LITERATURE REVIEW

A) LITERATURE REVIEW OF CANCER FROM ALLOPATHIC PERSPECTIVE

A-I) CANCER

Cancer can start anywhere in the body. The body is made up of trillions of cells. Normally human cells grow and divide to form new cells as the body needs them. When cells grow old or become damaged, they die, and new cells take their place. When cancer develops, however, this orderly process breaks down. As cells become more and more abnormal, old or damaged cells survive when they should die, and new cells form when they are not needed. These extra cells can divide without stopping and may form growths called tumours.

It is a complex genetic disease derived from the accumulation of various genetic changes. These genetic alterations include activation of protooncogenes and inactivation of tumour suppressor genes. It is a group of diseases, which arise by initial mutation hit in a single cell in any of the multiple cell regulatory systems. It can remain dormant for any length of period. Additional mutation hits drives the initiated cell into proliferation of cells and additional mutations selecting cells with growth advantage, invasive and metastatic properties. Cancer occurs in functionally differentiating cells. Cancer is characterised by invasion of normal tissue and metastasis at distant organs. Metastatic cells have different biochemical and immunological properties conducive of spread of the disease.

Many cancers form solid tumours, which are masses of tissue. Cancers of the blood, such as leukemias, generally do not form solid tumours which are called non solid tumours. Cancerous tumours are malignant, which means they can spread into, or invade, nearby tissues. In addition, as these tumours grow, some cancer cells can break off and travel to distant places in the body through the blood or the lymph system and form new tumours far from the original tumour.

Unlike malignant tumours, benign tumours do not spread into, or invade, nearby tissues. Benign tumours can sometimes be quite large, however, when removed; they usually don’t grow again, whereas malignant tumours sometimes can reaccure. Unlike most benign tumours elsewhere in the body, benign brain tumours can be life threatening.
A-II) ORAL CANCER

a. ANATOMY AND PHYSIOLOGY OF ORGANS OF ORAL CAVITY

The oral cavity begins at the border between the skin and the lips (vermillion border). The roof of the mouth is formed by the hard palate. The oral cavity leads into the oropharynx, which includes the soft palate, the back of the tongue and the tonsils. The inner surface of the cheeks forms the sides of the oral cavity. The lowest part of the oral cavity is the floor of the mouth, which is covered by the tongue.

The oral cavity can be divided into specific areas, including:

- lips
- labial mucosa (inner lining of the lips)
- commissure of lips (where the upper and lower lips meet at the corner of the mouth)
- vestibule (a space bounded by the teeth and gums on the inside and the mucosal surface of the lips and cheeks on the outside)
- oral tongue (the front two-thirds of the tongue)
- floor of the mouth
- buccal mucosa (the inner lining of cheeks)
- gingiva (gums)
- retromolar trigone (the area just behind the back molars in the lower jaw)
- hard palate (the bony part at the front of the roof of the mouth)
- teeth
- lower jaw (mandible)
- upper jaw (maxilla)

b. HISTOLOGY OF ORAL CAVITY CANCER

The vast majoritry of head and neck malignant neoplasms arise from the surface of epithelium and are therefore squamous cell carcinoma or one of its variants, including lympho-epithelioma, spindle cell carcinoma, verrucous carcinoma and undifferentiated carcinoma. Lymphomas and wide variety of other malignant and benign neoplasms make up the remaining cases.11

Lympho-epithelioma is a carcinoma with a lymphoid stroma. It occurs at anatomical sites with lymphoid aggregates in the submucosa, namely, the nasopharynx, tonsil, and base of the tongue. It may also occur in the major salivary glands.

In the spindle cell variant, found in 2% to 5% of upper aerodigestive tract malignancies, there is a component of spindle cells that resembles sarcoma intermixed with squamous cell carcinoma. For the most part, these lesions can not be distinguished grossly from the usual squamous cell carcinoma.

Verrucous carcinoma is a low grade squamous cell carcinoma found most often in the oral cavity, particularly in the gingio and buccal mucosa. It usually has an indolent growth pattern and is often associated with the chronic use of snuff or chewing tobacco. A verrucous tumour resembles a wart. These carcinomas rarely develop lymph node metastasis.

Small cell neuroendocrine carcinoma occurs rarely throughout the head and neck region and usually managed by radiotherapy and chemotherapy.

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c. ORAL CAVITY CANCER - RISK FACTORS
A risk factor is a cause associated with increased risk of disease or infection. Oral cancer has multiple etiological factors but tobacco use and alcohol consumption are widely considered to be its major risk factors.\(^\text{12}\).

1) ADDICTION

i. Smokeless Tobacco (Snuff and Chewing Tobacco)

Tobacco that is not burned is known as smokeless tobacco. It has many names like chewing tobacco, spit, spitting tobacco, chew, dip or sniff. People in many countries like Northern Europe, North America, India and other Asian countries, part of Africa are commonly using smokeless tobacco. While chewing tobacco i.e placing loose leaves between cheek and lower lip and then spitting or swallowing saliva. In this process nicotine in the tobacco is absorbed through the mouth lining.

There are two main types of smokeless tobacco:

a. Snuff - Snuff is finely cut or powdered tobacco sold in different scents and flavors. It is packaged moist or dry, available loose or in small pouches similar to tea bags. The user places a pinch or pouch of moist snuff between the cheek and gums or behind the upper or lower lip. Another name for moist snuff is snus pronounced “snoose”. Some people inhale dry snuff into the nose.

Chewing Tobacco- Chewing tobacco is a type of smokeless tobacco product consumed by placing a portion of the tobacco between the cheek and gum or upper lip teeth and chewing. Nearly all modern chewing tobaccos are produced via a process of leaf curing, cutting, fermentation and processing or sweetening.

Gutka or Gutkha is a preparation of sweeten tobacco along with crushed betal nut, slaked lime etc. It is a mild stimulant manufactured in India and exported to a few other countries in small, individual-sized packets that cost between 2 and 10 rupees per packet. Gutka is consumed by placing a pinch of it between the gum and cheek and gently sucking and chewing. There is no safe form of tobacco.

ii. Alcohol

Alcohol is already the second largest risk factors for the development of oral cancer. Addiction of alcohol consumption along with tobacco increases the risk of developing oral cavity cancers. The dehydrating effect of alcohol affected mouth tissues; additionally, nutritional deficiencies associated with heavy drinking can lower the body's natural ability to use antioxidants to prevent the formation of cancers. Eliminating the use of tobacco and reducing intake of alcohol immediately reduces risk of developing oral cancer 13.

iii. Cigarettes

Evidence from various epidemiological studies has shown the association between cigarette smoking and oral cancer 14.

The mortality risk for oral cancer in cigarette smokers is substantially greater than who are non smokers. Furthermore, the risk for death from oral cancer is related to number of cigarettes consumed in smokers. The more cigarettes consumed daily and the more years one has smoked, the greater the risk. In numerous studies examining the relative risk for oral cancer among former smokers have found that the risk for oral cancer was lower among former smokers after the first few years of non smoking than for those who continued to smoke. These studies have found that after 3 to 5 years of smoking abstinence, oral cancer risk decreased by about 50% 15.


iv. Cigars and Pipes

Cigarette smoking being a direct form of tobacco increases risk of oral cavity cancer. At the same time regular use of cigars and pipes which have indirect contact of tobacco, also showed increased incidence of oral cancer. Both prospective and retrospective studies have consistently documented that pipe and cigar smokers experience mortality rates for oral cancer either similar or higher than those risks observed among cigarette smokers.\textsuperscript{16,17}

2) MOUTHWASH

There is some concern that mouthwashes might cause oral cancer because they have high alcohol content and are used frequently. The link between oral cancer and mouthwash is less clear. The association was only significant when looking at very frequent use (three times a day).\textsuperscript{18}

3) DIET

Linking of deficient diet and oral cavity cancer is not as evident to that of tobacco and alcohol consumption. In some studies low beta-carotene intake has been associated with an increased risk of lung, laryngeal, gastric, ovarian, breast, cervical, and oral cancers.

