Classification system for completely edentulous patients

Multiple systems where developed to classify completely edentulous patients, depending on diagnostic and systemic findings. Among these systems there is one system by The American College of Prosthodontists (ACP), it was chosen her to be discussed. The system has multiple guidelines that may help practitioners determine appropriate treatments for their patients. Four categories are defined, ranging from Class I to Class IV, with Class I representing an uncomplicated clinical situation and a Class IV patient representing the most complex and higher-risk situation. Each class is differentiated by specific diagnostic criteria. This system is designed for use by dental professionals who are involved in the diagnosis of patients requiring treatment for complete edentulism.

Benefits of the classification systems:

1. Better patient care.
2. Improved professional communication.
3. More appropriate insurance reimbursement.
4. A better screening tool to assist dental school admission clinics.
5. Standardized criteria for outcomes assessment.

Completely edentulous patients exhibit a broad range of physical variations and health concerns. Classifying all edentulous patients as a single diagnostic group is insensitive to the multiple levels of physical variation and the differing treatment procedures required to restore function and comfort. A graduated classification of complete edentulism has been developed that describes varying levels of loss of denture supporting structures.

Complete edentulism defines as follows: the physical state of the jaw(s) following removal of all erupted teeth and the condition of the supporting structures available for reconstructive or replacement therapies.

Development of the classification system:

A review of the prosthodontic literature was used to identify the many variables associated with complete edentulism. These variable were differentiated into four subclasses:

1. Physical findings.
2. Prosthetic history.
3. Pharmaceutical history.
4. Systemic disease evaluation.

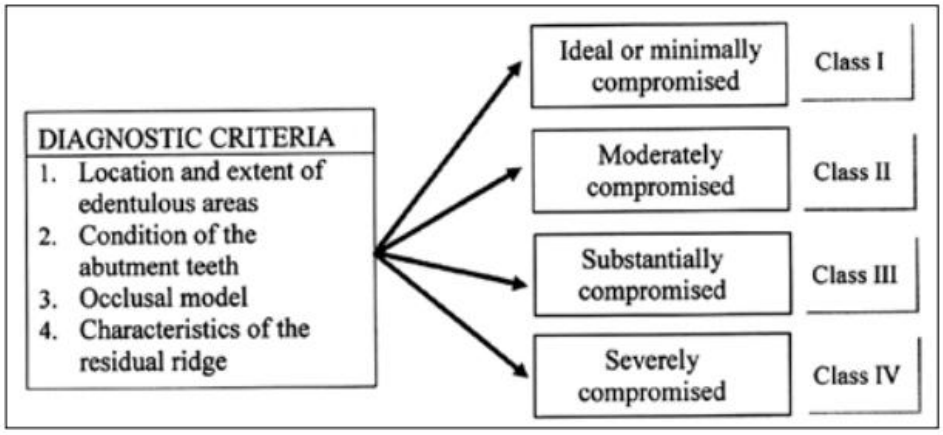
A classification system was developed based on the most objective variables. The classification system will be subject to monitoring and revision as new diagnostic and treatment information becomes available in the literature.

Diagnostic Criteria

The diagnostic criteria are organized by their objective nature and not in their rank of significance. Because of variations in adaptive responses, certain criteria are more significant than others. However, objective criteria will allow for the most accurate application of the classification system and measurement of its efficacy.

The diagnostic criteria used in the classification system are:

1. Bone height-mandible.
2. Maxillomandibular relationship.
3. Residual ridge morphology-maxilla.
4. Muscle attachments-mandible.



Bone height-mandible only:

The identification and measurement of residual bone height is the most easily quantified objective criterion for the mandibular edentulous ridge. In addition, it represents a measurement of the chronic debilitation associated with complete edentulism in the mandible. Despite the lack of a known etiology, it has been established that the loss of denture supporting structures does occur. Atwood's description in 1971 of alveolar bone loss is still applicable today: "Chronic progressive, irreversible and disabling process probably of multifactoral origin. At the present time, the importance of various cofactors is unknown." The continued decrease in bone volume affects:

1. Denture-bearing area.
2. Tissues remaining for reconstruction.
3. Facial muscle support/attachment.
4. Total facial height.
5. Ridge morphology.

The results of a radiographic survey of residual bone height measurement are affected by the variation in the radiographic techniques and magnification of panoramic machines of different manufacturers.

To minimize variability in radiographic techniques, the measurement should be made on the radiograph at that portion of the mandible of the least vertical height. The values assigned to each of the four types listed below are averages that historically have been used in relation to preprosthetic surgical procedures. A measurement is made and the patient is classified as follows:

Type I (most favourable): residual bone height of 21mm or greater measured at the least vertical height of the mandible.

Type II: residual bone height of 16 to 20 mm measured at the least vertical height of the mandible.

Type III: residual alveolar bone height of 11 to 15mm measured at the least vertical height of the mandible.

Type lV: residual vertical bone height of 10 mm or less measured at the least vertical height of the mandible.

Residual ridge morphology-maxilla only:

Residual ridge morphology is the most objective criterion for the maxilla, because measurement of the maxillary residual bone height by radiography is not reliable." The classification system continues on a logical progression, describing the effects of residual ridge morphology and the influence of musculature on a maxillary denture.

Type A (most favorable):

1. Anterior labial and posterior buccal vestibular depth that resists vertical and horizontal movement of the denture base.

2. Palatal morphology resists vertical and horizontal movement of the denture base.

3. Sufficient tuberosity definition to resist vertical and horizontal movement of the denture base.

4. Hamular notch is well defined to establish the posterior extension of the denture base.

5. Absence of tori or exostoses.

Type B:

1. Loss of posterior buccal vestibule.

2. Palatal vault morphology resists vertical and horizontal movement of the denture base.

3. Tuberosity and hamular notch are poorly defined, compromising delineation of the posterior extension of the denture base.

4. Maxillary palatal tori and/or lateral exostoses are rounded and do not affect the posterior extension of the denture base.

Type C:

1. Loss of anterior labial vestibule.

2. Palatal vault morphology offers minimal resistance to vertical and horizontal movement of the denture base.

3. Maxillary palatal tori and/or lateral exostoses with bony undercuts that do not affect the posterior extension of the denture base.

4. Hyperplastic, mobile anterior ridge offers minimum support and stability of the denture base.

5. Reduction of the post malar space by the coronoid process during mandibular opening and/or excursive movements.

Type D:

1. Loss of anterior labial and posterior buccal vestibules.

2. Palatal vault morphology does not resist vertical or horizontal movement of the denture base.

3. Maxillary palatal tori and/or lateral exostoses"(rounded or undercut) that interfere with the posterior border of the denture.

4. Hyperplastic, redundant anterior ridge.

5. Prominent anterior nasal spine.

Muscle Attachments: Mandible only

The effects of muscle attachment and location are most important to the function of a mandibular denture. These characteristics are difficult to quantify. The classification system follows a logical progression to describe the effects of muscular influence on a mandibular denture. The clinician examines the patient and selects the category that is most descriptive of the mandibular muscle attachments.

Type A (most favorable):

1. Attached mucosal base without undue muscular impingement during normal function in all regions.

Type B:

1. Attached mucosal base in all regions except labial from canine to canine.
2. Mentalis muscle attachment near crest of alveolar vestibule ridge.

Type C:

1. Attached mucosal base in all regions except anterior buccal and lingual vestibules-canine to canine.
2. Genioglossus and mentalis muscle attachments near crest of alveolar ridge.

Type D:

1. Attached mucosal base only in the posterior lingual region.
2. Mucosal base in all other regions is detached.

Type E:

No attached mucosa in any region.

Maxillomandibular Relationship

The classification of the maxillomandibular relationship characterizes the position of the artificial teeth in relation to the residual ridge and/or to opposing dentition. Examine the patient and assign a class as follows:

Class I (most favorable):

Maxillomandibular relation allows tooth position that has normal articulation with the teeth supported by the residual ridge.

Class II:

Maxillomandibular relation requires tooth position outside the normal ridge relation to attain esthetics, phonetics, and articulation (e.g., anterior or posterior tooth position is not supported by the residual ridge; anterior vertical and/or horizontal overlap exceeds the principles of fully balanced articulation).

Class III:

Maxillomandibular relation requires tooth position outside the normal ridge relation to attain esthetics, phonetics, and articulation (i.e. cross bite-anterior or posterior tooth position is not supported by the residual ridge).

Integration of Diagnostic Findings

The previous four sub classifications are important determinants in the overall diagnostic classification of complete edentulism. In addition, variables that can be expected to contribute to increased treatment difficulty are distributed across all classifications according to their significance.

Arrangement of artificial teeth in abnormal jaw relations: Maxillary protrusion and wider upper arch (class II jaw relation).

Arrangement of anterior teeth in maxillary protrusion.

As the upper arch in these situations is further forward in the anterior region, the first problem is that of an excessive amount of overjet (horizontal overlap) which results in an abnormal upper and lower canine tooth relationship. No attempt should be made to reduce this horizontal overlap by moving the upper anterior teeth palatally or the lower anterior teeth labially.

Management:

The management of such situation can be attempted in any of the following ways, depending upon the severity of the maxillary protrusion.

1. If the protrusion is not too extreme, the simplest way is to select the lower anterior teeth of a narrower mesiodistal width and try to achieve the normal canine relationship.
2. If esthetics permit, a little crowding of the lower anterior teeth by overlapping may solve the problem well.
3. Another solution which is effective at times is leave slight spaces between the upper anterior teeth to attain normal canine relations. However, such a procedure is esthetically limited.
4. In situations where the discrepancy is not too great, grinding of the distal surface of lower canine is sufficient to restore the normal canine relationship.
5. In situations where the discrepancy is excessive and cannot be managed by the manipulation and modification of the lower anterior teeth, the lower anterior teeth must be left as they are, and the lower first premolars must be eliminated from the dental arch.

Arrangement of posterior teeth when the upper jaw is wider as in class II jaw relation:

In this situation, the lower crest of the ridge in the posterior region is lingual to the upper residual ridge. This relationship is not very common, but when present, it may give rise to considerable difficulty in the placement of upper and lower teeth in their correct occlusal relationship. In such instances, the upper arch is wider than the lower, and if the upper teeth are placed on the crest of the ridge, they will make inadequate occlusal contact with the correctly placed lower teeth. At the same time, if an attempt is made to occlude the lower teeth with the correctly placed upper teeth, the lower teeth will place too far buccally leading to an instability of the lower denture. This is much more detrimental as the lower denture-bearing area is already very small.

MANAGEMENT. The following methods of correction may be employed:

(1) If the discrepancy is very slight, the upper teeth are moved slightly in apalatal direction to provide a working occlusal contact with the lower teeth. However, such a procedure has a very limited application as the upper posterior teeth cannot be moved inside (palatally) to any great extent without affecting phonetics and cheek support.

(2) If the upper arch is much wider than the lower one, any of the following methods can be used successfully:

(a) The lower posterior teeth are correctly placed on the crest of the ridge. The upper teeth are then set so that they occlude well with the lower teeth. Then the buccal contours are built on the upper teeth in wax which is later replaced by tooth-colored acrylic resin to fulfill esthetic requirements and to provide support for the cheek.

(b) Another method can be used alternatively for the same problem. The upper posterior teeth are arranged first to meet the requirements of esthetics. The lower teeth are kept on the crest of the ridge. This will result in an unfavorable occlusal relationship of the upper and lower posterior teeth. In order to establish a functional occlusal contact between the upper and lower posterior teeth, wax is

added on the palatal aspect of the upper posterior teeth. This wax is later replaced by tooth colored acrylic resin. This gives a functionally effective occlusal contact as well as an esthetically acceptable buccal surface contour of the upper posterior teeth.

Nonanatomical posterior teeth are best for these procedures as they allow more freedom in their buccolingual placement.

Arrangement of artificial teeth in abnormal jaw relations: Mandibular protrusion and wider lower arch (class III jaw relation):

Arrangement of anterior teeth in mandibular protrusion.

This condition is characterized by the lower anterior ridge being forward in relation to the maxillary ridge .This may vary from edge-to-edge relation (where both upper and lower ridges are at the same level) to a marked prognathism (in which the lower ridge is forward in relation to the upper ridge).

MANAGEMENT. These situations can be managed by any of the following methods, depending upon the severity of the mandibular protrusion.

(1) If the ridges are in an edge-to-edge relation, the incisal edges of the upper and lower incisors and cuspids will also meet in edge-to-edge relationship .The upper and lower teeth are placed as near as possible to the labial plates of bone in their respective ridges. No attempt should be made to introduce normal horizontal overlap if the ridge relation does not permit it.

(2) With an extreme protrusion of the mandible, a negative or reverse horizontal labial overlap must be used. The lower anterior teeth are placed labial to the upper anterior teeth. The magnitude of the reverse horizontal overlap depends upon the amount of protrusion of the lower residual ridge.

(3) If the difference in ridge size is too great, one of the following methods may be used to solve the problem.

(a) Use a slightly larger lower-tooth mold than that suggested for normal use with the upper teeth. This will compensate for the greater lower-arch width. This is the simplest method.

(b) Use a slight overlapping in the upper anterior teeth, if esthetically acceptable. This will automatically narrow the lower-arch space and may eliminate spacing.

(c) Use an extra lower incisor to avoid the spaces. However, this is hardly an acceptable measure. It is better, esthetically, to leave some spaces between the lower anterior teeth than for the dentures to appear to have too many teeth.

The relationship of the upper and lower canines in this situation does not present much of a problem. The lower anterior teeth are set in a forward relation to the upper anterior teeth. The distal surface of the lower canine coincides with the tip of the upper canine. If it finishes mesial to the canine tip, the discrepancy can be rectified by using small spaces between the lower anterior teeth so that the canine teeth will have their normal relationship.

Arrangement of posterior teeth when the lower arch is wider:

MANAGEMENT:

An arrangement for the posterior cross-bite relationship will depend on the severity of its deviation from normal. One of three procedures may be used.

(1) If the difference in size is slight and the upper ridge is well formed, the upper posterior teeth can be set slightly buccal to the crest of the upper ridge in such a position that correctly placed lower posterior teeth can make effective occlusal contacts with their antagonists. This should not be done to an extent that it introduces potential midline fracture in the upper denture.

(2) Nonanatomical teeth may be used. These teeth allow more freedom in their buccolingual placement and still provide an adequate occlusal contact between the upper and lower teeth. The teeth can still be kept on the crests of the respective ridges without losing the desired occlusal contacts.

(3) If the lower arch is too wide and cannot be managed otherwise, an interchange can be accomplished by using upper teeth on the lower denture and lower teeth on the upper denture. The interchange is made across the arch as well. The right upper teeth are placed on the left lower ridge, and left lower teeth are placed on the right upper ridge. Similarly, the left upper posterior teeth are set on the right lower ridge, and right lower posterior teeth are placed on the left upper ridge. Start by placing the lower teeth on the upper ridge. As the upper arch is already smaller in these patients, it is imperative that the first premolar tooth be eliminated from the arch to develop correct intercuspal relationships. The second premolar, first molar, and second molar (lower teeth) are set on the upper ridge. The buccal cusps of these teeth correspond to the guideline of the lower occlusal rim.

Sometimes a cross-bite setting (i.e., a reverse horizontal buccal overlap) is suggested without interchanging the teeth between the two arches. The success of such an arrangement of teeth is doubtful, as anatomically they are not meant to intercuspate with each other in this relationship. However, it might be attempted if nonanatomical posterior teeth are used.

The End

Best Wishes

GERIATRIC DENTISTRY RELATED TO PROSTHETIC (1)

Geriatric Dentistry:

Geriatric dentistry is the branch of dentistry that emphasizes dental care for the elderly population and focuses upon patients with chronic physiological, physical and / or psychological changes or morbid conditions.

Growth:- Growth is increase in size.

Development:- Development is progress towards maturity.

Maturation:- The stabilization of the adult stage brought about by the growth and development.

Aging:- Refers to irreversible and inevitable changes occurs with time it is also defined as the sum of all morphologic and function alterations that occur in an organism and lead to function impairment which decline the ability to survive stress.

Gerontology:- is the study of aging in all its aspects biologic, physiologic, sociologic and psychologic.

What Causes Aging?

Medvedev listed 300 theories that have been offered in an attempt to answer this but nothing conclusive comes.

The consensus today is that aging is the end result of multiple biological processes which includes.

Genetic Level:- where integrity of somatic cells is maintained.

Organ and Organ System Level:- Where physiologic functions are performed.

Coordination Level:- Physiologic functions are controlled and assembled into complex function

Factors influencing aging:

A) GENETIC

1- **Mutations**:- Several mutations reduces life span.
2- **Species specific life span**:- Each species is characterized by its own pattern of aging and maximum life span.
3- **Hybrid vigor**:- The effect of genetic constitution on longevity is perhaps best exemplified where hybrid vigor is demonstrated
4- **Sex**:- In humans\ animals, female lives longer.
5- **Parental age**:- Like father like son.
6- **Premature aging syndrome**:- Single gene changes results in premature senescence in humans e.g. progeria, cockayne's syndrome, werner's syndrome

B) ENVIROMENTAL

1- **Physical and Chemical** :- Pollution, radiation, working atmosphere etc.
2- **Biological Factors** :- Nutrition, general healthy etc.
3-**Pathogens and Parasites** :- they influence the rate of human development
⟶ Low income group\ tropical countries.
4- **Socioeconomic conditions** :- Bad housing, stresses etc.

AGING Vs OTHERS

It has always been difficult for researchers to differentiate whether the changes in tissue\organ system are due to physiologic aging or pathologic.

There is no precise method for determining the rate degree of aging because

AGING ⟶ SYSTEMIC DISEASE ⟶ SURGEIES, MEDICATIONS, CHEMOTHERAPY, RADIOTHERAPY ⟶ ALTERATION IN BODY ⟶ CHANGES…..SUPERIMPOSES

Effect of aging on oral tissues ((Gerontology of the oral cavity))

1- losses of tooth support structures (periodtium).
2- Increased loss of epithelium attachment.
3- Alveolar bone in the elderly.
4- Temporomandibular joint, orofacial\ mastication muscle, oropharyngeal mucosa, and oral sensory \ motor nerve system.
5- Salivary gland function, taste, tactile sensation and swallowing.

Often there is no clear demarcation between normal physiological aging and pathological disease. However,there may be some specific changes in individual tissues during aging.

Losses of tooth translucency and surface details, abrasion, attrition, and erosion of teeth usually increase with advancing age. The dental pulp become smaller.

Geriatric Dentistry differs from traditional general practice in the following aspects

1- It is concerned with aging patients, 86% of whom have at least one chronic disorder. (Nursing home residents may have as many as 25 concurrent disorders).
2- Cognitive dysfunction such as dementia affects compliance and oral healthy.
3- Use of polypharmacy cause xerostomia.(over 1000 medications cause dry mouth).
4- Many elderly have physical disabilities such as vision, hearing and taste disorders.
5- Require exceptional skill in history taking.
6- Challenges the dentist's ability to design treatment plan and differentiate normal aging from pathologic aging.

Pathological Oral Conditions In Elderly

i. Condition affecting the periodontium and tooth structure.
ii. Ulcerative lesion.
iii. Denture related condition.
iv. Xerostomia (dry mouth).
v. Tongue condition.
vi. White lesions.
vii. Malignant lesions.
viii. Vesiculo-bullous lesions.
ix. Pigmented lesions.

SALIVARY GLAND AND SALIVA

There are major paired and several minor salivary glands present in oral cavity.
Major gland are :- parotid, sublingual, submandibular glands.
Minor gland are :- labial, buccal, palatal glands.
Primary function is exocrine production of saliva.

Major role of salive in maintenance of oral healthy

1. Preparation and translocation of food bolus
2. Lubrication of oral mucosa
3. Preservation microbial balance
4. Mechanical cleansing
5. Antibacterial and antifungal activities
6. Maintenance of oral PH
7. Remineralization of dentition
8. Helps in taste activity

Salivary function during aging:

There is a fairly linear loss of acinar cells, replaced by fatty or connective tissue.

- Submandibular gland "40%" loss of acinar cells
- Parotid gland "30%" loss of acinar cells
- Minor labial gland"45%" loss of acinar cells

MORPHOMETORIC STUDIES SHOWS

1. Proportion of gland parenchyma occupied by acinar cells is reduced by 25%-30%
2. Atropy of acinar cells
3. Propliferation of ductal elements
4. Some degenerative changes

Earlier, it was thought that salivary secretion is also reduced with age but recent functional studies showed, despite the appearance of age related morphometric changes in salivary glands- functional output and composition of saliva doesn't appear to be consistently altered in older but otherwise healthy persons.

The decrease in salivary production is more related to salivary gland dysfunction and related oral morbidities associated with systemic diseases and medications.

ORAL MUCOSAL BARRIER

The oral mucosal performs essential protective function that profoundly affect the general healthy and well being of host.

1. It provides first line of defense.
2. Specialized mucosal sensory detectors serve to warn us of many potentially harmful situation such as spoiled food stuffs, temperature extremes, sharp objects, etc.
3. Any changes in O.M. barrier could expose the aging host to myriads of pathogens and chemicals that enter the oral cavity.
4. Both histologic layers of oral mucosa, epithelium, and connective tissue have important defensive functions.
5. Stratified squamous epithelium containing attached oppose cells forms physical barrier which restricts entry of microorganisms and toxic substances
6. Mucosal epithelial cells synthesize KERATIN and LAMININ, Laminin "preserve structural integrity and restore wound healing", keratin (masticatory mucosa) "protect against abrasive insults e.g. stiff foods".
   But literature doesn't give clear picture of histologic status of O.M. with normal aging. Reports says thinning of epithelium while others contradicts.

EFFECT OF AGING 0N PERIODONTIUM

A)Gingival Epithelium

- Thinning and decreased keratinization of the gingival epithelium
- Flatting of rete pigs, altered density.
- Migration of functional epithelium from its position in healthy individual (on enamel) to more apical position on the root surface with accompanying gingival recession.

B)Periodontal ligament (PDL).

A fibrous connective tissue that is noticeably cellular and vascular. Its functions are attachment and support, nutrition, proprioception, and synthesis.

Periodontal disease

Etiology

1. Gram positive and gram negative
2. Exacerbated in the elderly by diminied motor dexterity (arthritis, stroke) and poor hygiene.
3. Wide spectrum range of gingivitis, inflammation of sulcular epithelium, recession of periodontal pocketing.

Treatment

1. Antimicrobial therapy (chlorhexidine 0.12% mouth wash, tetracycline, impregnated sulcular fibers, metronidazol 500mg qid or clindamycin 300mg qid for 10 day).
2. Surgical elimination of pockets.

Cementum

- Cementum continuous to be laid throughout life but rate of formation diminishes with age.
- A thickening of cementum is observed on teeth that are not in function (Hypercementosis).
- Increase in cemental width (5-10 times) as cementum deposition is continues after tooth eruption.
- Increase in width is greater apically and lingually.

Alveolar bone (in relation to periodontium)

- A more irregular PDL surface of bone and less irregular insertion of collagen fiber.
- Healing of bone in extraction socket appears to be unaffected by aging.

Bacterial plaque

Dentogingival plaque accumulation increase because increase in hard tissue surface area as a result of gingival recession and the surface characteristic of the exposed root surface for plaque formation compared to enamel.

AGING AND TEETH

Enamel changes

Chemically

1) Increase levels of N2 and flourine therefore, increase organic matrix.
2) Enamel near the surface become darker and decay resistace
3) There is reduce permeability and enamel became britlle.

ATTRITION

It may defined define as physiological wear of occlusal or incisal surface and proximal contact as a result of mastication, physiological tooth movement, functional or parafunctional movement of mandible.

