa is most difficult to duplicate and is necessary for wearing dentures. Preservation of chewing, provision of a base for dental appliances and preservation of a normal appearing lower third of the face are achieved by preservation of the buccal sulcus and the oral floor, which are all essential for maintenance or restoration of the mandibular contour.

## **ADJUVANT TREATMENT**

Early-stage tumors of the buccal mucosa are often amenable to either surgery or radiotherapy. For intermediate tumors and those involving the oral commissure, definitive radiotherapy, which has good functional and cosmetic outcomes and a high local control rate, is preferred. For locally advanced lesions involving the bones, the gingiva, and buccogingival sulcus, surgery and reconstruction, followed by postoperative radiotherapy, are typically recommended. Postoperative radiotherapy can be started as soon as wound healing is satisfactory, usually 2 to 6 weeks after surgery. The standard adjuvant treatment for post-operative head and neck cancer patients with high-risk factors for recurrence is radiotherapy with or without chemotherapy.

Results showed that patients with risk factors for recurrence including (i) microscopically positive resection margin, (ii) extracapsular nodal extension-positive and (iii) multiple lymph node metastases (≥2) had a higher 5-year local relapse and decreased 5-year survival rate.

In addition to (i) microscopic resection margin positivity and (ii) extracapsular nodal

extension positivity, the European Organization for Research and Treatment of Cancer (EORTC) also suggests that Stage III/IV disease, perineural infiltration, Level 4/5 lymph node metastasis in oropharyngeal cancer/oral cavity cancer, and signs of vascular tumor embolism are also risk factors for recurrence <sup>51-54</sup>.

### **Radiation dose:**

The optimal radiation dose depends on the size and location of the primary tumors and the neck lymph nodes. In general, primary tumors and gross lymphadenopathy require a total of 70 Gy or more, with a daily fraction of 2 Gy. Radiation to low-risk neck nodal regions requires a total of 50 Gy or more. For postoperative radiotherapy, higher doses of radiation (60 to 66 Gy) are generally required for microscopic disease to decrease the risk of locoregional failure resulting from interruption of the normal vasculature, scarring, and relative hypoxia in the postoperative tumor bed <sup>51-55</sup>.

Intensity-modulated radiation therapy (IMRT) is an advanced form of three-dimensional conformal radiotherapy using computer-optimized inverse treatment planning and a computer-controlled multileaf collimator. With these techniques, the intensity of radiation can be modulated so that a higher radiation dose can be delivered to the targets with a sharply conformal target volume coverage, while at the same time the dose to the surrounding normal tissues is markedly reduced. <sup>56,57</sup>

Brachytherapy refers to treatment with radioactive sources at a short distance from the irradiated target .The procedure of surgical insertion of radioactive sources or applicators designed to hold the radioactive sources is known as interstitial implantation. Intracavitary brachytherapy consists of inserting applicators that will hold the radioactive sources into a body cavity in close proximity to the targets.

## **QUALITY OF LIFE**

Cancer of the oral cavity is one of the most common cancers of the head and neck, and is one of the ten most common causes of death in the world. Assessment of quality of life should be an indicator of the multidisciplinary treatment success and it should point to areas in which the affected person requires support.

Quality of life is defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns <sup>51</sup>. Surgical removal of extensive head and neck tumors inevitably results in the loss of vital functions such as swallowing, speech and senses of taste and smell<sup>58</sup>.

The consequences may affect the psychological, physical, social and emotional well-being and quality of life of patients <sup>59</sup>. Disease free survival, Overall survival and Tumour response rates have been outcome indicators used to judge efficacy of treatment.

### **Different dimensions of quality of life:**

- Physical complaints
- Functional status
- Psychological distress
- Social interactions

The unique attributes of the head and neck surgery and its role in speech, swallowing and deglutition as well as the cosmetic appearance allows for social interaction.

Mandibular resection has always been associated with some of the functional deficits.

Different quality of life scales are used to evaluate functional status in cancer patients.

They include:

- Karnofsky Performance Scale
- The Sickness Impact Profile
- ECOG 11 scale
- The University of Washington Quality of Life scale
- The Head & Neck Cancer Specific Quality of Life Instrument <sup>61</sup>

### **Karnofsky Performance Scale:**

The AJCC strongly recommends recording of KPS (The Karnofsky Performance Status) along with standard staging information. David A. Karnofsky devised KPS in 1948, which provides a uniform, reliable and objective assessment of an individual's functional status.

### **Karnofsky Scale: Criteria of Performance Status (PS)**

- 100 Normal; no complaints; no evidence of disease
- 90 Able to carry on normal activity; minor signs or symptoms of disease
- 80 Able to carry on normal activity with effort; some signs or symptoms of disease
- 70 Cares for self; unable to carry on normal activity or do active work
- Requires occasional assistance but is able to care for most of own needs.
- 50 Requires considerable assistance and frequent medical care
- 40 Disabled; requires special care and assistance

Diagnosis and treatment of depression also aid in symptom control and improved quality of life.

### MATERIALS AND METHODS

## **SOURCE OF DATA**

Following an informed written consent 66 patients, after fulfilling the inclusion criteria of the study, undergoing surgery for T2 and T3 staged oral cavity cancers under Department of Otorhinolaryngology and Head and Neck Surgery of R.L.Jalappa Hospital and Research Centre, Tamaka, Kolar from December 2018 till May 2020 will be included in this study. The patients will be segregated into two groups. Following a neck dissection for all these patients, Group A will undergo composite resection of oral cancer by lip split approach and Group B will undergo composite resection of oral cancer by visor approach without lower lip split.

### **SAMPLE SIZE**

Sample size of 66 was estimated based on the difference in recurrence rates in the two methods

In the study by Benjamin and his group in 2007 observed a difference of 60% reduction in recurrence with respect to visor in T4 lesions.

In the present study, to detect a difference of 80% reduction in recurrence rate with 95% confidence interval and alpha error of 5% with 80% power, estimated sample size per group will be 33.

# **FORMULA**

Formula

$$H_o: P_1 = P_2;$$
  $H_a: P_1 \neq P_2$ 

$$n = \frac{\left\{Z_{1-\frac{\alpha}{2}}\sqrt{2\,\overline{\mathrm{P}}\left(1-\overline{\mathrm{P}}\right)} + Z_{1,\rho}\,\sqrt{\mathrm{P}_{1}\left(1-\mathrm{P}_{1}\right)} + \mathrm{P}_{2}\left(1-P_{2}\right)\right\}^{2}}{\left(\mathrm{P}_{1}-\mathrm{P}_{2}\right)^{2}}$$

Where,

$$\overline{P} = \frac{P_1 + P_2}{2}$$

P<sub>1</sub> : Proportion in the first group

P<sub>2</sub> : Proportion in the second group

α : Significance level

 $1-\beta$ : Power

# **TYPE OF STUDY**

This is a Comparative observational study.

### **INCLUSION CRITERIA**

Patients between 35 to 65 years of age with buccal mucosa and lower alveolus cancers staged T2 and T3 planned for composite resection with neck dissection followed by reconstruction and adjuvant radiotherapy.

### **EXCLUSION CRITERIA**

- 1. Patients with recurrent tumours
- 2. Patients who had undergone head and neck surgery in the past.
- 3. Patients who have received Neoadjuvant chemotherapy.
- 4. Patients with H/O Radiotherapy to oral cavity or neck in the past.
- 5. Patients with major scars of the face or neck.

## **METHODOLOGY:**

Biopsy proven T2 and T3 staged patients of oral squamous cell carcinoma were included in the study after fulfilling the inclusion and exclusion criteria. Patients were explained about the advantages and problems & sequele of both Lower lip split and visor approach(sparing the lower lip incision). After an informed written consent, age, site and stage matched patients who are chosen for the study. Study subjects were alternately segregated into 2 groups, Group A(Lower lip split approach) and Group B(Visor approach).



Fig 16: T2 Lesion involving Left buccal mucosa



Fig 17: T3 lesion involving buccal mucosa

CECT scan was done and extent of the tumor was noted. All these details were entered in the proforma. All patients underwent composite resection composite resection of the primary tumour. Marginal mandibulectomy was done when there was lesion found abutting the mandible on CT-scan and height of the mandible was adequate. Hemi- mandibulectomy was done when lesion was found to be suspicious of mandible erosion on CT-scan, when mandibular body height was inadequate (edentulous) or when marginal mandibulectomy could not be done.

Patients in Group A underwent the conventional Gold standard Lower lip split approach for addressing the primary tumour following neck dissection. Whereas in Group B, patients were approached via a Visor approach wherein the lower lip split was avoided.

In Group B, after taking mucosal cuts around the tumor in cautery, the superior musical cut is taken transorally having sufficient margin from the upper margin. The specimen side of the mucosa following this cut is pulled inwards with superior cut extending anteriorly and posteriorly. The visor flap is raised upwards till the transillumination is appreciated or palpated. This helps in avoiding unnecessary extensive resection of healthy mucosa and well as from the third margin of tumor (base). The rest of the resection proceeds under vision in visor flap approach rather extending the mucosal cuts anteriorly and posteriorly till the mandible. The mandibular cuts (either segmental mandibulectomy or marginal mandibulectomy) are done directly under vision by retracting the visor flap upwards and composite resection can be done safely staying away from tumor and having good access.

Following the tumor excision, recontruction of the defect was addressed. Fasciocutaneous flap like supraclavicular flap which is based on supraclavicular artery was used as smaller defects. For larger defects, the work horse for

reconstruction of head & neck surgeries i.e., Pectoralis major myocutaneous flap which is based on Thoraco acromial artery was used. Also the aid of free flap like radial forearm free flap was taken in few cases.

Group A patients were subjected to neck dissection and composite resection of oral cavity tumours with lower lip split approach.



Fig 18: Preoperative marking for neck dissection and PMMC flap



Fig 19: Intraoperative image of Neck dissection

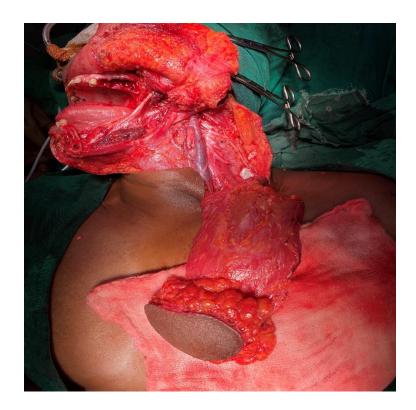


Fig 20: Intraoperative image of PMMC flap.



Fig 21: PMMC flap sutured intraorally.

Group B patients were subjected to neck dissection and composite resection of oral cavity tumours with Visor flap approach. Here the incision was stopped short on the contralateral side in most cases. Also the soft tissue was raised above the mandible not crossing the midline.



Fig 22: Preoperative marking for Visor approach with supraclavicular flap used for reconstruction.

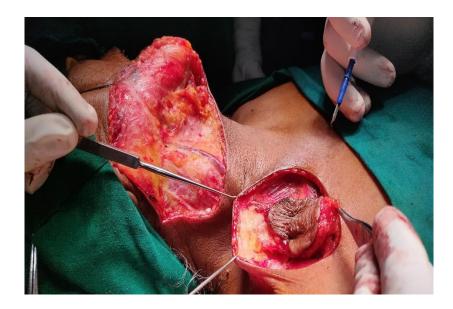


Fig 23: Subplatysmal flap raised with dissection of supraclavicular flap.



Fig 24: Hemimimandibulectomy specimen of buccal mucosa cancer



Fig 25: Hemimandibulectomy specimen of Lower gingivobuccal cancer.



Fig 26: Composite Resection specimen with neck dissection.

Following surgery, primary tumour with neck dissection specimen were sent for histopathological examination. Documentation of time taken for surgery, adequacy of exposure of oral tumour, accessibility for reconstruction, pathological tumour margins, time taken for healing, post operative complications if any, were noted. A comparison was made between visor flap approach and lower lip split approach for resection of primary tumour of oral cavity in the above patients. The patients were followed up for minimum of 6 months after completion of treatment. Post operative complications, and local or regional recurrence if any were documented.



Fig 27: Intraoperative image of Visor approach showing avoidance of lip split.

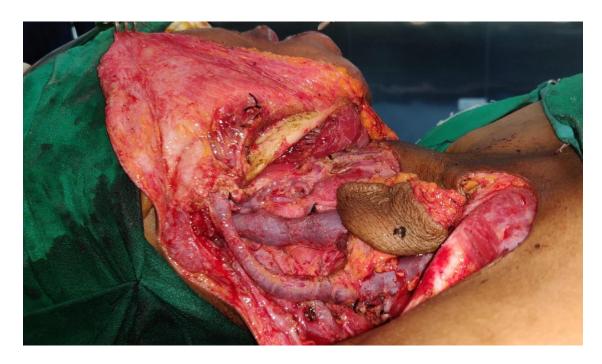




Fig 29: Intraoperative image showing access to oral cavity for flap in visor flap.



Fig 30: Intraoperative image showing supraclavicular flap being advanced into the oral cavity via visor approach



Fig 31: Closure following Visor flap approach

### **STATISTICAL ANALYSIS:**

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean  $\pm$  SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made, **Assumptions: 1.**Dependent variables should be normally distributed, 2.Samples drawn from the population should be random, Cases of the samples should be independent

Student t test ( two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters. Leven's test for homogeneity of variance has been performed to assess the homogeneity of variance. A t-test is a statistical test that is used to compare the means of two groups. It is often used in hypothesis testing to determine whether a process or treatment actually has an effect on the population of interest, or whether two groups are different from one another with the null hypothesis  $(H_0)$  is that the true difference between these group means is zero and the alternate hypothesis  $(H_a)$  is that the true difference is different from zero.

Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis. Fisher Exact test used when cell samples are very small.

# **SIGNIFICANT FIGURES**

- + Suggestive significance (P value: 0.05<P<0.10)
- \* Moderately significant ( P value:  $0.01 < P \le 0.05$ )
- \*\* Strongly significant (P value : P≤0.01)

**Graphical representation of data:** MS Excel and MS word was used to obtain various types of graphs.

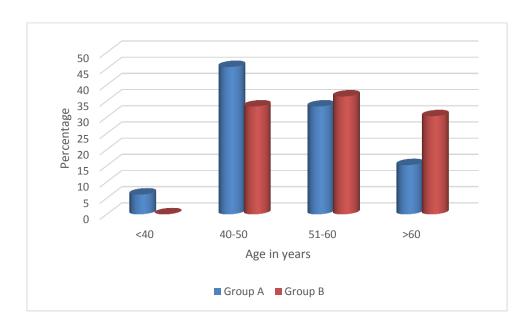
P value (Probability that the result is true) of < 0.05 was considered statistically significant after assuming all the rules of statistical tests.