Several studies have shown that a low intake of fruits and vegetables, which are the primary sources of beta-carotene, is also related to a generalized increased cancer risk and mortality.\textsuperscript{19}


4) **ACTINIC RADIATION**
Sunlight, through actinic radiation, helps to produce cancer along the vermilion border of the lip. These "sunlight" induced cancers are much more common in fair-skinned individuals exposed to the outdoor life than in individuals with darker pigmentation. It appears that darker pigment protects against actinic radiation damage 20.

5) **DENTAL FACTORS**
Poor oral hygiene, improperly fitting dental prostheses, defective dental restorations, or misaligned or sharp teeth promotes oral cancer 21.

6) **VIRUSES AND THEIR INTERACTIONS WITH ONCOGENES –**
The human papilloma virus (HPV) is a double-stranded DNA virus. It infects the epithelial cells of skin and mucosa. The moist epithelial surfaces (squamous cells) include all areas covered by skin and/or mucosa such as the mouth interior, throat, tongue, tonsils, vagina, cervix, vulva, penis and anus. Transmission of the virus occurs when these areas come into contact with a virus, allowing it to transfer between epithelial cells. While it is established now that sexual contacts, both conventional and oral, are means of transferring the HPV virus through direct skin to skin contact22. HPV plays a role in some head and neck cancers.

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   http://www.jaad.org/article/S0190-9622(11)01196-0/abstract


HPV positive oropharyngeal tumours compose a distinct clinical and pathological disease entity casually associated with HPV 23.

d. **ORAL CAVITY CANCER – SCREENING FOR EARLY DETECTION**

Screening of cancer means looking for a cancer before a patient has any symptoms. Appropriate cancer screening should lead to early detection of asymptomatic or unrecognized disease by the application of acceptable, inexpensive tests or examinations on large number of persons. The main objective of cancer screening is to detect cancer at an early stage when it is treatable and curable.

There is no standard or routine screening test for oral cancer.

Screening for oral cancer may be done during a routine check-up by a dentist or medical doctor. The exam will include looking for lesions, including areas of leukoplakia (an abnormal white patch of cells) and erythroplakia (an abnormal red patch of cells). Leukoplakia and erythroplakia lesions on the mucous membranes may become cancerous.

![Image of dental examination](image)

If lesions are seen in the mouth, the following procedures may be used to find abnormal tissue that might develop into oral cancer:

i. **Exfoliative cytology:** A procedure to collect cells from the lip or oral cavity. A piece of cotton, a brush, or a small wooden stick is used to gently scrape cells from the lips, tongue, mouth, or throat. The cells are viewed under a microscope to find out if they are abnormal.

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ii. **Fluorescence staining**: A procedure in which lesions in the mouth are viewed using a special light. After the patient uses a fluorescent mouth rinse, normal tissue looks different from abnormal tissue when seen under the light.

iii. **Toluidine blue stain**: A procedure in which lesions in the mouth are coated with a blue dye. Areas that stain darker are more likely to be cancer or become cancer.

iv. **Brush biopsy**: The removal of cells using a brush that is designed to collect cells from all layers of a lesion. The cells are viewed under a microscope to find out if they are abnormal.
More than half of oral cancers have already spread to lymph nodes or other areas by the time they are found. No studies have shown that screening would decrease the risk of dying from this disease \(^{25,26}\).

\(^{25}\). [URL](http://www.cancer.gov/cancertopics/pdq/screening/oral/Patient/page3)

\(^{26}\). Harrison’s Principal of Internal Medicine, Fauci, Braunwald, Kasper, Hauser, Longo, Jameson, Loscalzo, 17th edition, Part 6, Chapter 78, pp489-490
e. **ORAL CAVEITY CANCER - SIGNS AND SYMPTOMS**

Manifestations of oral cavity cancer vary according to the stage and primary site of tumour. Carcinoma of oral cavity commonly present with following Signs and symptoms\(^{27}\).

1. A patch in the mouth which is rough and does not heal within two weeks
2. Small lump inside the inner lining of oral cavity
3. Erosions around lips and gums
4. Numbness, loss of feeling and sensation inside the oral cavity
5. Loosening of teeth and bad breathe
6. Decreased tongue mobility
7. Loss of taste
8. Altertions in speech
9. Loss of appetite
10. Severe weight loss
11. Difficulty in swallowing
12. Trismus
13. Lymphadenopathy in neck region

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\(^{27}\) Harrison's Principal of Internal Medicine, Fauci, Braunwald, Kasper, Hauser, Longo,Jameson, Loscalzo, 17 th edition, Part 6, Chapter 86 , pp548-549
f. ORAL CAVITY CANCER – DIAGNOSIS

Diagnostic work up in oral cancer can be done as follows 28.

1. **History and physical examination** – The initial evaluation includes a thorough head and neck examination by one or more physicians. The location and extent of the primary tumour and any clinically positive cervical lymph node documentation can be done through this.

2. **CT scan / MRI** – Almost all patients undergo contrast enhanced CT or MRI or both for further defining the extent of local regional disease. The scan should be obtained before biopsy so that changes of biopsy are not confused with tumour.

3. **Biopsy** - If any abnormalities are found during the examination, a small tissue sample, or biopsy, is usually taken. This procedure is completed under local anaesthesia.

4. **Fine-needle-aspiration biopsy (FNA):** Patients presenting with a metastatic node from an unknown primary site undergo FNA of the node.

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5. **Ortho Pan Tomogram (OPG)**- OPG or plain radiograph of mandible will be done if the lesion extends to lower GB sulcus or lower alveolus.

![Ortho Pan Tomogram](image)

6. **A chest radiograph** is obtained to determine the presence of distant metastases.

7. Positron emission tomography (PET) may be useful to determine peripheral metastasis.

8. Complete blood counts, renal function tests including creatinine clearance & liver function tests may be needed.
g.  **STAGES OF ORAL CAVITY CANCER**

The staging for the primary lesions (T) is given in the site specific section oral cavity. The American Joint Committee on Cancer (AJCC) (2002) neck staging (N) is common to all head and neck sites, except the nasopharynx.²⁹

**TNM STAGING SYSTEM**

Method of staging oral carcinomas is referred as the TNM method. In this method T describes the tumour, N describes the lymph nodes, and M describes distant metastasis.³⁰

**T – (Tumour) TX** - Primary tumour cannot be assessed.

- **T0** - No evidence of primary tumour.
- **T1** - Tumour 2 cm or less in greatest dimension.
- **T2** - Tumour more than 2 cm but not more than 4 cm in greatest dimension.
- **T3** - Tumour more than 4 cm in greatest dimension.
- **T4** - Tumour invades adjacent structures e.g., through cortical bone, into deep [extrinsic] muscle of tongue etc.