CLINICAL FEATURE

1. Small polished facets on cusp tips/ ridge/ slight flattening of incisal edge.
2. Because a slight mobility of teeth in their sockets and a manifestation of resiliency of PDL, facets also occur at proximal surface.
3. Decrease cusp height.
4. Flatting occlusal plane.
5. Shortening of length of dental arch.

All these change occur more severely in men than women due to greater masticatory force.

ABFRACTION

Recently, it has been proposed that the predominant causative factor of some of the cervical, wedge-shaped is a strong (heavy) eccentric occlusal force resulting in microfracture or abfracture, such loads.

This defect is termed as ((idiopathic erosion or abfraction)).

DENTIN CHANGES

Since odontoblasts and its processes are integral part of dentin, therefore, there is no doubt that dentin is vital tissue.

It is laid throughout life though as age progress dentinogenesis slows.

Aging and functional change in dentin

Preparative/ secondary dentin

If attrition, abrasion, erosion, cavity cutting procedures cause the cut or exposure of odontoblast, either they die or if they live they form dentin called as reparative dentin

- The reparative dentin seals of the zone of injury occure as a healing process initiated by the pulp resulting in resolution of the inflammation process and removal of dead cells.
- The reparative dentin has fewer and more twisted tubules.

PULP CELL CHANGES

Decrease in number, size, and cytoplasmic organelle.

Fibroblast changes

Fibrosis

A. In aging pulp accumulations of both diffuse fibrillar component as well as bundles of collagen fibers usually appear.

B. Fiber bundle arranged into

1.Longitudinally -----radicular pulp.

2.Diffusely ----- coronal pulp.

C. Increase in fibers is generalized throughout the pulp organ.

D. Collagen increase in medial and adventitial layers of blood vessels.

E. Increase in collagen fiber is more apparent than actual because of decrease in size of pulp which makes the fibers to occupy less space.

F. Vascular changes in the aging pulp is same as occur in any other organ like plaque calcifications.

PULP STONES/DENTICLES

They are defined as nodular, calcified masses appearing in either or both the coronal or root portion of pulp organ.

They are seen in otherwise normal tooth in other respects.

They are seen in functional as well as embedded unerupted tooth.

TOOTH LOSS

1. Not a normal part of aging.
2. A consequence of oral disease:
    A. Caries
    B. Periodontal disease
3. Often associated with systemic diseases.

Decline in Edentulous Adults

Improved and still improving dental health care has led to significant declines in the number of edentulous adults with increased retention of teeth into old age, we are seeing more incidences of caries and other dental diseases in those teeth.

ORAL MUCOSA WITH AGING

- Epithelium thinner, more fragile, less keratinized
- Loss collagen and elastin from fiber also weaken mucosa.
- Increase in pathological change –loss of tongue papillae and taste buds
- Minor salivary glands diminish
- Lesion more common and slower to heal.
- Inflammations, irritation and infections.

TONGUE

- It seems to increase in size in edentulous mouth which may be because of result of transferences of the masticatory and phonetic function of the tongue.
- Enlarged tongue has negative effect on retention of denture.
- There is DEPAPILLATION which usually begin at apex and lateral border.
- Fissuring is also common.
- There is also reduction in the taste buds.

Taste

Reasons for decline in sense of taste are unclear possible decline in number of taste buds.

- Possible decline in density of taste buds.
- Possible decline in sensitivity of taste buds.
- Possible decline in neural processing or retrieval.

All of above are also possible.

Medications Known to interfere with Taste

Medications, including the most commonly prescribed, interfere with taste or olfactory senses:

1. Antibiotics: Amicillin, Azithromycin (Zithromax).
2. Ciprofloxaci(Cipron) Clarithrmycin (Biaxin).
3. Griseofulvin (Grisactin) Metronidazole (Flagyl).
4. Ofloxacin (Floxin) Tetracycline.
5. Anticonvulsants: Carbamazepine (Tegretol).
6. Phenytoin (Dilantin).

ORAL MOTOR PERFORMANCE:

1- SPEECH 2-MASTICATION 3-SWALLOWING

Tissue involved are:-

Upper lip, lower lip, jaws, tongue, floor of oral cavity, soft palate ect.

Swallowing

- Reduced chewing effectiveness
- Decreased tongue strength (less muscle and increase in fatty and connective tissue in the tongue).
- Atrophy of the alveolar bone with lost dentition.
- Increased swallowing time with age.
- Swallowing disorders may be prevalent.

SAWLLOWING/ ORAL MOVEMENT IN OLD AGE

1. People chew slowly as they get older. Although the duration of the total chewing cycle does not seem to change, it does seem that vertical displacement of mandible is shortened.
2. Movement of the mandible are governed by generator in the brainstem and influenced by the proprioception in the muscle, joint, and mucosa.

Age may impair the central processing of nerve impulses impede the activity of the striated muscles and retard the ability to make decisions

Masticatory ability:

It is an individual's own assessment of his/her masticatory function

Masticatory efficiency:

It is the capacity to grind the food during mastication.

- Essential that masticatory function (in complete denture wearers) be maintained throughout life.
- Masticatory function depends on skeletal muscular force and the ability to co-ordinate oral function movements during mastication.
- Maximal bite force decrease in older patients.
- Greater atrophy occur in complete denture wearers especially woman.
- Little evidence that new dentures reduce this atrophy wearing dentures does compromise masticatory performance greatly as compared to a natural set of teeth.

The End

Best Wishes

GERIATRIC DENTISTRY RELATED TO PROSTHETIC (2)

AGE CHANGES IN MAXILLA AND MANDIBLE

MAXILLA:

1. It resorbs upward and inward direction to become progressively smaller because of the direction and inclination of the roots of teeth and alveolar processs
2. Longer maxilla in edentulous, smaller the denture bearing area will be.
3. Incisive foramen becomes closer to the residual ridge.

MANDIBLE:

It resorbs in downward and outward so as to become progressively wider there by leading to class-III relation.

CONSEQUENCE OF RESIDUAL RIDGE RESORPTION:

- Apparent loss of sulcus width and depth.
- Displacement of muscle attachment closer to the crest of the residual ridge.
- Loss of vertical dimensions of occlusion.
- Decrease in relative prognathia.
- Ant. Protation of the mandible (class-111).
- Changes in interalveolar ridge relationship.
- Location of mental/ incisive foramen close to the crest of residual ridge.

Alveolar bone

- Loss of teeth means loss bone.
- Loss of alveolar bone lead to loss vertical dimention.
- Osteoporosis- seen particularly in females after menopause.
- Effect are exaggerated by malabsorption syndromes.

AGE CHANGES IN TEMPOROMANDIBULAR JOINT:

- The cartilage of the TMJ is essentially completely replaced by bone around 4th decade of life.
- The articular tissue remains relatively unchanged in appearance throughout adulthood, it may undergo metaplastic transformation into fibrocartilage, depending on the biomechanical loading to which joint was subjected.
- The articular eminence, in particular, is characterized by the presence of chondroid bone and very occasionally cartilage cell islands.
- Up through the 5th decade, the mandibular fossa even becomes more deep as the articular eminence continues to grow inferiorly, however after that time the articular eminence tends to become flatter, especially in individual who have become partially or completely edentulous and have reduced loading force on the eminence.

Difference between young and adult condylar Young condyle

- Condylar head more vascular.
- Neck absent
- Bone is soft and pliable
- Cartilage is predominant in the child.

Adult condyle

- Less vascular.
- Neck is thicker.
- Bone is less pliable
- Fibrous tissue is predominant

Age changes in maxillary sinus

- With growth sinus enlarge laterally under the orbit and by the 2nd year, they reach laterally to the infraorbit canals.
- By 9th year they extend to the zygomatic bones and to the level of the floor of the nasal fossae.
- Lateral growth ceases by the 15th year.
- A large sinus may extend into-zygomatic processes of the maxilla and into alveolar processes so that roots of molars and even premolar teeth lie immediately beneath the floor or project into it.

- In old age, bone enclose the roots of posterior teeth sometimes resorbs leading to apex lie in the direct contact with mucosa membrane and extraction of such teeth may lead to fistula

Oral health and general health in the elderly

Oral health affects the elderly with regards to diet and nutrition intake, psychosocial interaction, and general well- being.

The oral cavity is a portal of entry for microbial infections. Common oral disease such as periodontal diseases and dental caries are the result of bacterial plaque accumulation.

Oral health problem in elderly

1. Tooth loss
2. Denture related condition
3. Coronal and root caries
4. Periodontal disease
5. Xerostomia
6. Cancer and precancer

Risk factors associated with oral diseases and conditions in the elderly

Several studies suggested that 68-95% of persons 65years or older take medication. The average number of drugs, (prescription and /or non prescription) used by this group is 1.4 to 4.3.

With physiological aging and multiple pathologies, elderly patients are more susceptible to drug interactions and adverse effects. One profound side effect of multi-pharmacy is xerostomia. Without adequate salivary function, quality of life also is likely to be compromised.

Oral manifestations of systemic diseases

1. Evidence of systemic disease occurring elsewhere in the body is sometimes noted in the mouth.
2. Diabetes
3. Cardiovascular and thromboembolic diseases.
4. Osteoporosis
5. Respiratory diseases
6. Possible use of pulp stem cells in treating diseases.

Recent correlation studies have raised concerns about the possible linkage between oral infection / chronic inflammation and systemic disease development / progression.

Bacteria from the oral flora have been recovered from infection sites in other organs of patients with aspiration pneumonia or endocarditis .

The oral-systemic diseases linkage is a special health concern for the elderly since effective oral hygiene is usually compromised in patients with physical and neurological changes.

Many systemic diseases and conditions have oral manifestations, which may be the initial sing of a number of clinical diseases. Oral examination and oral health evaluation should be integrated components of a routine physical examination.

DIABETES:

1. Increased frequency of tooth loss in diabetic associated with periodontitis.
2. Two-way street- each represents a risk factor for the other
3. In addition to periodontitis, Type 2 diabetes related to other complications in the oral cavity including tooth decay, dry mouth, fungal infections and oral and peripheral Neuropathies.

Diabetes is a risk factor for advanced periodontal disease and candida infection.

CARDIOVASCULAR DISEASES:

1. Linkage between periodontal disease and atherosclerosis and thromboembolic evens.
2. Common basis for inflammatory responses, but cause and effect not established.
3. Independent causality.

Osteoporosis

A. Loss alveolar bone associated with osteoporosis.
B. Implication of interaction with endocrine system.
C. Effect of hormonal replacement treatment (HRT).

Recent reports raise concerns that patients undergoing long- term bisphosphonate treatment for metabolic bone disease or osteoporosis might be at risk for developing osteonecrosis of the jaw (called bisphosphonate- related osteonecrosis of the jaw).

Factor increasing susceptibility to periodontal disease

- Systemic diseases
- Arthritis / poor Dexterity
- Cancer Therapy
- Medication
- Genetics
- Tobacco Use
- Poor Nutrition
- Stress/ Depression
- Removable Partial Denture
- Microorganisms

Common Oral Diseases and Condition in the Elderly: Similar to the general population

- Caries and periodontal disease remain the two major dental problems in elderly patients.
- As gingival recession increases, resulting in dental root surface exposure to the oral environment, the prevalence of root surface caries increases in the dentate elderly population 50%.
- Candida infection and denture related lesions are common oral manifestations in geriatric patients.
- Incidence of oral cancers also increases with advancing age.

Ulceration lesions of the oral mucosa

A.Physical ulceration

- Traumatic ulceration

- Radiation mucositis

B. Chemical ulceration

Traumatic ulceration

Etiology

- Lip and check biting
- Motor dysfunction
- Pressure necrosis phenomenon
- Improper tooth brushing
- Broken teeth
- Irritation by faulty restoration
- Improperly fitting removable prostheses.

Appearance: ulcer with necrotic center and inflamed periphery.

Differential diagnosis: Aphthous ulcer, primary or secondary syphilis, erosive lichen planus, squamous cell carcinoma, and herpes simplex.

Treatment

Etiology must be identified and removed. If no resolution within 3-4 week (in elderly healing may take longer), lesion must be biopsied. Larger lesion may require topical anesthetics, topical steroids or topical antimicrobials.

Radiation Mucositis

Appearance: diffuse erythema on all mucosal surface, followed by epithelial desquamation and ulceration.

Differential diagnosis

1. Oral candidiasis
2. Recurrent herpetic stomatitis
3. Erythema multiforme

Treatment: management of salivary gland dysfunction and candidiasis increase fluids and nutrients.

Chemical Ulceration

Etiology:

- Prescription (e.g.chemotherapeutic agents, immunosuppressants).
- Prescription (aspirin burn) medications.
- Non-precious metal in prosthodontic appliances (cobalt- chromium and nickel-chromium alloys).

A white membranous path that leaves a raw, painful area when scraped off.

Example: aspirin burn, ulceration caused by drugs treat cancer, arthritis, or prevent rejection of transplants.

Side effects of drugs used to treat systemic disease (e.g. xerostomia, anemia, nutritional deficiency, leucopenia and lowering host defense response).

Treatment: larger lesion may require topical anesthetics, topical antimicrobials, and topical corticosteroids.

Indirect consequences of wearing denture

1- Residual ridge reduction

- Studies have established a continuous loss of the bone tissue after teeth extraction and the placement of complete dentures.
- The resorption rate varies by indivual.
- Some say that RRR is physiological process that occurs because the use of the alveolar bone is lost after tooth extraction, however, RRR can proceed to the basal bone and hence is basal bone and hence is believed to be a pathological process and not a physiological one.

2- Gagging: normal, healthy defense mechanism, prevents foreign bodies from entering trachea.

Many stimuli gagging, such as irritation of the posterior part of the tongue, soft palate, even sights, tastes etc… can cause gagging due to dentures, patient may gag initially but gets accustomed.

Gagging may also be a symptom of disorders and diseases of the GIT, adenoids or catarrh in the upper respiratory passage.

3- Overdenture abutments (caries and periodontal disease)

- The retention of selected teeth to serve as abutments under complete dentures is an excellent prosthodontic technique.
- However, bacterial colonization beneath a close fitting denture is enhances and leads to caries, due to microbial plaque of Streptomyces and Actinomyces (predominantly).
- If the plaque is left undisturbed, it intitiates gingivitis in to three days.
- Patients with overdentures demonstrate up to 30% increase in caries within one year.
- Preventive measures should be aimed at preventing the accumulation of plaque near the roots.

4- Nutrition Deficiencies

- Aging is often associated with significant decrease in energy needs as a consequence of decline in muscle mass and decreased physical activity.
- There is a 30% fall in the energy however, with the exception of carbs, the nutritional requirement doesn't decrease with age.
- As a result dietary intake of elder individuals often reveals evidence of deficiencies clearly related to dental/ prosthetic status.

Severe nutritional deficiencies are rare in the healthy, even with impaired masticatory functions, it is only in hospitalized/ chronically ill patients that inability to chew and altered taste perception lead to negative dietary habits and nutritional status.

5- Periimplantitis

- Soft and hard tissues surrounding asseointegrated implant show similarities with periodontium.
- Big difference in the collagen fibers being non-attached and parallel to implant surface instead of being perpendicular and in function arrangement from bone to cementum.
- Periodontitis like process- periimplantitis affects implants and leads to loss osseointegrated implant.
- Bacteria play significant role in this, similar to periodontitis, failing implants include gingival inflammation, deep pockets and bone loss.
- Bacteria flora is gram negative rods e.g. Bactertoides and fusobacterium sps.

Probing depths> 6mm and perimplant radiolucency.

6- **Allergic reactions:** intraoral contact allergic reactions. Poorly understood, not very commonly dealt with in specialized literature.

- ❖ No single or specific clinical picture however licheniod reactions are common.
- ❖ Metal used in dental practice- e.g. amalgams, Ni base metal alloy- cause reactions, hypersensitivity consequence.
- ❖ Common allergens: 2-HEMA (hydoxyethyl methacrylate) and triethylene glycol dimethacrylate.
- ❖ Methacrylates have rarely cause oral lichenoid reactions.
- ❖ Replacement of restorations containing materials that give a positive epicutaneous test is not warranted.
- ❖ Allergy due to many nonspecific or unclear intraoral clinical disorders.

GERIATRIC PEOPLE PROBLEMS

- **Healthy problems**

1) Joint problems
2) Impairment of special sense
3) Cardio- vascular disease
4) Cancer, prostate enlargement
5) Diabetes and accidental falls

- **Psychological problems**

1) Emotional problems
2) Sexual problems
3) Mental disorder, senile dementia, Alzheimer' disease

- **Social problems**

Poverty, Loneliness, Dependency, Isolation, Elder abuse.

Conclusion

- Placement of removable prostheses in the oral cavity produces profound changes of the environment that may have an adverse effect on the integrity of the oral tissue.
- Mucosal reaction occur from the mechanical irritation, accumulation of microbial plaque and occasionally due to allergic reactions.
- Denture that function poorly may act as negative factor in muscle function.
- Surface irregularities and micro porosities can greatly encourage plaque formation.
- At the times, the local irritation may end up increasing the permeability of mucosa to allergens, hence making it difficult to distinguish between simple irritation and an allergic response.
- Some bacteria can use the PMMA as a carbon source and hence the accumulation of bacterial plaque at the interface of the denture and mucosa causes several negative effects.

The End
Best Wishes

Concerns when planning for a complete denture

There are specific intra-oral and extra-oral considerations to investigate while evaluating and setting the treatment plan for a complete denture patient. Starting with the very first appointment being the most important one as it allow the chance to create communication skills and mutual understanding between the patient and the dentist. The patient evaluation starts as the pt. walk into the clinic (why?) and then while the dentist recording the personal details, medical and dental history. Followed by thorough, comprehensive examination for any local or systematic conditions that might require modifying the prosthesis. A proper physical and mental assessment can be acquired by getting acquainted with the pt. and performing meticulous visual and radiographic examination. In addition, making a diagnostic impression and a study cast can be useful as a visual explanation for the patient, guidance for the surgeon and to draw the preliminary design.

Medical history (evaluation)

Represents the history of systematic diseases and to what extent they might affect the success of the treatment (duration of illness and therapeutic agents). Here are some examples on these conditions:

Diabetes mellitus

Patients with this condition are unable to metabolize carbohydrates due to insulin deficiency or resistance; they will be highly susceptible to infection (fungal, viral and bacterial), delayed wound healing, osteoporosis, increased bone resorption, appointments scheduling to fit their meal times and consider the chronic xerostomia.

Cardiovascular diseases

Conditions like angina pectoris require previous consultation with the physician and continuous provision of the emergency medications during the dental appointment. Any non-emergency dental treatment should be avoided during the first 6-months after myocardial infarction. Despite the fact that it is highly controversial, antibiotic coverage (prophylactic) is still recommended by some

clinicians for patients with synthetic heart valves or with previous infective endocarditis.

Blood dyscrasias

This group of conditions related to deficiency in one of the blood components and usually associated with variable oral manifestations for example; iron deficiency anemia causes atrophied oral mucosa while megaloblastic anemia (B12 deficiency) is commonly underlying angular chelitis. Leukemic patients might present very indicative oral signes such as ptichiae, purperic leasions and ulceration.

Figure 1 Angular chelitis

Diseases of bones and joints

Three examples worth mentioning in this field:

- Osteoarthritis: age –related degenerative disease affects people over 45 years old affects the weight bearing bones and less frequently the TMJ causing pain, crepitation and restrict the movement of the joint. This would compromise the impression and occlusal records procedures and continuous change in occlusion will require corrections.
- Rheumatoid arthritis: inflammatory condition affecting the joints (symmetrically). TMJ pain, crepitation, stiffness, anterior open bite and increased vertical facial height.
- Paget disease: a chronic bone abnormality affects pts. Over 40. Affects maxilla more than mandible with a ratio 2.3:1 resulting in progressive

growth (widening, flattened) maxilla so the pt. ends up unable to wear their (previously fit) denture.

➢ In all conditions that constrict the mouth opening, consider the sectional impression tray and the sectional dentures.

Central nervous system diseases

➢ *Bell's palsy*: temporary facial nerve paralysis caused by cold, trauma, inappropriate L.A injection or nerve damage during parotid gland surgery. As the patent has mask face and uncontrolled dropping in the corner of the mouth, this ill compromise mouth opening and impression taking.

➢ *Parkinson's disease*: a degenerative disease of the basal ganglia resulting in decreased dopamine release. Generally this condition affects the patient gait, balance; give stare look and dental-related symptoms (tremor of the mandible and muscle rigidity).

➢ *Trigeminal neuralgia*: affecting the nervous supply for the facial muscle, teeth and associated structures (included in the trigger zone). Sharp, deep, stabbing pain throughout the supply area of the affected nerve.

➢ *Patients on psychotropic drug therapy* may show dental-related side effects presented as uncoordinated tongue movements, uncontrolled chewing and licking movements.

Xerostomia

Ø Associated with hypertension.

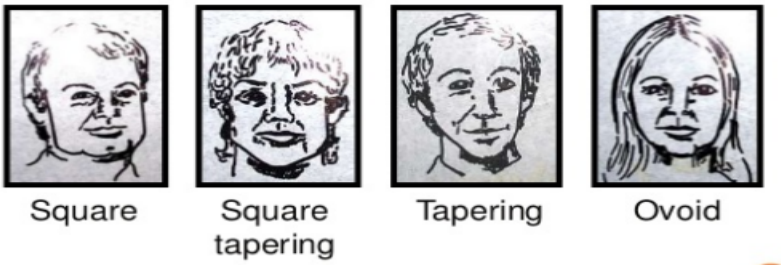
Ø Sjogren's syndrome: Dry mouth accompanied by burning sensation all over the oral mucosa.

Ø Salivary glands (and associated ducts infection and/or obstruction with stone).

Clinical evaluation of the patient

Local examination: Include general inspection for abnormal signs in the head and neck area.

- Facial form
    - Ovoid
    - Square
    - Tapering
    - Square tapering



- Facial symmetry
    - Symmetrical
    - Asymmetrical (hemi (hypertrophy, atrophy) , swelling).
- Facial profile

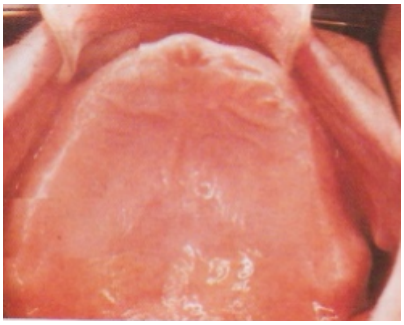
  According to angle classification
    - Class I Normal

  - Class II Retrognathic
  - Class III Prognathic

- Facial muscle tone
  - Heavy
  - Medium
  - Light
- Facial complexion
  - Dark
  - Medium
  - Fair
- Color of the pt. eyes.
- Lip examination: for any cracks, ulcerations (painful or not).
- Lip support
  - Well- supported by the anterior teeth
  - Collapsed , wrinkled
- Lip thickness
  - Thick
  - Thin
- Lip mobility
  - Normal
  - Limited

- Paralyzed

- Lip length
  - Long (hides the whole anterior teeth)
  - Medium
  - Short
- Vertical facial height
  - Normal
  - Increased
  - Decreased (collapsed, false prognathic jaw relation).
- Arch size
  - Large…. Ideal
  - Medium…….Acceptable
  - Small ……Poor
- Arch form
  - Square
  - Ovoid
  - Tapering



- Residual ridge form
- Tongue size
    - Hypertrophic
    - Atrophic
    - Normal
- Type of the saliva
    - Thin serous saliva with normal quantity (Favorable).
    - Thick mucus saliva (decrease retention).
    - Xerostomic .
- Patient occlusion : One of the most important criteria through which we can assess the function of natural and synthetic teeth.

  First, we need to memorize some of the occlusion terminology:

  Occlusion: Is the static relationship between the incising or masticating surfaces of the maxillary or mandibular teeth or teeth analogues.