**Statistical software:** The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

## **RESULTS**

Table 1: Distribution of subjects according to age group

| Age in years | Group A     | Group B    | Total       |
|--------------|-------------|------------|-------------|
| <40          | 2(6.1%)     | 0(0%)      | 2(3%)       |
| 40-50        | 15(45.5%)   | 11(33.3%)  | 26(39.4%)   |
| 51-60        | 11(33.3%)   | 12(36.4%)  | 23(34.8%)   |
| >60          | 5(15.2%)    | 10(30.3%)  | 15(22.7%)   |
| Total        | 33(100%)    | 33(100%)   | 66(100%)    |
| Mean ± SD    | 53.09±10.88 | 57.03±9.19 | 55.06±10.19 |

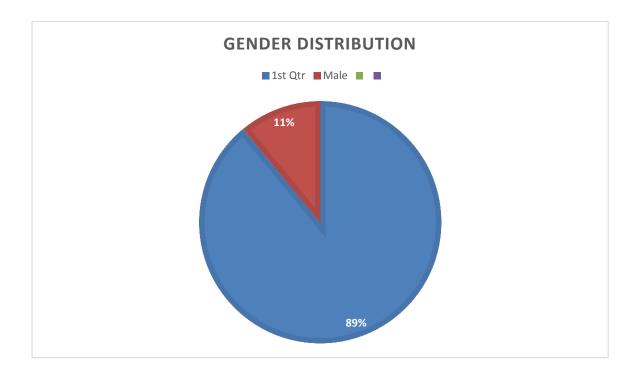


Graph 1: Distribution of subjects according to age group

In our study, among group A patients, majority were between 40-50 year age group, whereas in group B majority were between 51-60 year age group. Thus all the study subjects were age matched.

Table 2: Distribution of subjects according to gender

| Gender | Group A   | Group B   | Total     |
|--------|-----------|-----------|-----------|
| Female | 28(84.8%) | 31(93.9%) | 59(89.4%) |
| Male   | 5(15.2%)  | 2(6.1%)   | 7(10.6%)  |
| Total  | 33(100%)  | 33(100%)  | 66(100%)  |

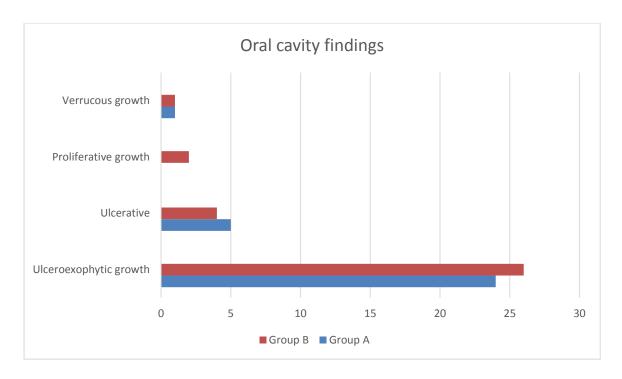


Graph 2: Distribution of subjects according to gender

In our study, in both group A and B, females were predominant comprising of approximately 90% of the study population.

Table 3: Distribution of subjects according to Oral Cavity Findings

| Oral Cavity Findings   | Group A   | Group B   | Total     |
|------------------------|-----------|-----------|-----------|
| Ulceroexophytic growth | 24(72.7%) | 26(78.8%) | 50(75.7%) |
| Ulcerative growth      | 5(15.1%)  | 4(12.1%)  | 9(13.6%)  |
| Proliferative growth   | 3(9.09%)  | 2(6.06%)  | 5(7.6%)   |
| Verrucous growth       | 1(3%)     | 1(3%)     | 2(3%)     |
| Total                  | 33(100%)  | 33(100%)  | 66(100%)  |

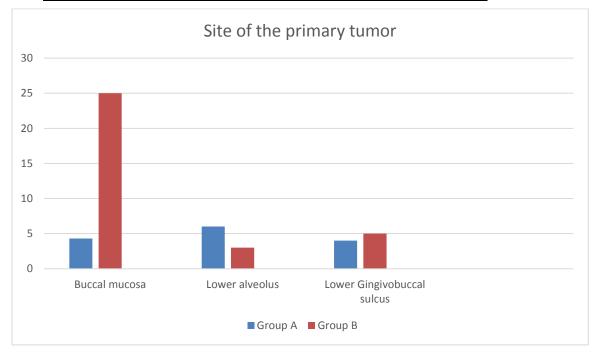


**Graph 3: Distribution of subjects according to Oral Cavity Findings** 

Ulceroexophytic growth (75%) presentation in oral cavity was the most common presentation among both the groups and it was statistically significant in both the groups.

Table 4: Distribution of subjects according to Site of the primary lesion

| Site           | Group A | Group B |
|----------------|---------|---------|
| Buccal mucosa  | 23      | 25      |
| Lower alveolus | 6       | 3       |
| Lower          |         |         |
| Gingivobuccal  | 4       | 5       |
| sulcus         |         |         |



Graph 4: Distribution of subjects according to Site of the primary lesion

28 patients in each group presented with primary lesion at buccal mucosa and 5 patients in each group presented with primary at lower alveolus.

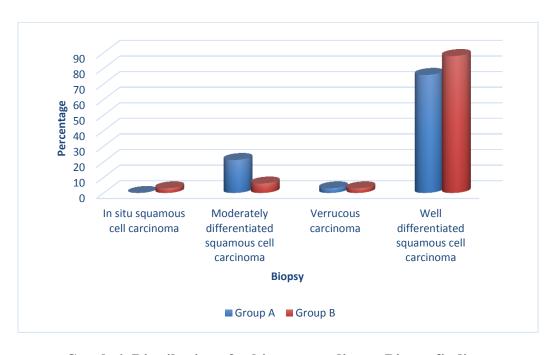
Table 5: Distribution of subjects according to Staging

| Staging | Group A   | Group B   | Total     |
|---------|-----------|-----------|-----------|
| T2N0M0  | 11(33.3%) | 16(48.5%) | 27(40.9%) |
| T2N1M0  | 6(18.2%)  | 2(6.1%)   | 8(12.1%)  |
| T2N1M0  | 1(3%)     | 0(0%)     | 1(1.5%)   |
| T2N2bM0 | 0(0%)     | 2(3%)     | 2(3%)     |
| T3N0M0  | 5(15.2%)  | 5(15.2%)  | 10(15.2%) |
| T3N1M0  | 9(27.3%)  | 7(21.2%)  | 16(24.2%) |
| Т3N2bM0 | 1(3%)     | 1(3%)     | 2(3%)     |
| Total   | 33(100%)  | 33(100%)  | 66(100%)  |

Among the patients staged T2 in Group A, majority were found to have no palpable lymph node( 33.3% and 48.5% in Group A & Group B respectively). Among the patients staged T3, majority were found to have palpable neck nodes ( 24.2% & 18.2% in Group A & Group B respectively)

Table 6: Distribution of subjects according to Biopsy findings

| Biopsy  | Group A   | Group B   | Total     |
|---|-----------|-----------|-----------|
| In situ squamous cell carcinoma                   | 0(0%)     | 1(3%)     | 1(1.5%)   |
| Moderately differentiated squamous cell carcinoma | 7(21.2%)  | 2(6.1%)   | 9(13.6%)  |
| Verrucous carcinoma                               | 1(3%)     | 1(3%)     | 2(3%)     |
| Well differentiated squamous cell carcinoma       | 25(75.8%) | 29(87.9%) | 54(81.8%) |
| Total   | 33(100%)  | 33(100%)  | 66(100%)  |

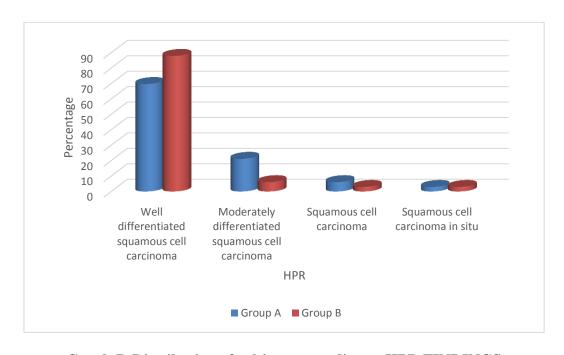


**Graph 6: Distribution of subjects according to Biopsy findings** 

In this study, well differentiated squamous cell carcinoma was the most common biopsy finding in both group A (75.8%) and group B patients(87.9%). Moderately differentiated carcinoma was the second most common finding. One patient in each group were found to be verrucous carcinoma.

Table 7: Distribution of subjects according to HPR FINDINGS

| HPR   | Group A   | Group B   | Total     |
|---|-----------|-----------|-----------|
| Well differentiated squamous cell carcinoma       | 23(69.7%) | 29(87.9%) | 52(78.8%) |
| Moderately differentiated squamous cell carcinoma | 7(21.2%)  | 2(6.1%)   | 9(13.6%)  |
| Squamous cell carcinoma                           | 2(6.1%)   | 1(3%)     | 3(4.5%)   |
| Squamous cell carcinoma in situ                   | 1(3%)     | 1(3%)     | 2(3%)     |
| Total   | 33(100%)  | 33(100%)  | 66(100%)  |

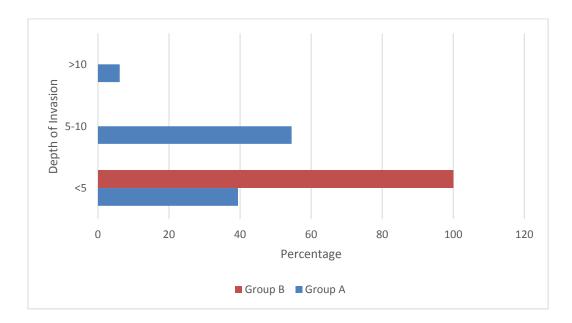


**Graph 7: Distribution of subjects according to HPR FINDINGS** 

Well differentiated squamous cell carcinoma was the most common finding on histopathological results(78.8%), followed by moderately differentiated squamous cell carcinoma(13.6%).

Table 8: Distribution of subjects according to Depth of Invasion (mm)

| Depth of<br>Invasion | Group A   | Group B  | Total     |
|----------------------|-----------|----------|-----------|
| <5                   | 13(39.4%) | 33(100%) | 46(69.7%) |
| 5-10                 | 18(54.5%) | 0(0%)    | 18(27.3%) |
| >10                  | 2(6.1%)   | 0(0%)    | 2(3%)     |
| Total                | 33(100%)  | 33(100%) | 66(100%)  |



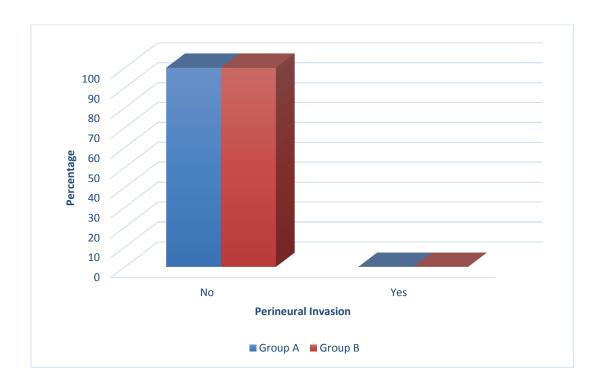
**Graph 8: Distribution of subjects according to Depth of Invasion (mm)** 

Though unintentionally there was a bias that a larger number of deep tumors underwent lower lip split because the third dimention(depth) appeared close to the plane of resection peroperatively.

In depth of invasion analysis, <5 mm invasion -39.4%, 5-10mm invasion -54.5% was seen in group A patients, where as 100% of group B patients had <5mm depth of invasion and it was significant.(P <0.001)

Table 9: Distribution of subjects according to Perineural Invasion

| Perineural<br>Invasion | Group A  | Group B  | Total    |
|------------------------|----------|----------|----------|
| No                     | 33(100%) | 33(100%) | 66(100%) |
| Yes                    | 0(0%)    | 0(0%)    | 0(0%)    |
| Total                  | 33(100%) | 33(100%) | 66(100%) |

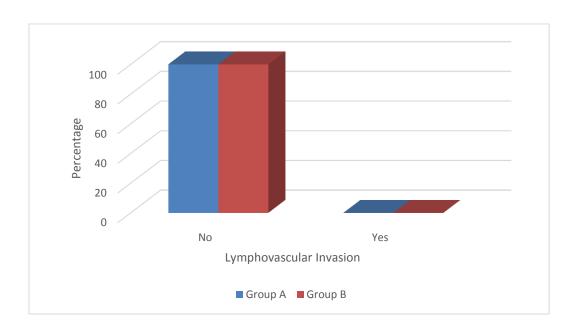


**Graph 9: Distribution of subjects according to Perineural Invasion** 

In both the groups studied, there was no perineural invasion in any case.

Table 10: Distribution of subjects according to Lymphovascular Invasion

| Lymphovascular Invasion | Group A  | Group B  | Total    |
|-------------------------|----------|----------|----------|
| No                      | 33(100%) | 33(100%) | 66(100%) |
| Yes                     | 0(0%)    | 0(0%)    | 0(0%)    |
| Total                   | 33(100%) | 33(100%) | 66(100%) |

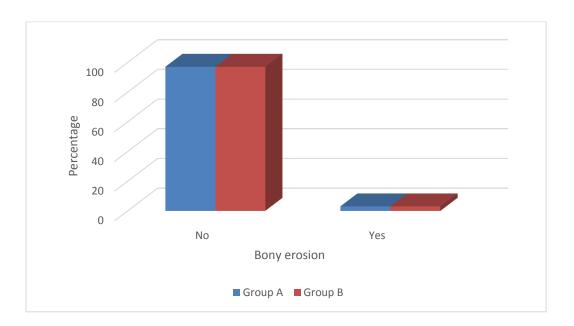


Graph 10: Distribution of subjects according to Lymphovascular Invasion

In our study in both the groups, there was no lymphovascular invasion in any case.

Table 11: Distribution of subjects according to Bony erosion

| Bony erosion | Group A  | Group B  | Total    |
|--------------|----------|----------|----------|
| No           | 32(97%)  | 32(97%)  | 64(97%)  |
| Yes          | 1(3%)    | 1(3%)    | 2(3%)    |
| Total        | 33(100%) | 33(100%) | 66(100%) |



Graph 11: Distribution of subjects according to Bony erosion

In our study, there was only one case in each group with bony erosion. Hence there was no difference between the two groups.