**N- (Lymph nodes) NX-** Regional lymph nodes cannot be assessed.

- **N0** - No regional lymph node metastasis.
- **N1** - Metastasis in a single ipsilateral lymph node, 3 cm or less in greatest dimension.
- **N2** - Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension and in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension; in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension.

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N2a - Metastasis in single ipsilateral lymph node more than 3 cm but not more than 6 cm in greatest dimension.

N2b - Metastasis in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension.

N2c - Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension.

N3 - Metastasis in a lymph node more than 6 cm in greatest dimension.

M (Metastasis) MX- Presence of distant metastasis cannot be assessed

M0 - No distant metastasis.

M1 - Distant metastasis.

The format for combining T and N stages into an overall stage is as follows –

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>Tis</th>
<th>N0</th>
<th>M0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>T1</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage II</td>
<td>T2</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage III</td>
<td>T3</td>
<td>N0</td>
<td>M0 /</td>
</tr>
<tr>
<td></td>
<td>T1-T3</td>
<td>N1</td>
<td>M0</td>
</tr>
</tbody>
</table>

Stage IV can further divide into -

<table>
<thead>
<tr>
<th>Stage IV A</th>
<th>T4a</th>
<th>N0-N1</th>
<th>M0 /</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1-T4a</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IV B</td>
<td>Any T</td>
<td>N3</td>
<td>M0 /</td>
</tr>
<tr>
<td></td>
<td>T4b</td>
<td>Any N</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IV C</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
</tbody>
</table>
h. **ORAL CAVITY CANCER MANAGEMENT**

Surgery and radiation therapy are the only curative treatments for carcinoma arising in the head and neck. Chemotherapy is useful in the adjunct setting; used alone, it is not curative\(^\text{31}\).

**Advantage of surgery with radiation therapy may include following** –

1. A limited amount of tissue is exposed to treatment.
2. Treatment time is shorter.
3. The risk of immediate and late side effects can be avoided.

**Advantage of irradiation may include the following** –

1. The risk of a major postoperative complication is avoided.
2. No tissues are removed so that the probability of a functional or cosmetic defect may be reduced.
3. Elective irradiation of the lymph nodes can be included with little added morbidity, whereas the surgeon must observe the neck or proceed with an elective neck dissection (sometimes bilateral depending on the primary site).
4. The surgical salvage of irradiation failure is probably more likely than the salvage of a surgical failure.

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Treatment options for oral cavity cancer by stage—
(Practice Guidelines for Buccal mucosa cancer (SCC) in India according to Indian Council of Medical Research Guidelines)\textsuperscript{32}.

The type of treatment depends on the stage of cancer and tumour site.

<table>
<thead>
<tr>
<th>Stage (TNM)</th>
<th>Initial treatment planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 N0 M0</td>
<td>Surgery or Radiotherapy (RT) (EBRT+ISI Boost)</td>
</tr>
<tr>
<td>T2 N0 M0</td>
<td>Surgery (Primary + SOHND or RT(EBRT +ISI boost)</td>
</tr>
<tr>
<td>T3/ T4a N1/N2 M0</td>
<td>Surgery followed by CT-RT (or RT) or Radical CT + RT.</td>
</tr>
<tr>
<td>T3/ T4 N1/N2 M0 Borderline</td>
<td>Induction chemotherapy followed by surgery or CT + RT</td>
</tr>
<tr>
<td>T4B or N3 (Fixed Node)</td>
<td>Chemotherapy /RT</td>
</tr>
<tr>
<td>Occult primary (SCC on biopsy)</td>
<td>Surgery or CT +RT</td>
</tr>
<tr>
<td>Recurrent disease &lt; 6 months old</td>
<td>CT + RT if patient had undergone surgery earlier and surgery if CT + RT earlier</td>
</tr>
<tr>
<td>Recurrent disease &gt; 6 months after initial treatment</td>
<td>Surgery if resectable / CT + RT if unresectable and RT Naive</td>
</tr>
<tr>
<td>Recurrent disease advanced</td>
<td>Palliative chemotherapy or best supportive care.</td>
</tr>
</tbody>
</table>

\textsuperscript{32.} Indian Council of Medical Research Guidelines for Management of Buccal Mucosa Cancer\textsuperscript{a}Indian Council of Medical Research, New Delhi – 110029, 2010
ORAL CANCER TREATMENT - RADIOTHERAPY

Radiation therapy uses high-energy x-rays or particles to destroy cancer cells or slow their rate of growth. Radiation therapy can be prescribed before surgery, after surgery, or sometimes as the only treatment. Although radiation damages both cancer cells and normal cells, healthy cells are able to repair themselves and return to proper functioning. The total dose of radiation therapy prescribed by the radiation oncologist is broken down into small amounts (fractions) which are given on a daily basis, usually five days in a row with a two day break each week. It has been found that patients better tolerate the smaller daily doses while still receiving the maximum benefit of the treatments.

Radiation therapy can be used in following situations for oral cancers:

- It can be used as the main treatment for small cancers.
- Patients with larger cancers may need both surgery and radiation therapy or a combination of radiation therapy and chemotherapy or a targeted drug.
- After surgery, radiation therapy can be used, either alone or with chemotherapy, as an additional (adjuvant) treatment to try to kill any small deposits of cancer that may not have been removed during surgery. This is known as adjuvant radiation therapy.
- Radiation may be used (along with chemotherapy) to try to shrink some larger cancers before surgery. This is called neo adjuvant therapy. In some cases this makes it possible to use less radical surgery and remove less tissue.
- Radiation therapy can also be used to relieve symptoms of more advanced cancer, such as pain, bleeding, trouble swallowing, and problems caused by bone metastases.
j. ORAL CANCER TREATMENT – RADIOThERAPY – SIDE EFFECTS

Xerostomia

Xerostomia, commonly called dry mouth, occurs when the salivary glands do not make enough saliva, or spit, to keep the mouth moist. Because saliva is needed for chewing, swallowing, tasting, and talking, these activities may be more difficult with a dry mouth.33

Xerostomia is experienced by the patient receiving radiation therapy to the head and neck region. The parotid and the submandibular glands are the main contributors to salivary flow, contributing approximately 90% of salivary volume. The secretory unit of the salivary gland is constructed of acinar cells, myoepithelial cells; intercalated ducts, striated ducts and excretory ducts. The acini are responsible for secreting serous and mucous constituents of saliva. Severity of xerostomia dependant on radiation dosage and location, and volume of exposed salivary glands. Xerostomia can affect oral confort, fit of prostheses, speech and swallowing. Many of the enzymes found in patients with xerostomia contribute to the growth of caries-producing organisms, and the decrease in quantity and quality of saliva can be harmful to the dentures.34

33. Xerostomia and hypofunction of the salivary glands in cancer therapy ,(2003), Siri Jensen , Anne Pedersen, Jesper Reibel, Birgitte Nauntofte, Supportive Care in Cancer , , Volume 11, Issue 4, pp 207-225

**Excessive Salivation**

The stringy saliva is the initial phase of dry mouth. The damaged saliva glands are still working but are not able to produce the lighter type of saliva, thus only the thicker type remains.