  Centric relation: a maxillomandibular relationship, independent of tooth contact, in which the condyles articulate in the anterior-superior position against the posterior slopes of the articular eminences; in this position, the mandible is restricted to a purely rotary movement; from this unstrained, physiologic, maxillomandibular relationship, the patient can make vertical, lateral or protrusive movements; it is a clinically useful, repeatable reference position

Centric occlusion: the occlusion of opposing teeth when the mandible is in centric relation; this may or may not coincide with the maximal intercuspal position.

Maximal intecuspal position: the complete intercuspation of the opposing teeth independent of condylar position, sometimes referred to as the best fit of the teeth regardless of the condylar position

Mandibular movements: As the teeth slides over each other the path of the mandibular movement is partially determined by the shape and the arrangement o the teeth in contact and the anatomical constrains by the TMJ and masticatory neuromuscular function. Two types of mandibular movements:

- Rotational movements :
  - In the lower part of the TMJ
  - Between the superior surface of the condyles and the inferior surface of the articular disks.
- Translatory, gliding movements:
  - Takes place in the upper compartment o the TMJ.
  - Between the superior surface of the articular disks (with the condyl) and the inferior surface of the glenoid fossa.

A general classification of the mandibular movements is; opening-closing, protrusive and lateral. The later will produce two different sides, **the working side** where the mandible moves towards the opposing teeth in a lateral excursion. While the non-working side is where the mandible moves away from the opposing teeth.

The tooth contacts that inhibits the remaining occluding surfaces from achieving stable and harmonious contacts is known as the **occlusal interferences**

In natural dentition, the pathways teeth are taking depend on the cusp and occlusal surfaces morphology in addition to the joint function. The intercuspal position of the opposing teeth is applicable during chewing, swallowing and deliberate clenching. Here, the effect of the cuspal surfaces is important to separate the teeth during lateral or protrusive jaw movements when on the other side the teeth are in contact (function).

One of the most critical facts about occlusion with complete denture is to consider the absence of the direct contact between the denture base and the patient's musculo-skeletal system (why?) and the effect of the force on one tooth might affect the denture base stability. Therefore ….

The requirements of complete denture occlusion are:

1) Stability at centric relation
2) Bilaterally balanced occlusal contacts
3) Control of the horizontal forces by controlling the arch and interarch distances.
4) Favourable tooth –to- crest ridge position
5) Occlusal surfaces with high cutting, shearing and penetrating efficiency.
6) Efficient incisal clearance during masticatory movements.

Concepts of denture occlsion:

I. Balanced occlusion.

Bilaterlal simultaneous anterior and posterior occlusal contact of the upper and lower teeth in centric and eccentric positions (protrusive , lateral). Representing the continuing contacts of as any maxillary and mandibular artificial teeth as possible in all excursive movements.

II. Ligualized occlusion .

The lingual cusps tips should be in contact with the central fossae of the opposing mandibular teeth. The mandibular teeth cusps are relatively flat resulting in less lateral displacing forces during function; therefore, it is possible to use flat lower teeth.

Advantages:

- Good aesthetic
- Potential bilateral balance
- Centralize the vertical forces
- Minimize the tipping forces
- Facilitate food penetration
- Easier to adjust the occlusion
- Simple technique
- Can be used in class II, III and crossbite.
- Indicated for pts. With severe alveolar bone resorption, narrow upper ridge and wide lower ridge, implant-supported overdenture (why?), weak muscle attachments and high aesthetic demands.

III. Monoplane occlusion.

Assume that the anterio-posterior plane of occlusion should be parallel to the denture foundation area, having a very flat occlusal plane. No vertical overlap of the anterior teeth (incising the food is recommended). This concept is

indicated for pts. With jaw discrepancies, cross-bite, Class II, III, uncoordinated jaw movements.

The End

Best Wishes

Residual Ridge Resorption (RRR)

A chronic, progressive, accumulative inevitable reduction of the external width and height of the alveolar bone. After the teeth extraction the remaining portion of the alveolar bone and its covering soft tissues is called the residual ridge. As the bone is a living connective tissue that undergoes continuous catabolic metabolism, therefore, the rate of size reduction progresses at a low rate. However, after extraction, the rate of residual ridge reduction is the highest the first 3-6 months then it slows down resulting in variable loss of the jaw structure and complicating any prosthodontic procedures (as any prosthesis stability relies on the amount and the architecture of the underlying bone). This phenomenon known as the **Residual Ridge Reduction,** which varies in rates and severity among persons, different sites and times in same patient. The health and economic consequences of this event makes it one of the major concerns for both patient and dentist alike.

Following the tooth extraction, a cascade of inflammatory reactions take place in the injury site. Starting with sealing the empty socket with a blood clot and the epithelial tissue migration into the site to end with a more organized fibrous tissue filling the socket. As early as 2 weeks after extraction, the first histological sign of active bone can be recognized, then, the socket will be progressively filled with newly formed bone within 6 months.

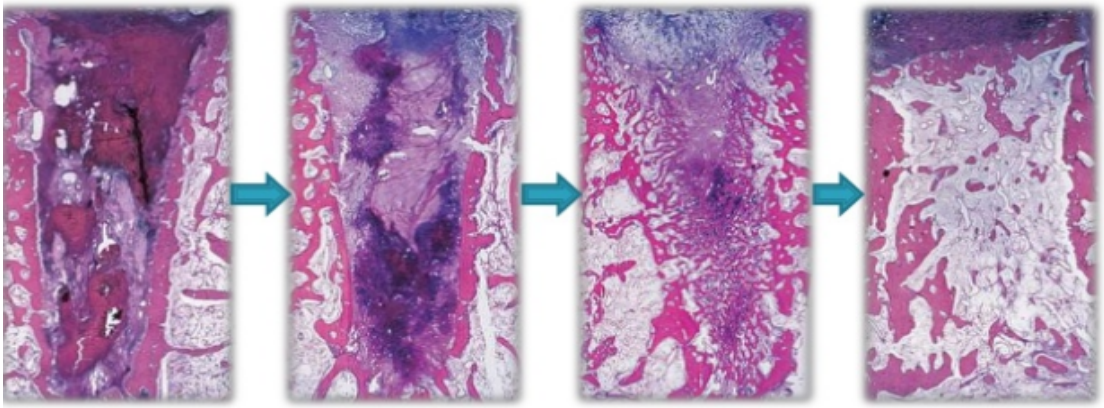


Figure 1 Stages of the socket healing after tooth extraction

Pathology of RRR

Basically it is noticed by the patient as gum shrinkage because it is usually associated with disconnection/loosening of the mucoperiosteum layer to appear as a redundant tissue in the affected area(s). Reduction might not be limited to the residual ridge, and extend toward the lower edge of the mandible creating a serious clinical challenge (see figure 2).

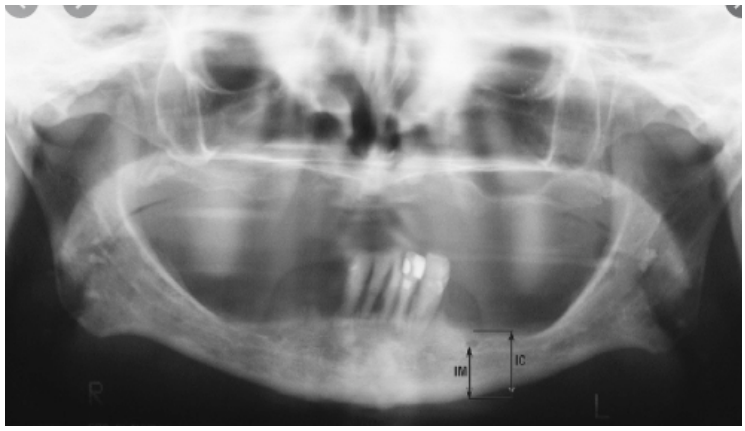
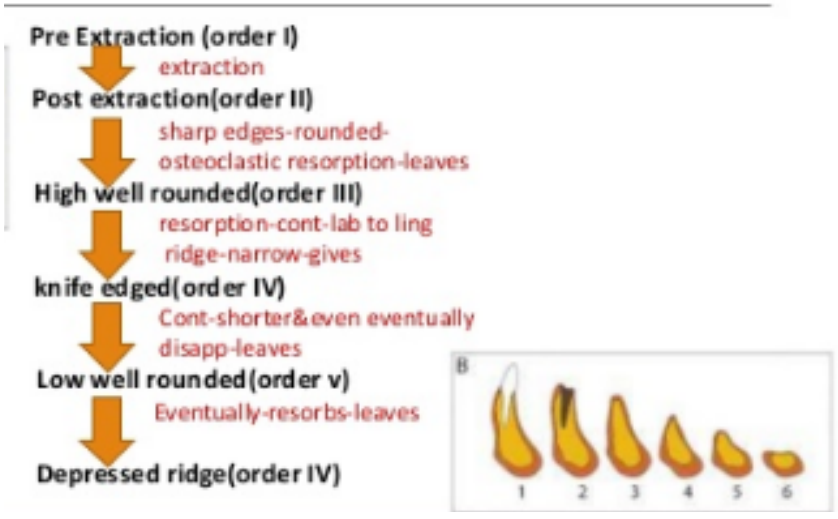


Figure 2 Panoramic radiography of a severely reduced residual ridge in both maxilla and mandible

Classification

A) Atwood's Classification

Order I: Pre-extractio.
Order II: Post-extraction.
Order III: High well rounded.
Order IV: Knife edge.
Order V: Low well rounded.
Order VI: Depressed.



Immediately after extraction (order II), any sharp edges at the site rounded under the effect of the external osteoclastic activity to produce a high-well rounded residual ridge (order III). As the resorption continues from labial and lingual sides,

the ridge will become narrow and take the knife edge shape (order IV). Then, the narrowed edge shorten and eventually disappear leaving a flat or low well rounded ridge (order V) that progressively reduced until it became depressed (orderVI).

The mean ratio of anterior maxilla to anterior mandible resorption is 1:4 so the rate of RRR in mandible is greater than in maxilla by 4 times in general (See figure 3). Therefore, according to Boucher, during the first year after extraction, the amount of bone height loss is around 2-3 mm in maxilla and 4-5 mm in mandible. Annual bone height reduction in mandible has been estimated around 0.1- 0.2 mm and 4 times less in the maxilla.

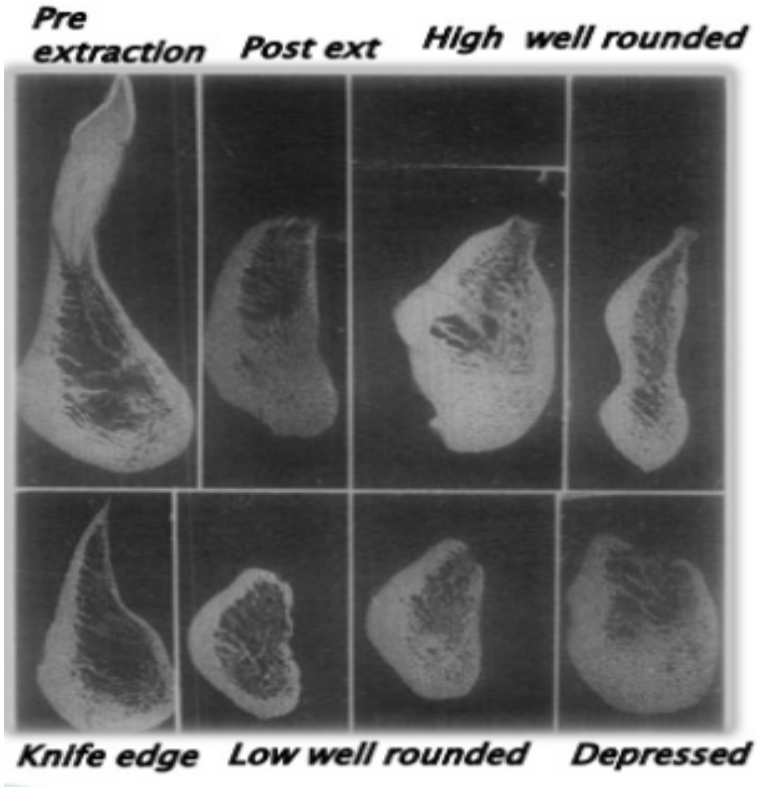


Figure 3 Stages of RRR according to Atwood's classification

Wical and Swoope classification:

Class I: Up to the third of the original vertical ridge height is lost.

Class II: one to two thirds of the original vertical height is lost.
Class III: Tow thirds or more of the mandibular vertical height is lost. (figure 4).

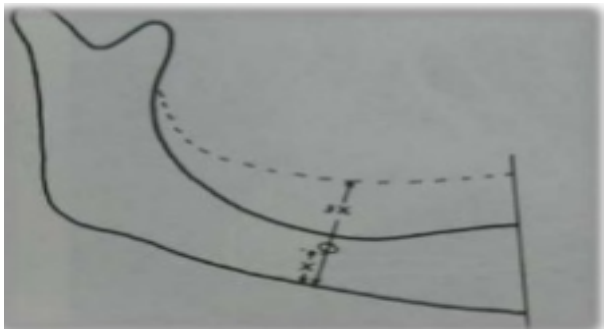


Figure 4

Etiology

The residual ridge resorption is a multifactorial condition, and the rate of the progress depends on the concurrence of two or more of the causative factors. A combination of anatomical, metabolic and mechanical factors can affect the incidence and the rate of the RRR in different patients according to the patient susceptibility.

1) **Anatomical factors:**

a) quality and quantity of bone

b) Period of edentulisim

c) Patient age and gender.

The amount of the bone is not a scientific factor to predict the amount of the RRR because sometimes wide ridges might resorb faster than narrow ridge. Bone quality, density and architecture have greater impact on the RRR.

2) **Metabolic factors**

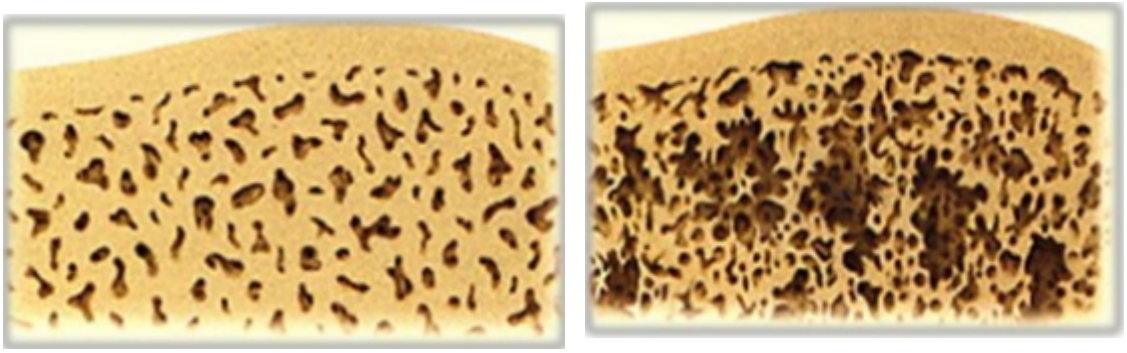
Based on the balanced anabolisim vs. catabolisim activities in the body. In case of bone, the equilibrium between the osteoblastic and osteoclastic activities is highly critical. Despite the fact that it is a normal part of the bone remodeling as it

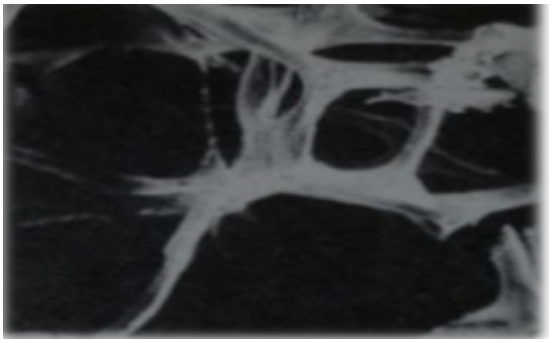
grows, hyperactive osteoclasts and/or hypoactive osteoblast will result in high RRR rate. Generally, the rate of resorption proportionally (directly) varies with the local and systemic resorptive factors, while inversely with the bone formative factors.

Bone resorption factors	
Local	**Systemic**
Human gingival bone resorption factor	Amount of thyroxin, Estrogen, Growth hormone, Calcium, Vitamin D and Phosphate**.**
Endotoxines from dental plaque	Osteoporosis
Osteoclast activating factor (OAF)	Hypophosphatamia
Trauma from ill-fitted denture	Parathormone and Calcitonin

Patient with Osteoporosis usually have a Bone Mineral Density that is **2.5 standard deviations** less than that of a normal adult BMD. It is correlated to decreased levels of estrogen hormone in post-menopausal women. For men, associated with falling levels of calcium and hormonal changes and lack of physical activity.

Osteoporotic bone





3) Functional factors: includes frequency, intensity, direction and duration of the forces applied on the alveolar bone. Compressive, tensile and shearing forces bring about the complicated mechanism of bone remodeling. The periodontal ligaments play a vital role in translating the masticatory forces into the alveolar bone to stimulate bone formation and resorption. Once the teeth are removed, PDLs are lost, so the residual ridge will be subjected to unequally distributed and different amount/types of forces.

4) Prosthetic factors:

a) Excessive stress from artificial environment.

b) Tissue abuse (lack of rest) and some areas being always under function.

c) Long- duration continuous use of ill-fitted denture (incorrect occlusion, faulty jaw relation).

d) Increased vertical dimension (lack of free way space).

e) Incorrect centric relationship (incorrect records for the maxillo-mandibular occlusion) resulted in eccentric relation and excessive pressure.

f) Lack of the occlusal records will produce high spots (excessive pressure).

Combination syndrome: Where patients with natural lower anterior segment against upper complete denture will experience excessive resorption in the upper anterior maxilla, see figure 5.

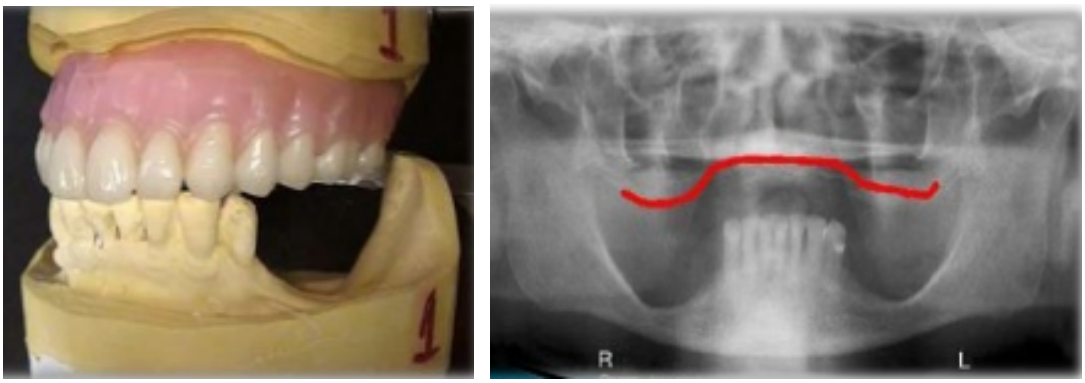


Figure 5 Combination syndrome patient's cast and x-ray.

Prosthodontic implications of RRR

1) Loss/mobility of teeth.
2) Edentulisim.
3) Repeat denture relining and remaking.
4) Loss of sulcus width and depth.
5) Loss of vertical dimension.
6) Reduced lower facial height.
7) Increased prognathia.
8) Displacement of muscular attachments and mental nerve.
9) Morphological changes in the alveolar ridge; sharpness, spiny projections and inequality.

How to determine the amount of bone loss?

- ✓ Examination by visualization.
- ✓ Palpation.
- ✓ Serial dental casts.
- ✓ Lateral cephalometric radiograph
- ✓ Orthopanoramic radiograph.

Treatment or prevention?

The easiest way to treat the RRR is to prevent it !!

How is that?

- Prevent the loss of the natural teeth.
- Proper denture design and preparation…
  - Optemize the tissue health prior to impression procedure.
  - Minimal pressure during impression and selective pressure impression tech. on the areas that resist the occlusal forces the best.
  - Adequate relief on the non stress-bearing areas.
  - Broad coverage area (Snow Shoe effect).
  - Avoid unnecessary inclinations to prevent dislodging (shear) forces.
  - Maximize the denture stability by centralizing the occlusal contacts.
  - Provide adequate space for the tongue (strong dislodging force).
  - Adequate inter-occlusal space (decrease the duration and intensity of teeth contact).
  - Neutralized teeth arrangement (narrow occlusal table).
- Improve patient's nutrition.
- Pre-prosthetic surgery: re-arrange the muscular and /or nerve attachment (e.g: removal of high frenal attachment, osseous reconstruction and augmentation procedures).
- Immediate and over dentures (reduces bone loss from 5mm to 0.6 mm in compare to conventional complete denture)
- Osseo-integrated implants.
- Metal-based dentures with soft lining (providing adequate weight for retention and the liner accommodate the ridge irregularities).

Thank you

Best Wishes

Post insertion problems in complete denture

Lecture: 17

Treating a completely edentulous patient and being able to restore some degree of function, esthetics, and the individuals self- esteem can be a very satisfying experience for a dentist. Or it can be an extremely frustrating experience if things fail to go smoothly and the patient comes back repeatedly with complaints about the quality of the denture and the capability of the dentist. It is unlikely that any dentist can solve all the problems that patients may present. Certainly the best approach is to avoid as many problems as possible. This can be accomplished most effectively by selecting a satisfactory technique and by using care in diagnosis and all phases of treatment. Adequate patient education is also essential. Factors which may limit the prognosis of treatment must be explained to the patient.

Post insertion care is a critical phase in the treatment of the edentulous patient. Scheduled and systemic follow up care can uncover minor problems and complaints which can become major problems if not treated promptly. There are problems arises subsequent to the insertion of complete dentures. These problems may be transient and may be essentially disregarded by the patient, or they may be serious enough to result in the patient being unable to tolerate the dentures. Some complication requiring a quick solution. Another difficulty would be the adaptation of the patient to the required changes in their day time habit pattern which, is not easy. Complete denture problems are divided into many general categories. Specific problems are listed in each category and their probable causes, specific diagnostic procedures, and appropriate corrective measures are present

Complete denture fabrication techniques, and placement of a complete denture are not the final steps in the treatment of edentulous, patients and patient's visit to the dentist continues long after that. Two thirds of the denture wearers surveyed in a study reported that they were “very satisfied“ with their maxillary denture as compared with 51% for mandibular dentures, of the individuals who wore their dentures “all day” 5% were “very dissatisfied” with at least one of their dentures.

Many practitioners will experience a situation, when a patient with newly fabricated complete dentures continues the experience difficulty in adapting to

them; this can lead to a long period of appointments that may not result in resolution of the problem. Therefore, it is often concluded that there is some patient factor either age, gender, medical or psychological status that is hindering the success of treatment.

Treatment challenges for such patients have traditionally been described as a combination of function, comfort, and aesthetics. Often there is not total agreement between the patient and the dentist as to the adequacy of their dentures.

Several authors cite the most frequent complaints with complete dentures are those pertaining to aesthetics, retention and stability, comfort while eating, and the accumulation of food under the appliance. The factor that most often appears to have an impact on either success or failure of complete dentures is aesthetics. Sometimes the appearance of their dentures prevents from wearing them. The way in which the patient believes he should look is not always in accordance with the clinician's perception of a pleasing appearance. Other studies reported complete denture patients experiencing difficulties with their dentures most frequently complained of looseness of their dentures, aesthetics, difficulty while eating, and accumulation of food under the appliance.