Table 12: Distribution of subjects according to Surgical procedure

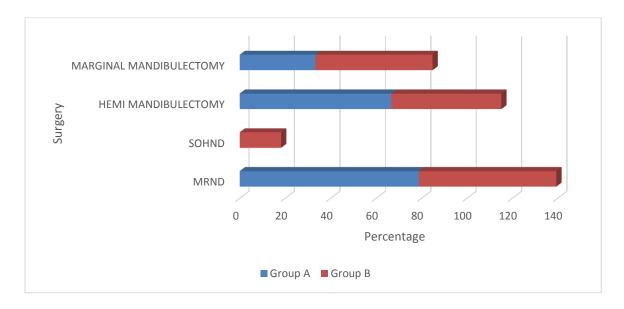
| Surgery                                  | Group A   | Group B  | Total     |
|--|-----------|----------|-----------|
| Composite resection(left hemi            |           |          |           |
| mandibulectomy)+ MRND+PMMC flap          | 10(30.3%) | 9(27.3%) | 19(28.8%) |
| reconstruction                           |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+ Right SOHND+ PMMC       | 0(0%)     | 3(9.1%)  | 3(4.5%)   |
| flap reconstruction                      |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+ SOHND+ submental        | 0(0%)     | 1(3%)    | 1(1.5%)   |
| flap reconstruction                      |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+left MRND+PMMC flap      | 2(6.1%)   | 0(0%)    | 2(3%)     |
| reconstruction                           |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+left                     | 1(3%)     | 0(0%)    | 1(1.5%)   |
| MRND+supraclavicular flap reconstruction |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+left SOHND+ submental    | 0(0%)     | 1(3%)    | 1(1.5%)   |
| flap reconstruction                      |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+MRND +PMMC flap          | 0(0%)     | 1(3%)    | 1(1.5%)   |
| reconstruction                           |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+MRND+PMMC flap           | 1(3%)     | 0(0%)    | 1(1.5%)   |
| reconstruction                           |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+MRND+supraclavicular     | 0(0%)     | 1(3%)    | 1(1.5%)   |
| flap reconstruction                      |           |          |           |
| composite resection(marginal             |           |          |           |
| mandibulectomy)+Right MRND+ PMMC         | 0(0%)     | 1(3%)    | 1(1.5%)   |
| flap reconstruction                      |           |          |           |
| Composite resection(marginal             | 0(0%)     | 1(3%)    | 1(1.5%)   |

| mandibulectomy)+Right MRND+Radial     |           |          |           |
|---------------------------------------|-----------|----------|-----------|
| forearm free flap reconstru           |           |          |           |
| composite resection(marginal          |           |          |           |
| mandibulectomy)+Right                 | 0(0%)     | 1(3%)    | 1(1.5%)   |
| SOHND+submental flap reconstruction   |           |          |           |
| composite resection(marginal          |           |          |           |
| mandibulectomy)+SND(I,II,III)+PMMC    | 1(3%)     | 0(0%)    | 1(1.5%)   |
| flap reconstruction                   |           |          |           |
| composite resection(marginal          |           |          |           |
| mandibulectomy)+SOHND+PMMC flap       | 3(9.1%)   | 0(0%)    | 3(4.5%)   |
| reconstruction                        |           |          |           |
| composite resection(marginal          |           |          |           |
| mandibulectomy)+SOHND+supraclavicular | 3(9.1%)   | 7(21.2%) | 10(15.2%) |
| flap reconstruction                   |           |          |           |
| Composite resection(right hemi        |           |          |           |
| mandibulectomy)+ MRND+PMMC flap       | 11(33.3%) | 7(21.2%) | 18(27.3%) |
| reconstruction                        |           |          |           |
| Composite resection(right hemi        |           |          |           |
| mandibulectomy)+ MRND+supraclavicular | 1(3%)     | 0(0%)    | 1(1.5%)   |
| flap reconstruction                   |           |          |           |
| Total                                 | 33(100%)  | 33(100%) | 66(100%)  |

Table showing the surgical procedures underwent by the patients.

Table 13: Distribution of subjects according to neck dissection and type of mandible excision.

| Surgery                    | Group A   | Group B   | Total     |
|----------------------------|-----------|-----------|-----------|
| MRND                       | 26(78.8%) | 20(60.6%) | 46(69.7%) |
| SOHND                      | 0(0%)     | 6(18.2%)  | 6(9.1%)   |
| HEMI MANDIBULECTOMY        | 22(66.7%) | 16(48.5%) | 38(57.6%) |
| MARGINAL<br>MANDIBULECTOMY | 11(33.3%) | 17(51.5%) | 28(42.4%) |
| Total                      | 33(100%)  | 33(100%)  | 66(100%)  |



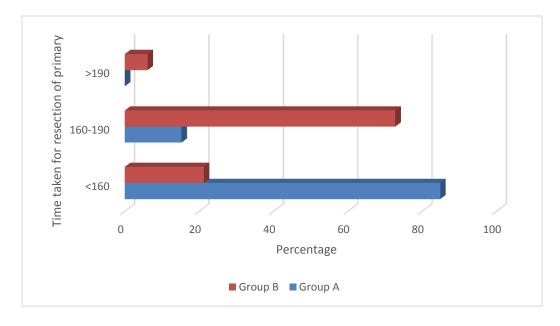
Graph 13: Distribution of subjects according to neck dissection and type of mandible excision.

In our study, in group A majority of the patients underwent Composite resection(right hemi mandibulectomy)+ MRND+PMMC flap reconstruction (33.3%) where as in group B majority underwent Composite resection(left hemi mandibulectomy)+ MRND+PMMC flap reconstruction (27.3%)

Majority of patients who underwent hemimandibulectomy underwent MRND and a significant number patients who underwent marginal mandibulectomy underwent SOHND

Table 14: Distribution of subjects according to Time taken for resection of primary and suturing of intraoral flap

| Time taken for resection of primary | Group A   | Group B   | Total     |
|-------------------------------------|-----------|-----------|-----------|
| <160                                | 28(84.8%) | 7(21.2%)  | 35(53%)   |
| 160-190                             | 5(15.2%)  | 24(72.7%) | 29(43.9%) |
| >190                                | 0(0%)     | 2(6.1%)   | 2(3%)     |
| Total                               | 33(100%)  | 33(100%)  | 66(100%)  |



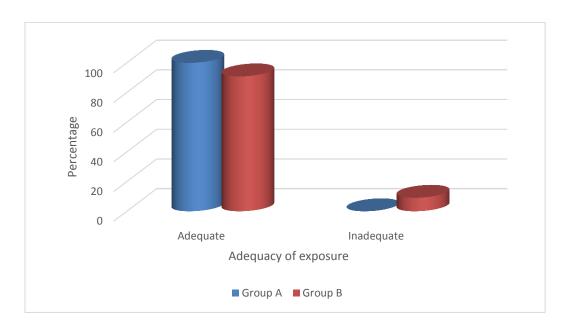
Graph 14: Distribution of subjects according to Time taken for resection of primary and suturing of intraoral flap

In our study, in group A patients the average time taken for surgery was less than  $160\min(84.4\%)$  where as in group B patients it was  $160-190\min(72.7\%)$  and this was statistically significant. P<0.001. Visor approach has taken almost 20% more time compared to lower lip split approach. Mean duration in Group A was 135 min whereas

in Group B it was 173 min. This indicates that Visor approach is more time consumable than lip split approach due to narrow exposure of surgical field.

Table 15: Distribution of subjects according to Adequacy of exposure

| Adequacy of exposure | Group A  | Group B   | Total     |
|----------------------|----------|-----------|-----------|
| Adequate             | 33(100%) | 30(90.9%) | 63(95.5%) |
| Inadequate           | 0(0%)    | 3(9.1%)   | 3(4.5%)   |
| Total                | 33(100%) | 33(100%)  | 66(100%)  |

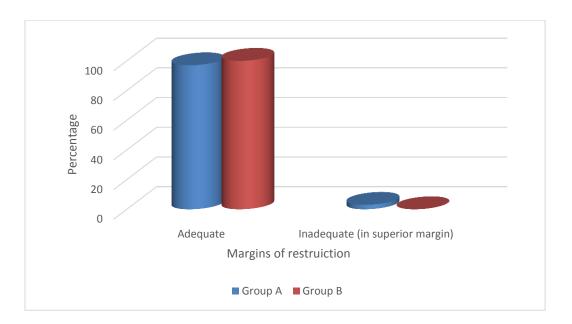


Graph 15: Distribution of subjects according to Adequacy of exposure

In our study, among group A patients, all the 100% patient had adequacy of exposure , where as in group B 90.9% had adequacy of exposure.

Table 16: Distribution of subjects according to surgical resection of margins

| Margins of resection            | Group A  | Group B  | Total     |
|---------------------------------|----------|----------|-----------|
| Adequate                        | 32(97%)  | 33(100%) | 65(98.5%) |
| Inadequate (in superior margin) | 1(3%)    | 0(0%)    | 1(1.5%)   |
| Total                           | 33(100%) | 33(100%) | 66(100%)  |

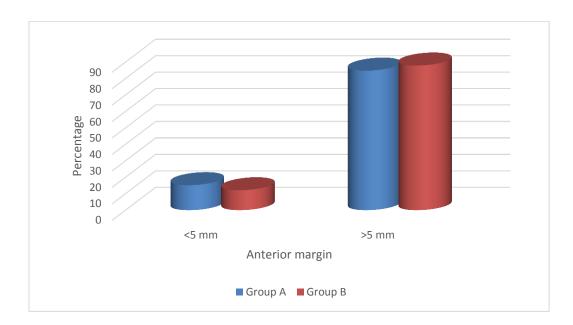


Graph 16: Distribution of subjects according to surgical resection of margins

In this study, on analyzing resection margins, there was one case with positive superior margin among group A patients, whereas in group B all patients had adequate margin of resection.

Table 17: Distribution of subjects according to Anterior margin (mm) of resection

| Anterior<br>margin | Group A   | Group B   | Total     |
|--------------------|-----------|-----------|-----------|
| <5 mm              | 5(15.2%)  | 4(12.1%)  | 9(13.6%)  |
| >5 mm              | 28(84.8%) | 29(87.9%) | 57(86.4%) |
| Total              | 33(100%)  | 33(100%)  | 66(100%)  |



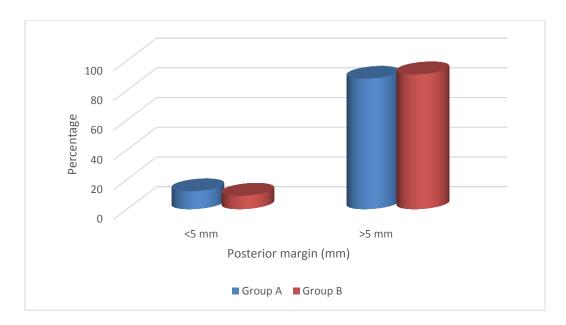
Graph 17: Distribution of subjects according to Anterior margin (mm) of resection

In our study, in both the groups, >5mm anterior margin was present in more than 80% of study population. Close margins were seen in almost similar percentage in both the groups.

Although the anterior margin is the most accessible, inorder to ensure vascularity of lower lip in Group A peroperatively, the closest margin happened to be anterior margin(15.2%)

Table 18: Distribution of subjects according to Posterior margin (mm) of resection

| Posterior margin (mm) | Group A   | Group B   | Total     |
|-----------------------|-----------|-----------|-----------|
| <5 mm                 | 4(12.1%)  | 3(9.1%)   | 7(10.6%)  |
| >5 mm                 | 29(87.9%) | 30(90.9%) | 59(89.4%) |
| Total                 | 33(100%)  | 33(100%)  | 66(100%)  |

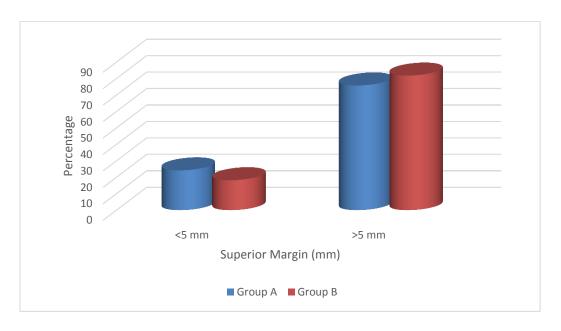


Graph 18: Distribution of subjects according to Posterior margin (mm) of resection

On analyzing the posterior margins in both the groups, >5mm margin was present in more than 85% of study population. Close margins were seen in almost similar percentage in both the groups.

Table 19: Distribution of subjects according to Superior Margin (mm)

| Superior Margin (mm) | Group A   | Group B   | Total     |
|----------------------|-----------|-----------|-----------|
| <5 mm                | 8(24.2%)  | 6(18.2%)  | 14(21.2%) |
| >5 mm                | 25(75.8%) | 27(81.8%) | 52(78.8%) |
| Total                | 33(100%)  | 33(100%)  | 66(100%)  |

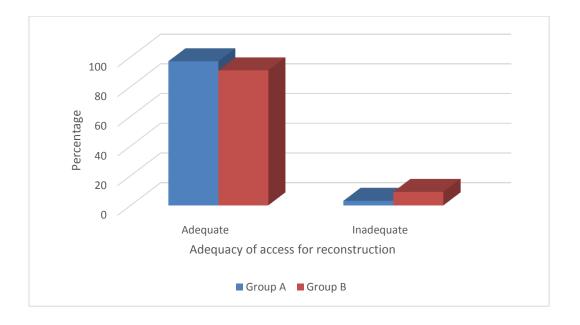


**Graph 19: Distribution of subjects according to Superior Margin (mm)** 

On analyzing the posterior margins in both the groups, >5mm margin was present in more than 75% of study population. Close margins were seen in almost similar percentage in both the groups.

Table 20: Distribution of subjects according to Adequacy of access for reconstruction

| Adequacy of access for reconstruction | Group A  | Group B   | Total     |
|---------------------------------------|----------|-----------|-----------|
| Adequate                              | 32(97%)  | 30(90.9%) | 62(93.9%) |
| Inadequate                            | 1(3%)    | 3(9.1%)   | 4(6.1%)   |
| Total                                 | 33(100%) | 33(100%)  | 66(100%)  |

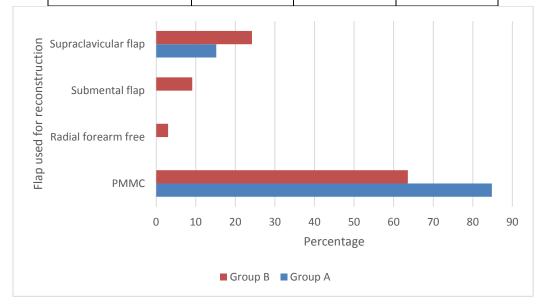


Graph 20: Distribution of subjects according to Adequacy of access for reconstruction

There was an inadequate access for reconstruction in Group B in 9% of stusy subjects compared to Group A (3%). This could be attributed to bulky PMMC flaps and reduced space for suturing intraoral flap used in Visor approach.