**Stomatitis / Oral Mucositis**

Oral mucositis is probably the most common, debilitating complication of radiotherapy. Radiation induced mucositis is initiated by direct injury to basal epithelial cells and cells in the underlying tissue. It can lead to several problems, including pain, nutritional problems as a result of inability to eat, and increased risk of infection due to open sores in the mucosa. It has a significant effect on the patient’s quality of life and can be dose-limiting (i.e., requiring a reduction in subsequent radiotherapy doses)\(^3\).
Trismus
The term 'trismus' has been used to describe any restriction to mouth opening, including restrictions caused by trauma, surgery or radiation. This limitation in the ability to open the mouth can have serious health implications.\(^{36}\)

Problems caused by trismus are as follows -

- **Eating issues** - Limited mouth opening frequently results in reduced nutrition. The inability to open the mouth to receive more than a very small amount of food makes eating quite difficult. Patients with this condition may experience significant weight loss, and may have significant nutritional deficits.
- **Limited mouth opening** may also result in compromised airway clearance.

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• Oral hygiene issues - Limited mouth opening can result in compromised oral hygiene. In cancer patients who have received radiation oral hygiene is of particular importance.

• Swallowing and speech issues - Many persons with limited mouth opening also present with difficulty in swallowing and speech. Speech is compromised when the mouth is unable to open sufficiently to create normal sounds. Swallowing is compromised when, due to muscle damage, surgery or radiation, the larynx is unable to be properly elevated, or when the timing of the elevation does not coincide with the passage of the bolus.

• Joint Immobilization - Although the most apparent signs of trismus involve the ability to open the mouth, it is important to realize that there are likely to be problems within the joint, as well. When a joint is immobilized, degenerative changes occur within the joint. These changes may mimic arthritic changes, and may be accompanied by inflammation and pain.

**Weight Loss**

Patients when treated with radiotherapy in head and neck cancer can lose weight because of dry mouth, poor appetite, taste changes, due to treatment and difficulty in swallowing due to soreness or swelling in throat. These effects may be temporary and will gradually go back to normal after a few months when the treatment ends.
**k. ORAL CANCER - REHABILITATION**

Rehabilitation is an essential phase of cancer care and should be considered from the time of diagnosis in a complete and comprehensive treatment plan. Post treatment functional limitations may result from any treatment for head and neck cancer. Combined modality treatments multiples the risk for functional deficit after treatment. Surgical resections often create large defects accompanied by dysfunction and disfigurement, and radiation therapy produces significant morbidity and unique tissue-management problems. Speech, swallowing, control of saliva, and mastication can all be adversely affected. This dispersion of potential deficits extends beyond the scope of any single professional. Thus patients benefit most from multidisciplinary rehabilitation efforts. If these cosmetic and functional impairments are not corrected or minimized, the patient may be unable to resume a normal working and social life.\(^{37}\)

The primary objective of rehabilitation is the restoration of appearance and function. How successfully this is accomplished, depends upon both the judgment and skill of the therapist, and the post-treatment anatomic, physiologic, and psychological makeup of the patient.

Rehabilitation of the head and neck cancer patient requires a team approach, which includes many specialists. In addition to the surgeon, the dental oncologist and the prosthetic doctor, there are many other individuals involved as part of the restorative team. As there may be conditions which alter eating habits, dietitians advise patients on proper nutrition. Occupational and physical therapists help retrain altered muscular systems, and the speech pathologist can help patients to adapt speech mechanisms to prosthetic appliances, and altered physiology. Dental hygienists provide prophylaxis and oral-health-care instruction.

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\(^{37}\) Cancer Principal and Practice of oncology, Vincent T. Devita, Jr., Samuel Hellman, Steven A. Rosenberg, 7th edition, Chapter 26.2, pp 732-743
B) AYURVEDIC LITERATURE REVIEW

B-I) ANUKTA VYADHI FROM AYURVEDIC PERSPECTIVE

Cancer is not directly mentioned in Ayurvedic text as one disease. Many diseases which are described in Ayurvedic text show similes with cancer. Etiology (Nidan) pathogenesis (samprapti), treatment (chikitsa) of cancer can be described by considering the basic principles of Ayurveda.

Acharya Charaka has clearly mentioned that a physician should not bother too much to understand name of the disease. On the contrary he has to understand thoroughly Vikaraprakruti - state of vitiated, dosha, dhatu, mala causing disease, Adhisthanantarani - site of vitiated dosha and samutthanavishesha - cause of vitiation of dosha  

A vitiated dosha can exhibit various diseases according to different causes of vitiation & different sites. One, who treats the disease by the knowledge of these 3 things, achieves success in the treatment\textsuperscript{39, 40}.


B-II) DIAGNOSIS OF CANCER FROM AYURVEDIC PERSPECTIVE

Cancer is not mentioned in Ayurvedic Samhitas as a single disease. Various diseases mentioned in Ayurvedic texts like Dushta Vrana, Dushta Granthi, Dushta Arbuda, Dushta Vranashotha, Dushta Nadivrana, Dushta Visarpa show simili with cancer. Malignant tumours are divided as solid tumours and non-solid tumours in modern literature. Non solid tumours which mainly include Leukemia, Hodgkin’s diseases and Non-Hodgkin’s disease resemble

1. Rasa-Rakta Dhatugata Jwara- (Fever pertaining to Rasadhatu & Raktadhatu)
2. Raktapitta - (Bleeding Disorders)
3. Pandu - (Anemia)
4. Raktaja Krumi - (Worms’s causing skin disorders)

Solid malignant tumours are similar to diseases like

1. Dushta Shotha - (Malignant Oedema)
2. Dushta Vrana - (Malignant Wounds / Ulcers)
3. Dushta Granthi - (Malignant Nodes)
4. Dushta Arbuda - (Malignant Tumours)
5. Dushta Visarpa - (Malignant Spreading Cellulitis)
6. Dushta Nadivrana - (Malignant Fistula / Sinus)
7. Dushta Mansapradoshaja Vikara - (Malignant Diseases caused due to vitiation of Mansa dhatu)

All these diseases are various forms of Vranashotha as explained by Acharya Sushruta⁴¹.

⁴¹. Sushrut Samhita with commentary Ayurveda Tatvasandipika by Kaviraj Ambikadatta Shastri, Chaukhamba Sanskriti Sansthan, Varanasi (2005), sutrsthhan, 17/3, pp70
It is clearly mentioned by Charakacharya in trishothiya Adhyaya that Shotha developed at various sites, forms various diseases like adhimansa, arbud, shleepad etc.\textsuperscript{42}

B-III) STAGES OF CANCER FROM AYURVEDIC PERSPECTIVE

Basically Granthi, Arbuda, Visarpa, Nadivrana and Mansapradoshaja Vikara are various forms of Shotha (oedema), because Utsedha (growth / swelling) is the common and predominant symptom in them.