Many factors may influence patients' satisfaction with their dentures:

1. Quality of bone tissue and
2. Oral mucosa of denture bearing area, tissue changes that occur on denture bearing area due to alveolar ridge resorption lead to poorer denture retention and stability which consequently affects patients' satisfaction.
3. The adaptability of the neuromuscular mechanism,
4. Individual feeling of security by denture wearing,
5. Influence of the surrounding muscles on denture flanges,
6. Viscosity of saliva,
7. Patient's age,
8. Position of occlusal plane,
9. Occlusion,
10. Hygiene, type of food, etc.

Classification of denture complaints

- ***According to the time of delivery:***
  - Immediate complaints.
  - Delayed complaints.

- **General classification**

- ***Complaints about comfort of the denture:***
  - Sore spots
  - Burning sensation
  - Redness
  - Pain in TMJ
  - Tongue & cheek biting
  - Swallowing & sore throat
  - Nausea & gagging
  - Deafness
  - Fatigue of the muscles of mastication

- ***Complaints about function of the denture:***
  - Instability or poor fit
  - Interference

  a) When swallowing
  b) Clicking

- ***Complaints about esthetics:***
  - Fullness under the nose
  - Depressed philtrum or naso-labial sulcus
  - Upper lip sunken in
  - Too much of teeth exposed
  - Artificial look

- ***Complaints about phonetics:***
  - Whistle on “S” sounds
  - Lisp on “S” sounds
  - Indistinct “TH” & “T” sounds
  - “T sound like “TH”
  - “ F” & “V” sounds indistinct.

PROBLEMS RELATED TO SOFT TISSUE		
Complaints/area	Causes	Treatments
Sore spots – mandible		
Peripheral areas	Overextension	Adjust denture accordingly
	Unpolished or sharp edge	Polish denture borders
	Herpetic or apthous ulcer	Leave denture out as much as possible and wait 7-10 days
Crest of ridge	Bone spicules	Identify the area in denture with pressure – indicating paste and provide relief over spicule and/or surgically remove spicule
	Spinous ridge crest	Provide relief in the denture
	Pressure spots at time of impression	Use PIP or indelible pencil to determine the areas and adjust accordingly
	Occlusal prematurities	Correct occlusal defects, recheck vertical dimension and clinical remount
Side of ridge-anterior area	Overextension	Use pressure indicating paste and adjust denture border involved
	Maximum intercuspation not in harmony with centric relation	Enlarge centric area; grind mesial inclined planes of maxillary teeth and distal inclined planes of mandibular

		teeth using a clinical remount
Side of ridge-bicuspid area	Lingual tori (nonyielding areas)	Provide adequate relief in denture base
	Pressure spots at time of impression	Adjust denture accordingly
	Shrinkage of denture during processing (dimensional changes)	Rebase denture
	Error in occlusion - occlusal prematurities	Check occlusion on the opposite side of arch from the sore spot
	Pressure on mental foramen if ridge is greatly resorbed	Provide adequate relief
Side of ridge-posterior area	Overextension in lateral throat area	Shorten posterior of lingual flange
	Error in occlusion	Check teeth diagonally across the arch from the sore area
	Spinous projection of mylohyoid ridge distolaterally (feeling of sore throat)	Correct undercut surgically; you must under extend the denture. Relieve denture if not severe
	Overextension in anterior area (causes rotation of distal flanges)	Adjust peripheral overextension
Under lingual flange	Maximum intercuspation not in harmony with centric relation (drives mandibular denture forward)	Enlarge centric area and adjust local area-

Under labial flange	Excessive overbite	Adjust anterior occlusion
	Habit- mastication in protrusive relation	Train patient to masticate in centric
Generalized soreness and redness	Heavy biting force-strong musculature	Reduce buccolingual width of teeth; reduce vertical dimension; use soft lining if necessary
	Excessive vertical dimension of occlusion	Reduce vertical dimension
	Locked occlusion	Enlarge centric area
	Failure to provide freedom for Bennett movement (soreness usually on working side	Reduce cusps to a nonanatomical plane or reset teeth
	Improperly processed base material	Rebase denture
Sore spots – maxilla		
Peripheral areas	Overextension	Adjust denture accordingly
	Unpolished or sharp edge	Polish denture borders
	Herpetic or apthous ulcer	Leave denture out as much as possible for 7-10 days
Maxillary frenum	Overextension	Open a V-shaped notch for the labial frenum and widen the buccal frenum areas
Posterior border of denture	Sharp edge at the post dam area	Adjust sharp edge slightly without reducing dam area

Midline of denture	Prominent midsuture or torus palatinus	Provide some relief over the area
Generalized discomfort		
Improper occlusion		Correct occlusion (clinical remount)
Maximum intercuspation not in harmony with centric relation		Enlarge centric area (clinical remount)
Excessive vertical dimension of occlusion		Reduce vertical dimension (clinical remount)
Burning sensation		
Maxillary anterior hard palate and anterior alveolar ridge area	Pressure on anterior palatine foramen	Relieve area over foramen
Maxillary bicuspid area or molar tuberosity	Pressure on posterior palatine foramen	Relieve area over foramen
Mandibular anterior region	Pressure on mental foramen	Relieve area over foramen
Generalized	Improperly processed	Reline denture; replace as much as possible base material with new acrylic resin
Tongue	Allergic reaction xerostoma	
Redness		

Fiery redness - All tissue contacted by denture including tongue and cheeks	Denture base allergy (very unusual)	Remake denture and use all metal base (after allergy test)
Bearing tissues	Ill-fitting denture, Avitaminosis	Remake or rebase dentures. Employ vitamin therapy regimen
Tongue and cheek biting		
Thin or under extended periphery (base material does not provide enough support for the cheek)		Build out thin areas, or extend the short periphery
Insufficient interarch clearance between distal parts of denture bases		Thin maxillary denture over tuberosity; if more space is required, remove it from the retromolar area of the mandibular denture
Inadequate amount of horizontal overlap in molar region		Re-contour buccal surface of mandibular molars and bicuspids; eliminate the tight contact of the maxillary buccal cusps on the mandibular buccal surfaces
Pain in TMJ		
Insufficient vertical dimension of occlusion		Increase vertical dimension of occlusion
Maximum intercuspation not in harmony with centric relation		Make new occlusal record, regrind and remount occlusion
Arthritis		Treat with analgesics

Trauma		Treat with analgesics
Gagging		
Immediately upon insertion	Maxillary denture overextended or too thick in posterior border	Adjust denture or thin posterior border
	Lack of retention	Reline denture
	Mandibular denture too thick in distolingual flange	Reduce thickness or distolingual flange
Delay (2 weeks - 2 months after insertion)	Incomplete border seal allowing saliva under denture	Increase border seal with self- curing acrylic resin (possibly at the posterior palatal border
	Improper occlusion causing denture to loosen and allowing saliva under denture	Correct occlusion (clinical remount)
Deafness		
Decrease vertical dimension of occlusion (rare)		Increase vertical dimension of occlusion
Fatigue of the muscles of mastication		
Excessive vertical dimension of occlusion		Reduce vertical dimension of occlusion
Insufficient vertical dimension of occlusion		Increase vertical dimension of occlusion

PROBLEMS RELATED TO FUNCTION			
Complaints/area		Causes	Treatments
Instability			
Looseness of mandibular denture		Error in occlusion (maximum intercuspation not in harmony with centric relation)	Correct faulty occlusion by remount and regrind procedure
		Occlusion plane too high	Reset teeth at a lower plane
		Underextension of periphery (inadequate impression)	Rebase denture providing proper extension
		Inability of patient to master denture	Use denture adhesives to help develop skill in handling denture (for a short time only)
		Tongue position (retracted tongue)	
Looseness of maxillary denture	Occasionally	Underextension in some area	Correct with self-curing acrylic resin; first check with compound for diagnostic purpose
		Faulty occlusion	Correct Occlusion

		Overextension of peripheries	Adjust denture accordingly
		Dehydration of tissue due to alcoholism	Remove cause
		Displacement of flabby tissues when making impression	Correct surgically; modify impression technique to change primary denture stress- bearing area to the buccal shelf
	When eating on either side	Nonyeilding area in hard palate (ridge tissue yields under chewing stresses; denture rocks on hard area	Provide relief chamber over non-yielding area
		Incorrect tooth position (teeth may beset too far buccally off ridge	Rebalance in lateral excursions; reset teeth where nature should have had them
		Chewing resistant foods	Instruct patient to maintain soft diet until mouth is conditioned to wearing denture
	Approximately every 2 hours	Heavy mucinous saliva	Prescribe astringent mouthwashes and regular scrubbing of dentures; reduction of carbohydrate

		Incorrect tooth position (teeth may be set too far buccally and labially	Correct surgically; change primary denture stress -bearing area to the buccal shelf
		Improper incising habits	Train patient to masticate in centric relation
		Loss of posterior palatal seal (seal on hard palate; posterior limit not in hamular notches; insufficient valve seal)	Increase postpalatal seal with self-curing acrylic resin; first use compound as a diagnostic aid
	When yawning or opening wide	Denture base too thick in buccal posterior area (coronoid process exerts forward and downward force on posterior of denture upon opening)	Reduce thickness of denture base
		Overextended in hamular notch	Shorten denture until pterygomaxillary ligament does not exert tension on posterior border when mouth is opened wide
		Inadequate posterior palatal seal	Increase postpalatal seal with self-curing acrylic resin
	When talking	Inadequate posterior	Increase postpalatal seal

		palatal seal	with self-curing acrylic resin
		Overextended in posterior region	Shorten posterior until soft palate does not lift upward and break contact with the denture base
	When occluding in centric relation	Improper occlusion	Correct occlusion
		Poor denture foundation (flabby tissues over ridge)	Correct surgically; change primary denture stress-bearing area to the buccal shelf
		Incorrect tooth position (teeth set too far buccally)	Reset teeth
		Maximum intercuspation not in harmony with centric region	Enlarge centric area
		Nonyielding area in hard plate	Provide relief in area
	Only a feeling of looseness (support and retention are present yet denture feels suspended in	Large area of nonyeilding tissue in hard plate	Provide relief chamber, adequate to permit denture to be properly seated

	mouth		
Interference			
When swallowing		Maxillary denture too thick or over-extended in posterior region	Reduce thickness or adjust posterior
		Mandibular denture too thick or overextended in posterior lingual flange area	Reduce thickness or adjust posterior lingual flange area
		Insufficient vertical dimension of occlusion	Reduce vertical dimension
		Excessive vertical dimension of occlusion	Reduce vertical dimension
		Incorrect tooth position (posterior teeth set too far lingually - tongue crowded	Reset teeth
Clicking		Excessive vertical dimension of occlusion	Reduce vertical dimension
		Ill-fitting dentures	New dentures
		Overextended lower dentures	Reduce peripheral length

PROBLEMS RELATED TO ESTHETICS		
Complaints	Causes	Treatments
Fullness under nose	Labial flange of maxillary denture too long or too thick	Reduce length or thickness of labial flange
Depressed philtrum	Labial flange of maxillary denture too short	Increase length or thickness of labial flange
Upper lip sunken in	Maxillary anterior teeth set too far lingually	Reset anterior teeth labially
Too much of the teeth are exposed	Excessive vertical dimension of occlusion	Reduce the vertical dimension of occlusion
	Incisal plane too low	Reset teeth at higher plane
	Cuspids and lateral incisors too prominent	Adjust accordingly
Artificial appearance	Technique setup (teeth are too regular in alignment)	Individualize by rotating and shortening some teeth
	All teeth in same shape	Choose different but complimentary

		shades; use staining techniques
	Lack of individualization of teeth	Grind incisal edges and angles
	Lack of individualization of denture base	Individualize gingival contour and color of denture base

PROBLEMS RELATED TO PHONETICS		
Complaints	Causes	Treatments
Whistle on "S" sounds	Air stream passes unimpeded or with inadequate impedance between the dorsal surface of the tongue and the anterior palate	Increase the palatal resin convex contours lingual to the maxillary central incisors to impede the air stream passing between the tongue and palate. Create rugae if necessary
Lisp on "S" sounds	The air stream passing between the tongue and anterior palate is excessively impeded, usually by rugae or excessive resin contour(to small anterior air	Thin the palatolingual area

	space).	
Maxillary & Mandibular incisors or premolars contact during sibilant (s, sh, z, ch) sounds	Occlusal vertical dimension too great	Reduce occlusal vertical dimension until premolars no longer contact during speech
Clinician observes that incisal edges of maxillary incisors contact the lower lip 1 mm or more labial to the wet/dry junction of lower lip when "F" & "V" sounds are made	Maxillary teeth may be set too far labially	Evaluate lip support and overall appearance of anterior teeth as they are positioned. Reset to a more lingual postiion as needed. incisal edge of maxillary incisiors should contact the wet dry junction ro just lingual to it during production of the "F" & "V" sounds.

A study done for CD complains. The results showed that the number of mandibular dentures requiring adjustments was significantly higher than maxillary dentures in all the post-insertion appointments.

Most frequently injured maxillary areas were posterior palatal seal area in the soft palate (27%), in the mandible, the most frequently injured areas were retromylohyoid area (48.6%).

The least common locations for maxillary ulcerations were hard palate and mid-palatal suture (0%), incisive papilla and rugae (0.65%), tuberosity (2.6%), and buccal and labial sulci (4.6%). The lowest frequency of lesions in the mandible

was seen in the sublingual fold (0%), labial sulcus and mylohyoid region of the lingual sulcus (1.2%) and buccal frenum and buccal shelf (2.1%).

No significant differences were detected between males and females in terms of mucosal injuries in the above-mentioned anatomic areas of the maxilla and mandible.

The most frequently observed faults in denture construction related to retention and vertical and horizontal jaw relationships. There is significant relationship between inadequate retention and in proper intermaxillary relationships and patient's complaints of looseness and difficult eating.

Clinician must carefully evaluate the denture for faults in horizontal and vertical jaw relationships before concluding that the patient's complaint is related to age, gender, or general medical condition

Limitations of Dentures

- Dentures are less efficient than natural teeth
- Some people can eat all foods easily, but these are the exception
- Generally the better the ridge form, the fewer problems are encountered. Patients with minimal ridges should be advised that their dentures will likely move (especially the mandibular) and their efficiency will therefore be reduced.
- Patients with minimal ridges will likely encounter more sore spots than others.
- It is wise to point out these limitations to patients prior to the delivery appointment so that it is viewed as an explanation, rather than an excuse.

Adaptation to Dentures

Adaptability is affected by:

1. Length of time wearing dentures.
2. Amount of residual ridge remaining.
3. Degree of changes made in new dentures.
4. Individual variation (e.g. patients with more acute oral sensory perception have more difficulty adapting).

Adaptation to Chewing may be affected if:

1. CO has been changed to coincide to CR.
2. Tooth positions (esp. incisors) have changed.
3. Vertical dimension has changed.

These patients may experience initial decreased efficiency, cheek or lip biting. Adaptation may be improved by initially eating soft foods, increasing to hard foods, cutting food into smaller pieces, and placing food towards the corners of the mouth. Adaptation may be accompanied by an initial, transitory increase in saliva. Patients should be advised of the need to persevere while their neuromusculature adapts to the new prostheses.

Speaking may be affected by changes in:

1. Tooth position (esp. anteriors).
2. Tongue space (particularly if patients have been without dentures forsome time).
3. Palatal contours.

Initial speaking problems are usually transitory, since the tongue is very adaptable – tooth positions must be close at delivery, however).

Appearance may be changed in some individuals. These changes are usually due to:

1. Increasing length of incisors (worn).
2. Changes in vertical dimension.
3. Improved lip support.

The End

Best Wishes

Single complete denture

Lecture: 8

It is a CD maxillary or mandibular may be fabricated to opposed by:

1. An arch containing a sufficient number of natural teeth and fixed restorations so as to not require any other prosthesis.
2. A partially edentulous arch in which the missing teeth have been or will be replaced by a removable partial denture, fixed partial dentures, or implant-supported prostheses.
3. An existing acceptable complete denture, whether it be mucosal-borne, tooth-supported, or implant-supported; the patient may ask for a new single complete denture construction.

Glossary of prosthodontics defined **combination syndrome** as: the characteristic features that occur when an edentulous maxilla is opposed by natural mandibular anterior teeth, including:-

1. loss of bone from the anterior portion of the maxillary ridge.
2. Overgrowth of the tuberosities.
3. Papillary hyperplasia of the hard palate's mucosa.
4. Extrusion of the lower anterior teeth.
5. Loss of alveolar bone and ridge height beneath the mandibular removable denture bases.

The qualitative and quantitative differences between the natural teeth and CD in support is demonstrated by the ability of the natural teeth to respond well to the physiological limits of the occlusal load in a way help to maintain functional and preservation requirements; while the mucoperiosteal supported denture is incapable to adapt such a condition in same level with the natural teeth.

Maxillary single dentures are often more successful than mandibular- dentures for a number of reasons:

First, the mandibular arch is the moveable member of the stomatognathic system (mouth, jaws, and related structures), which inherently decreases its stability.

The first step in the diagnosis phase is identification of these changes:-

Second , the proximity of the mandibular denture borders to the tongue and other moveable mucosa may lead to easier displacement.

Thirdly, the mandibular edentulous ridge, with its limited amount of attached submucosal tissue, provides less support for the denture base.

Diagnosis and treatment plan:

Treatment procedures in single CD must aim to prevent occurrence and further degenerative changes in the oral cavity. When only one arch is edentulous and the other is dentate the characteristics of physiological occlusion may not achieved due to presence of the remaining teeth especially if these teeth were in an unfavorable condition.

1. Extensive morphological changes in the denture foundation area that may result in arch relationship or occlusal discrepancy.
2. Jaw relationship extreme.
3. Excessive displaceable denture bearing tissues.

Extensive morphological changes in the denture foundation area that may result in arch relationship or occlusal discrepancy:

A- After tooth extraction usually and even in normal morphology leads to bone resorption. In the upper arch this will lead to smaller maxilla in relation to the mandible, this creates improper horizontal relationship with opposing dentulous arch, anteriorly and posteriorly.

B-In a patient with longstanding upper edentulous arch opposed by lower anterior teeth or even poorly constructed Cl. I Kennedy RPD; in both cases a progressively lose bone in the posterior mandible, the lower denture bases gradually sink and a posterior open bite develops. When patients' complete maxillary and partial mandibular dentures are adjusted routinely, the development of the posterior open bite is less severe. Subsequently, important features usually develop:-

1. **The first** is hypertrophy of the anterior mandible with anterior hyper function. Posterior reduction of function (posterior hypo function) leads to anterior increase in function and subsequently hypertrophy of anterior mandibular bone to accommodate it. This repetitive force inevitably causes considerable resorption of the premaxillary alveolar bone. ***This produce another changes are:***

- As anterior maxillary atrophy and anterior mandibular hypertrophy develop, this lead to eventual unaesthetic submergence of maxillary anterior denture teeth underneath the upper lip and abnormal exposure of mandibular anterior natural teeth above the lower lip.
- Chronic occlusal trauma from the incisal edges of mandibular anterior teeth also often causes flabby and fibrous soft tissue changes of the anterior palate, commonly describe in the literature as papillary hyperplasia.
- This make the upper denture sink more toward the supporting area which is now contains more movable tissues irritating the vestibular tissues; if the condition is continued without adjustment, epulis fissuratum is most probably developed.

2. Second:- If this load is not corrected and the premaxillary region continue undergoes a destructive changes that allow displacement of the denture superiorly and resultant changes in the occlusal plane can allow a down growth of the maxillary tuberosities.

3. **Resorption** of both anterior maxillary and posterior mandibular edentulous alveolar ridges leads to a progressive collapse of the OVD. The mandible moves forward, causing a relative (pseudo) mandibular prognathism. An over projected and up-rotated chin point and a collapsed lower facial height are associated with the altered facial esthetics seen in advanced cases.

Irregular occlusal plane:

Jaw relationship extreme:

This makes it difficult to place the denture teeth in a position that allows the denture bearing area to be in line with occlusal support; as in CL.III skeletal relationship. This results in cross bite posterior teeth arrangement while anterior teeth cannot be set lingual to the lower anterior teeth and the risk of denture dislodgement with anterior tooth contact is problematic.

Excessive displaceable denture bearing tissues:-

In denture; the forces of occlusion are resisted by mucoperiosteum which allows some movement of the denture base by its resiliency. When tissue displacement allow excessive displacement in one area but not in another; the movement of the prosthesis under load is greater in the region of greater tissue displacement with resultant dislodgement.

This is often is seen as a tilting or extrusion of teeth after the extraction of a mandibular first molar the 2nd and 3rd molars are inclined anteriorly; this lead to a superior position occlusal plane than normal. This result in an irregular occlusal plane and consequently unfavorable force distribution. This indicated the need for selective grinding, with a template placed on the dental arch. The device will rest on the most prominent teeth to ensure enough number of teeth are in contact. This provides a uniform reduction but may not meet the need of a specific denture arrangement for stable cross arch balance.

Clinical and laboratory steps:-

Preprosthetic work:-

Different patients with particular clinical findings should be treated specifically to prosthodontically rehabilitate them and prevent combination syndrome. Therefore consider the following individually (it is not essential to have all the complications in every patients).

- Treatment of the abused tissues by using tissue conditioners, occlusal adjustment and extension correction of the existed denture; you may ask the patient not to wear old denture. Surgical correction may be needed according to the extension and severity.
- Reduction enlarged tuberosities; surgically to allow the lower RPD occlusion to oriented properly in relation to the retromolar pad area and buccal shelf area.
- Splinting the remaining mandibular anterior teeth to provide the RPD with positive occlusal support, rigidity and stability, while minimizing excessive stress on the ant. natural teeth; in this way provide posterior and to minimize occlusal pressure in the ant. maxilla.
- Surgical intervention (vestibuloplasty and excision of flabby tissue).
- **Improvement of the denture foundation areas** as augmentations or grafting; dental implant is a strong choice.
- **Diagnostic casts** in most cases is essential to chart the treatment planning and modifications required; in some cases even teeth corrections may be made on the casts to ensure efficacy of these modifications and its approximation to the functional movements and needs of each patient.

Primary impression:-

In an ordinary cases; primary impression can be made as usual, use a stock tray and suitable impression material. If a movable tissue in the upper or lower ridge

crest is detected; it is better to use modify the impression technique or material to minimize tissue displacement during impression.

Final impression:-

In cases where the flabby or mobile tissues is diagnosed; selective pressure or minimum pressure or even non pressure impression technique must be used in the final impression.

☒ First model:

1. The places with flabby mucosa were delineated and as well the places on the "medaina palatine raphe" and" torus palatinus".
2. Those spots were then covered with a wax layer.
3. After that an individual tray is formed.
4. Holes are drilled at the places corresponding to the critical spots mentioned earlier with a space approximately 5mm apart.

☒ Second model:

You can follow same steps in the 1st model but instead of putting holes you prepare a window at the delineated areas of flabby tissues. You must use an impression material making. Plaster of Paris impression materials is mostly the material of choice. It can be applied in a layers with a brush to produce the desired need.

Third model:

1. On this model the areas of movable- flabby tissues are delineated as well as the areas need relief as the torus palatinus-if present.
2. Then relieved with a layer of wax in a uniform thickness.
3. Another base plate wax covered the whole basal seat i.e. the surface outlined for tray.
4. Wax is cut away in locations where stops are desired; usually we place them in the areas opposed to the canines and1st molars.
5. The tray is completed with the wax spacer as relief.

6. Holes are drilled at the places corresponding to the flabby tissues areas and torus palatinus.

Jaw relation records:-

Maxillary occlusion rim is constructed with tripod or stable centric stops if possible to record centric jaw relation with wax or other suitable material. If opposing mandible is partial edentulous this indicates construction of lower occlusion rim to have a stable jaw relations.