Table 21: Distribution of subjects according to Flap used for reconstruction

| Flap used for reconstruction | Group A   | Group B   | Total      |
|------------------------------|-----------|-----------|------------|
| PMMC                         | 28(84.8%) | 21(63.6%) | 49(74.2%)  |
| Radial forearm free          | 0(0%)     | 1(3%)     | 1(1.5%)    |
| Submental flap               | 0(0%)     | 3(9.1%)   | 3(4.5%)    |
| Supraclavicular              | 5(15.2%)  | 8(24.2%)  | 13(19.7%)  |
| flap                         | 3(13.270) | 0(24.270) | 13(17.170) |
| Total                        | 33(100%)  | 33(100%)  | 66(100%)   |

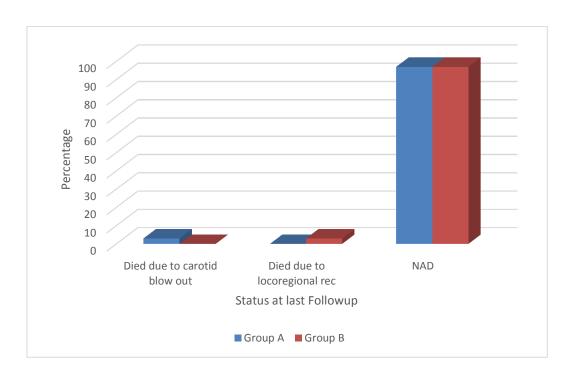


Graph 21: Distribution of subjects according to Flap used for reconstruction

PMMC flap was the most commonly used flap in both the groups, again proving that it is the work horse for reconstruction in head & neck cancers. Supraclavicular flap was the second most commonly used flap for reconstruction. Also, it is noted that fasciocutaneous flaps like supraclavicular flap, Submental flaps were more used in Group B than Group A. This was to ensure better access and provide adequate space for suturing in Group B.

Table 22: Distribution of subjects according to Status at last Follow-up

| Status at last Followup       | Group A  | Group B  | Total    |
|-------------------------------|----------|----------|----------|
| Died due to carotid  blow out | 1(3%)    | 0(0%)    | 1(1.5%)  |
| Died due to locoregional rec  | 0(0%)    | 1(3%)    | 1(1.5%)  |
| NAD                           | 32(97%)  | 32(97%)  | 64(97%)  |
| Total                         | 33(100%) | 33(100%) | 66(100%) |

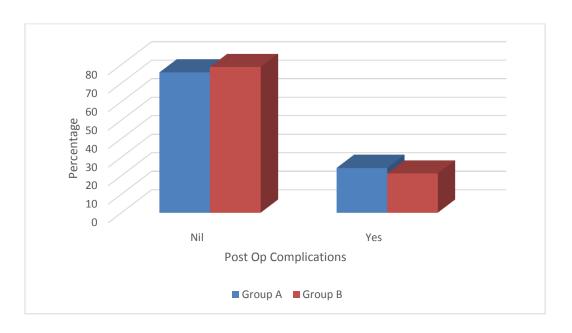


Graph 22: Distribution of subjects according to Status at last Follow-up

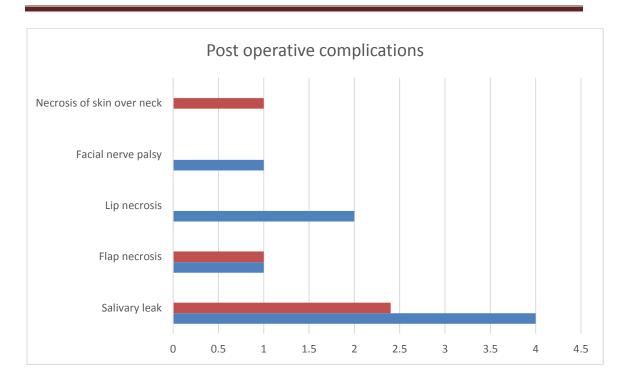
One patient in both the groups developed recurrence. A patient in Group A died due to carotid blow out. However one patient in Group B died due to locoregional recurrence.

Table 23: Distribution of subjects according to Post Operative Complications

| Post Op          | Group A   | Group B   | Total     |
|------------------|-----------|-----------|-----------|
| Complications    | (n=33)    | (n=33)    | (n=66)    |
| Nil              | 25(75.8%) | 26(78.8%) | 51(77.3%) |
| Yes              | 8(24.2%)  | 7(21.2%)  | 15(22.7%) |
| Salivary leak    | 4(12.1%)  | 6(15.2%)  | 9(13.6%)  |
| Flap necrosis    | 1(3%)     | 1(3%)     | 2(3%)     |
| Lip necrosis     | 2(6.1%)   | 0(0%)     | 2(3%)     |
| Facial nerve     | 1(3%)     | 0(0%)     | 1(1.5%)   |
| palsy            |           |           |           |
| Necrosis of skin | 0(0%)     | 1(3%)     | 1(1.5%)   |



**Graph 23a: Distribution of subjects according to Post Operative Complications** 

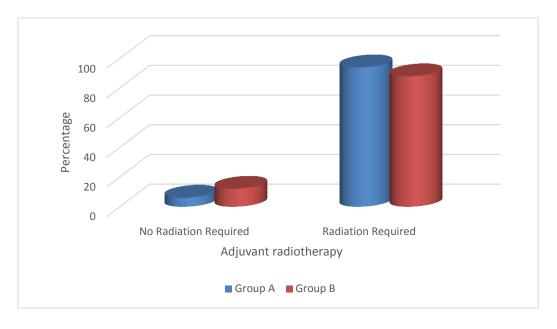


Graph 23b: Distribution of subjects according to Post Operative Complications

Salivary leak was the most common post operative complication. Salivary leak was seen in 4 patients in group A and 6 patients in Group B respectively. Two patients in GroupA developed lip necrosis. One patient in each group developed flap necrosis for which flap debridement and secondary reconstruction was done at a later stage. One patient who underwent radial forearm free flap reconstruction developed skin necrosis over the neck.

Table 24: Distribution of subjects according to Adjuvant therapy

| Adjuvant<br>radiotherapy | Group A (n=33) | Group B (n=33) | Total (n=66) |
|--------------------------|----------------|----------------|--------------|
| No Radiation Required    | 2(6.1%)        | 4(12.1%)       | 6(9.1%)      |
| Radiation Required       | 31(93.9%)      | 29(87.9%)      | 60(90.9%)    |
| • 30#                    | 6(18.2%)       | 2(6.1%)        | 8(12.1%)     |
| • 33#                    | 25(75.8%)      | 25(75.8%)      | 50(75.8%)    |
| • 33# radiation + chemo  | 0(0%)          | 2(6.1%)        | 2(3%)        |



Graph 24a: Distribution of subjects according to Adjuvant therapy

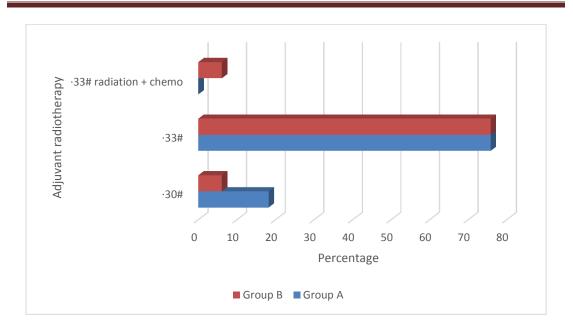
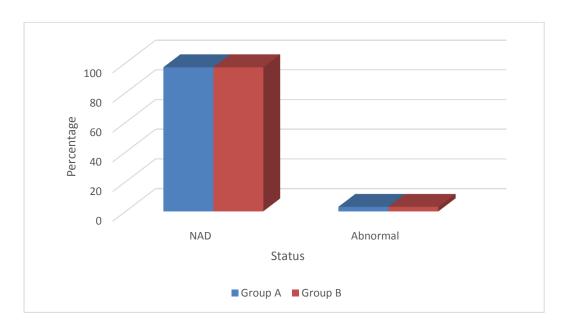


Table 24b: Distribution of subjects according to Adjuvant therapy

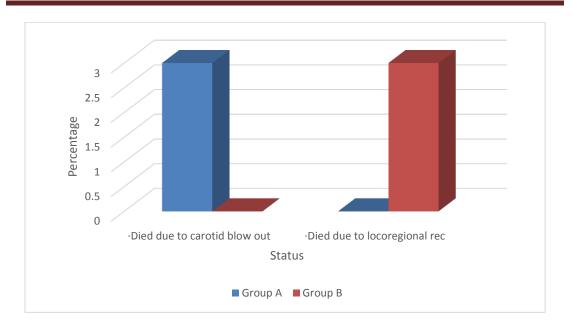
2 patients in Group A and 4 patients in Group B did not receive any Radiotherapy as decided by the Radiation Oncologist. 30# of Radiotherapy was provided to 6 patients in Group A and 2 patients in Group B. 25(75.8%) patients in Group A and 25 (75.8%) in Group B received 33# of Radiation.

Table 25: Distribution of subjects according to Status at last follow up

| Status       | Group A | Group B | Total   |
|--------------|---------|---------|---------|
|              | (n=33)  | (n=33)  | (n=66)  |
| NAD          | 32(97%) | 32(97%) | 64(97%) |
| Abnormal     | 1(3%)   | 1(3%)   | 2(3%)   |
| Died due to  |         |         |         |
| carotid blow | 1(3%)   | 0(0%)   | 1(1.5%) |
| out          |         |         |         |
| Died due to  |         |         |         |
| locoregional | 0(0%)   | 1(3%)   | 1(1.5%) |
| recurrence   |         |         |         |



Graph 25a: Distribution of subjects according to Status at last follow up



Graph 25b: Distribution of subjects according to Status at last follow up

One patient in each group developed recurrence within 6 months of completion of treatment. The patient who recurred in Group A died due to carotid blow out. The patient who recurred in Group B died due to locoregional recurrence

## **DISCUSSION**

This comparative observational study was undertaken in a tertiary care rural hospital in an economically backward area having a high prevalence of oral cancers. In this study, the standard lower lip split approach(Group A) for resection of oral cavity cancers was compared with visor flap approach(Group B) where the lower lip split was avoided for similar oral cancers. The variables taken between the two groups included adequacy of exposure, resection margins, time taken for excision of primary and placement of flap, adequacy for access of reconstruction and post operative complications like orocutaneous fistula, flap necrosis, oral incompetence etc.

In the previous decade, many institutions attempted to avoid lower lip split while accessing tumors in oral cavity for composite resection. The main advantage of this approach was to avoid the unaesthetic scar on the lower lip and the mental region. This attempt was made in USA, Europe and Korea <sup>62,63,64</sup>. Over the last five years interest in non lip split approach for oral cavity cancers was reignited in USA and Europe(Italy).

In our study, majority of the patients were elderly women in the age group of 46-60 years. This can be explained by the fact that the women in this rural area are addicted to chewable carcinogens like tobacco quid(sometimes kept overnight in the cheek), areca nut, betel leaves etc while the men are more addicted to smoking tobacco.

Our study included T2(58%) and T3 (42%) staged squamous cell carcinoma of the oral cavity. The T4 tumors were excluded to avoid the risk of positive bone margin in visor flap approach which was relatively new to this institution. The site of the

primary tumor was buccal mucosa, Lower Gingivobuccal sulcus and lower alveolus.( 72.7%, 13.6%, 13.6 %) This is in contrast to few western studies particularly the one done in USA(Pennsylvania and Seattle & US Navy), where T4 tumors were included and majority of patients had oral cancer involving the lower alveolus(close to the midline, floor of mouth and tongue) <sup>65</sup>.

56% of our patients had no palpable lymph nodes and 44% of patients presented with palpable neck nodes. The nodal status did not affect the approach or resection of the primary tumor in both groups.

All patients in both Group A and B in our study underwent neck dissection (MRND-78.8% in Group A, 60.6% in Group B And SOHND-0% in Group A % and 18.2% in Group B) SOHND was done only in clinically N0 necks.

Literature also shows that the nodal status has no implication on the approach to oral cavity cancers as long as extra nodal spread is not there. Our study had equal number of patients in both the Group A and Group B. However the studies in USA and Italy did not have equal number of patients in both their groups of approach <sup>65</sup>.

In our study, there was a marginal unintentional bias towards the larger volume tumors being taken up for lower lip split approach. However this difference was not statistically significant.

In our study, many of the visor flaps were modified such that the neck incision did not extend from one mastoid tip to another and ended below the contralateral mental foramen. This was similar to the approach adapted by the Pennsylvania group. The reason for this modification is that all the patients included in our study had lateralised tumors involving buccal mucosa, Lower GBS or lower alveolus unlike the patients in studies done in other institutions in USA and Korea <sup>64</sup>. An extension of the incision from one mastoid tip till the contralateral mastoid tip would have been unnecessary when adequate exposure was available through our modification.

A classical visor flap in our study was used whenever the tumor was close to midline (around lower alveolus) or when it involves the lower lip. All cases in both groups in our study were operated by the same senior surgeon to avoid surgeon bias. In our study, the mean time taken for neck dissection and resection of the primary tumor was 173 min when Visor flap was used and 135 min when lower lip approach was used. This shows that the visor flap approach required a longer operating time when compared to lower lip split. This was in contrast to an Italian study and Pennsylvanian study where the resection time was less in visor flap approach compared to lower lip split approach <sup>66</sup>.

Our limited experience in adopting the visor flap for composite resection of oral cavity squamous carcinoma could have been the reason for the relatively longer time(20% longer time). The access to the primary tumor was adequate in both the approaches in our study and the confidence in maintaining a wide margin from the tumor anteriorly was more in visor flap approach as there was no risk to the vascularity of lower lip in our study. Similar observations were made by authors of other studies adopting visor flap approach.

There was no difference in the volume of blood loss between both Group A and Group B patients in our study. Similar observations were made by all other studies comparing these two approaches for resection of oral cancers. Unlike a few American studies which included oropharyngeal and parapharyngeal cancers, our study had only oral cavity cancers.

In our study, only one patient had a positive margin (superior aspect) in Group A while none of the patients in Group B had positive margins. This can be explained by the fact that few of the larger tumors staged T3 were taken up in Lower lip split approach. In rest of the patients there was no statistically significant difference in resection margins in the lip split approach and Visor flap approach. However the close margins were marginally more frequent in Group A -particularly anterior margin. Similar observations were made by the US Navy study, Korean study as well as Italian study <sup>66</sup>. The reason for this may be the apprehension on part of the surgeon regarding the lower lip vascularity while resecting the oral cavity tumors coming close to oral commissure by lower lip split approach.