- Ayurvedic treatment differs in various avastha (stages) of the disease.
- Stages of cancer are described in following manner in Ayurvedic Samhitas –

a) According to progression of Shotha

1. Aama Avastha
2. Pachyamana Avastha
3. Pakwa Avastha (i.e. Acutely Tender Stage) of Shotha (Oedema)

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\text{आमा विषयमां च सम्यक् पाकचन् यो भिषक् ।}
\]
\[
\text{जानीयात् स भवदैवः शेषास्तत्सक्तत्तमः । ।}
\]
\[
\text{सू. सू. १७/११}
\]

The Aama (unripped stage), Pachyamana (semi -ripped stage) and Pakwa avastha (stage of inflammation), which are described in Shotha (Swelling), are also observed in above-mentioned diseases.

b) According to gati and swarupa of Dushta Dhatu causing disease

1. Dhatugata Awastha
2. Dhatupaka Awastha

\[
\text{मांसदौष्टेष पातीयात् अरुंधं मांससंबंधम् ।}
\]
\[
\text{शीर्षान्ते कस्य मांसानि यत्र सर्वत्रे: च वेदना । ।}
\]
\[
\text{विद्वात् ले मांसपाकं तु सर्वदेशचृतां भिषक् ।}
\]
\[
\text{सू. ति. १४ । १५}
\]


44. Acharya Narendra Nath Shastri (2002), Madhav Nidan of Acharya Madhav with Madhukosh commentary, edn. 3rd, Motilal Banarsidas, Chapter 2/66-73, Pg. 151 – 159

45. Sushrut Samhita with commentary Ayurveda Tatvasandipika by Kaviraj Ambikadatta Shastri, Chaukhamba Sanskriti Sansthan, Varanasi (2005), Nidanstan 14/15pp 290
c) According to Sadhya - Asadhya avastha of the disease. (curable & non-curable stage)

1. Sadhya Vyadhi
2. Asadhya Vyadhi

In Sushrut samhita along with Charak sutrasthan, adhyaya tenth, mahachatushapad criteria of sadhya – asadhya vyadhis are mentioned. As in many patients, cancer is diagnosed in late stage i.e. in Dhatupaka avastha (Stage of loss of tissues) and Dhatugata avastha; these are the signs of Asadhyatwa (Non-curable stage). At this stage also, physician should try his best to control further growth, to give relief to the patients suffering in miserable conditions⁴⁶.

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B-IV) Mukhagata Roga

Shalakya Tantra is one of the eight branches of Ayurveda which particularly deals with the diseases occurring in head, neck, eyes, ear and oral cavity. Mukhagata Roga is described in ancient Ayurvedic texts like Sushrut Samhita, Charak Samhita, Astanga Sangraha, Yoga Ratnakar, Madhav Nidan, etc.

Mukha– Mukha (Oral cavity) consists of 7 different parts –

1. Oshtha (Lips)
2. Dantmoola (Gums)
3. Danta (Teeth)
4. Jivha (Tongue)
5. Talu (Palate)
6. Gala (Throat)
7. Mukhadi (All of the above mentioned parts as a whole)\textsuperscript{47,48}

\textsuperscript{47} Yogaratnakar with Vidyodini Hindi Commentary of Shri Laxmipati Shastri Chaukhamba Prakashan (2012), pp 482.
\textsuperscript{48} Sushrut Samhita with commentary Ayurveda Tatvasandipika by Kaviraj Ambikadatta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi (2005), Nidanstan 16-3 pp294.
Aetiological factors (Nidan) of Mukhagata Roga –
Following etiological factors are taken into consideration while describing Mughgat Roga in ancient literature -

मल्लस्यमहिष्वायार्घिष्टामलक्ष्मूलक्रमः |
माषपुपुषपदिकंसुक्कसुतंसारसफागितमस्य |
अवार्तशया च भजतो दिशतो दंतधावनमस्य |
धूलचछर्दन्तङ्गुणुबिंदिं च सिसाव्यधमस्य |

वा.उ.२१-१, २

Dietary factors like fish, buffalo meat, pork which are heavy to digest; ash gourd, raddish, soup of black gram, curds, milk and milk products, vinegar, sugarcane juice and jaggery syrup consumed in excessive proportion can cause diseases of Oral cavity. Also, consumption of excessive hot and spicy food items can lead to diseases of oral cavity⁴⁹.

Sleeping in prone position (Avakchhaya), improper brushing habits, not following procedures like Dhoompana (inhaling medicated fumes), Vaman (emesis), Gandush (gargling with medicated decoctions) and Raktamokshan (blood letting) whenever required can also lead to diseases of oral cavity.

Pathogenesis (Samprapti) –
Pathogenesis of oral diseases is described as follows -

क्रुद्धा: श्लेष्मोल्वणा दोषा: कुर्वल्यंतमुखे गदानः |

वा.उ.२१-३

Improper dietary habit and improper behavioral habit leads to vitiation of tridosha to develop oral cavity diseases⁵⁰.

⁴⁹. Ashtanghridya, Vagbhat with Sarvasunder commentary of Arundatta and Ayurved Rasayan commentary of Hemadry, Chaukhamba Surbharati Prakashan, Varanasi (2010), Uttarsthan 21J1,2, pp 845
Types of Mukha Roga –

मुखरोगः पंचवट्टिर्मवर्ती सातस्वायत्नेषु।
तत्रादावोषष्ट्रः, पंचदशं दंतमूलेषु, अष्टों दंतेषु, पंच जिखायां,
नव तालूनि सप्तदशं कंठे, भ्रयः सर्वचायत्नेषु।

सू.ति. १६-३

There are various differences of opinion regarding the Samkya Samprapti or number of types of Mukha Roga⁵¹.

Table 1 – showing types of Mukhagat rog described in the ancient texts

<table>
<thead>
<tr>
<th>Site</th>
<th>Sushrut Samhita</th>
<th>Astanga Hridaya</th>
<th>Charak Samhita</th>
<th>Yoga Ratnakar</th>
<th>Madhav Nidan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oshtha</td>
<td>08</td>
<td>11</td>
<td>-</td>
<td>08</td>
<td>08</td>
</tr>
<tr>
<td>Dantmoola</td>
<td>15</td>
<td>13</td>
<td>-</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Dant</td>
<td>08</td>
<td>10</td>
<td>-</td>
<td>08</td>
<td>08</td>
</tr>
<tr>
<td>Jivha</td>
<td>05</td>
<td>06</td>
<td>-</td>
<td>05</td>
<td>05</td>
</tr>
<tr>
<td>Talu</td>
<td>09</td>
<td>08</td>
<td>-</td>
<td>09</td>
<td>09</td>
</tr>
<tr>
<td>Kanta</td>
<td>17</td>
<td>18</td>
<td>-</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Sarvamukha</td>
<td>03</td>
<td>08</td>
<td>-</td>
<td>03</td>
<td>03</td>
</tr>
<tr>
<td>Ganda</td>
<td>-</td>
<td>01</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65</strong></td>
<td><strong>75</strong></td>
<td><strong>64</strong></td>
<td><strong>67</strong></td>
<td><strong>65</strong></td>
</tr>
</tbody>
</table>

Symptoms of mukhaga rog (Samanya Lakshanas)-

The general symptoms of Mukha roga have been mentioned in the Vedana Adhaya of Kashyap Samhita in context with pediatric group. These are as follows –

लालस्त्रवणमस्तयथः स्तनवंदेयारतिवथः्।
पीलमुद्दिष्टि क्रीरं नासाश्वासी मुखामयेः।

का.सं.सू. २५-४

These symptoms can be co-related to other age group also. These symptoms can be in the form of:

1. Excessive salivation
2. Anorexia
3. Regurgitation
4. Tachypnoea
5. Loss of appetite

---

Mukhagata Roga which are correlated with Oral cavity Cancer

Amongst the various diseases of oral cavities described by our Ayurvedic scholars, few of these which are relevant for the present study can be correlated with malignant manifestations. These are as follows –

Kaphaj Jivha Kantaka - This disease is mentioned under Jivha gata roga and can be correlated with chronic glossitis or Leucoplakia which is pre malignant condition of tongue cancer.