1. A face bow registration is made and a cast mounting must be either by using an average value articulator or using semi adjustable articulator that indicates a protrusive relation record.
2. Recording vertical jaw relation may be interfered with the over erupted or malposed teeth; these may require some modification in the bite rim orientation but this must be made in a local areas without- as possible- interference with the proper orientation of occlusal plane.
3. Using gothic arch tracer for CR, or using zinc oxide paste or wax for recording CR.
4. Freeing the anterior occlusion rim.
5. Incisal guidance is set according to the need. Aesthetic of the denture will influence the angle of incisal guidance because of the vertical position of the anterior teeth with various vertical overlap used.

Selection of teeth:

Selection of teeth is important to establish functional and esthetic requirements. Teeth material and location must be evaluated and verified inside the patient's mouth to decide its suitability. It is well known that acrylic teeth are abraded more easily than porcelain teeth. Never use porcelain teeth opposing to natural because it lead to natural teeth attrition; therefore it is better to let denture teeth to wear rather

than the natural one. Generally porcelain teeth have a good wear resistance; although it is good property but this may lead to:

- Excessive load on the ridge.
- Patient with a single CD need frequent occlusal adjustment to accommodate changes in the basal area and porcelain teeth are difficult to be adjusted.

Teeth with metal occlusal surface can serve stable occlusion. These changes in the teeth form after denture insertion need periodic recalls. To select teeth material you have to consider:

- Opposing teeth, natural or artificial.
- Selected occlusion concept that control function load.
- Remaining teeth alignment; some cases may require reduced teeth number.
- Need for future adjustment.
- Type of denture base material; acrylic or metal.
- Patient history with previous denture-if present- and any problems.

Teeth setting:

Setting of artificial teeth must be done properly with vertical overlap and inclination but in some cases you should not follow the occlusal plane of the opposing teeth because it is mostly not ideal due to extraction, proclination and extrusion.

Occlusion:-

-Prevention of the combination syndrome must be our primary objective. Restoring a stable posterior occlusion, while minimizing occlusal pressures on the anterior maxilla.

-A bilateral balanced occlusion of the posterior teeth using pantographic recordings transferred to a fully adjustable articulator to stabilize the maxillary denture.

-Another way of potentially increasing the stability and retention of the single denture is to use anatomic form posterior denture teeth and a balanced occlusal scheme.

-The posterior occlusal table was formed by cast metal chewing platforms or hard resin posterior teeth.

-Acrylic teeth were used to replace the max. ant. Teeth **because** they abrade rapidly and tend to reduce stress concentration on the max. ant. ridge. But this may lead to reduce OVD and improper stress distribution; with the time when residual ridge resorption of the arches is continued physiologically, the denture retention and stability may be affected greatly.

Try-in step:-

- The teeth in a wax trial denture must be evaluated in CR on the articulator; evaluation of the occlusion in eccentric relations also.
- Modification of teeth position are made to provide balance stable cross arch balance within functional movement (2mm).
- The denture arrangement and all necessary natural teeth modification can be accomplished on the opposing stone cast to mark the location and extent of modification.
- Other methods of teeth adjustment can be used depending on the case and dentist's experience.(teeth adjustment must be determined at diagnosis step)

Denture fracture:-

Fracturing the denture base of the single denture is a common complication because the denture is often opposed by a full or nearly full complement of natural teeth or fixed restorations. The restating high occlusal forces on the denture combined with a typical denture base thickness sometimes results in fracture.

potential.

Alternative treatments and options:

Careful control over the occlusion or use of a cast metal base are considerations to prevent this problem. The precipitating factors of this condition could be :-

1. Excessive anterior occlusal load.
2. Deep labial notch.
3. High excessive load due to excessive action of masseter muscle.

Treatment:

1. Check for occlusal contacts.
2. Adequate and even denture base thickness.
3. Do not deepen or improperly shape the labial notch.
4. Cast metal denture base may solve the problem in cases with high fracture

It is clear and well understood the subsequent of single CD construction. Therefore, it is advisable always try to prevent this condition as possible.

1. Planned extraction with immediate denture construction.
2. Over-denture with metal denture base.
3. Using of denture liners with periodic recall for occlusal adjustment and liner replacement.

4. Dental implants: this is regarded as a solution for this condition whenever it is indicated.

The End

Best Wishes

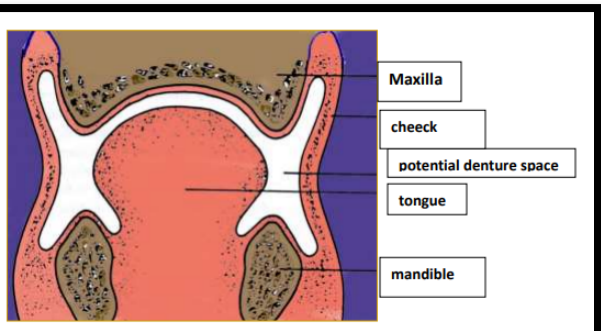
Neutral Zone

Lecture: 14

The lower denture commonly presents the most difficulties with pain and looseness being the most common complain. This is because the mandible atrophies at greater rate than the maxilla and has less residual ridge for retention and support. The Neutral Zone technique is most effective for patients who have had numerous unstable and un retentive lower complete dentures. These patients usually have highly atrophic mandible and there has been difficulty in positioning the teeth to produce a stable denture.

N.Z. IS THAT :-area in the potential denture space where the forces of tongue pressing outward are neutralized by the forces of the cheeks and lips pressing inward.

Since these forces are developed through muscular contraction during the various functions of chewing , speaking and swallowing . They vary in magnitude and direction in different individuals.



Cross section/ The potential denture space

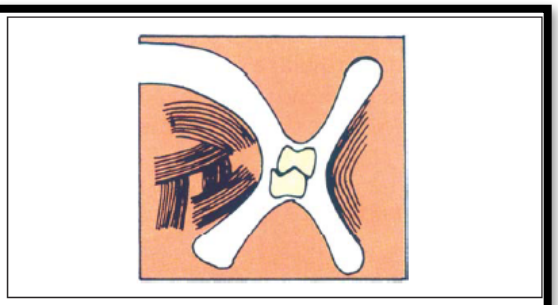


Fig. 5.46: Posterior teeth arrangement in the neutral zone in order to prevent the action of muscular de-stabilizing forces on the denture

INDICATIONS:-N.Z. is indicated when stability and patient, s acceptance of lower C.D. are in question.

1- Severely atrophic mandibular ridge

2- Patients with prominent and highly attached mentalis muscle , lateral spreading of tongue as a result of poor transition from dentate to edentulous state and sever resorption

3- Patients with diminished neuromuscular control such as those with a history of stroke , Parkinson, s disease or patients with impaired motor innervations to oral and facial muscles as a result of brain surgery.

4- Patients with a typical shape or consistency of oral and perioral structure for example. patient who have scleroderma , marginal or segmental mandibulectomy and partial glossectomy.

5- N.Z. technique can be used to locate optimal position for implants in cases of implant supported or retained the overall outcome of treatment.

Muscles involved in the N.Z.

The musculature of the denture space can be divided into two groups:-

1- Those muscles which primarily dislocate the denture during activity (Dislocating muscles).

2- Muscles that fix the denture by muscular pressure on the polished surfaces (Fixing muscles).

These can then be further divided according to their location on the Vestibular(labial and buccal) side or lingual side of the dentures.

Dislocating muscles
Vestibular:
Masseter
Mentalis
Incisive Labii Infer.
Lingual:
Medial Pterygoid
Palatoglossus
Styloglossus
Mylohyoid

Fixing muscles
Vestibular:
Buccinator
Orbicularis oris
Lingual:
Genioglossus
Lingual longitudinal
Lingual vertical
Lingual transverse

Materials used for N.Z. Impression:-

1. Impression plaster

2. Impression waxes
3. Impression compound
4. Regular bodies silicon
5. Tissue conditioner
6. Polyether
7. Hard relining.

Clinical techniques:-**1st technique**:- Primary and secondary impression are taken for maxillary and mandibular denture bearing areas as in standard complete denture treatment.

Bite registration is then performed as in conventional treatment. Master casts with record blocks should be mounted on an articulator. In the lab, the lower occlusal rim is removed from base plate and substituted with a base plate with acrylic pillars in the premolar regions and or wire loops on the remaining areas of the base plate. The pillars preserve the OVD recorded in bite registration stage .It is essential that the pillars are relatively thin bucco-lingually and are positioned directly over the ridge. The base plate is then fitted in the patient's mouth and OVD and extensions are checked. Then impression material is applied to the base plate and retained by the wire loops and or acrylic pillars.

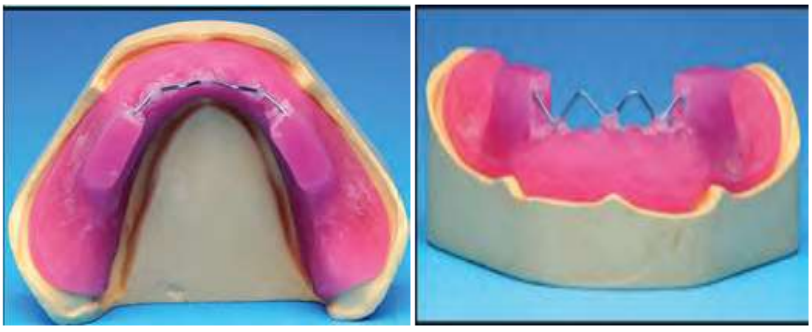


fig:- wire loop application

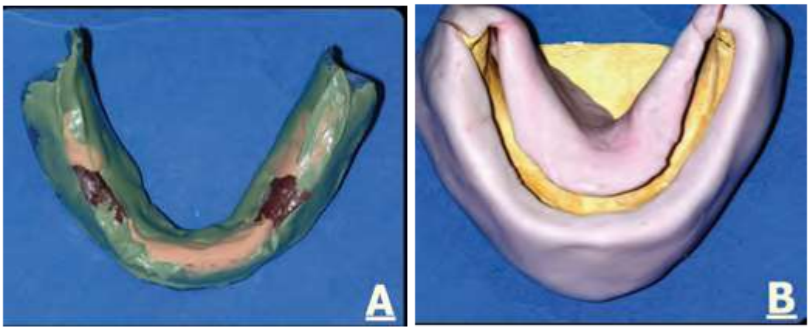


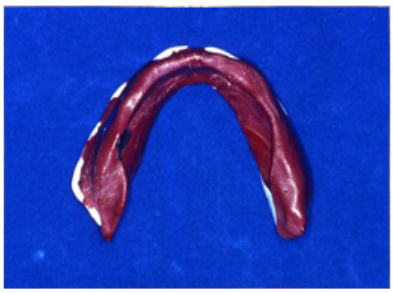
fig:- A- application of material B- plaster index after recording N.Z.

Before setting of material, patient is asked to perform functional movement such as licking lips, swallowing, pronouncing some words or combination of these. Care should be taken that the patient should continue performing. Functional movements until the full setting of material, otherwise material might flow back and give inaccurate recording of the N.Z.

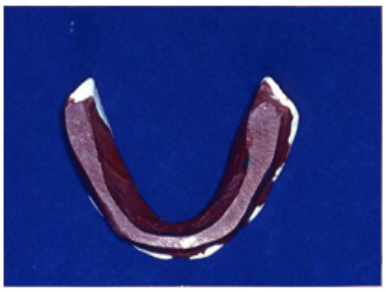
It is useful if the chosen material has relatively long working time to allow the required movements to be carried out before the material becomes rigid. Also denture is fitted in the patient mouth as it may help to control recording material and prevent it from being displaced in a labio-occlusal direction.

2nd technique(Reversed sequence in denture construction):-

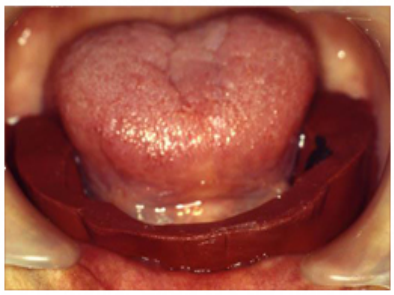
The usual sequence for complete denture is to make primary impression, construct individual trays, make final impression and then fabricate stabilized bases. Occlusal rims or other devices are used to establish the occlusal Vertical dimension and centric relation. With the neutral zone approach to complete dentures, the procedure is reversed. Special trays are constructed first. These trays are very carefully adjusted in the mouth to be sure that they are not overextended and remain stable during opening, swallowing and speaking. Next, modeling compound is used to fabricate occlusal rims. These rims which are molded by muscle function, locate the patient, s N.Z.



4- After neutral zone molding for few times, the compound block was kneaded upward.



5- Cut down the compound bite block and leveling the occlusal plane from the angular of the mouth to 2-3retromolar pad.

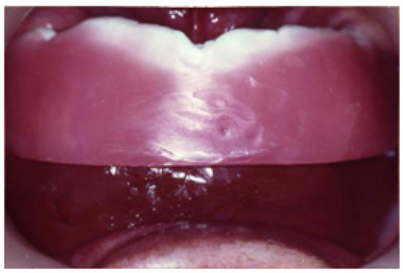


6- Molded lower bite block in place, even with lips retracted, was ready for further bite registration.

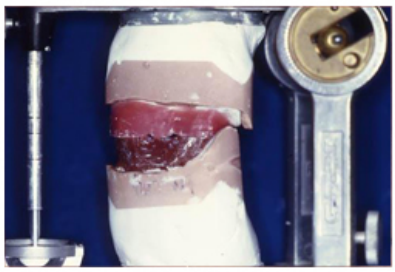
After a tentative Vertical dimension and Centric relation have been established the final impression are made with a closed-mouth procedure only. When the final

impression are completed are the occlusal Vertical dimension and Centric relation finally determined.

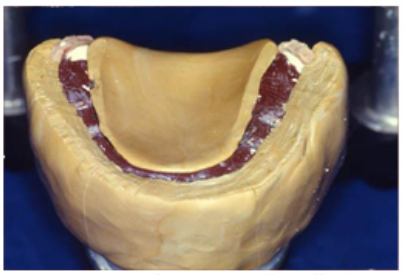
- Plaster index fabrication and tooth arrangement.



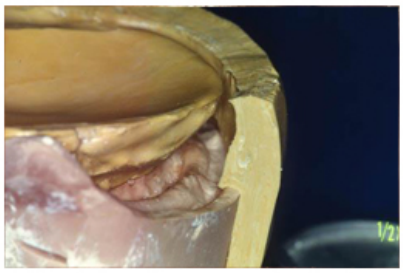
7- Anterior view with upper and lower bite blocks in place. Notice the upper bite block was fabricated by conventional technique.



8- After bite registration, the case was mounted in the articulator.



9- Preservation of molding surface (future Polishing surface of denture) was done with silicone putty.



10- Sectioning of the preservation jig shows the relationship of the ridge and potential teeth position.

11- Set-up teeth along with the preservation jig.

12- Preservation jig was used to contour the polishing surface of denture.

- -Tooth arrangement and initial wax up for the soft tissue contours.
- Then lingual index are being removed and buccal index after that.
- Intra oral try in

For soft tissue contour:-

- Application of Vaseline before adding impression material.
- Impression material is evenly applied on the buccal and lingual surface of the waxed-up dentures.
- Patient performs oral functions including chewing to determine the thickness, contour and shape of the polished surfaces.

- The material flown over the tooth surfaces must be removed carefully with carver. Then complete the procedure to obtain denture based on neutral zone technique.

Denture surfaces covered with impression material to record polished surface accurately.

-

The End

Best WIshes

IMMEDIATE DENTURE

Lecture: 7

❖ Definition:

An immediate denture is "any complete or partial removable dental prosthesis fabricated for placement immediately following the removal of natural teeth".

It may be either single immediate dentures or upper and lower immediate dentures in the same patient. The latter should be made together to ensure optimal esthetics and occlusal relationships.

❖ Indications:

1-Educated patient with daily social activity (doctors, lawyers and teachers).

2-**Hopeless** remaining teeth (caries, periodontal diseases or malocclusion)

3-patient with stable health **condition.**

4- Patient don't mind some additional visits or cost.

The best patient for immediate dentures is the philosophical type.

❖ Contraindications:

1. Patients who are in **poor** general health (systemic diseases).
2. Patients who are identified as **uncooperative**, indifferent and unappreciative.

3. Patient at risk from **bacteremia.**
4. Patient with recurrent history of post extraction **hemorrhage**.
5. The presence of acute periapical or periodontal diseases and extensive **bone loss**.
6. Patient don't **mind** being edentulous for a period of time till complete healing.

❖ **Advantages:**

1. Maintenance of a patient's **appearance** because there is no edentulous period.
2. Circumoral support, muscle tone, vertical dimension of occlusion, jaw relationship, and face height can be maintained. The tongue will not spread out as a result of tooth loss.
3. Less postoperative **pain** is likely to be encountered because the extraction sites are protected. Some authors have discussed whether immediate dentures reduce residual ridge resorption.

4. It is **easier to duplicate** (if desired) the natural tooth shape and position, plus arch form and width.

5. The patient is likely to **adapt** more easily to dentures at the same time that recovery from surgery is progressing. Speech and mastication are rarely compromised, and nutrition can be maintained.

6. Overall, the **patient's psychological** and social well-being is preserved. The most compelling reasons for the immediate denture prescription are that a patient does not have to go without teeth and that there is no interruption of a normal lifestyle of smiling, talking, eating, and socializing.

❖ Disadvantages:

Immediate dentures are a more challenging modality than complete dentures because the presence of teeth makes impressions and maxillomandibular positions more difficult to record.

Specific disadvantages include the following:

1. The anterior ridge undercut (often severe) that is caused by the presence of the remaining teeth may interfere with the impression procedures and therefore preclude also accurately capturing a posteriorly located undercut, which is important for retention.
2. The presence of different numbers of remaining teeth in various locations (anteriorly, posteriorly, or both) frequently leads to recording incorrectly the centric relation position or planning improperly the appropriate vertical dimension of occlusion. An occlusal adjustment, or even selective pre-treatment extractions, may be needed to make accurate records at the proper vertical dimension of occlusion.
3. The inability to accomplish a denture tooth try-in in advance on extractions precludes knowing what the denture will actually look like on the day of insertion
4. Because this is a more difficult and demanding procedure, more chair time, additional appointments, and therefore increased costs are unavoidable.
5. Functional activities such as speech and mastication are likely to be impaired however this is a temporary inconvenience.

❖ Types of immediate dentures:

According to the case and type of treatment plan, immediate denture may planned to be:-

1. **Conventional (or classic) immediate denture (CID):**

   After this immediate denture is placed and after healing is completed, the denture is refitted or relined to serve as the long-term prosthesis.

2. Interim (or transitional or nontraditional) immediate denture (IID):

After this immediate denture is made and after healing is completed, a second, new complete denture is fabricated as the long-term prosthesis. The interim prosthesis designed to enhance esthetics, stabilization and/or function for a limited period of time, after which it is replaced by a definitive prosthesis. It is temporary treatment, must be followed by the definite treatment.

CID	IID
Definitive	Transitional
Intended as the final or long term prosthesis	Intended for short term use only
After healing, it is relined with acrylic resin	After healing, a second denture is made

Indicated when two extraction visits are feasible	Indicated when only one surgical visit is preferable to maximize insurance benefits
The esthetics of the denture cannot be changed	The second denture procedure allows an alteration of esthetics, and all other factors, if indicated
At the end of treatment, the patient has one denture	At the end of treatment, the patient has a spare denture to use in case of extenuating
If all posterior teeth are initially removed, vertical dimension of occlusion is not preserved. (however , opposing bicuspids can	Since posterior teeth need not be removed, vertical dimension of occlusion may be preserved
Contraindication for patients who will need complicated treatment plans involving both arches, such as periodontal therapy, crowns and fixed ,partial dentures and dentures opposing removable partial dentures	Often indicated when the patient will become edentulous in one arch and partially edentulous in the opposing arch for the first time. An interim complete denture can be made. Then any periodontal procedures, crowns and fixed ,partial dentures, can

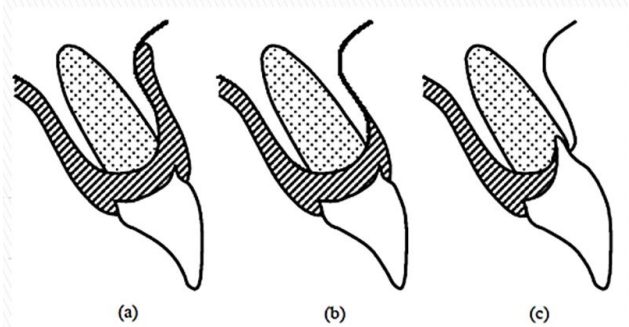
Immediate denture can be classified:

❖ **According to flange design:**

1.flanged type .

A. complete flange.

B. partial flange.



Types of immediate denture: (a) complete flange; (b) partial flange; (c) open face.

2. Open-faced flangeless type (open face or close fit).

❖ Comparisons of flanged and open faced denture:

1. Appearance of flanged denture does not altered after fitting where the appearance of open – face denture (although good initially) can deteriorate rapidly as resorption create a gap between the necks of the teeth and ridge.

2. The flanged denture allows freedom in the positioning of teeth ,where, in open face denture teeth have to be positioned in the sockets of the natural teeth

- So on case of malpositional teeth we can do good alignment in flanged denture while we cannot in open face type.

3. in upper denture:

a flange on an upper denture create a more effective borders seal , therefore , better retention than is achieved with an open face denture.

4. in lower denture:

Open face denture is not usually constructed because of poor stability of lower denture during function, so flange denture is commonly used.

- So flange denture is better from the point of stability.

5.The presence of labial flange produces a stronger denture, labial flange will make the denture stiffer so the midline fatigue fracture cause by repeated flexing across the midline is reduced .so from the point of strength the flange denture is better .

6. As the bone resorbed fallowing extraction the denture become loose and a reline is required, so the presence of labial flange make it easier to add either a short – term soft lining materials or a cold curing relining materials as a chair side procedure, as the color of some reline materials

is not always ideal they may be visible when used with open face denture.

7. The flange denture cover the clot completely and protect them more effectively, the flange denture exerts pressure on both lingual and labial gingiva reducing post extraction hemorrhage.

8. When the ridge morphology produce deeply undercut area it may not be possible to fit a full labial flange unless there is surgical reduction, In this case the using of partially flange denture or open face denture is preferable when surgical procedure is contraindication.

❖ **Diagnostic steps:**

- Good oral hygiene is essential before starting any prosthodontic treatment.
- Patient's systemic condition.
- Full dental history must be recorded in the case sheet.
- Periodontal condition of the remaining teeth must be assessed.
- **Radiographic examination** is essential for immediate denture patients.
- Teeth mold and shade must be recorded.
- **Occlusal plane adjustment** is necessary because the factors that necessitate tooth extraction are often associated with occlusal discrepancies.
- Presence of any infection or inflammation
- Diagnostic casts.

In the diagnosis step; with all the collected information you have to decide type of surgical procedure, **immediate denture can be constructed with one of the surgical procedure:**

1-Extraction of teeth only.

2-Extraction of teeth with alveoloplasty.

In some case simple corrections may be needed at the sight of extracted teeth to improve the shape of the alveolar process in order to facilitate and improve denture objectives. In these cases surgical splint construction is important. This splint usually constructed on the master cast after teeth trimming. Cases with excessive bone correction may be end up with rapid bone resorption and unfitted denture, therefore bone removal must be conservative. Consultation with the surgeon is essential in some cases.

❖ Impression:

Successful primary impression is governed by proper stock tray selection, proper material selection and manipulation (usually irreversible hydrocolloid material is used) and well trained dentist to handle and make the impression in a proper technique.

☒ The primary impression:

May be useful as a final impression in case of immediate single tooth replacement with or without short span partially edentulous arch.

- ✓ Primary cast helps as a study cast to plan the sequences of the treatment as well as used to construct special tray.
- ✓ Surveying, undercuts block out and relief must be done on the cast.