In our study, 19.7 % of patients had reconstruction of the defect by supraclavicular flap-an axial fasciocutaneous flap based on supraclavicular branch of transverse cervical artery and 74.2% had reconstruction by Pectoralis major myocutaneous flap – a bulky axial flap based on pectoral branch of acromiothoracic artery. Only one patient had reconstruction by radial forearm free flap. 4.5 % had reconstruction by submental flaps.

The larger defects in our study were reconstructed by Pectoralis major myocutaneous

flap and the relatively smaller defects were reconstructed by supraclavicular, submental and free flap. We experienced inadequacy of exposure, difficulty in suturing and longer operating time while using the bulky Pectoralis major myocutaneous flap for reconstruction in patients with visor flap approach. However, the reconstruction had relatively good access and surgical time for suturing the flap was similar in both GROUP A and group B when fasciocutaneous flaps were used.

All the American studies and Italian studies have documented no difference in access as well as time taken for reconstruction in both the groups <sup>66</sup>. The relatively longer time and difficulty in access in our series when Pectoralis major myocutaneous flap reconstructuion was done by visor flap approach could have been due to the bulkiness and weight of the flap. Most of the western studies (Pennsylvania, US Navy, Italy and UK) had oral cancer closer to midline and involving lower alveolus and floor of mouth. Our tumors were mainly lateralised making the access for reconstruction difficult.

We did not use mandibular lingual release approach which was adopted in a study done in UK.

Studies done in USA, Korea and Italy have reported orocutaneous fistulas to be more commonly associated with lower lip split approach compared to visor flap approach. This has been implicated to the trifurcate suture near the cut edge of mandible. They also report a higher frequency of lower lip necrosis in midline lower lip split approach. However there was no difference in complications like flap necrosis, competence of oral commissure and asymmetry in angle of mouth between lip split

and visor flap approach in literature. However in our study the complications were more frequent in the visor flap approach when Pectoralis major myocutaneous flap was used for reconstruction. This included orocutaneous fistula (15.2%) when compared to 12.1% by lower lip split approach. Necrosis of the lower rim of visor flap(margin only) in visor flap approach. This could have been due to the bulkiness and weight of the Pectoralis major myocutaneous flap dragging down and a small defect in the upper part of the resected area. However all the orocutaneous fistulas healed spontaneously. In our study 2 patients in the lower split group had necrosis of lower lip requiring secondary reconstruction of lip. This could have been due to devascularization the lower lip close to the oral commissure. Similar observations were made by studies in other countries. There was no difference in frequency of flap necrosis between the two groups in our study. Literature reports similar results.

A few studies including one from turkey have advocated visor flap approach for bilateral temporoparietal flap or microvascular free tissue transfer for reconstruction of oral cavity defects.

In our study, the aesthetic appearance was better when visor flap approach was used compared to midline lower lip split. This was due to absence of visible scar over the lip and mental region. There was no difference between the two approaches with regard to injury to marginal mandibular nerve. Similar observations have been made by all other studies comparing the lip split and visor flap approach for resection and reconstruction of oral cancers.

In our study, there was subjective difficulty in suturing the Pectoralis major myocutaneous flap when visor flap was used. The other studies in literature have not

used the bulky Pectoralis major myocutaneous flap and relied more on macro vascular free tissue transfer. Therefore they have reported good exposure and no difficulty in suturing the reconstructive flap in their studies. The fact that the western studies had lower alveolar margins close to midline also contributes to the adequacy of exposure and ease of reconstruction when visor flap was used.

A few studies including one from turkey have advocated visor flap approach for bilateral temporoparietal flap or microvascular free tissue transfer for reconstruction of oral cavity defects <sup>67</sup>.

In our study there was no difference with regard to mastication, speech and tongue movement between the two groups. This was unlike the UK study which reported mandibular lingual release affecting speech, mastication and swallowing.

There was no statistically significant difference in the time taken for healing as well as duration of hospital stay between both the groups.

Similar observations were made by all the other studies comparing lower lip split and visor flap approach for resection of oral cavity cancers and their reconstruction.

## **SUMMARY**

In India head and neck cancers account for 30-35% of all malignancies, and about 50% of these are oral cancers. Buccal mucosa and lower gingivobuccal sulcus are usually affected in our patients due to the habit of tobacco quid chewing.

Early cancers of the oral cavity can be resected by both Lip split and without splitting the lower lip by raising the soft tissues of the face off the mandible like a visor thereby accessing the oral cavity -Visor approach. Anteriorly placed oral cancers can also be addressed by visor approach, thereby avoiding the lip-split and providing a better cosmetic result. Also, in tumors present close to the angle of mouth, it is advisable to avoid splitting the lip as it may result in avascular necrosis post operatively. Lip-split approach for oral cancers can compromise vascularity of lower lip and can predispose to lip necrosis when lip split approach is used during composite resection. So, surgical approaches that preserve function, minimize complications, maximize cosmetic outcome should be utilized appropriately in patients depending on size and site of the tumor.

The Visor flap approach has been tried for accessing oral cavity tumors without splitting the lower lip to reduce morbidity and preserve aesthetics. In this technique, the soft tissues of the face are elevated along with the neck flap without splitting the lower lip (like the visor of a helmet). Visor flap can also be used when a microvascular free tissue transfer is done for the reconstruction of the surgical defect. In our study we intend to compare resection of lateral tumors of oral cavity by conventional lower lip split approach and visor approach avoiding the lip split with regard to the

following variables: time taken for surgery, adequacy of exposure of primary tumour and resection margins, adequacy of access for reconstruction, and post-operative complications if any.

In our study, many of the visor flaps were modified such that the neck incision did not extend from one mastoid tip to another and ended below the contralateral mental foramen. The reason for this modification is that all the patients included in our study had lateralised tumors involving buccal mucosa, Lower GBS or lower alveolus.

Our study included T2(58%)and T3 (42%) staged squamous cancers of the oral cavity. The T4 tumors were excluded to avoid the risk of positive bone margin in visor flap approach which was relatively new to this institution. In our study, majority of the patients were elderly women in the age group of 46-60 years. This can be explained by the fact that the women in this rural area are addicted to chewable carcinogens like tobacco quid(sometimes kept overnight in the cheek), areca nut, betel leaves etc while the men are more addicted to smoking tobacco.

56% of our patients had no palpable lymph nodes and 44% of patients presented with palpable neck nodes. The nodal status did not affect the approach or resection of the primary tumor in both groups. 75.8% patients in Group A and 87.9% patients in Group B showed well differentiated tumour on histopathology.

In our study, there was no significant, difference in both the two groups with respect to adequacy of exposure. However, in group B, we noticed an inadequate exposure in 3 cases (9%). In our study, we have used Pectoralis major myocutaneous flap,

supraclavicular flap, submental flap, radial forearm free flap for reconstruction of the defect following excision of the primary tumour. However Bulky PMMC flaps owed to difficult access for reconstruction as seen in one patient in Group A and 3 patients in Group B. Compared to Group A, we have used more of supraclavicular flap in Group B to aid in better reconstruction as the exposure is limited in visor approach.

The mean time taken for excision of primary tumor and reconstruction in Group B was more than in Group A (Group A-135min and Group B-173 min). Close margins were marginally more frequent in Group A -particularly anterior margin. However other margins in both groups were comparable. The access to the primary tumor was adequate in both the approaches in our study and the confidence in maintaining a wide margin from the tumor anteriorly was more in visor flap approach as there was no risk to the vascularity of lower lip in our study. Salivary leak was the most common complication in both the groups.

In our study there was no difference with regard to mastication, speech and tongue movement between the two groups. This was unlike the UK study which reported mandibular lingual release affecting speech, mastication and swallowing

There was no statistically significant difference in the time taken for healing as well as duration of hospital stay between both the groups.

Similar observations were made by all the other studies comparing lower lip split and visor flap approach for resection of oral cavity cancers and their reconstruction.

#### **CONCLUSION**

- 1) Oral cancer has a high prevalence in developing countries and requires aggressive multimodality treatment resulting in functional and aesthetic deficits.
- 2) With the improving diagnostic facilities and therapeutic options, head and neck surgeons are faced with the challenge of minimizing morbidity and ensuring better quality of life while simultaneously improving the loco regional control.
- The midline lower lip split to access the oral cavity malignancies for surgical resection remains the gold standard but also has limitations with regard to aesthetic appearance and vascularity of lip, particularly in lesions situated close to oral commissure.
- 4) A visor flap approach (non lip-split) for resection of oral cancers and few of its modifications provide a better aesthetic appearance and competence of oral commissure. And also ensures better vascularity for lower lip.
- 5) The frequency of surgical complications encountered both by lip split approach and visor flap approach is almost similar. However the operating time may be longer and access for suturing a bulky flap for reconstruction may be limited.
- 6) Having been used less frequently few surgeons may find the visor flap approach more time consuming and difficult. However this is a subjective perception and can be minimized as more is gained in this approached.
- 7) The adequacy of resected margins and outcome of surgery with regards to healing remains similar between the two approaches-lower lip split and visor flap approach.
- 8) Visor flap approach for resection of oral malignancies is a reliable and effective option especially if the tumor is situated to close to oral commissure.

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# ANNEXURES STUDY PROFORMA

# PERSONAL DETAILS

| Name:      |      |                |  |
|------------|------|----------------|--|
|            | Age: |                |  |
| M F        | Sex: |                |  |
| Address:   |      |                |  |
| Date:      |      |                |  |
| Occupation | :    |                |  |
|            |      | Telephone no.: |  |
| Hospital   |      | no:            |  |
| E-mail ID: |      |                |  |

## PRESENTING COMPLAINT

| CHIEF COMPLAINTS                      | YES/NO | SINCE |
|---------------------------------------|--------|-------|
| Presence of ulcer/mass in oral cavity |        |       |
| Presence of mass/ swelling in neck    |        |       |
| Restricted mouth opening              |        |       |
| Excessive salivation                  |        |       |
| Difficulty in swallowing              |        |       |
| Change in voice                       |        |       |
| Loss of appetite                      |        |       |
| Weight loss                           |        |       |

| Generalized weakness |  |
|----------------------|--|
| Difficulty in speech |  |
| Loosening of teeth   |  |
| Earache              |  |

### **HISTORY OF PRESENTING ILLNESS**

| Onset:       |  |  |
|--------------|--|--|
| Duration:    |  |  |
| Progression: |  |  |

Relieving factors:

Aggravating factors:

H/O trauma:Y/N

H/O difficulty in swallowing: Y/N

H/O difficulty in breathing: Y/N

H/O change in voice: Y/ N

H/O weight loss: Y/N

# **PAST HISTORY**

| COMORBIDITIES          | YES/NO | SINCE |
|------------------------|--------|-------|
|                        |        |       |
| Hypertension           |        |       |
| Diabetes Mellitus      |        |       |
| Pulmonary Tuberculosis |        |       |
| GERD                   |        |       |
| Bronchial Asthma       |        |       |

| H/O previous surg | gery: Y/N                |                    |        |  |
|-------------------|--------------------------|--------------------|--------|--|
| Treatment History | / (if any): Surgery/ Rac | liotherapy/ Chemot | herapy |  |
| FAMILY HISTO      | <u>DRY</u>               |                    |        |  |
| Contributory      | Not contributory         |                    |        |  |
| PERSONAL HIS      | STORY _                  |                    |        |  |
| Loss of appet     | ite: Y/N                 |                    |        |  |
| Disturbed slee    | ep: Y/N                  |                    |        |  |
| Bowel and bla     | adder disturbances: Y/I  | N                  |        |  |
| Habits –          |                          |                    |        |  |
| • Tob             | acco chewing:            |                    |        |  |
|                   | Type –Tobacco quid       |                    |        |  |
|                   | Areca nut                |                    |        |  |
|                   | Beetle leave             | s                  |        |  |
|                   | Pan Masala               |                    |        |  |
| Gut               | ка                       |                    |        |  |
| Tob               | acco – Y/N               | Lime – Y/N         |        |  |
| Duration -        |                          | Frequency -        | -      |  |

|                | Side – Right/ Left/ Both    |
|----------------|-----------------------------|
|                | Leaves overnight – Y/N      |
|                | Stopped since (if stopped)  |
|                |                             |
| •              | Smoking:                    |
|                |                             |
| Beedi          |                             |
| Hookah         |                             |
| Pipe           |                             |
|                |                             |
| Duration -     | Packs/Day -                 |
|                |                             |
| Reverse s      | moking: Y/N Stopped since – |
| (if stopped)   |                             |
|                |                             |
| •              | Alcohol:                    |
|                | Duration -                  |
|                | Type -                      |
|                | Amount/day -                |
|                | Stopped since (if stopped): |
| <b>EXAMINA</b> | <u>TION</u>                 |
|                |                             |
| GENERAL        | PHYSICAL EXAMINATION        |
|                |                             |
| Built: Poor/N  | Medium/Well built           |
| Nutritional s  | status: Poor                |
|                | Satisfactory                |

| Temperature  | e: Pulse:                            | BP:   | RR:                   |
|--------------|--------------------------------------|-------|-----------------------|
| Pallor: Y/N  | Icterus: Y/N Cyanosis Y/N            |       |                       |
| Clubbing: Y  | /N Lymphadenopathy: Y/N              | Edem  | a: Y/N                |
| LOCAL EX     | <u>XAMINATION</u>                    |       |                       |
| •            | Oral Cavity:                         |       |                       |
|              | Mouth opening: Adequate/ Trismu      | 1S.   |                       |
|              | Grade of Trismus (if any):           |       |                       |
|              | Oro-dental Hygiene: Poor/ Satisfa    | ctory | Nicotine stains: Y/ N |
|              | Site: Buccal mucosa                  |       |                       |
|              | Retromolar Trigone                   |       |                       |
|              | Lower alveolus                       |       |                       |
|              | Upper alveolus                       |       |                       |
|              | Hard palate                          |       |                       |
|              | Anterior 2/3 <sup>rd</sup> of tongue |       |                       |
|              | floor of mouth                       |       |                       |
|              | Side: Right                          |       |                       |
| Type of Les  | ion:                                 |       |                       |
| Verrucous    |                                      |       |                       |
| Ulceroprolif | erative                              |       |                       |
| Ulcerative   |                                      |       |                       |
| Infiltrative |                                      |       |                       |

| Dimension: length X breath                                    |
|---|
| depth   |
|   |
| Skin involvement: Y/N   |
| Bone erosion: Y/N   |
| Lymph nodes:  |
| ■ Number:   |
| • Level/ s involved:  |
| Size:   |
| • Mobile/Fixed :  |
| TNM STAGING:  |
| <u>INVESTIGATIONS</u> :                                       |
| Hb: RBC: TC: Platelets: DC: N: L: M: E: B:                    |
| BT: CT: HIV: Y/N HbsAg: Y/N RBS:                              |
| CT SCAN/USG NECK:   |
| DIMENSIONS : VOLUME:  |
|   |
| BIOPSY REPORT:  |
| CLINICAL DIAGNOSIS:   |
| SURGERY:  |
| NECK DISSECTION: SOND/MRND/RND                                |
| PRIMARY TUMOUR EXCISION APPROACH: Lower lin split /visor flan |