Signs and Symptoms - In this condition, vitiated Kapha dosha causes jihva as heavy, thick, wide and is scattered with thorny buds resembling Shalmali Kantak and is associated with pain, discomfort, itching sensation and sticky salivation.

Treatment – The treatment described in this condition is in the form of scrapping, gargling with white seasame oil mixed with rock salt, bloodletting, local application of powder of long pepper and honey and few dietary recommendations like vegetables in the form of snake gourd, Nimba, bringal; kshara and lentil soups.

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54. Sushrut Samhita with commentary Ayurveda Tatvasandipika by Kaviraj Ambikadatta Shastri, Chaukhamba Sanskriti Sansthan, Varanasi (2005), Chikitsasthan 22-46, 47 pp 100
- Lekhana (Scraping) or Gharshana with the leaves of Gojihva or Shephalika to remove the impure blood.
- Rakta Mokshan (Blood letting)
- Pratisaran – Local application over tongue lesions with Trikatu, Sarshapa + Saindhav + Madhu.
- Kavala and Gandusha– Gargling with Shweta Sarshapa + Saindhav.
- Yusha sevan – Yusha prepared with Patola, Nimba twak, Varthaka and Yavakshara.

**Galarbuda** - This disease is mentioned under Gala gata Roga and can be correlated with tumour in throat region in the vicinity of tongue.

**Signs and Symptoms** - In this condition, vitiated Vatadi doshas produces a hard, immobile, painless, non-suppurative, reddish tumour in the throat in the vicinity of tongue.\(^{55}\)

According to Acharya Vagbhatt, this is asadhya (incurable) type of disease.

**Treatment** – The treatment described in this condition is in the form of excision, gargling, nasal drops, local application and few dietary recommendations.

- Chedana (Excision) to be done if the growth is small
- Pratisaran – Local application over the lesion with Sarja kshara + Shunthi + Madhu.
- Gandusha– Gargling with Guduchi + Nimba Kashaya + Honey + Tila Tailam.
- Nasya and Abhyanga.
- Yavanna sevan.

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\(^{55}\) Ashtanghridya, Vagbhatt with Sarvasunder commentary of Arundatta and Ayurved Rasayan commentary of Hemadry, Chaukhamba Surbharati Prakashan, Varanasi (2010), Uttarsthan, 21-52-53, pp 849
Kapharbuda = This disease is mentioned under Mukhadi Roga and can be correlated with Cancer of Buccal Mucosa.

अंतःकपोलमाधिनित्रेष्यावपूं: कपोलबुद्धम् ।
कुर्माललापितं छिन्नं मुदितं च विकर्घते ॥
बादले. २१-६२, ६३

Signs and Symptoms - In this condition, vitiated Kapha dosha produces a blackish-white color tumour in the oral cavity specifically in the internal surface of Kapola i.e. cheeks. By compression, incision and excision the disease recurs and aggravates\(^5\)

According to Acharya Vaghbhatt, this is asadhya (incurable) type of disease.

Treatment – The treatment described in this condition is in form of excision, gargling, nasal drops, local application and few dietary recommendations.

नवेद्वैद्वत्तसंवृध्दे छेदिते प्रतिसारणम् ।
स्वर्जिकानागरकृत्रैः क्वाशो गंधृत्य इङ्गले ॥
पुरुषीनिनिबक्तकोल्चुओ मधुतत्तममिति: ।
यवान्कुलं तीक्ष्णतत्त्वायमंगास्तथाचरेत् ॥
बादले. २२-७७ ते ७९

- Chedana (excision) to be done if the growth is small
- Pratisaran – Local application over the lesion with Sarja kshara + Shunthi + Madhu.

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\(^5\) Asstanghriyda, Vagbhat with Sarvasunder commentary of Arundatta and Ayurved Rasayan commentary of Hemadry, Chaukhamba Surbharati Prakashan, Varanasi (2010), Uttarsthan, 21-62,63, pp 850
- Gandusha – Gargling with Guduchi + Nimba Kashaya + Honey + Tila Tailam.
- Teekshna Nasya, Dhoomapana and Abhyanga.
- Yavanna sevan.
- Kaphahara Picchu at the site of vrana (lesion or ulcer)\(^{57}\).

**Sarvasara Mukha Roga** - They occur by spreading completely in the Mukha so named as Sarvasara mukha roga\(^{58}\). They are also called as Mukha Roga. In this the main sign is inflammation or ulceration in the oral cavity. This sign is mainly seen in all types of oral cavity cancers and also can be pre-malignant and malignant stage.

**Dushta Arbuda as Mansapradoshaja Vyadhi and it’s management**

\[\text{शृणु मांसप्रकोपज्य} \]
\[\text{अधिमांसप्रकोपकोल गलाशालकुक्षुणिका} \]
\[\text{मूलमांसप्रकोपयुग्म गण्डमालोपिष्टिका} \]
\[\text{विद्यामांसप्रकोपवत} \]
\[\text{च. सू. २८/१३-१४} \]
\[\text{मांसजनान्त्र संशुधिः शस्त्रहारानिकर्मच च} \]
\[\text{च. सू. २८/२६} \]

Dushta arbud is mentioned as one of mansapradoshja vyadhi in Charak Samhita. The line of treatment in this condition is shastrakrma, agnikarma and ksharakarma\(^{59,60}\).

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Agni karma, Kshara Karma and Shastra Karma in treatment of Cancer

Kshara Karma, Agani Karma & Shastra Karma are the choice of treatment in Arbuda & Granthi. These treatment need to be carried out without injuring / causing harm to the vital organ involved.

According to Ayurveda generally complete excision of granthi / arbuda (tumour) is recommended. After excising the tumour growth, Agnikarma (type of cauterization) is to be carried out. This is helpful in complete removal of tumour. Growth which is not removed completely, recurrence may take place.

Therefore it is advisable to remove the tumour in accordance to the organ involved.

As per the modern terminology, surgery can be correlated to Shastrakarma, Chemotherapy to Kshara Karma & Radiation therapy to Agni Karma

B-V) PATHOGENESIS OF SIDE-EFFECTS OF RADIOTHERAPY IN ORAL CAVITY CANCERS AS PER AYURVEDIC PERSPECTIVE

I) Talushosha (Xerostomia)

Talushosh arises due to vitiation of Vata and Pitta. In this condition, there is dryness in the talu region, sometimes it might bifurcate (as seen in cleft palate) and is associated with shwas (Dyspnoea) 63.

Treatment – The treatment described in this condition is in the form of gargling, nasal drops, local application and few dietary recommendations 64.

- Vata pitta har chikitsa.
- Intake of ghee after meals.
- Amla dravya or sneha dravya gandush.
- Kshirisarpi nasya (Ghee + Milk).

II) Mukhapaka – (Stomatitis)

There are 5 types of Mukha Paka –

i) Vataj Mukha Paka – This condition can be correlated with Stomatitis.

Signs and Symptoms - In this, vitiated Vata dosha causes a single or multiple ulcers in the oral mucosa with acute inflammatory changes. The disease is progressive in nature, very painful, mucosa becomes dry and rough. The associated symptoms are inflammed lips, tongue and palate, difficulty in opening the mouth and sensitivity to cold items, etc.