☒ **The Final impression**:

Different tray design and impression techniques were described to deliver final impression, these techniques may range from simple to more complicated depend on tray design and material used.

Final impression may be taken by:

❖ **<u>Single full arch custom tray</u>:**

☒ This technique can be used for conventional immediate denture and the only tray used for interim immediate denture.

☒ Also, it is the used when the patient have anterior teeth only or anterior and posterior remaining teeth.

✓ Technically; first of all, on the primary cast outline the tray extension to be shorter than the vestibular depth by 2 mm and include the posterior limit.

✓ The remaining teeth must be covered with single layer of sheet wax; then second layer is used to cover all the area needed to be recorded by the impression and covered with the denture; this technique usually used in conventional immediate denture while in interim immediate denture all the teeth and denture foundation area are blocked using two layers of wax. Tissue undercut must be blocked properly to facilitate tray removal.

✓ A stops effect is provided by making 4-5 regular holes through the wax, symmetrically distributed anteriorly and posteriorly.

- ✓ Finally adapt the cold cured acrylic resin dough layer to fabricate the special tray; ensure proper extension and stops holes are filled with acrylic. The handle can be placed on the anterior area as usual or you may place it in the mid of the palate to prevent over lengthening of the tray in the anterior area might interfere with impression making.
- ✓ Allow the resin to set; then remove the tray and reduce excess material, finish and smooth the borders and surfaces. Proper perforations must be done symmetrically-as possible- or using adhesive depending on used impression material.
- ✓ This technique can be used when the anterior teeth are remaining only or when anterior and posterior teeth are present.
- ✓ Now check the tray in the patient's mouth and do border molding by using tracing compound; in the same manner as in conventional complete denture and continue to do final impression.
- ✓ You may use irreversible hydrocolloid or polyvinyl silicone or polysulfide rubber base or polyether as a final impression material. More expert dentist may use 2 impression material in one tray for maximum accuracy.

❖ **<u>(sectional impression tray OR split impression tray technique)</u>:**

- ☒ Use two trays or sectional custom tray.
- ☒ This technique is used in conventional immediate denture only; and cannot be used in interim immediate denture.
- ☒ It involves construction of two trays on the same cast one for the posterior region made as in complete denture and the 2nd is

constructed for the anterior region(backless tray indices or references must be made in the tray.

- ✓ Outline the tray extension in the same manner as in 1st technique.
- ✓ Block all tissue undercuts and interdental spaces.
- ✓ Use proper separating medium then adapt the cold cured resin mix to the posterior edentulous area and extend it to cover the lingual surface of the anterior teeth beyond the incisal edge then put the handle.
- ✓ For the anterior region; you may use:
  - construct a custom tray to cover this area only. Alternatively, the impression material may be carried to the mouth in a second sectional tray that is indexed to the primary tray. In either case, the anterior section impression will capture the facial anatomy of the teeth, the vestibular anatomy, and indices on the primary impression/tray. Upon removal of the anterior and posterior sections separately, the 2 sections are reassembled outside the mouth (using the indices) and prepared for casting.
  - you may adapt and cut a plastic stock tray to fit the anterior section.
  - expert dentist prefer not to use a tray but they use a heavy mix of elastomeric impression material in the mouth.
- ✓ The anterior section of the impression must record the labial aspect of the teeth as well as the vestibular area.

- ✓ To make the impression, the posterior sectional tray-must be tried for proper extension, border molding is made with tracing compound- as in conventional complete denture- then final impression for edentulous area is made by using zinc oxide eugenol impression material or polyvinyl silicon or polysulfide or polyether, you can use non elastomeric impression material here.
- ✓ The most important thing in sectional impression tray is the accuracy and proper seating of the trays and reassembling both. Care must be taken not to distorted this assembly during tray removal from the mouth or during pouring therefore it's advisable to beed and box the impression before pouring.
- ✓ Modification of the above technique can be made as to make a full tray covering the denture bearing area with a hole opposite to the teeth area, again we do border molding and impression then a proper stock tray over the custom one can be used to capture the teeth area with alginate material.
- ✓ Finally when you remove the impression from patient's mouth it will record the whole denture bearing area made by two different materials.
- ✓ This technique is used mainly when the posterior area is edentulous and only anterior teeth are remain and need to be replaced with immediate denture.

Note: the projections on the external tray surface serve as indices.

- ❖ **<u>Record base and occlusion rim</u>:**

  Bite rim usually constructed to record jaw relations

- If the patient have enough number of remaining anterior and posterior teeth no need for record base or bite rim as in most of interim immediate denture.
- while if there isn't enough number of remaining teeth as in all of conventional immediate denture and some of the interim immediate denture cases; bite rim must be constructed.
- Before contracting the record base, all teeth and tissue undercuts must be blocked by wax, then cold cure acrylic dough is applied on the edentulous area of the cast. When the material set, record base must be finished and polished; final evaluation must show a stable properly extended record base.
- Wax occlusion rim is added to the corresponded edentulous area on the base. Leveling of the wax must depend on some anatomical landmarks as the retromolar area and you may use the remaining teeth but not always.
- Record base extension and wax rim height must be evaluated clinically. Lip lines; high and low must be determined and marked on the cast, in this way any correction or modifications can be done or marked on the cast to be considered in the teeth setting.

❖ **Jaw relations record:**

Include vertical and horizontal relations, these usually made as in the conventional denture construction.

- If we have vertical stops between two opposing posterior teeth, these relation are maintained unless further corrections are needed to improve esthetic or function.
- Evaluation of the existed vertical dimension of occlusion must be accomplished and dentist must decide if this going to be restored or modified.
- Uneven tooth loss, teeth wear, loosening of the remaining teeth drifting and extrusion all may indicate correction of vertical relation.
- The occlusion rim and sometimes remaining teeth must be adjusted for correct occlusal vertical dimension.
- In the immediate complete denture; leave first premolars bilaterally to maintain vertical and horizontal relations and facilitate recording of the jaw relations.
- In this visit dentist must record the midline, canine lines, ala-tragus line, smiling and high lip line, anterior occlusal plane In relation to the remaining teeth.
- Face bow transfer and centric Jaw relation must be recorded.
- Once you record vertical and horizontal relations you are ready to mount the cast on a suitable articulator.
- Selection of artificial teeth, acrylic teeth are the recommended type.
- Consider all parameters in teeth selection, in the anterior and posterior segment. Shade, Size, form, an occlusal form of posterior teeth must be selected to fit each case specifically.

- Arrangement of posterior teeth done in the same way as in the conventional complete denture, maintain proper occlusal plane.

❖ Try-in:

- In this way you set the posterior or anterior missing teeth to try it in the patient's mouth check and verify occlusal plan and jaw relations in the try-in step.
- Try in step is not possible in every immediate denture case but even so mounting of the master casts must be confirmed in patient's visit.
- In most of conventional immediate denture cases posterior teeth are missed so you can set the posterior teeth as in conventional complete denture construction following the rules of teeth arrangement in the centric occlusion.
- The trial denture now must be tried in the patient's mouth and verify the vertical and centric relations.
- If errors can be detected in the centric relation, lower cast must be remounted after a new record and teeth must be reset.
- All the required change must be recorded on the cast as well as on the case sheet.
- In this visit further information about the following must be given,Surgical procedures, tissue changes as edematous and discoloration few days after insertion, local sense of lip puffiness even when the edema dissolved due to the flange extension.

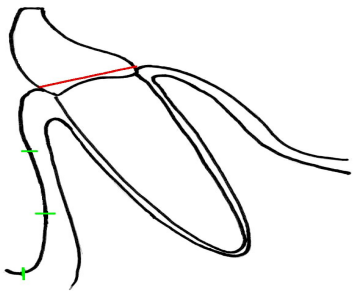
- At the end of the try in visit you have to check all what is related to the present teeth and mark all what you have to change- teeth and tissues.

❖ Cast trimming:

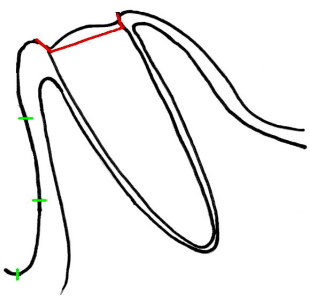
- The remaining teeth now must be trimmed to be replaced with artificial teeth.
- Trimming of the cast must be done carefully to estimate as possible the shape of the residual ridge after teeth extraction.
- Final cast ridge must be similar to the couture of the foundation area after teeth extraction.
- More than one method may be use to trim and set the teeth in immediate denture cases, **It depends on:**
  1. If you decide to duplicate same teeth alignment or not.
  2. Esthetic and functional requirement.
  3. Amount of changes expected during surgery.
- Usually teeth are trimmed by using a saw or disc bur sharp knife or wax knife may help.
- Scribe guidelines on the cast recording the position, angulations and incisal level of the natural teeth (In this step it must follow the rule of third to guide cast trimming).

Steps of trimming are:-

Step 1



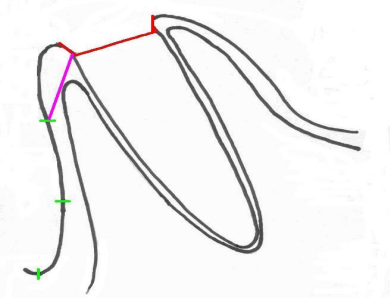
Step 2



Remove tooth at gingival level

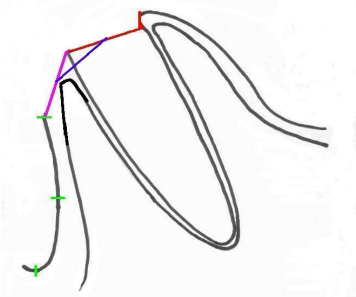
Recess Socket 1 mm

Step 3



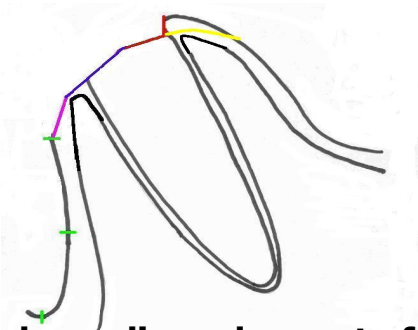
Labial edge recess to incisal third mark

Step 4



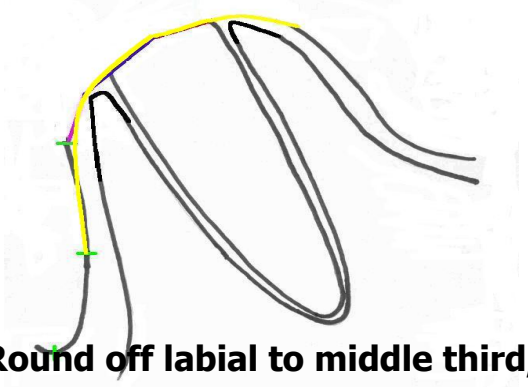
Mid-point recess to mid-width labial cut

Step 5



Round over lingual aspect of socket

Step 6



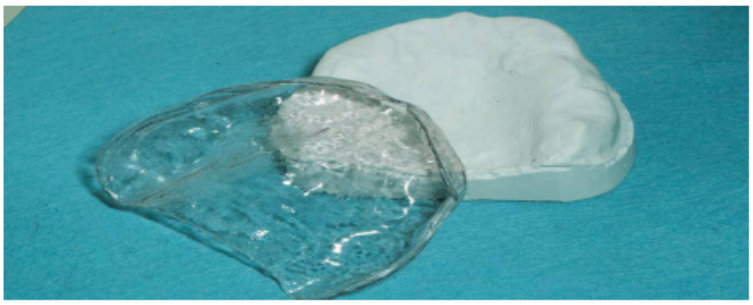
Round off labial to middle third, sand smooth

- Note that the amount of grinding is very minimal on the palatal side, this is because the remodeling after extraction is usually minimal in this side.

- Final ridge form must be round and continuous from the buccal and lingual surfaces.
- Cast trimming may be done at same time of teeth arrangement.
- Do not change or trim the essential landmarks as incisive papilla or any frenum.

❖ **Surgical splints:**

- After complete cast trimming, surgical splint must be constructed
- It is a thin transparent form of tissue surface of the immediate denture,it is used to guide the surgical shaping of the alveolar process.
- It is essential when there is a need to do some alveolar corrections after teeth extraction or ridge recontouring or correction of the interseptal bone or in multiple teeth extraction.
  - ✓ Make alginate impression on the cast after trimming.
  - ✓ Pour the impression (cast duplication).
  - ✓ Make the clear template processed either by heat or light ,vacuum form and sprinkle-on method can be Used also.



❖ **Setting of anterior teeth:**

Arrangement of anterior teeth can be made in different ways, we have to decide:

1. If the teeth are need to be changed in location or alignment to improve the aesthetic. OR
2. The teeth are well aligned, aesthetically and functionally acceptable; then we can reproduce same alignment in the denture.

- **First way:**

  Produce a labial index of the natural teeth before they are cut off the cast.

- **Second way:**

  Remove one tooth from the cast and immediately wax an artificial tooth into position so that the adjacent teeth serve as a guide to the positioning of the artificial replacement.

❖ **Processing and finishing:**

- It is same as in the conventional complete denture.
- Do not remove posterior undercut and try to modify the path of insertion.
- Keep both the denture and the splint template in the disinfectant to delivery.

❖ **Insertion:**

- **At the day of surgery and insertion:**

  - ✓ Extraction of the marked teeth; preserve the labial plate and be conservative, no bone trimming is done without guiding; use suture if necessary.
  - ✓ Use the surgical template to guide any alveolar corrections. Seat the template: blanch areas seen through the template indicates pressure, then need correction.
  - ✓ Insert the denture; remove all the detected over extended especially healrs areas and correct any pressure areas. Check the frenam relief.
  - ✓ At the day of insertion try to reduce the numbers on insertion and removing of the denture to avoid trauma and edema.

- **Post-operative care and instructions:**

  - **First 24 hour:**

1. A void removing the immediate denture.
2. Put gentle biting pressure on your denture during the first four hours.
3. Avoid hard food and eat soft healthy food, avoid drinking hot fluids.
4. Using ice pack in the first 24h (20 min on followed by 20 min off) may control inflammation 'and swelling.

- **1st Adjustment must be seen after 24 hours:**

1. The denture should be kept out of patient mouth only for short time, therefore quickly checking the tissue sore spots, over extension and any gross occlusal discrepancy.
2. On removal the denture may be painful; inform the patient and adjust sore area which appears as deep red areas mostly undercuts as canine eminence, tuberosity, and retro mylohyoid ridge.
3. Adjust occlusion.
4. Assess retention and use tissue conditioner if needed.

- **1st week after extraction and denture insertion:-**

1) Instruct your patient to wear the denture day and night for first 7 days after extraction or until swelling reduction.

2) Remove the denture 4 or 5 times a day after the first day, and rinse the mouth with warm salt water. Do this for the first week.

3) The denture must be cleaned and rinsed after meal as early as possible and when removal and insertion of the denture is with little or tolerable pain.

The End

Best Wishes

Dental Implants (3)
Implant Restorations

Lecture: 12

A) REMOVABLE IMPLANT OVERDENTURES

Most industrialised countries are experiencing a rapid decline in edentulism. However, tooth loss increases with age, so the number of edentulous patients within society will continue to increase for several decades because of the increase in mean age.

Total tooth loss is a serious life event. Becoming edentulous renders an individual as disabled and many patients report that they subsequently experience lowered self-confidence and poor self-image. Complete dentures have been the traditional standard of care for edentulous patients for more than a century. Many denture wearers are able to wear a maxillary complete denture without problems but most struggle to eat with the complete mandibular denture because of its inherent mobility. In the past few decades, culture changes have resulted in heightened patient expectations. Many ‘older’ patients now find it unacceptable to consider having conventional complete dentures due to inferior comfort and function.

Many scientific studies have been carried out over the past decade to determine the benefit of the mandibular two implant overdenture. The results are significant enough to propose that a mandibular implant overdenture, rather than the conventional denture, should be regarded as the first treatment option in the management of the edentulous mandible. The Mc Gill consensus statement on overdentures states that “a two implant overdenture should become the first choice of treatment for the edentulous mandible."

What Happens to the Facial Support following Total Tooth Loss?

We have already described the process of physiological alveolar bone resorption following tooth loss, however when the resorption becomes excessive, skeletal support for the facial tissues is lost resulting in a 'collapsed' facial appearance of ageing. Patients who have been edentulous since an early age often present with an 'overaged'

Courtesy of Biohorizons

When restoring edentulous patients the treatment choices are:

1- Conventional Complete Dentures:

Dentures have never been a good substitute for natural teeth. A conventional denture is reliant on the mucoperiostium for support and retention. The dentures are resting on mucosal tissue and can be easily dislodged by the strong forces of the adjacent muscles. This is a particular issue in the mandible where instability of the denture in function is a common complaint. A stable conventional denture is one which moves little during function. Patients who are 'denture tolerant' often have developed good muscular control and this, rather than the surface fit results in the successful wear of the prosthesis. Fundamental principles of complete prosthetic design apply whether a conventional or implant based treatment is being considered.

2. Removable Implant Overdenture:

A removable implant overdenture is a prosthesis which is removable by the patient and is supported or retained by dental implants. The prosthesis has to be removed for the purpose of cleaning the implants. Patients who have been edentulous for a number of years are often 'denture tolerant' and seek treatment to stabilise their progressively loosening dentures rather than always demand the fixed option. These patients invariably present with hard and soft tissue deficit where the aesthetic benefit of acrylic flanges in restoring facial support is crucial to a successful treatment outcome. Facial support and dental aesthetics are more readily restored in this group of patients with implant overdentures rather that a fixed prosthesis.

3. Fixed Restoration:

With a fixed full arch implant restoration, it is often difficult to create a restored facial appearance in terms of facial profile and lip support in patients who present with extensive skeletal bone atrophy. Such cases may also preclude the placement of a sufficient number of implants to allow a fixed prosthesis to be considered. An implant overdenture will always require fewer implants than a fixed restoration in the edentulous jaw.

Hybrid and fixed restorations are considered by the patient to be non-removable. Implant overdentures are removable and are generally a very successful treatment. They have high implant survival compared with fixed prosthodontics, high patient satisfaction levels, relatively simple treatment protocols and treatment time that is comparable to conventional prosthodontics. Initial treatment costs are low compared with fixed restorations and various attachment systems can be used to restore the implants. Clinical studies, however have shown that overdentures may require more maintenance in the long term including periodic relines to compensate for continued bone shrinkage that occurs under the mucosa that partially supports the prostheses in function. Failure to do so could result in overloading of implants or retentive devices.

Classification of the type of overdenture treatment:

1. Mainly tissue supported:

Implant overdenture where two individual attachments are used. The overdenture is mainly tissue-borne. The attachments give retention to the prosthesis. The overdenture base needs maximum tissue coverage like a conventional denture. In eating, the ridge receives masticatory forces. In the mandible a minimum of 2 and in the maxilla a minimum of 4 implants are indicated for this type of an overdenture. Relining of the denture bearing area will still be required. This is often the case with two mandibular implants in the lower canine sites. The tissue supported implant overdenture is useful in cases where the presenting problem is that of denture movement. Dentists who provide long-term monitoring and maintenance to the overdenture patient should review the need for a reline periodically.

Tissue-implant supported - two implants and a resilient bar attachment is needed. The base of the prosthesis still needs extensive tissue coverage but during function the implants and attachment assembly receive most of the forces with some being absorbed by the supporting tissue. This type of prosthesis is mostly implant supported and usually requires a minimum of 3 implants in the mandible and 4 in the maxilla.

2. Fully implant supported:

This requires a minimum of four implants in the mandible and 4 to 6 in the maxilla. During mastication, the attachment assembly transfers all the masticatory forces to the supporting implants. The consequence of this is that minimal flange and tissue coverage is needed since the prosthesis is fully implant-borne.

The totally implant supported overdenture not only retains the removable prosthesis but also provides support for chewing function. This type of implant overdenture is particularly appropriate for patients who present with considerable functional difficulty and pain while functioning on their complete dentures. There are a some disadvantages of implant borne overdentures, these include a higher cost due to more implants and components. Furthermore a minimum of 12mm intraocclusal space (from the head of the implant to the opposing occlusion) is needed to accommodate the retentive bar or framework.

The components available for retaining overdentures are:

1. Bars with clips
2. Studs such as ball anchor devices
3. Locators with plastic retentive elements

4- Milled cylinders or frames

5- Magnets

B) FIXED IMPLANT PROSTHETICS

The surgical placement of dental implants is a very predictable process. The osseointegration of dental implants has revolutionised dentistry, allowing the replacement of missing or damaged teeth with the option of a fixed solution, negating the need for preparation of any remaining natural teeth. A fixed restorative result is highly desirable as it allows security in function (speech and perception), improved masticatory efficiency and occlusal support together with psychosocial improvement. The direct support of a fixed restoration by implants allows a decreased volume of the prosthesis, in particular, a fixed maxillary solution can be provided without extensive palatal coverage.

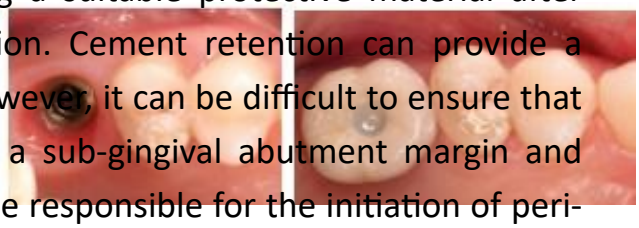
Design features for fixed implant prosthetics:

1. **Passive Fit:** When providing a fixed prosthesis, it is essential that all components of the restoration fit passively together. Failure to provide a passive fit may result in adverse pressures on implant, abutment or crown leading to mechanical or biological complications. Pacificity is ensured by utilizing verification techniques in each step of the construction of the restoration and can be confirmed if required using radiographic imaging to visualise the implant/abutment/ crown interface.
2. **Hygienic and Aesthetic Design:** The design of a fixed implant solution must ensure adequate strength in function and aesthetics whilst allowing ease of cleansing to ensure that the ability to clean and maintain the supporting implant(s) is not diminished.
3. **Screw or Cement Retained**: A fixed solution can be achieved by either fixing the prosthetic directly to the implant head using a screw for retention, or can be achieved by cementing the final prosthetic on to an abutment, which, in turn, has been screwed to the implant. There are advantages and disadvantages to each of these methods, which are of relevance in specific cases. Whilst screw retained fixed solutions offer greater retrievability which is important to allow repair and maintenance as required over time, the screw access channels can be deemed detrimental to aesthetics - implant

orientation is of paramount importance to ensure the screw access point

can be placed palatal to the incisal edge anteriorly or on the occlusal plane posteriorly.

Screw retention requires placement of components to a specific force (torque) to ensure their adequate retention in function. Screw access channels require to be covered using a suitable protective material after seating of a screw retained restoration. Cement retention can provide a more desirable aesthetic outcome, however, it can be difficult to ensure that any excess cement is removed from a sub-gingival abutment margin and such excess cement if left in situ can be responsible for the initiation of peri-implant disease.



Retrievability can be an issue in cement retention and although some clinicians will advocate the use of a temporary cement for a definitive restoration, even then, its removal if required can be very difficult assuming that the restoration has been properly manufactured.

Indications for fixed implant prosthetics:

Fixed implant restorations can be provided in all manner of situations, including single teeth, short span bridges, medium span bridges or full arch restorations, all of which will be discussed in turn. The restorations themselves can be made from many and varied restorative materials chosen for their specific case benefits in terms of strength in function, aesthetics or a combination of both.

A-**Fixed Implant Restoration – Single Tooth**:

A fixed solution can be provided on an implant to replace a single missing tooth.