Composite resection with marginal mandibulectomy/hemimandibulectomy

**RECONSTRUCTION**: PMMC/forehead flap/supraclavicular flap/submental artery flap/radial forearm free flap/bipaddle PMMC/ buccal pad of fat/ skin graft

TIME TAKEN FOR SURGERY: **ADEQUACY OF EXPOSURE: FARTHEST MARGIN OF RESECTION: CLOSEST MARGIN OF RESECTION:** ADEQUACY OF ACCESS FOR RECONSTRUCTION: adequate/ difficult/ inadequate. **COMPLICATIONS:** wound dehiscence/orocutaneous fistula/ flap necrosis/incompetence of lips/trismus/lip necrosis/salivary leak **SCARRING OF FACE: Y/N** AESTHETIC APPEARANCE(POST OP): good/satisfactory/ unsatisfactory **HISTOPATHOLOGY REPORT: Tumour size: Tumour grade:** Resected margin of tumour:

|           | ANTERIOR | POSTERIOR | SUPERIOR |          |
|-----------|----------|-----------|----------|----------|
|           |          |           |          | INFERIOR |
| FREE FROM |          |           |          |          |
| TUMOUR    |          |           |          |          |
| INVOLVED  |          |           |          |          |
| BY THE    |          |           |          |          |
| TUMOUR    |          |           |          |          |

| Perineural invasion: Y/N  |
|---------------------------|
| Bone invasion: Y/N        |
| RADIOTHERAPY: DOSE: Gy    |
| FRACTIONS: #              |
| DAYS:                     |
| FOLLOW UP: 6 months       |
| STATUS AT LAST FOLLOW UP: |
|                           |
| LOCAL RECURRENCE:         |
| REGIONAL RECURRENCE:      |
| LOCO REGIONAL RECURRENCE: |
| DISTANT METASTASIS:       |
| DIED DUE TO OTHER CAUSE:  |
| DIED DUE TO DISEASE:      |
| LOST FOR FOLLOW UP:       |
| SYSTEMIC EXAMINATION:     |
| Cardio vascular system:   |
| Respiratory system:       |
| • Abdomen:                |
| • Central nervous system: |

### INFORMED CONSENT FORM

I Mr./Mrs. have been explained in a language I understand, that I will be included in a study which is **COMPARISON OF VISOR FLAP APPROACH**WITH LIP SPLIT APPROACH IN RESECTION OF ORAL CANCERS, being conducted in Department of Otorhinolaryngology and Head and neck surgery,RL JALAPPA HOSPITAL.

I have been explained that my clinical findings, investigations, intraoperative findings, post-operative course, will be assessed and documented for study purpose.

I have been explained my participation in this study is entirely voluntary, and I can withdraw from the study any time and this will not affect my relation with my doctor or the treatment for my ailment. I have been explained about the follow up details in my own understandable language.

I have been given the option to choose between the lip slpit approach and visor flap approach. However I have been explained that lip split approach is considered to be a gold standard approach.

I have understood that all my details found during the study are kept confidential and while publishing or sharing of the findings, my personal and clinical details will be kept confidential and my photograph if any will not reveal my identity.

| I in my sound mind give full consent to be added in the part of this study. |
|---|
|   |
| Signature of the patient:   |
| Name:   |
| Signature of the witness:   |
| Name:   |
| Relation to patient:  |
| Date:   |
| Place:  |
|   |
|   |
|   |
|   |
|   |
|   |

**PATIENT INFORMATION SHEET** 

**Study title**: Comparison of visor flap approach with lower lip split approach in

resection of oral cancers

**Study location:** R L Jalappa Hospital and Research Centre attached to

Sri DevarajUrs

Medical College, Tamaka, Kolar.

Details-

This is to inform you that you have been diagnosed with cancer of the oral cavity

which requires surgery followed by adjuvant treatment like Radiotherapy. Surgery

will involve removal of the tumor with 1 cm margin and partial/full thickness

removal of the lower jaw bone along with neck dissection followed by reconstruction.

To approach the tumors of oral cavity, one of the following two approaches are

feasible i.e., lower lip split approach and visor flap approach. Midline lower lip split

approach is the gold standard approach. However, for tumors close to the angle of

mouth, it results in necrosis of the lip. Visor flap approach can be used for resection of

the tumors which may require more time, but this approach does not cause scar over

face.

You will be part of this study and will have to undergo routin.

e preoperative investigations, CECT for evaluation of primary tumour.

You can ask any question regarding the study. If you agree to participate in the study

we will collect information (as per Proforma) from you or a person responsible for

you or both. Relevant history will be taken. This information collected will be used

only for dissertation and publication.

All information collected from you will be kept confidential and will not be disclosed to any outsider. Your identity will not be revealed. You will not have any additional expenditure for being part of the study nor will you have any financial benefit for

being part of the study. In the unlikely event of complications during the study, you

will be necessarily treated with standard care.

This study has been reviewed by the Institutional Ethics Committee and you are free

to contact the member of the Institutional Ethics Committee. There is no compulsion

to agree to this study. The care you will get will not change if you don't wish to

participate. You are required to sign/ provide thumb impression only if you

voluntarily agree to participate in this study.

For further information contact

Dr. Vyshnavi. V (Post graduate)

9901673035

Department of Otorhinolaryngology

SDUMC, Kolar

| Tues qu | Age<br>Sex | OHIO   | Hote                              | oni tavity findings  | Lymph node status                             | ske            | Dagnosis   | อินเสียง<br>- | Acetog   | Sugary  | Approxit           | Adequacy of exposure | им   | depth of invasion | perineural invasion<br>lymphovascular invasion | bonverosion | Time taken for resection of primary and and suturing of intraoral Plap | margins of resection | Anterior margin(mm)  Doctorior margin(mm) | Superior margin (mm.) | Inferior margin(mm.) Adominant of access for proposition than | Flap used for reconstruction | Post op er alive complications | Adjuvant Radiotherapy | Adjuvant Chemotherapy + Radiotherapy | Status at last follow up |
|---------|------------|--------|-----------------------------------|--|---|----------------|--|---------------|--|---|--------------------|----------------------|--|-------------------|--|-------------|--|----------------------|---|-----------------------|---|------------------------------|--------------------------------|-----------------------|--------------------------------------|--------------------------|
| 1 5     | 5 F 6      | 635071 | tobacco quid chewing              | ulcero-exophytic<br>growth-3X4 cm  | No palpable lymph<br>node                     | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N0M0)            | T3N0M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction             | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 3mm               | no no  | no          | 2 hours i  | inadequate           | 4 9                                       | 5                     | 10 adeq   | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 2 4     | 0 F 6      | 654367 | tobacco quid chewing              | ulcero-exophytic<br>growth-1X2 cm  | single ipsilateral<br>lymph node of 3X1<br>cm | lower alveolus | carcinoma left lower<br>alveolus(T2N1M0)           | T2N1M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction             | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 5mm               | no no  | no          | 2 hours  | adequate             | 25 1:                                     | 2 5                   | 12 adeq   | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 3 5     | 0 F 6      | 643687 | tobacco quid chewing              | ulcero exophytic<br>growth-3X4 cm  | No palpable lymph<br>node                     | buccal mucosa  | carcinoma right buccal<br>mucosa(T3N0M0)           | T3N0M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction            | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 4mm               | no no  | no          | 2 hours  | adequate             | 10 1                                      | 0 15                  | 4 adeq  | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 4 4     | 9 F :      | 599884 | tobacco quid chewing              | ulcero-exophytic<br>growth-3X4 cm  | No palpable lymph<br>node                     | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N0M0)            | T3N0M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction            | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 5mm               | no no  | no          | 2 hours  | adequate             | 8 7                                       | 6                     | 11 adeq   | ate PMMC                     | salivary leak                  | 33#                   |                                      | NAD                      |
| 5 5     | 5 F 5      | 570256 | tobacco quid chewing              | ulcero-exophytic<br>growth-3X4 cm  | single ipsilateral<br>lymph node of 3X2<br>cm | buccal mucosa  | carinoma left buccal<br>mucosa(T3N1M0)             | T3N1M0        | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+P<br>MMC flap reconstruction                | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 8mm               | no no  | no          | 2 hours  | adequate             | 22 5                                      | 14                    | 10 adeq   | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 6       | 0 F        | 643687 | tobacco quid chewing              | ulcero-exophytic<br>growth-1X2 cm  | single ipsilateral<br>lymph node of 3X1<br>cm | GBS            | carcinoma right<br>GBS(T2N1M0)T2N1M0               |               | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction            | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 4mm               | no no  | no          | 2 hours 15min  | adequate             | 10 1                                      | 0 15                  | 4 adeq  | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 7       | 8 M S      | 571099 | tobacco quid chewing +<br>smoking | ulcerative growth-<br>2.5X1 cm   | No palpable lymph<br>node                     | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)           | T2N0M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction            | Lip split approach | adequate             | moderately<br>differentiated<br>squamous cell<br>carcinoma | 4mm               | no no  | no          | 2 hours  | adequate             | 5 1                                       | 1 3                   | 10 adeq   | ate PMMC                     | nil                            | 30#                   |                                      | NAD                      |
| 8 6     | 9 F 6      | 666223 | tobacco quid chewing              | ulceroexophytic<br>growth-2X1 cm   | No palpable lymph<br>node                     | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)           | T2N0M0        | moderately<br>differentiated<br>squamous cell<br>carcinoma | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction            | Lip split approach | adequate             | moderately<br>differentiated<br>squamous cell<br>carcinoma | 9mm               | no no  | no          | 2 hours i  | inadequate           | 7 1                                       | . 3                   | 5 adeq  | ate PMMC                     | lip necrosis                   | 30#                   |                                      | NAD                      |
| 9 6     | 0 F :      | 575272 | tobacco quid chewing              | 3x4cm verrucous<br>lesion  | single ipsilateral<br>lymph node of 2X1<br>cm | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N1M0)            | T3N1M0        | verrucous carcinoma  | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction             | Lip split approach | adequate             | verrucous carcinoma  | 5mm               | no no  | no          | 2 hours  | adequate             | 6 5                                       | 3                     | 1 adeq  | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 10      | 0 F 4      | 451226 | tobacco quid chewing              | ulceroexophytic<br>growth-3X4 cm   | single ipsilateral<br>lymph node of 3X1<br>cm | buccal mucosa  | carcinoma right buccal<br>mucosa(T3N1M0)T3N1<br>M0 |               | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction            | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 4mm               | no no  | no          | 2 hours 15min  | adequate             | 8 6                                       | 5                     | 10 adeq   | ate PMMC                     | salivary leak                  | 33#                   |                                      | NAD                      |
| 11 4    | 5 F :      | 536274 | tobacco quid chewing              | ulceroexophytic<br>growth-2X2 cm   | single ipsilateral<br>lymph node of 2X2<br>cm | lower alveolus | carcinoma left lower<br>alveolus(T2N1M0)           | T2N1M0        | moderately<br>differentiated<br>squamous cell<br>carcinoma | composite resection(marginal<br>mandibulectomy)+left<br>MRND+PMMC flap<br>reconstruction          | Lip split approach | adequate             | moderately<br>differentiated<br>squamous cell<br>carcinoma | 5mm               | no no  | no          | 2 hours  | adequate             | 4 8                                       | 7                     | 2 adeq  | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 12 6    | 8 F 4      | 493205 | tobacco quid chewing              | ulcero-exophytic<br>growth-3X4 cm  | No palpable lymph<br>node                     | buccal mucosa  | carcinoma right buccal<br>mucosa(T3N0M0)           | T3N0M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction            | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 9mm               | no no  | no          | 2 hours  | adequate             | 20 1                                      | 0 15                  | 10 adeq   | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 13      | 6 F !      | 598680 | tobacco quid chewing              | ulcero-exophytic<br>growth-3X4 cm  | No palpable lymph<br>node                     | buccal mucosa  | carcinoma left buccal<br>mucosa(T2N0M0)            | T2N0M0        | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+left<br>MRND+PMMC flap<br>reconstruction          | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 5mm               | no no  | no          | 2 hours  | adequate             | 10 1                                      | 0 12                  | 8 adeq  | ate PMMC                     | lip necrosis                   | 33#                   |                                      | NAD                      |
| 14 6    | 8 F (      | 608471 | tobacco quid chewing              | ulcerative growth-<br>3X4 cm   | single ipsilateral<br>lymph node of 2X1<br>cm | GBS            | carcinoma left<br>GBS(T3N1M0)                      | T3N1M0        | moderately<br>differentiated<br>squamous cell<br>carcinoma | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction             | Lip split approach | adequate             | moderately<br>differentiated<br>squamous cell<br>carcinoma | 6mm               | no no  | no          | 2 hours 15min  | adequate             | 8 1                                       | 0 6                   | 10 adeq   | ate PMMC                     | nil                            | 30#                   |                                      | NAD                      |
| 15 5    | 5 F 6      | 603880 | tobacco quid chewing              | ulceroexophytic<br>growth-2X2 cm,left<br>buccal mucosa-<br>leukoplakic patch | No palpable lymph<br>node                     | buccal mucosa  | carcinoma left buccal<br>mucosa(T2N0M0)            | T2N0M0        | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+P<br>MMC flap reconstruction                | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 7mm               | no no  | no          | 2 hours  | adequate             | 7 2                                       | 7 7                   | 6 adeq  | ate PMMC                     | nil                            | 33#                   |                                      | NAD                      |
| 16      | 0 F        | 623594 | tobacco quid chewing              | ulcerative growth-<br>3X3 cm   | single ipsilateral<br>lymph node of 3X2<br>cm | lower alveolus | carcinoma left lower<br>alveolus(T3N1M0)           | T3N1M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction             | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 6mm               | no no  | no          | 2 hours 30 min   | adequate             | 12 1                                      | 0 15                  | 12 adeq   | ate PMMC                     | salivary leak                  | 33#                   |                                      | NAD                      |
| 17      | 8 F 6      | 627576 | tobacco quid chewing              | proliferative growth-<br>2X2 cm  | single ipsilateral<br>lymph node of 2X1<br>cm | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N1M0)            | T3N1M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction             | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 14mm              | no no  | no          | 2 hours 20 min   | adequate             | 22 8                                      | 12                    | 10 adeq   | ate PMMC                     | salivary leak                  | 33#                   |                                      | NAD                      |
| 18 5    | 0 F 6      | 633796 | tobacco quid chewing              | ulcero-exophytic<br>growth-2X2 cm  | single ipsilateral<br>lymph node of 1X1<br>cm | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N1M0)T2N1<br>M0 |               | moderately<br>differentiated<br>squamous cell<br>carcinoma | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction  | Lip split approach | adequate             | moderately<br>differentiated<br>squamous cell<br>carcinoma | 2mm               | no no  | no          | 2 hours 30 min   | adequate             | 11 9                                      | 9                     | 3 adeq  | ate supraclavicular f        | ap nil                         | 33#                   |                                      | NAD                      |
| 19 6    | 0 F 6      | 653986 | tobacco quid chewing              | ulcero-exophytic<br>growth-3X4 cm  | single ipsilateral<br>lymph node of 3X1<br>cm | lower alveolus | carcinoma left lower<br>alveolus(T3N1M0)           | T3N1M0        | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction             | Lip split approach | adequate             | well differentiated<br>squamous cell<br>carcinoma          | 11mm              | no no  | yes         | 2 hours 40 min i   | inadequate           | 6 1                                       | 5 tumour              | 10 adeq   | ate PMMC                     | nil                            | 33#                   | Yes                                  | NAD                      |
| 20      | 2 F        | 727292 | tobacco quid chewing              | ulcerative growth-<br>2.5X1 cm   | No palpable lymph<br>node                     | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)           | T2N0M0        | moderately<br>differentiated<br>squamous cell<br>carcinoma | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+supraclavicular flap<br>reconstruction | Lip split approach | adequate             | moderately<br>differentiated<br>squamous cell<br>carcinoma | 9mm               | no no  | no          | 3 hours  | adequate             | 3 1                                       | 0 10                  | 5 adeq  | ate supraclavicular f        | ap nil                         | 30#                   |                                      | NAD                      |