63. Sushrut Samhita with commentary Ayurveda Tatvasandipika by Kaviraj Ambikadatta Shastri, Chaukhamba Sanskriti Sansthan, Varanasi (2005), Nidansthan, 16/45, pp299
64. Sushrut Samhita with commentary Ayurveda Tatvasandipika by Kaviraj Ambikadatta Shastri, Chaukhamba Sanskriti Sansthan, Varanasi (2005), Chikitsasthan, 22/58, pp101
Treatment –

- Nidan Parivarjan (avoiding causative factors)
- Snehan, swedana (oleation and Fomentation)
- Shodhana Karma (vaman, Virechan, Nasya, Rakta mokshan)
- Kavalgraha / Gandush with Triphala Kashaya, Rasnadi Kashaya, Dashmoola Kashaya, Vatahara Taila or Ghrita.
- Snehika Dhoomapana (medicated smoking) with Shalaphadi drugs, sarjarasa, khadiradi vati, etc.
- Snehana Nasya with Vatahara Taila or Ghrita.
- Lekhana and Pratisaran

ii) Pittaj Mukha Paka – This condition can be correlated with Acute Stomatitis.

**Signs and Symptoms** - In this, vitiated pitta dosha causes inflammation and ulceration of oral mucosa. Smaller reddish yellow papules develop throughout the mouth and causes severe burning, altered taste, difficulty in mastication and deglutition.

Treatment –

- Nidan Parivarjan (avoiding causative factors)
- Snehan, swedana (oleation and fomentation)
- Shodhana Karma (Vaman, Virechan, Nasya, Rakta mokshan)

- Kavalgraha / Gandush with Panch valkal Kashaya, Pancha Tikta Kashaya, Yashtimadhu Kashaya, milk, sugarcane juice and ghee.
- Shaman Dhoomapana (Medicated Smoking)
- Nasya with Sheeta virya, Pittahara Taila or Ghrita or Kashaya.
- Lekhana and Pratisaran\(^66\).

### iii) Kaphaj Mukha Paka –
This condition can be correlated with Sub acute or chronic Stomatitis.

**Signs and Symptoms** - In this, vitiated Kapha dosha causes inflammation and ulceration of oral mucosa. The mouth becomes sweet and sticky with itching sensation and negligible pain. Small cysts or tumours develop and become more severe by compression and excision.

*कफज मधुरास्वत्वं कंठदृष्टिगतिक्षिणाः प्रकरणः* ।

वा.उ. २१-६२

**Treatment** –
- Nidan Parivarjan (avoiding causative factors)
- Snehan, swedana (oleation and fomentation)
- Shodhana Karma (Vaman, Virechan, Nasya, Rakta mokshan)
- Kavalgraha / Gandush with Khadiradi Taila, Haridradi Taila, Trikatu Kashaya.
- Virechanika Dhoomapana (Medicated Smoking)
- Lekhana / Bhedhan / Chedan and Pratisaran\(^67\).

### iv) Sannipataja Mukha Paka –
All the symptoms of Tridosha and Rakta dosha are present in this disease.

**Treatment** – Tridosha hara Chikitsa should be given. Pratisaran with Haridra + Kasis + Rasanjan + Mocha rasa + Madhu

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\(^66\) Ashtanghridya, Vagbhat with Sarvasunder commentary of Arundatta and Ayurved Rasayan commentary of Hemadry, Chaukhamba Surbharati Prakashan, Varanasi (2010), Uttarsthhan, 21-61, pp850

\(^67\) Ashtanghridya, Vagbhat with Sarvasunder commentary of Arundatta and Ayurved Rasayan commentary of Hemadry, Chaukhamba Surbharati Prakashan, Varanasi (2010), Uttarsthhan, 21-62, pp 850
v) **Raktaj Mukha Paka** – All the signs and symptoms and treatment are like Pittaja Mukha Paka. 68

रक्तेन पिल्लोदित एक एव कैशिण्ट्र प्रदिपो मुखायकसंवः ।
सू.नि. १६-६४ ते ६६

III) **Talupak (Stomatitis)**

पिल्लं कुर्यात्पाकमत्यधोरं तालुन्येन तालुपकं वदन्ति ।
सू.नि. १६-४५

Vitiated Pitta causes severe dreadful ulceration in talu region. Sometime the ulcer may be painful and pus discharging 69.

**Treatment** -

तालुपके तु कर्तव्य विधानं पिल्लाननम् ।
सू.चि. २२-५८

**Treatment** – The treatment described in this condition is in the form of gargling, nasal drops, local application and few dietary recommendations 70.

- Pitta- visarp har chikitsa.
- Kaval with shita, Kashaya and Madhur dravyas like Kakolyadi Gana.
IV) Hanugraha (Trismus)

In this condition there is difficulty in opening of mouth and disability in movement of jaw.\textsuperscript{71}

Snigdha Chikitsa is mentioned for Hanugraha in chikitsasthana\textsuperscript{72}.

\textsuperscript{71} Ashtanghridya, Vagbhat with Sarvasunder commentary of Arundatta and Ayurved Rasayan commentary of Hemadry, Chaukhamba Surbharati Prakashan, Varanasi (2010), Nidansthan 15/29, pp 533

\textsuperscript{72} Ashtanghridya, Vagbhat with Sarvasunder commentary of Arundatta and Ayurved Rasayan commentary of Hemadry, Chaukhamba Surbharati Prakashan, Varanasi (2010), chikitsasthan, 21/40-41, pp 725
V) Aruchi and Hrullas (Loss of taste and Nausea)

अश्रध्दा चारुविध्वायस्यवस्यमसंग्रहता
हललासो गौरवं तन्त्रा साधनवन्त्यज्यरस्तमः

च. सू. २८/९

Aruchi and Hrullas are caused due to Rasavaha srotodushti. In this condition there is loss of taste sensation and nausea

Treatment –

रजसजनानं विकाराणां सर्वं लघुलमोपधमः

च. सू. २८/२५

Treatment – The treatment described in this condition is Langhan.

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C) DRUG REVIEW

Combination of Ayurvedic drugs which are selected for this study on the basis of following review -

As mentioned in Vagbhatt the signs of ati daghdha can be correlated with side effects caused due to radiotherapy. These can be charring of the skin associated with blackish discoloration along with Jwara, Daha, Trushna and Murchha\textsuperscript{75}.

Treatment –

Ropan chikitsa is the best line of treatment in such conditions. For This Madhur, Kashay, Tikta rasatmak, Shit Veeryatmaka, Snigdha Gunatmak dravyas are used which pacifies Pitta and Rakta and ultimately cause Pitta shaman, Daha shaman and Raktta prasadan. Selection of drugs in our study has been done keeping in mind this chikitsa sutra \textsuperscript{76}.