This solution can either be screw retained or cement retained but both solutions start by adequately recording the position of the implant with a specific impression. A screw retained fixed solution requires the production of a one-piece abutment and crown which can be screwed into place to provide the final solution.

A cement-retained solution requires the production of an abutment initially. Abutments can be of the pre-fabricated type, which can be placed and used with or without alteration depending upon the position of the implant. Abutments can also be specifically manufactured using either a cast wax casting technique or CAD-CAM technology. Such abutments can be manufactured using many and varied materials including titanium, gold and zirconium. Regardless of the abutment type, its angulation and morphology must allow the passive but retentive fit of the definitive crown. Following its construction, the abutment is retained in the implant generally using screw retention, however, some systems will use only frictional retention. Once in place, the definitive crown will be cemented into place.

B- **Fixed Implant Restoration – Short and Medium Span Bridges**

Multiple implants can be used to provide a solution where more than one tooth is missing. There is an important decision to be made regarding the number of implants which will be used to support a specific design fixed solution when more than one tooth is missing. This is dependent upon many case-specific factors, all of which must be adequately considered during case assessment and planning. In order for more than one implant to retain a screw retained fixed solution, the implants require to be adequately placed such that their long axes display only minimal deviation. This being the case, an adequate record of the position of the

implants is taken with a specific impression, which can then be verified to confirm accuracy.

C-**Fixed Implant Restoration – Full Arch Bridge**

Multiple implants can be used to provide a solution where all teeth in an arch are missing. Again, serious consideration must be given to the number of implants required to retain the proposed fixed solution, ensuring longevity in function.

With an increasing number of implants, the angulation of each implant is of paramount importance in determining the final solution, which should ideally be screw retained.

The End

Best Wishes

Relining and Rebasing

Lecture: 13

Sometimes, the residual ridge contour changes so rapidly that the repeated construction of new dentures becomes a financial burden to the patient. Maintenance of the adaptation of denture base to these ever resorbing tissues is a critical part of a complete denture service. A number of changes can occur in the tissues that support complete dentures. They are more common under the mandibular dentures than the maxillary dentures. They are also common in maxillary dentures opposing natural teeth. These changes may be insidious or rapid, but they are progressive and inevitable, and are usually accompanied by the following signs:

- Loss of retention and stability
- Loss of vertical dimension at occlusion
- Loss of facial support
- Shift of dentures
- Reorientation of occlusal plane

Pattern of Resorption

- Resorption occurs more rapidly in the first six months after extraction of teeth and at a slower pace till 12 months.
- The rate of resorption progresses after 65 years of age.
- In general, residual ridges resorb more rapidly in females than in males.
- It can be precipitated by certain systemic diseases or ill-fitting dentures. Every denture patient should be examined periodically on an annual basis. Rate of osseous changes can be retarded when complete dentures are readapted at the first signs and symptoms of loss of adaptation. When such changes are observed, the dentist may choose to reline or rebase the dentures.

Vertical Changes in the Basal Seat Area

- These problems are usually not a simple change in the occlusal vertical dimension. It also can result in a change in the horizontal relation of the dentures to each other and to their basal seats. A loss of vertical dimension will automatically move the mandible to a more forward position in relation to the maxillae. We must not overlook the unpredictability of bone morphological changes. This outcome will in turn influence the position of the denture.

Horizontal Changes in the Basal Seat Area

- The horizontal position of each denture in relation to its own supporting ridge must be considered, so a determination can be made as to whether the denture has moved forward or backward because of occlusal forces applied to it. Furthermore, one or both dentures may have rotated in relation to the supporting structures.

The occlusion in the mouth cannot, therefore, be used as a guide to the horizontal repositioning of either dentures. A new vertical dimension should be measured with a correct inter-occlusal distance. The relation of the teeth to the ridges must be observed for accuracy. If shrinkage has been only in the vertical direction *(allowing the jaws to approach each other more closely than they should when occlusal contacts are made),* the occlusion cannot be corrected, even though there has been no anterior or posterior movement of the dentures.

RELINING

Definition: Relining is defined as, “A procedure to resurface the tissue surface of the denture with new base material to make the denture fit more accurately”GPT.

Indications for Relining

1. Immediate dentures after 3-6 months where maximum residual ridge resorption would have occurred.
2. When the adaptation of the denture to the ridge is poor due to residual ridge resorption.

3. Economical reasons where the patient cannot afford a new denture.
4. Geriatric or chronically ill patients who cannot withstand physical and mental stress of construction of new dentures

Contraindications for Relining and Rebasing

1. When the residual ridge has resorbed excessively.
2. Abused soft tissues due to an ill-fitting denture.
3. Temporo-mandibular joint problems.
4. Patient dissatisfied with the appearance of the existing dentures.
5. Unsatisfactory jaw relationships in the denture.
6. Dentures causing major speech problems.
7. Severe osseous undercuts.

Advantages

1. Eliminates frequency of patient visits.
2. Economical for the patient.
3. Improves fit of the denture.
4. A soft liner can be incorporated in this denture, if necessary.

Disadvantages

1. Likelihood of altering the jaw relationship during the process.
2. Cannot correct aesthetics, or jaw relations.
3. Cannot correct occlusal arrangement.
4. Cannot be used when excessive resorption has occurred. Hence it cannot be a substitute for a new denture.

Preparation of Tissues for relining

- Hyperplastic tissues should be surgically excised and the existing dentures can be used as surgical splints.
- Oral mucosa should be free of irritations.
- Dentures should not be worn during sleep.
- Dentures should not be worn for at least 2 to 3 days prior to final impression appointment.

Preparation of the Dentures for Impression

- Pressure areas on the tissue surface of the denture should be relieved.
- Minor occlusal disharmony should be corrected by selective grinding.
- Border inadequacies should be corrected.
- Borders should be shortened by 1 mm, to allow space for new impression material.
- Posterior palatal seal area should be established using greenstick compound or autopolymerizing resin.
- All large undercuts should be removed.

Relining Procedures

- **Clinical procedures**:
  - Static methods:
    - Open-mouth technique.
    - Closed-mouth technique.
  - Functional methods
  - Chair-side technique
- **Laboratory procedures**:
  - Articulator method
  - Jig method
  - Flask method

Clinical Procedures:

Clinical procedures for relining and rebasing are similar. Only the laboratory procedures vary.

Static Methods

Open-mouth technique

Boucher's technique is the only one described in the literature that explains a method for relining the mandibular and maxillary denture at the same time. It has been emphasised that in this technique the impressions are made independently without utilising the existing centric occlusion.

Actually, the dentures are used as special trays for making the secondary

impression. ZnOE is the material of choice. It is loaded on the tissue surface of the

denture and the impression is made using the denture as the special tray. After the maxillary and mandibular impressions are made a new centric relation record is accomplished. All these procedures are done in one appointment.

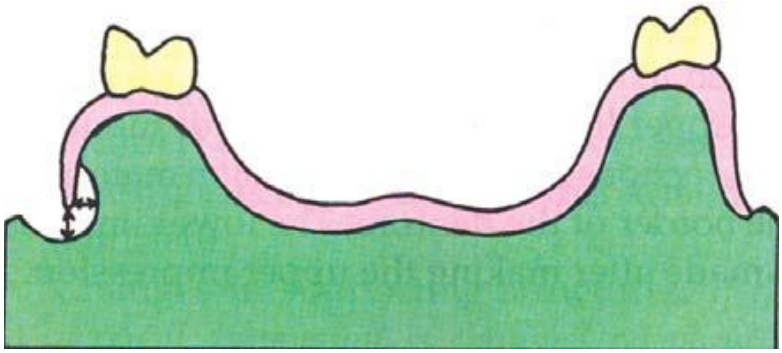
Exactly 15 seconds after the denture has been placed in the mouth, the patient is asked to pull the upper lip down and to open his mouth wide these actions mould the impression material over the border of the denture. The lower impression is made after making the upper impression.

Closed-mouth Technique

Maxillary and mandibular relining/rebasing should be done separately. Various techniques have been explained. Here we will explain only two technique and we will call them technique A and B.

Technique A: requires recording a new centric relation record using modeling wax or compound.

Technique A It is a two step technique wherein the centric relation is recorded using an interocclusal record and is used to guide the dentures in to position while making the reline impression. Centric relation (inter-occlusal record) is recorded using wax or compound. 1.5 to 2 mm relief should be given to large undercuts. Borders are reduced by 1 to 2 mm except in the posterior region.



- Relieving the denture flange near the undercut.

The centre portion of the palate in the denture can be removed (optional) for visibility in positioning the maxillary denture during impression making. Borders are reformed to their functional contours using low fusing compound. ZnOE is the impression material of choice. During impression making, patient is asked to close lightly into the newly made inter-occlusal record.

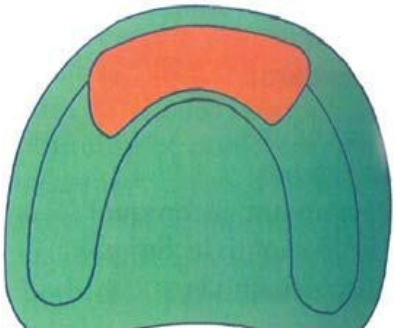
Advantages:

1. Palatal opening (if done) will allow better seating of the denture and alleviate the increase in vertical dimension.
2. Pre-made inter-occlusal record helps to position the denture during impression making.
3. It also helps in orienting dentures in an articulator.
4. It is a two-step procedure and it reduces the possibility of moving the maxillary denture forward during final impression making. Hence, its more reliable.

Disadvantages

- This procedure cannot be used to reline or rebase the dentures simultaneously.
- Wax inter-occlusal record is not very accurate.

Technique B: No new centric relation record is made here. Denture is prepared as explained in technique A. Border moulding is done using low fusing compound. Impression wax (Iowa wax) is the material of choice for making impressions. Impression is made in two stages. In the first step all areas except the labial flange and the alveolar crest in-between the canines are recorded. The labial flange and alveolar crest between canines are recorded in the second step.



Area shaded in red are recorded during the second step in technique 'B'

Advantages: It will reduce the possibility of extreme forward movement of the maxillary denture.

Disadvantages: Wax impression materials are difficult to work with and can distort easily. If the existing centric relation record is wrong then the impression becomes inaccurate.

Functional Method

Here, the patient need not be without dentures unlike previous techniques (i.e. dentures are not required for laboratory procedures). Fluid resins (tissue conditioners) are used as impression material. It is a simple and practical procedure and is more popular.

Tissue conditioners are temporary soft liners with the following characteristics:

- Easy to use.
- Excellent for refitting complete dentures.
- Capable of retaining for many weeks.
- Good in dimensional stability.
- Good in bonding to resin denture bases.

Procedure:

- The patient is advised to avoid nightwear of dentures.
- Occlusal errors in the dentures are corrected to obtain centric occlusion that coincides with the centric relation.
- Flange overextensions/underextensions and posterior palatal seal areas should be corrected.
- The tissue surface should be reduced to accommodate the tissue-conditioning material.
- The tissue surface of the denture is dried and tissue-conditioning material is placed. It should flow evenly as a thin layer to cover the entire impression surface of the denture and its borders.
- Next, the denture is inserted and the patient's mandible is guided to centric relation in order to stabilize the denture and the material is allowed to set. Once it sets, the impression is removed and excess material is trimmed. Overextensions and voids are corrected.
- After making the corrections, the dentures are inserted with the material and the patient is dismissed. After 3 to 5 days, dentures are examined for depressed areas, which should be relieved. Areas of underextension are corrected by adding more material. The material should be renewed periodically (once a week) till the tissue healing is complete.
- Once the tissues are normal, impression is made with ZnOE or a light bodied elastomer over the tissue conditioner material and a cast is poured

immediately. During one of the previous visits, an accurate orientation record of the maxillary denture should be recorded using a face-bow.

- The tissue conditioner material undergoes some physical changes during its use, which help the dentist use it for different purposes. In its plastic and elastic stages it is used as tissue conditioner, whereas in its firm stage it is used as reline impression material. Hence, for relining procedures, it should be left in place for about 10 -14 days to allow them to become firm and then reline procedure is carried out.

Chair Side Procedure

This method makes use of acrylic that could be added to the denture and allowed to set in the mouth to produce instant relining/rebasing.

Disadvantages

- Material produces a chemical burn in oral mucosa.
- Material is porous and develops a bad odour.
- Poor colour stability.
- Material is not easy to remove if not placed correctly.

Recently, visible light cure (VLC) resin has been developed which is similar to tissue conditioners. This material can be regulated by selection of appropriate viscosity and partial intraoral polymerization with a hand-held curing light. It is then taken to the laboratory for curing the unpolymerized molecules. This material seems to hold considerable promise.

Laboratory Procedures

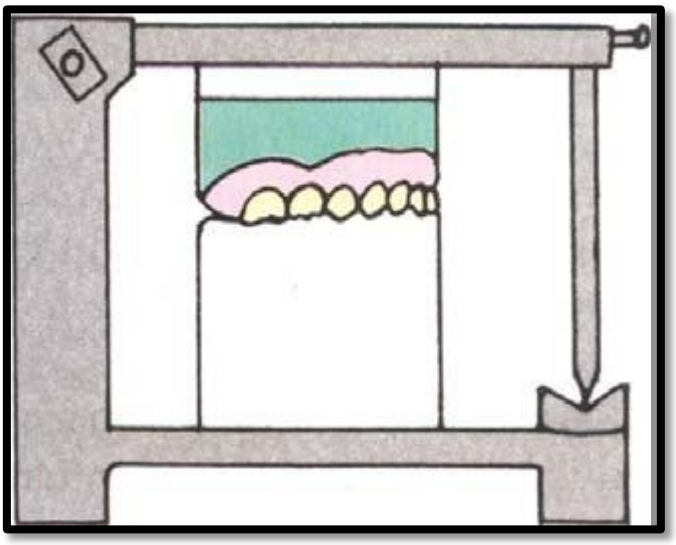
Laboratory procedures for relining include articulator method, jig, and flask methods. It is common for both relining and rebasing except for a few differences.

Articulator Method

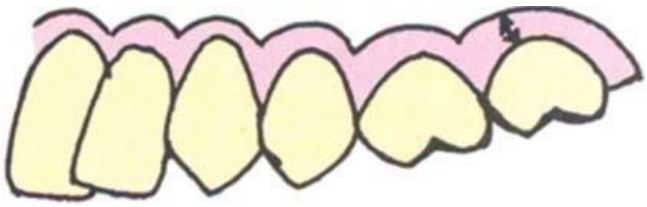
Once the impression is received, a cast is poured immediately. Maxillary cast is mounted on a semiadjustable articulator with the help of a face-bow transfer. A jig can be used for this purpose, but additional occlusal adjustments will be required later. Mandibular denture is mounted using an inter-occlusal record. If occlusal discrepancies exist, selective grinding is done before the denture with the impression is seperated from the casts.

After mounting, the denture base is trimmed to up to 2 mm near cervical margins of the artificial teeth.

Articulating the denture (with impression) and cast against a plaster template



The procedure is common for both relining and rebasing upto this stage. For relining, the required amount of tissue surface of the existing denture is trimmed away using an acrylic bur. If rebasing is to be done, the denture base should be trimmed to just leave 2 mm of acrylic around the existing teeth. After trimming, the dentures are placed in the articulator and waxed up without altering the vertical height.



Jig Method

Here the impression is boxed and a cast is poured. A reline jig is used in this

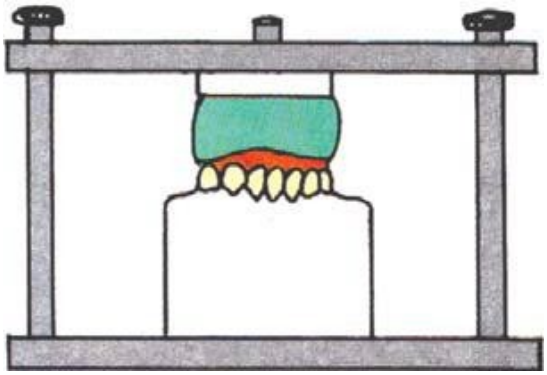
method. There are two types of jigs for this purpose:

- Hooper's duplicator.
- Jectron jig.

Hooper's duplicator

About these jigs

- They function to maintain the occlusomucosal relation.
- The cast alongwith the impression is mounted on the upper member of these instruments.
- Hooper's duplicator is an instrument that has two triangular parts connected by three pillars in each corner. Whereas, Jectron Jig uses only two pillars.
- A plaster index is made on the lower platform with the denture teeth penetrating the depth of about 2 mm. When the plaster sets the indentations made by the denture teeth act as a key into which the denture teeth can be repeatedly positioned to maintain a fixed distance and relation between the cast and the occlusal surfaces.

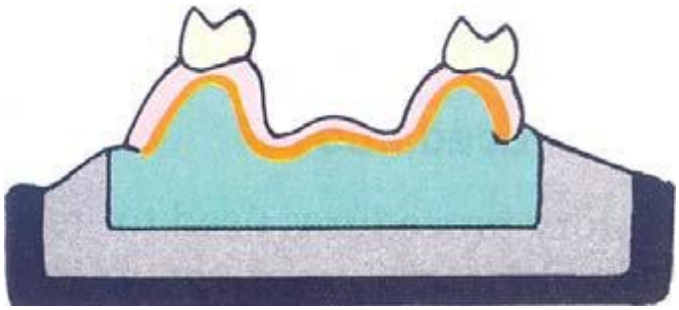


Mounting a denture (with impression) in a jig against a plaster template

- When the key has set, the top and the bottom members of the jig are separated. Denture is removed from the cast.
- All of the impression material is removed from the denture and the denture is prepared (trimmed) according to the treatment selected (relining or rebasing).
- If rebasing is selected, the entire denture base is removed from the teeth (if they are porcelain), and all but a small connecting bridge of acrylic is removed (if the teeth are plastic or acrylic).
- The trimmed dentures are then set into the plaster key and the top of the instrument is replaced. The denture is waxed to the cast, processed and finished as usual. The cured denture should be repositioned on the jig to correct the occlusion prior to insertion.
- If relining is opted, auto-polymerizing resin is used on the tissue surface of the denture and the upper member of the jig is closed. The denture is cured in a pressure container of warm water at 15 psi for 30 minutes. Use of auto-polymerizing resin is controversial due to its irritation to the tissues but it avoids the use of excess heat (required for heat curing resins), which may warp the original base material.

Flask Method

The poured impression along with denture is invested into the base of a flask.

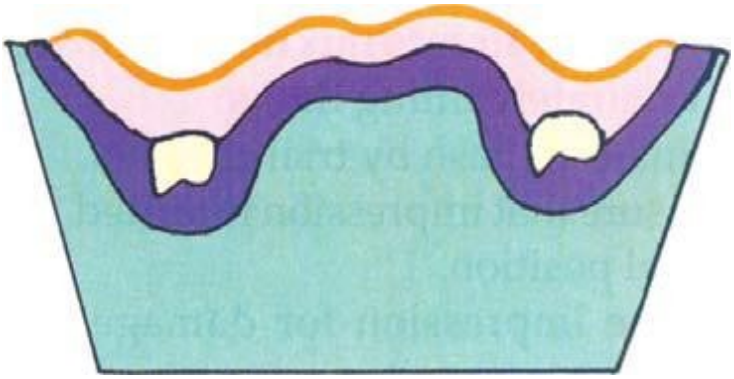


Investing the denture (with impression) and cast on the base of a flask.

A silicone mould material is painted over the denture prior to investing the body. This is done to create a flexible mould. Flasking is completed as usual.

Coating silicone mould material.

Since silicone provides a flexible mold, the denture can be removed carefully after opening the flask.



Investing the counter of the flask.

The denture base is trimmed as required (a portion of the tissue surface in relining and the entire denture base in rebasing). And placed back into the mould.

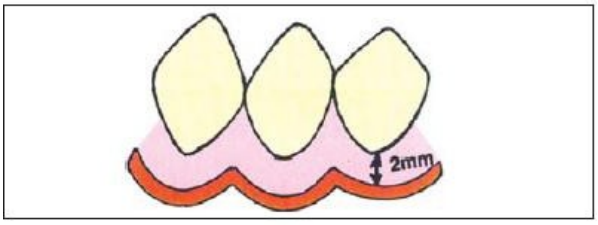


Fig. 14.18a: After trimming the denture it is placed back into the silicone mould

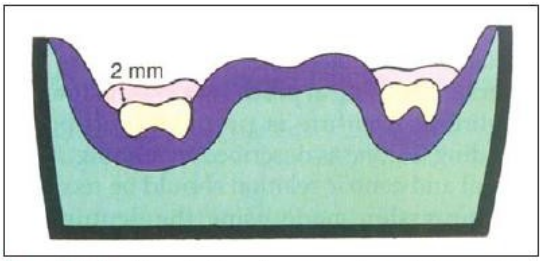


Fig. 14.18b: The denture is removed carefully and the denture base is trimmed upto 2 mm near the artificial teeth

The invested stone present in the base of the flask is the cast for the denture. If it is a maxillary denture then the posterior palatal seal should be marked using a sharp instrument on the invested stone.

Separating medium is painted over the mould space of the denture. The resin is packed, cured, finished and polished as described in compression moulding technique. The finished dentures are remounted to check for occlusal disharmony.

REBASING

Definition "A process of refitting a denture by the replacement of the denture base material" – GPT

Rebasing is similar to relining except that there is extensive replacement of the denture base material. The clinical procedure is similar to that of relining. Denture is prepared and border moulding is done as described in relining. A new vertical and centric relation should be recorded. The impression made using the dentures are processed as described in relining. The only difference is that only a layer of acrylic is removed before wax-up in relining but in rebasing the entire denture base is removed prior to wax-up.

Clinical Management: Clinical management includes impression making and insertion. Both these procedures are similar to the ones explained in relining.

Laboratory Procedures: The laboratory procedures used for rebasing are the same as the ones used for relining. They include articulator method, flasking

method and jig method. Irrespective of the methods used, rebasing differs from relining only in denture trimming prior to wax-up.

Denture Trimming Prior to Wax-up: This is the only step where rebasing differs from relining. After articulating or flasking the cast (depending of the method) the denture is removed from the cast and the entire denture base is trimmed leaving just 2 mm of acrylic around the porcelain teeth. The acrylic is retained to preserve the positions of the denture teeth. After trimming the denture wax up is done over all the supporting structures of the cast.

Processing the Denture: It is similar to relining.

The End

Best Wishes

Dental Implants (1)

Lecture: 10

A prosthetic device or alloplastic material implanted into the oral tissues beneath the mucosal or /and periosteal layer, and/or within the bone to provide retention and support for a fixed or removable prosthesis.

OSSEOUS INTERGRATION (osteointegration):- apparent direct attachment or connection of osseous tissue to an inert, alloplastic material without intervening connective tissue.

INDICATIONS:-

1. For completely edentulous patients with advanced residual ridge resorption
2. For partially edentulous arches where removable p.d. may weaken the abutment and reduce masticatory efficiency.
3. For single tooth replacement where fixed partial denture cannot be placed.
4. Patient s desire.

Patient's signs and symptoms that frequently preclude and adaptive complete denture:

1. Sever morphological compromised of the denture supporting areas.
2. Poor oral muscular coordination
3. Low tolerance of the mucosal tissues
4. Parafunctional habits leading to recurrent soreness and instability of the prosthesis
5. Active or hyperactive gag reflex.
6. Psychological inability to wear a denture.