| LIP SPLLT     | 26к     | Habits                         | onal cavity findings                                   | Lymph node status  | ske            | Diagnostis   | ging as S | Asdoss   | Andres  | Арргожћ             | e unsodke jo Å se nbepy | Ve de  | depth of invasion | perineural invasion<br>lymphovascular invasion | bonyerosion | me taken for resection of primary and and suturing of intraoral | margins of resection | Anterior margin(mm) | Posterior margin (mm)<br>Superior margin (mm) | Inferior marginfinm) Adequacy of access for reconstruction | Flip used for reconstruction | Post operative complications | Adjuvant Radioth erapy      | Adjuvant Chemother apy + Radiotherapy | Status at last follow up        |
|---------------|---------|--------------------------------|--|--|----------------|--|-----------|--|---|---------------------|-------------------------|--|-------------------|--|-------------|---|----------------------|---------------------|---|--|------------------------------|------------------------------|-----------------------------|---------------------------------------|---------------------------------|
| 21 40         | M 66855 | tobacco quid chewing + smoking | ulcero-proliferative<br>growth-2X1 cm                  | No palpable lymph<br>node                                      | GBS            | carcinoma left<br>GBS(T2N0M0)                      | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+left<br>MRND+supraclavicular flap<br>reconstruction     | Lip split approach  | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 8mm               | no no  | no          | 2 hours   | adequate             | 6                   | 10 10   | 10 adequal   | e supraclavicular flag       | o nil                        | 30#                         |                                       | NAD                             |
| 22 55         | F 59138 | 5 tobacco quid chewing         | ulceroexophytic<br>lesion of 2X2cm                     | No palpable lymph<br>node                                      | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)           | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+P<br>MMC flap reconstruction                      | Lip split approach  | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 10mm              | no no  | no          | 2 hours   | adequate             | 12                  | 4 4   | 18 adequal   | PMMC                         | facial nerve palsy           | 33#                         |                                       | Died due to<br>carotid blow out |
| 23 45         | м 73776 | tobacco quid chewing + smoking | ulceroexophytic<br>lesion of 2.5X2cm                   | No palpable lymph node   | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0))          | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | Lip split approach  | adequate                | squamous cell<br>carcinoma                                 | 7mm               | no no  | no          | 2 hours 30 min  | inadequate           | 8                   | 5 4   | 0.2 adequat  | PMMC                         | nil                          | 33#                         | Yes                                   | NAD                             |
| 24 60         | F 73652 | 5 tobacco quid chewing         | proliferative growth-<br>2X1 cm                        | No palpable lymph node   | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)           | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | Lip split approach  | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 6mm               | no no  | no          | 2 hours 30 min  | adequate             | 10                  | 5 8   | 6 adequat  | PMMC                         | nil                          | No Radiotherapy<br>received |                                       | NAD                             |
| 25 55         | F 75413 | tobacco quid chewing           | ulcero-exophytic<br>growth- 2x1.5 cm                   | single ipsilateral<br>lymph node of 2X3<br>cm                  | buccal mucosa  | carcinoma light buccal<br>mucosa(T2N1M0)           | T2N1M0    | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction        | Lip split approach  | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 5mm               | no no  | no          | 1 hour 50 min   | adequate             | 10                  | 10 13   | 14 adequat   | e supraclavicular flap       | o nil                        | 33#                         |                                       | NAD                             |
| 26 40         | F 75529 | tobacco quid chewing           | ulcero-exophytic<br>growth-2.5X1.5 cm                  | single ipsilateral<br>lymph node of 3X3<br>cm                  | buccal mucosa  | carcinoma left buccal<br>mucosa(T2N1M0)            | T2N1M0    | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+P<br>MMC flap reconstruction                      | Lip split approach  | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 0.6mm             | no no  | no          | 2 hours 10 min  | adequate             | 7                   | 10 5  | 20 adequal   | e PMMC                       | nil                          | 33#                         |                                       | NAD                             |
| 27 67         | M 70958 | 5 tobacco quid chewing         | ulcero-exophytic<br>growth-3.5X3 cm                    | 2 ipsilateral lymph<br>nodes , both<br>measuring 3X2,<br>4X3cm | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N2bM0)           | T3N2bM0   | moderately<br>differentiated<br>squamous cell              | composite resection(marginal<br>mandibulectomy)+MRND+PM<br>MC flap reconstruction                       | Lip split approach  | adequate                | moderately<br>differentiated<br>squamous cell              | 8mm               | no no  | no          | 2 hours 45min   | adequate             | 6                   | 15 8  | 10 adequal   | PMMC                         | nil                          | 33#                         |                                       | NAD                             |
| 28 50         | F 71263 | 1 tobacco quid chewing         | ulcero-exophytic<br>growth-3.5X2.5cm                   | No palpable lymph<br>node                                      | lower alveolus | carcinoma left lower<br>alveolus(T3N0M0)           | T3N0M0    | carcinoma well differentiated squamous cell carcinoma      | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | Lip split approach  | adequate                | carcinoma well differentiated squamous cell carcinoma      | 2mm               | no no  | no          | 2 hours 40 min  | adequate             | 10                  | 15 5  | 6 adequat  | PMMC                         | nil                          | 33#                         |                                       | NAD                             |
| 29 65         | F 75177 | 3 tobacco quid chewing         | ulcerative growth of<br>3X1.5cm                        | single ipsilateral<br>lymph node of 2X2<br>cm                  | buccal mucosa  | carcinoma right buccal<br>mucosa(T3N1M0)T3N1<br>M0 | T3N1M0    | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | Lip split approach  | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 3mm               | no no  | no          | 2 hours 20 min  | adequate             | 2                   | 5 5   | 10 adequal   | PMMC                         | flap necrosis                | 33#                         |                                       | NAD                             |
| 30 48         | M 53886 | 3 tobacco quid chewing         | ulcero exophytic<br>growth of 2X1cm                    | single ipsilateral<br>lymph node of 1X2<br>cm                  | lower alveolus | carcinoma left lower<br>alveolus(T2N1M0)           | T2N1M0    | moderately<br>differentiated<br>squamous cell<br>carcinoma | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | Lip split approach  | adequate                | moderately<br>differentiated<br>squamous cell<br>carcinoma | 1mm               | no no  | no          | 2 hours 10 min  | adequate             | 15                  | 10 5  | 12 adequal   | PMMC                         | nil                          | 33#                         |                                       | NAD                             |
| 31 50         | F 78778 | 9 tobacco quid chewing         | ulcero-exophytic<br>growth-2X1 cm                      | No palpable lymph<br>node                                      | GBS            | carcinoma left<br>GBS(T2NOMO)                      | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | Lip split approach  | adequate                | squamous cell<br>carcinoma in situ                         | 1mm               | no no  | no          | 2 hours 25 min  | adequate             | 10                  | 5 8   | 10 adequat   | PMMC                         | nil                          | No Radiotherapy<br>received |                                       | NAD                             |
| 32 60         | F 78632 | 5 tobacco quid chewing         | proliferative growth-<br>3X1 cm                        | single ipsilateral<br>lymph node of 2X1<br>cm                  | buccal mucosa  | carcinoma right buccal<br>mucosa (T3N1M0)          | T3N1M0    | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | Lip split approach  | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 3mm               | no no  | no          | 2 hours 55 min  | adequate             | 10                  | 10 5  | 10 adequal   | PMMC                         | nil                          | 33#                         |                                       | NAD                             |
| 33 48         | F 78651 | 5 tobacco quid chewing         | ulcero-exophytic<br>growth-2X1.5cm<br>with leukoplakia | No palpable lymph<br>node                                      | buccal mucosa  | carcinoma right buccal<br>mucosa(T2NOMO)           | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction        | Lip split approach  | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 4mm               | no no  | no          | 2 hours 30 min  | adequate             | 20                  | 1 3   | 8 adequal  | e supraclavicular flag       | o nil                        | 30#                         |                                       | NAD                             |
| VISOR<br>1 65 | F 66065 | 5 tobacco quid chewing         | ulceroexophytic<br>growth of 2X2cm                     | No palpable lymph<br>node                                      | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)           | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap                                     | visor flap approach | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 8mm               | no no  | no          | 2 hours 50 min  | adequate             | 18                  | 6 15  | 18 adequal   | PMMC                         | nil                          | 33#                         |                                       | NAD                             |
| 2 66          | F 73283 | 2 tobacco quid chewing         | ulceroexophytic<br>growth of 2X2cm                     | No palpable lymph<br>node                                      | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)           | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | reconstruction  composite resection(marginal mandibulectomy)+SOHND+su praclavicular flap reconstruction | visor flap approach | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 4mm               | no no  | no          | 3 hours   | adequate             | 10                  | 18 5  | 7 adequat  | e supraclavicular flag       | o nil                        | 33#                         |                                       | NAD                             |
| 3 55          | F 68487 | o tobacco quid chewing         | ulceroexophytic<br>growth of 2X2.5cm                   | No palpable lymph<br>node                                      | buccal mucosa  | carcinoma left buccal<br>mucosa(T2N0M0)            | T2N0M0    | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+left<br>SOHND+ submental flap<br>reconstruction         | visor flap approach | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 8mm               | no no  | no          | 2 hours 50 min  | adequate             | 10                  | 10 8  | 8 adequal  | e submental flap             | nil                          | 33#                         |                                       | NAD                             |
| 4 42          | F 85753 | 7 tobacco quid chewing         | proliferative growth<br>of 3x2 cm                      | No palpable lymph<br>node                                      | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N0M0)            | T3N0M0    | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | visor flap approach | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 8mm               | no no  | no          | 2 hours 45 min  | adequate             | 12                  | 5 5   | 15 adequat   | PMMC                         | nil                          | 33#                         |                                       | NAD                             |
| 5 46          | F 67002 | tobacco quid chewing           | ulceroexophytic<br>growth of 3X2cm                     | No palpable lymph<br>node                                      | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N0M0)            | T3N0M0    | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction        | visor flap approach | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 6mm               | no no  | no          | 3 hours   | adequate             | 10                  | 7 6   | 10 adequal   | e supraclavicular flap       | salivary leak                | 33#                         |                                       | NAD                             |
| 6 68          | F 72784 | 3 tobacco quid chewing         | ulceroexophytic<br>growth of 4X2cm                     | single ipsilateral<br>lymph node of 3X1<br>cm                  | GBS            | carcinoma left<br>GBS(T3N1M0)                      | T3N1M0    | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | visor flap approach | adequate                | well differentiated<br>squamous cell<br>carcinoma          | 4mm               | no no  | no          | 3 hours 5 min   | adequate             | 25                  | 5 5   | 10 adequal   | PMMC                         | nil                          | 33#                         |                                       | NAD                             |