\textsuperscript{75} Ashtanghridya, Vagbhat with Sarvasunder commentary of Arundatta and Ayurved Rasayan commentary of Hemadry, Chaukambha Surbharati Prakashan, Varanasi (2010), Sutrasthan30/47, pp 359

\textsuperscript{76} Sushrut Samhita with commentary Ayurveda Tatvasandipika by Kaviraj Ambikadatta Shastri, Chaukambha Sanskriti Sansthan, Varanasi (2005), Sutrasthan, 12/27-29,pp42
Table 2— Details of contents of Mouktikayukta Kamdudha

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Dravya Name</th>
<th>English Name</th>
<th>Rasa (Taste)</th>
<th>Veerya (Potency)</th>
<th>Vipaka (Post-digestive test)</th>
<th>Doshghnata (Action on doshas)</th>
<th>Karya (Action)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Praval</td>
<td>Coral</td>
<td>Madhur(Sweet), Amla (sour ), Kashay (Astringent)</td>
<td>Sheeta (Cold)</td>
<td>Madhur (Sweet)</td>
<td>Pittashamak, Kaphaghna</td>
<td>Rasayan, Jwaraghna, Raktapitahara, Vishbadhahara</td>
</tr>
<tr>
<td>2</td>
<td>Mouktika</td>
<td>Pearl</td>
<td>Madhur (Sweet), Kashay (Astringent)</td>
<td>Sheeta (Cold)</td>
<td>Madhur (Sweet)</td>
<td>Tridoshshamak</td>
<td>Daha shamak, Balya</td>
</tr>
<tr>
<td>3</td>
<td>Shankha</td>
<td>Conch shell</td>
<td>Tikta (Bitter)</td>
<td>Ushana (Hot)</td>
<td>Madhur (Sweet)</td>
<td>Kaph pitta shamak</td>
<td>Chhradighna</td>
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<tr>
<td>4</td>
<td>Shauktika</td>
<td>Peral Shell</td>
<td>Katu (Pungent)</td>
<td>Sheeta (Cold)</td>
<td>Madhur (Sweet)</td>
<td>Vat Pittagha</td>
<td>Arochakahar, Chhardighna</td>
</tr>
<tr>
<td>5</td>
<td>Kapardika</td>
<td>Cowrie shell</td>
<td>Katu (Pungent)</td>
<td>Sheetoshna</td>
<td>Madhur (Sweet)</td>
<td>Vat Kaphaghna</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Guduchi</td>
<td>Tinospora cordifolia</td>
<td>Tikta, Kashay</td>
<td>Ushna</td>
<td>Madhura</td>
<td>Tridoshshamak</td>
<td>Deepan, Pachak, Pittasarak, Balya, Raktashodhak, Jwaraghna, Dahaprasahan</td>
</tr>
<tr>
<td>7</td>
<td>Gairik</td>
<td>Red Lumber Stone</td>
<td>Madhur Kashay</td>
<td>Sheet</td>
<td>Madhur</td>
<td>Pittashamak</td>
<td>Pittashamak, Vishhara</td>
</tr>
</tbody>
</table>

77. Sharma HP Rasa Yoga Sagar Part -1, Krishnadas Ayurved Series, pp 260
Table 3 – Details of contents of Mouktikayukta Praval Panchamrut

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Dravya Name</th>
<th>English Name</th>
<th>Rasa (Taste)</th>
<th>Veerya (Potency)</th>
<th>Vipaka (Post-digestive test)</th>
<th>Doshghnata (Action on doshas)</th>
<th>Karya (Action)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Praval</td>
<td>Coral</td>
<td>Madhur (Sweet), Amla (sour), Kashay (Astringent)</td>
<td>Sheeta (Cold)</td>
<td>Madhur (Sweet), Pittashak, Kaphaghna</td>
<td>Rasayan, Jwaraghna Raktapittahar, Vishbadhahar</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mouktika</td>
<td>Pearl</td>
<td>Madhur (Sweet), Kashay (Astringent)</td>
<td>Sheeta (Cold)</td>
<td>Madhur (Sweet), Tridoshshamak</td>
<td>Daha shamak, Balya</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shankha</td>
<td>Conch shell</td>
<td>Tikta (Bitter)</td>
<td>Ushana (Hot)</td>
<td>Madhur (Sweet), Kaph pitta shamak</td>
<td>Chhradighna</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Shauktika</td>
<td>Pearl Shell</td>
<td>Katu (Pungent)</td>
<td>Sheeta (Cold)</td>
<td>Madhur (Sweet), Vat Pittagghna</td>
<td>Arochakhar, Chhardighna</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Kapardika</td>
<td>Cowrie shell</td>
<td>Katu (Pungent)</td>
<td>Ushna (Hot)</td>
<td>Madhur (Sweet), Vatshamak Kaphaghna</td>
<td>Dahshamak, Deepan, Raktavikarhar, Pittahar</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Arka kshira</td>
<td>Calotrophis giganticum</td>
<td>Tikta (Bitter) Lavan (salty)</td>
<td>Ushna (Hot)</td>
<td>Katu</td>
<td>Kaphashamak</td>
<td>Virechaka, Gulmahara</td>
</tr>
</tbody>
</table>

78 Sharma HP Rasa Yoga Sagar Part -2, Krishnadas Ayurved Series, pp 93.
### III) Ananta Vati

सारिवायोगलेस्वादु विनम्रशुक्रकरं गुरु
अगिमान्द्राविश्वासाकारसामविवानानम्
दोषन्यायाद्वद्विसारीसारनानम् २३८

भ.प्र. ४२६

**Table 4- showing details of Ananta Vati**

<table>
<thead>
<tr>
<th>Dravya Name</th>
<th>Botanical Name</th>
<th>Rasa (Taste)</th>
<th>Veerya (Potency)</th>
<th>Vipaka (Post-digestive test)</th>
<th>Guna (Properties)</th>
<th>Doshghnata (Action on doshas)</th>
<th>Karya (Action)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ananta</td>
<td>Hemidesmus indicus</td>
<td>Tikta (Bitter)</td>
<td>Sheet (cold)</td>
<td>Madhura (Sweet)</td>
<td>Guru</td>
<td>Tridosha shamak</td>
<td>Pittashamak, Raktaprasadak, Vishaghna, Daha shamak</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Madhura (Sweet)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IV) Yashtimadhu Ghrut

यास्तीमधु तथा यास्तीमधुकरं कशीतकं तथा ।
अन्यत्वस्तीतनकं तात्तु भवेत्ततोष मध्यतिका ॥
यास्ती हिमा गुरु स्वादी विष्वाम्य बलवर्णकृत् ।
सुस्तिनयः शुक्लः केशरः स्वर्यः मित्सामिलास्वजितः ॥
शोधितविषक्षितात्रुणांग्लानिक्षयापहः ।

भा.प्र. ६५

Table 5 – Shwoing details of Yashtimadhu Ghrut

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Dravya Name</th>
<th>Botanical Name</th>
<th>Rasa (Taste)</th>
<th>Veerya (Potency)</th>
<th>Vipaka (Post-digestive test)</th>
<th>Guna (Properties)</th>
<th>Doshghnata (Action on doshas)</th>
<th>Karya (Action)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yashtimadhua</td>
<td>Glycyrrhiza glabra</td>
<td>Madhura (Sweet)</td>
<td>Sheeta (Cold)</td>
<td>Madhura (sweet)</td>
<td>Guru, Snigdha</td>
<td>Vata Pitta, Shamak</td>
<td>Dahashamaka, Kanthya, Varnya, Sandhaneeya, Rasayana</td>
</tr>
<tr>
<td>2</td>
<td>Ghrut</td>
<td>Madhura (Sweet)</td>
<td>Sheeta (Cold)</td>
<td>Madhura (sweet)</td>
<td>Guru, snigdha</td>
<td>Vata Pitta, Visha dosghna</td>
<td>Balvardhan, Agni – daghdha vrana ropak</td>
<td></td>
</tr>
</tbody>
</table>