| Thes ell | Age  | ОНЮ    | нары                              | onal cavity findings                  | Lymph node status  | ske            | Diagnosis                                 | BujBess | Acetog   | Segary  | Approxh             | a insodka jo A ze nba py | use  | depth of invasion | perineural invasion<br>lymphovascular invasion | bonyeroslon                     | ine taken for resection of primary and and suturing of intraonal | margins of resection | Anterior margin(mm) Posterior margin(mm) | Superior margin (mm) | Inferior marginfimm) Adequacy of access for reconstruction | Flap used for reconstruction               | Post operative complications   | Adjuvant Radiotherapy | Adjuvant Chemotherapy + Radiotherapy Satus at last follow up |
|----------|------|--------|-----------------------------------|---------------------------------------|--|----------------|---|---------|--|---|---------------------|--------------------------|--|-------------------|--|---------------------------------|--|----------------------|--|----------------------|--|--|--|-----------------------|--|
| 7        | 60 F | 696880 | tobacco quid chewing              | ulcerative growth of 2X2cm            | No palpable lymph<br>node                                | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)  | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction        | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 6mm               | no no  | no                              | 2 hours 55 min   | adequate             | 5 10                                     | 3                    | 5 adequate   | supraclavicular flap                       | flap necrosis  | 33#                   | NAD  |
| 8        | 50 F | 737662 | tobacco quid chewing              | proliferative growth<br>2.5X2.5cm     | No palpable lymph<br>node                                | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N0M0)   | T3N0M0  | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 5mm               | no no  | no                              | 2 hours 55 min   | adequate             | 4 5                                      | 7                    | 10 adequate  | PMMC                                       | nil  | 33#                   | NAD  |
| 9        | 65 F | 712565 | tobacco quid chewing              | ulceroexophytic<br>growth of 2X2cm    | single ipsilateral<br>lymph node of 3X3<br>cm            | buccal mucosa  | carcinoma left buccal<br>mucosa(T2N1M0)   | T2N1M0  | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction        | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 4mm               | no no  | no                              | 3 hours 5 min  | adequate             | 6 22                                     | 3                    | 18 adequate  | supraclavicular flap                       | salivary leak  | 33#                   | NAD  |
| 10       | 48 F | 743612 | tobacco quid chewing              | ulcerative growth of<br>3.5X3cm       | No palpable lymph<br>node                                | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)  | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction        | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 5mm               | no no  | no                              | 3 hours 05 min   | adequate             | 6 5                                      | 8                    | 6 adequate   | supraclavicular flap                       | nil  | 33#                   | NAD  |
| 11       | 50 F | 714374 | tobacco quid chewing              | ulceroexophytic<br>growth of 2X3 cm   | No palpable lymph<br>node                                | lower alveolus | carcinoma left lower<br>alveolus(T3N0M0)  | T3N0M0  | moderately<br>differentiated<br>squamous cell<br>carcinoma | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | visor flap approach | adequate                 | moderately<br>differentiated<br>squamous cell<br>carcinoma | 6mm               | no no  | no                              | 3 hours 10 min   | adequate             | 13 25                                    | 15                   | 10 adequate  | PMMC                                       | nil  | 33#                   | NAD  |
| 12       | 52 F | 710243 | tobacco quid chewing              | ulceroexophytic<br>growth of 3X2cm    | No palpable lymph<br>node                                | GBS            | carcinoma right<br>GBS(T3NOMO)            | T3N0M0  | in situ squamous cell<br>carcinoma                         | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 10mm              | no no  | no                              | 3 hours 10 min   | adequate             | 20 10                                    | 8                    | 7 adequate   | PMMC                                       | nil  | 33#                   | NAD  |
| 13       | 68 F | 773362 | tobacco quid chewing              | ulceroexophytic<br>growth of 2.5X2 cm | No palpable lymph<br>node                                | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)  | T2N0M0  | squamous cell<br>carcinoma                                 | composite resection(marginal<br>mandibulectomy)+MRND<br>+PMMC flap reconstruction                       | visor flap approach | adequate                 | squamous cell<br>carcinoma in situ                         | 6mm               | no no  | no                              | 4 hours(due to bulky<br>flap)                                    | adequate             | 10 7                                     | 8                    | 10 adequate  | PMMC                                       | salivary leak  | 33#                   | NAD  |
| 14       | 65 F | 774216 | tobacco quid chewing              | ulceroexophytic<br>growth of 2.5X4 cm | single ipsilateral<br>lymph node of 2X1<br>cm            | lower alveolus | carcinoma left lower<br>alveolus(T3N1M0)  | T3N1M0  | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 11mm              | no no  | bone<br>infiltration<br>present | 3 hours  | adequate             | 15 5                                     | 10                   | 5 adequate   | PMMC                                       | nil  | 33#                   | NAD  |
| 15       | 55 F | 647537 | tobacco quid chewing              | verrucous growth of<br>3X4 cm         | 2 ipsiltaeral lymph<br>nodes meeasuring<br>3X2 cm, 2X1cm | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N2bM0)  | T3N2bM0 | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 10mm              | no no  | no                              | 3 hours 10 min   | adequate             | 5 6                                      | 15                   | 8 adequate   | PMMC                                       | nil  | 33#                   | NAD  |
| 16       | 56 F | 538701 | tobacco quid chewing              | ulceroexophytic<br>growth of 2X2cm    | single ipsiltaeral<br>lymph node<br>measuring 5X4cm      | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N2aM0) | T2N2M0  | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction        | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 6mm               | no no  | no                              | 2 hours 35 min   | adequate             | 16 9                                     | 10                   | 5 adequate   | supraclavicular flap                       | nil  | 33#                   | NAD  |
| 17       | 54 F | 792154 | tobacco quid chewing              | ulceroexophytic<br>growth of 2.5X2 cm | single ipsilateral<br>lymph node of 2X2<br>cm            | buccal mucosa  | carcinoma left buccal<br>mucosa(T3N1M0)   | T3N1M0  | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 7mm               | no no  | no                              | 2 hours 55 min   | adequate             | 6 6                                      | 3                    | 10 adequate  | PMMC                                       | nil  | 33#                   | NAD  |
| 18       | 48 F | 803043 | tobacco quid chewing              | ulcerative growth of<br>2.5X1.5 cm    | single ipsilateral<br>lymph node of 3X1<br>cm            | buccal mucosa  | carcinoma right buccal<br>mucosa(T3N1M0)  | T3N1M0  | moderately<br>differentiated<br>squamous cell<br>carcinoma | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | visor flap approach | adequate                 | moderately<br>differentiated<br>squamous cell<br>carcinoma | 14mm              | no no  | no                              | 3 hours  | adequate             | 9 10                                     | 5                    | 8 adequate   | PMMC                                       | nil  | 33#                   | NAD  |
| 19       | 49 F | 801406 | tobacco quid chewing              | ulceroexophytic<br>growth of 2.5X1 cm | No palpable lymph<br>node                                | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)  | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(marginal<br>mandibulectomy)+Right<br>MRD+Radial forearm free<br>flap reconstruction | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 7mm               | no no  | no                              | 3 hours 30 min   | adequate             | 4 5                                      | 15                   | 5 adequate   | Radial forearm free<br>flap reconstruction | necrosis of<br>skin over<br>neck,salivary<br>leak, patient<br>underwent<br>skin grafting | 33#                   | NAD  |
| 20       | 60 F | 684133 | tobacco quid chewing              | ulcero-exophytic<br>growth-2X1 cm     | No palpable lymph<br>node                                | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)  | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | visor flap approach | inadequate               | well differentiated<br>squamous cell<br>carcinoma          | 5mm               | no no  | no                              | 2 hours 55 min   | inadequate           | 2 2                                      | 2                    | 10 inadequate  | PMMC                                       | salivary leak  | 33#                   | NAD  |
| 21       | 65 M | 806140 | tobacco quid chewing +<br>smoking | ulcero exophytic<br>growth of 2.5X1cm | single ipsilateral<br>lymph node of 2X2<br>cm            | GBS            | carcinoma left<br>GBS(T3N1M0)             | T3N1M0  | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+MRND+sup<br>raclavicular flap<br>reconstruction         | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 6mm               | no no  | no                              | 2 hours 45 min   | adequate             | 8 4                                      | 5                    | 10 adequate  | supraclavicular flap                       | nil  | 30#                   | Died due to<br>locoregiona<br>recurrence                     |
| 22       | 67 F | 742065 | tobacco quid chewing              | ulcerative growth of<br>2X1.5cm       | No palpable lymph<br>node                                | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)  | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma          | composite resection(marginal<br>mandibulectomy)+SOHND+su<br>praclavicular flap<br>reconstruction        | visor flap approach | inadequate               | well differentiated<br>squamous cell<br>carcinoma          | 4mm               | no no  | no                              | 3 hours  | inadequate           | 15 5                                     | 3                    | 4 adequate   | supraclavicular flap                       | nil  | 30#                   | NAD  |
| 23       | 60 F | 758962 | tobacco quid chewing              | ulceroexophytic<br>growth of 3X2.5cm  | 2 ipsiltaeral lymph<br>nodes meeasuring<br>3X2 cm, 2X3cm | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N2bM0) | T2N2bM0 | squamous cell<br>carcinoma                                 | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | visor flap approach | adequate                 | moderately<br>differentiated<br>squamous cell<br>carcinoma | 8mm               | no no  | no                              | 3 hours  | adequate             | 20 25                                    | 2                    | 5 adequate   | PMMC                                       | nil  | 33#                   | NAD  |
| 24       | 60 F | 692019 | tobacco quid chewing              | ulceroexophytic<br>growth of 3X2cm    | No palpable lymph<br>node                                | buccal mucosa  | carcinoma right buccal<br>mucosa(T2N0M0)  | T2N0M0  | squamous cell<br>carcinoma                                 | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                  | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 7mm               | no no  | no                              | 2 hours 30 min   | adequate             | 5 25                                     | 10                   | 25 adequate  | PMMC                                       | nil  | 33#                   | NAD  |
| 25       | 46 F | 710219 | tobacco quid chewing              | ulceroexophytic<br>growth of 3X3 cm   | single ipsilateral<br>lymph node of 2X3<br>cm            | lower alveolus | carcinoma left lower<br>alveolus(T3N1M0)  | T3N1M0  | well differentiated<br>squamous cell<br>carcinoma          | Composite resection(left<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction                   | visor flap approach | adequate                 | well differentiated<br>squamous cell<br>carcinoma          | 11mm              | no no  | no                              | 2 hours 40 min   | adequate             | 8 10                                     | 8                    | 12 adequate  | PMMC                                       | nil  | 33#                   | NAD  |

| LIP SPLIT | Age<br>Sex | UHID   | Habbs                             | oral curity findings                       | Lymph node status                             | site          | Dagroods                                 | Staging | менен   | Ambus   | Арргожћ             | Adequacy of exposure | ъмн   | depth of invasion | perineural invasion<br>lymphovascular invasion | bonyerosion | Time taken for resection of primary and and suturing of intraonal<br>flap | margins of resection | Anterior margin(mm) | Posterior margin(mm) Superior margin(mm) | Inferior marginism) Adequacy of access for reconstruction | Flap used for reconstruction | Post operative complications | Adjuvant Radioth erapy      | Adjuvant Chemotherapy + Radiotherapy | Status at last follow up |
|-----------|------------|--------|-----------------------------------|--|---|---------------|--|---------|---|---|---------------------|----------------------|---|-------------------|--|-------------|---|----------------------|---------------------|--|---|------------------------------|------------------------------|-----------------------------|--------------------------------------|--------------------------|
| 26        | 50 F       | 806130 | tobacco quid chewing              | ulceroexophytic<br>growth of 2X2cm         | single ipsilateral<br>lymph node of 3X2<br>cm | GBS           | carcinoma right<br>GBS(T2N1M0)           | T2N1M0  | well differentiated<br>squamous cell<br>carcinoma | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction          | visor flap approach | adequate             | well differentiated<br>squamous cell<br>carcinoma | 6mm               | no no  | no          | 2 hours 30 min  | adequate             | 3 1                 | .0 5                                     | 5 adequate  | PMMC                         | nil                          | 33#                         |                                      | NAD                      |
| 27        | 58 F       | 819927 | tobacco quid chewing              | ulceroexophytic<br>growth of 3X2.5cm       | single ipsilateral<br>lymph node of 2X1<br>cm | buccal mucosa | carcinoma right buccal<br>mucosa(T3N1M0) | T3N1M0  | well differentiated<br>squamous cell<br>carcinoma | Composite resection(right<br>hemi mandibulectomy)+<br>MRND+PMMC flap<br>reconstruction          | visor flap approach | adequate             | well differentiated<br>squamous cell<br>carcinoma | 8mm               | no no  | no          | 2 hours 40 min  | adequate             | 10                  | 8 8                                      | 10 inadequat  | PMMC                         | salivary leak                | 33#                         |                                      | NAD                      |
| 28        | 51 M       | 849941 | tobacco quid chewing +<br>smoking | ulcerative growth<br>2.5X2.5cm             | No palpable lymph<br>node                     | buccal mucosa | carcinoma right buccal<br>mucosa(T2NOMO) | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma | composite resection(marginal<br>mandibulectomy)+ Right<br>SOHND+ PMMC flap<br>reconstruction    | visor flap approach | adequate             | well differentiated<br>squamous cell<br>carcinoma | 7mm               | no no  | no          | 2 hours 35 min  | adequate             | 10                  | 8 10                                     | 10 adequate   | PMMC                         | nil                          | no Radiotherapy<br>received |                                      | NAD                      |
| 29        | 50 F       | 608974 | tobacco quid chewing              | ulceroexophytic<br>growth of 2X 1.5 cm     | No palpable lymph<br>node                     | buccal mucosa | carcinoma left buccal<br>mucosa(T2N0M0)  | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma | composite resection(marginal<br>mandibulectomy)+ Right<br>SOHND+ PMMC flap<br>reconstruction    | visor flap approach | inadequate           | well differentiated<br>squamous cell<br>carcinoma | 8mm               | no no  | no          | 2 hours 45 min  | adequate             | 15 2                | 10 8                                     | 20 inadequat  | PMMC                         | salivary leak                | no Radiotherapy<br>received |                                      | NAD                      |
| 30        | 55 F       | 688679 | tobacco quid chewing              | ulcerative growth of<br>2X1 cm             | No palpable lymph<br>node                     | GBS           | carcinoma left<br>GBS(T2N0M0)            | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma | composite resection(marginal<br>mandibulectomy)+ Right<br>SOHND+ PMMC flap<br>reconstruction    | visor flap approach | adequate             | well differentiated<br>squamous cell<br>carcinoma | 4mm               | no no  | no          | 2 hours 25min   | adequate             | 12 1                | 10 11                                    | 10 adequate   | PMMC                         | nil                          | no Radiotherapy<br>received |                                      | NAD                      |
| 31        | 50 F       | 863937 | tobacco quid chewing              | ulceroexophytic<br>growth of 2x1 cm        | No palpable lymph<br>node                     | buccal mucosa | carcinoma right buccal<br>mucosa(T2NOM0) | T2N0M0  | verrucous carcinoma                               | composite resection(marginal<br>mandibulectomy)+Right<br>MRND+ PMMC flap<br>reconstruction      | visor flap approach | adequate             | verrucous carcinoma                               | 5mm               | no no  | no          | 2 hours 40 min  | inadequate           | 12                  | 3 8                                      | 3 adequate  | PMMC                         | nil                          | 33#                         |                                      | NAD                      |
| 32        | 45 F       | 509800 | tobacco quid chewing              | ulceroexophytic<br>growth of 2.5X1.5<br>cm | No palpable lymph<br>node                     | buccal mucosa | carcinoma right buccal<br>mucosa(T2N0M0) | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma | composite resection(marginal<br>mandibulectomy)+ SOHND+<br>submental flap<br>reconstruction     | visor flap approach | adequate             | well differentiated<br>squamous cell<br>carcinoma | 7mm               | no no  | no          | 2 hours 30 min  | adequate             | 10 1                | 0 10                                     | 5 adequate  | submental flap               | nil                          | 33#                         |                                      | NAD                      |
| 33        | 40 F       | 423869 | tobacco quid chewing              | ulceroexophytic<br>growth 2.5X 1cm         | No palpable lymph<br>node                     | buccal mucosa | carcinoma right buccal<br>mucosa(T2NOM0) | T2N0M0  | well differentiated<br>squamous cell<br>carcinoma | composite resection(marginal<br>mandibulectomy)+Right<br>SOHND+submental flap<br>reconstruction | visor flap approach | adequate             | well differentiated<br>squamous cell<br>carcinoma | 4mm               | no no  | no          | 2 hours 20 min  | adequate             | 7                   | 6 8                                      | 11 adequate   | submental flap               | nil                          | 33#                         |                                      | NAD                      |