ADVANTAGES:-

1. Preservation of bone
2. Improved function
3. Aesthetic
4. Stability and retention
5. Comfort

 Single tooth replacement through denture support by:-

DISADVANTAGES:-

1. It is very expensive
2. Cant used in medically compromised patients who cannot undergo surgery.
3. Many patients do not accept longer duration of treatment
4. Need a lot of patient cooperation because repeated recall visits for after care is essential.
5. It cannot be universally placed due to the presence of anatomical limitation

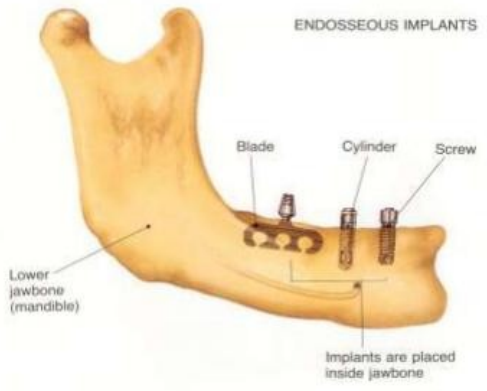
Contra indications:

1. In adequate bone for implant placement(Minimum of 7mm height and 6mm width)
2. Medical contraindications
    a. Pregnancyl
    b. Inability to undergo elective surger
    c. Psychological disorders
    d. Metabolic disease (endocrine disorder)
    e. Previous therapeutic radiation to the area

TYPES OF IMPLANT

A-**Endosseous** – resides partially in bone

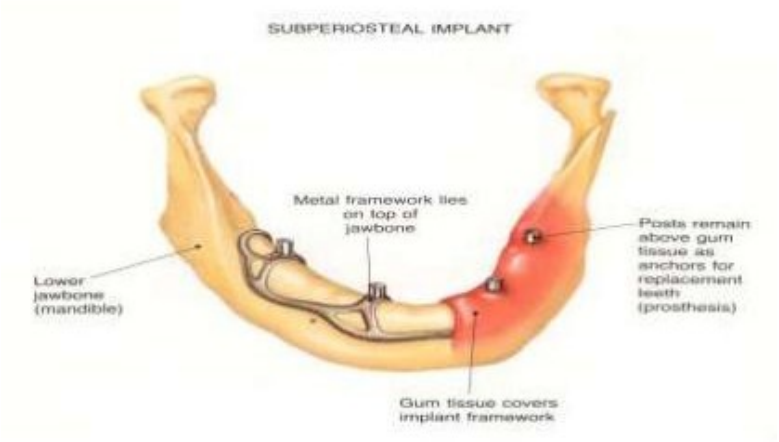
1. Root form(screw or cylinder) Most common type
2. Blade.



B- **Subperiosteal**: rests on alveolar ridge, no bone invasion

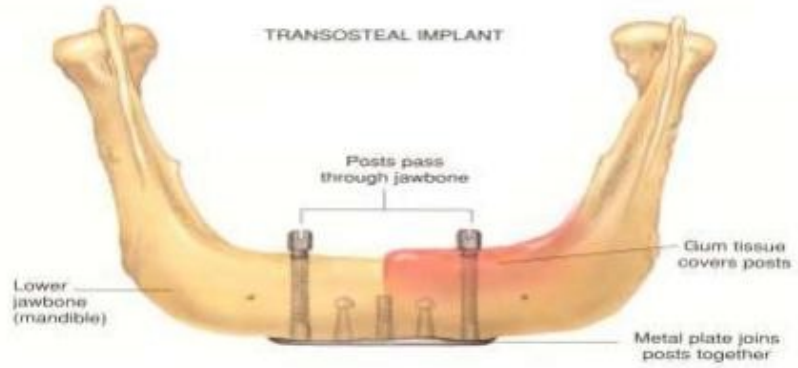
-Less invasive, less stable.

-Supports denture.



C- **Transosteal**: placed through the mandible (only)

- Attachments reside above ridge
- Rarely used



IMPLANT MATERIALS:-

A- Early materials

1. Ivory, bone and natural teeth
2. Gold and gold alloys
3. Stainless steel
4. Tantalum

B- -Current materials:

1. Metallic implant:
    - Titanium:
    - Used as almost pure metal
    - Corrosion resistant
    - Strong & lightweight
    - Great biocompatibility
2. Non-metallic
    - Ceramics: (Most biocompatible, Formation of hydroxyapatite at surface, Potential for chemical bond between bone & implant)
    - Coated Metals: (Combines strength of metal with good interface potential of ceramic)

Parts and components of dental implant:

1. Main components

a) Fixture

b)Abutment

c)Superstructure

2. Accessories

a)Surgical

-Cover Screw

-Gingival Former

b)Prosthetic

-Implant Analogue

-Impression Post

Criteria of implant success:

1. Immobility of the implant
2. No radiolucency around the implant
3. No pain or discomfort

4. Provide proper prosthetic construction with good esthetic

5. Constant vertical bone level with good architecture

PREPERATION OF PATIENT FOR IMPLANTATION BEFORE SURGERY:-

1- EXTRA ORAL EXAMINATION:-

- Smile line
- Smile symmetry
- Incisal edge in relation to lower lip
- If any functional disturbances of masticatory system are present, recreate functional harmony by selective grinding or fabrication of night guard.

2. INTRA-ORAL EXAMINATION:- which include if there is:-
   A- Any lesion
   B- Any abscess
   C- Check for ideal inter arch space (7mm-post. and 8-10mm ant.)
   D- Tooth mobility

3. SURGICAL GUIDE:-

Mal-aligned implants often complicate the clinical laboratory procedures employed for fabrication of superstructures. Due to improper load distribution, an overall increase in stress concentration on supporting structures may occur, this may compromise the maintenance of the bone implant interface.

The fabrication of a surgical guide, used in implant treatment, is determined by the patient's anatomy and local references, such as the numbers and locations of teeth in the arch to be treated or in the opposing arch.

Tooth	Implant
◆ 1-attachment mechanism is pdl ◆ 2-variable mobility is present ◆ 3-can be intruded ,extruded or moved ◆ 4-tooth continue erupt in young patient	1-interfacial osteogenesis 2-immobile(ankylotic like) 3-cannt be intruded ,exruded 4-implant are left behind while surrounding tissue change

Difference between tooth and implant:-

COMPLICATIONS:-

1. Inflammation
   a. -Mobility.
   b. -Pain.
   c. -Peri-implantitis
   d. -Impaired wound healing

e. -Gingival recession

2. Prosthetic complications
   a. Abutment fracture/loosening
   b. O-ring damage requiring replacement less than 12months after insertion of over denture.

3. OPERATIVE (Surgical) COMPLICATIONS
   a. In advertent placement of implant into sinus or submandibular space.
   b. Parasthesia
   c. Mal aligned implants or implants in non esthetic areas

The End

Best Wishes

Retention, Stability and Support of Complete denture

Lecture: 18

RETENTION:-It is the resistance to removal in a direction opposite to that of insertion.

BOUCHER described retention as the most spectacular yet probably the least important of all complete denture objectives. This property may indeed be least important, it provides psychologic comfort to patient.

FACTORS AFFECTING RETENTION

1. ANATOMICAL FACTORS
2. PHYSIOLOGICAL FACTORS
3. PHYSICAL FACTORS
4. MECHANICAL FACTORS
5. NEUROMUSCULAR FACTORS

1-ANATOMICAL FACTORS:

A. Size of the denture bearing area:-Retention increases with increase in size of the denture bearing area. The size of the maxillary denture bearing area is about 24cm . Mandible is about 14cm, so the maxillary retention will be more than mandibular denture.

B. Quality of the denture bearing area:- the displaceability of the tissues influence the retention of the denture. Tissues displaced during impression making will lead to tissue rebound during denture use leading to loss of retention.

2- physiological factors:

Saliva :the viscosity of saliva determines retention. Thick and ropy saliva gets accumulated between the tissue surface of the denture and the palate leading to loss of retention .Thin and watery saliva can also lead to compromised retention.

3-**Physical factors:**

A. **Adhesion**: is defined as (the physical attraction of unlike molecules to another).The role of saliva is very important for adhesion .Saliva wets the tissue surface of the denture and the mucosa. A thin film of saliva is formed between the denture and the tissue surface. This thin film helps to hold the denture to the mucosa. The amount of adhesion present is proportional to the denture base area. The patients with xerostomia, adhesion does not play a major role.

B. -**Cohesion**:-is defined as "the physical attraction of like molecules for each other". The cohesive forces act within film of saliva. The effectiveness of these forces increase with increase in denture bearing area. than thick mucus saliva.

C. **Interfacial surface tension**:- is the resistance to separation possessed by a film of liquid between two well-adapted surfaces.

   It is the result of the cohesive forces acting at the surface of the liquid. It is similar to the force that causes a liquid to rise in a capillary tube - the capillary attraction, or capillarity. Once again, close adaptation of the denture base to the mucosa will enhance these forces.

   If two microscope slides have a thin layer of water between them, it is difficult to separate them by pulling them away from each other precisely because of these forces. But they can be more easily separated by sliding one slide over the other, as the forces of adhesion, cohesion, and surface tension and capillarity will be easily overcome. This has implications for the shape of the underlying basal seat area, especially in the upper. If the shape

of the palate is high and vaulted, it will be easier to displace a denture base than if the palate is flatter.

D. **Atmospheric pressure and peripheral seal**: Atmospheric pressure can act to resist dislodging forces applied to dentures, if the dentures have an effective seal around their borders. Retention produced by an atmospheric pressure is directly proportional to the denture base area Peripheral seal is the area of contact between the peripheral borders of the denture and the resilient limiting structures. This peripheral seal prevent air entry between the denture surface and the soft tissue.

4- **MECHANICAL FACTORS:**

A. UNDER CUTS: unilateral undercuts aid in retention while bilateral undercuts will interfere with denture insertion and require surgical correction.

B. MAGNETIC FORCES: intra-mucosal magnets aid in increasing retention of highly resorbed ridges.

C. DENTURE ADHESIVES: they are available as creams or gels or powders. They should be coated on the tissue surface before wearing the denture.

D. Rotational path of insertion.

The action of adhesive are:-

(1) increasing the adhesive and cohesive properties and viscosity of the medium lying between the denture and its basal seat.

(2) eliminating voids between the denture base and its basal seat.

5-**MUSCULAR FACTORS**:- the muscles apply supplementary retentive forces on the denture. There is a balance between the forces acting from the buccal musculature and the tongue . The balance is obtained in the neutral zone.

Hence, the artificial teeth should be arranged in the neutral zone to achieve the best retention possible. The occlusal plane should be parallel to the residual ridge and divide the inter-arch space equally.

Stability of complete denture

Stability: Is the ability of the denture to withstand horizontal forces. The various factors affecting stability are:-

1-**Vertical height of the residual ridge:-**

The residual ridge should have sufficient vertical height to obtain good stability. Highly resorbed ridges offer the least stability.

2-quality of soft tissue covering the ridge:-

The ridge should provide a firm soft tissue base with adequate sub-mucosa to offer good stability.

3-Quality of the impression:-

An impression should be accurate as possible .The impression surface should be smooth and duplicate all the details accurately. It should be devoid of voids and any rough surfaces. It should be dimensional stable and cast should be poured as soon as possible.

4-Occlusal plane orientation:-

Occlusal plane should be oriented parallel to the ridge. If the occlusal plane is inclined, then the sliding forces may act on the denture, reduce its stability .

5-Arrangement of teeth:-

The position of the teeth and there Occlusion play an important role in the stability of the denture.

Balanced occlusion facilitates the even distribution of forces across the denture.

The teeth in the denture should be arranged in the neutral zone. Natural or artificial teeth in this zone are subject to equal and opposite forces from the surrounding musculature.

6-Contour of the polished surfaces:-

The polished surfaces of the denture should be harmonious with the oral structures. They should not interfere with the action of the oral musculature.

Support of complete denture

Support: is defined as the resistance to vertical forces of mastication ,occlusal forces and other forces applied in a direction towards to denture bearing area.Support is derived from bone , that all forces are ultimately transmitted via the mucosa.

This depends on the anatomical and histological factors of the ridge and the way of pressure direction on the ridge during impression making procedure, therefore the maximum coverage provides the greater the support, which distributes applied forces over as wide an area as possible. The best support for denture is the compact bone covered with fibrous connective tissue. (Support depends on: Denture base + Bone + soft tissue).

STRESS BEARING AREAS(SUPPORTING AREA):-

Areas of the oral structures that resist forces, strains or pressures brought on them during function. They are portions of the mouth capable of providing support for a denture; they show minimal ridge resorption even under constant load.

Stress bearing areas of maxilla:

A-Primary stress bearing areas:

1-hard palate

2-posterior lateral slopes of residual ridge

B-Secondary stress bearing areas

1-Rugae area

2-maxillary tuberosity

Stress bearing areas of mandible:

Primary stress bearing area

Buccal shelf area

Secondary stress bearing area

Labial and lingual slopes of lower residual ridge

The End Best Wishes

Esthetics Considerations in Complete Denture

Lecture: 16

Esthetics: 1. the branch of philosophy dealing with beauty; 2. in dentistry, the theory and philosophy that deal with beauty and the beautiful, especially with respect to the appearance of a dental restoration, as achieved through its form and/or color; those subjective and objective elements and principles underlying the beauty and attractiveness of an object, design, or principle.

Dental esthetics: the application of the principles of esthetics to the natural or artificial teeth and restorations

Denture esthetics: the effect produced by a dental prosthesis that affects the beauty, attractiveness, character, and dignity of an individual. It is a combination of art and science of prosthodontics.

Factors Influencing the Appearance of Dentures:

- Patient factors
- Tooth factors
- Denture base factors
- Tooth/Denture base factors
- ***Patient Factors***
- 1. Sex
- 2. Age
- 3. Personality
- ***Tooth Factors***

  1. Position
  2. Color
  3. Size
  4. Form.

Steps in achieving esthetic complete denture

1- An accurate impression
2- Jaw relation
3- Selection of teeth
4- Arrangement of teeth
5- Characterization

1. An accurate impression

Thickness of labial flange of both dentures, this is accomplished at the impression phase of treatment, so that the esthetics as well as retention and stability are important goals. Border thickness should vary with the needs of the patient, depending on the extent of residual ridge loss. The vestibular fornix should be filled, but not overfilled, to restore facial contour.

2. jaw relation

Amount of separation between maxilla and mandible, this is establishment of the correct vertical dimension of occlusion; proper vertical dimension of occlusion helps restore normal physiological length to muscles and allows normal facial expression.

Reestablishing the appropriate vertical spacing will improve the patient's appearance by decreasing the sunken and aging appearance. This vertical space must be not only esthetically pleasing but also compatible with the typical mandibular joint apparatus, including the muscles of mastication.

3. Selection of teeth:

Teeth selection is very important as the selection of the appropriate shade, size, and form of the artificial teeth determines the esthetic and function of the denture.

Objective of tooth selection:

1. Function efficiently

2. Normal speech

3. Aesthetically pleasing

4. No tissue abuse

5. Should maintain the vertical dimension.

Anterior teeth selection: anterior teeth selected primarily to satisfy esthetic while posterior selected for function.

Guides for anterior teeth size

Pre-extraction records:

Diagnostic cast, photograph, radiograph, extracted teeth and previous denture.

Post extraction record

1.Central incisors restore philtrum if possible.

2.Central incisors restore vermillion border.

3.Incisal points and smile line determine height of tooth (age-related).

4.Position of canine points

A. Relate to inter-alar width (smiling).

B. Relate to pupils (require pre-extraction photograph).

5. If patient is already a denture wearer, the mouth should be examined with the dentures in the mouth giving importance to physiological and esthetic aspects.

FACTORS OF SELECTION OF ANTERIOR TEETH

1.Color

2.Size

3.Mold

1. Color

   Show your patients a complete shade guide and select the two lightest and darkest tabs. Point out how different these two are and find out which one they prefer. Delete the rejected color, and select another shade from the preferred half of the shade guide. Repeat this pair comparison, and after two or three selections by your patients, you will have the shades that they want. Note the selections used in your file.

2. Size depend on
    a. Existing dentures.
    b. Models of previous teeth**.**
    c. Photograph

All of above give valuable input for selection of the size and shape of teeth. Teeth can be measured in millimeters and teeth of similar size selected coupled with actual measurement, again use a method of pair comparison to assist patients to decide what size of tooth they prefer.

Factors that influence the size of anterior teeth are:

1. Size of the face.
2. Amount of available interarch space.
3. Measured distance between distal of right and left maxillary cuspids.
4. Length of the lip.
5. Size and relation of arches.

3. Mold

select and agree on the *mold* of the teeth. Teeth of a similar size can appear entirely different because of their taper, contacts, and labial curvature. Allow your patient to select between molds of the same size but different shapes. Set two

different molds on the right and left sides of a piece of wax rope and ask patients which they prefer.

There is a choice of mold: square, tapering or ovoid. In general terms, square molds suit patients with large, rugged features. Long and narrow faces may be best suited to tapering molds, whereas ovoid molds tend to suit patients with small, round faces.

Form of the Anterior Teeth

The form or outline of the anterior teeth can be determined using the following factors:

1. Shape of the patient's face or facial form (previously mentioned)
2. SPA factors (sex, personality, age.)

Sex: The form or shape of the teeth differs in males and females. The differences in the shape of the anterior teeth in males and females are:

• In females, the incisal angles are more rounded and the teeth have a lesser angulation. In males, the incisal angles are rounded to a lesser degree and the teeth are more angular

• The incisal edge of the central incisors is parallel to the lips and the laterals are above the occlusal plane in males. But the incisal edges of the central and lateral incisors follow the curve of the lower lip in females.

• The distal surface of the centrals is rotated posteriorly for females.

• The mesial surface of the lateral incisors is rotated anteriorly in relation to the centrals in females

• In males the mesial end of the laterals is hidden by the centrals. This makes the canine very prominent in males

• Only the mesial thirds of the canines are visible in females because they are rotated anteriorly whereas even the middle two-thirds of the canines are visible in males.

• The cervical regions are prominent in males than in females.

• Females on smiling expose more anterior teeth hence, the premolars should be arranged based on aesthetics for females.

Age: The age of the patient is important in teeth selection because of the physiological and functional changes that occur in the oral tissues. The patient can be either young, middle-aged or old-aged. The following changes are observed with an advance in age of the patient:

• Due to decrease in muscle tone, sagging of the cheeks and the lower lips occur. To prevent cheek biting (due to sagging), the horizontal overlap of the posterior teeth can be increased.

• Inter-occlusal distance reduces with age. Hence, mandibular teeth are more visible than the maxillary teeth.

• Old people usually have abraded teeth with worn out contacts. Hence, placement of contoured teeth may look artificial.

• Old patients have gingival recession. It can be reproduced in the dentures to provide a natural appearance.

• Old people show a blunt smile line and pathologic migration of teeth.

• The color of the teeth also changes with age. In old people, the enamel is abraded and the dentine which carries a yellow tinge, is more visible.

ADDITIONAL CLINICAL AND TECHNICAL CONSIDERATIONS

IN ANTERIOR TOOTH SELECTION PATIENT PREFERENCES

A high smile line that displays a lot of gingiva would benefit from the selection of a less tapered mold with a long contact point. This minimizes the interproximal display of pink gingival acrylic, which is more difficult to make look more realistic than teeth. The resultant smile ends up being slightly more dental but with a less gingival display.

4.Arrangement of teeth

The goals of tooth arrangement are

1. to have the front teeth look good.
2. allow the patient to speak clearly.

have all the teeth positioned for the best comfort, stability and retention of the dentures.

Position of the Teeth

The amount of tooth showing, orientation of the occlusal plane, and labiolingual inclination all have an influence on aesthetics. If the level of the occlusal plane is set too low, or if the anterior teeth are set on a flat plane, then the teeth will be too visible. This will be emphasized when the patient smiles, as the teeth will not follow the smile line of the lip. The orientation will also have an influence, and if is not approximately parallel to the interpupillary line, then the smile will look crooked. The center line of the teeth is also critical, as this will have a negative effect on appearance if it is not coincident with the center line of the face The labial frenum should not be used to guide positioning of the center line, as this is often not in the center of the face. The labiolingual position of the anterior teeth, in particular of the necks of the teeth, is critical in terms of lip support. A common misconception is that lip support is reliant on the shape of the labial flange of the denture. However, if the flange is thickened, then this will cause bulking out beneath the nose similar to a gum shield. If teeth are moved away from the crest of the ridge, then this will cause instability of the denture. Setting teeth directly over the crest of the ridge with an upright inclination will not provide adequate lip support. As previously discussed, the use of biometric guides to place the teeth where the natural teeth used to be can improve aesthetics dramatically. A further possibility is to place the necks of the teeth close to the alveolar ridge and tilt the incisal edges of the teeth labially. This will improve the lip support and is less likely to be unstable than when using biometric guides.

Arrangement of teeth with esthetics consideration

The clinician should attempt to create the illusion of natural teeth when finalizing the appearance. It should be remembered that the prevalence of irregularity or crowding of natural teeth is high. Therefore, if dentures are constructed with a ‘perfect’ arrangement, the risk of the resulting appearance seeming artificial is considerable.

As a general rule, imperfection in the anterior tooth arrangement is a basic requirement in creating the illusion of natural teeth. Complete symmetry should be avoided: for example, the anterior teeth should not be placed so that the incisal edges are all at the same level.

The vertical axes of the anterior teeth can be varied, but if the inclination of these axes on one side of the mouth does not approximately balance that on the other, an unsatisfactory appearance will result.

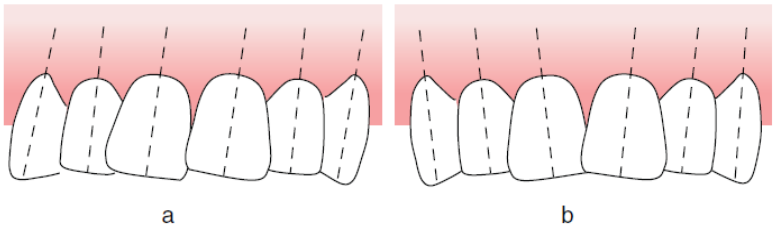
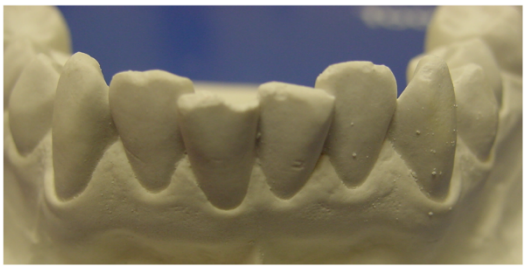


Figure 13.4 (a) Imbalance produced by inclining the vertical axes of the anterior teeth in the same direction. (b) The improvement in appearance produced by counterbalancing the inclination of the axes on one side of the mouth with those on the other.

Arrangement of the lower anterior teeth

In many patients, they will be displayed more during function than the upper teeth and therefore may be a dominant factor in determining the patient's dental appearance. Again, the same general rules regarding perfection and evenness of tooth arrangement which have been discussed previously should be applied. The following should be considered when arranging lower anterior teeth:

1. Vertical overlap.
2. Horizontal overlap.
3. Antero-posterior inclination in proximal view.
4. Inclination of long axes.



Incisal relationship

The method of determining an incisal relationship which is appropriate for an edentulous patient's skeletal relationship is important. If a patient is provided with dentures which have an inappropriate incisal relationship, for example, a Class I incisal relationship on a marked skeletal Class II base, there is a risk that, in addition to problems with stability, the dentures will lack in harmony and the aesthetic result will be poor.

The Gingival Contour

There are three aspects to consider:

1. The contour of the gingival margins at the necks of the teeth.
2. The contour of the flange.
3. The color of the flange.

In a natural dentition, the contour of the gingival margin varies from central incisor to lateral incisor to canine. This should be reproduced in a complete replacement denture. In terms of the shape of the flange, the clinician must decide whether to provide a flange with a smooth or anatomical finish. In the case of the anatomical finishing, the dental technician is instructed to

1. reproduce the shapes of the roots of teeth when contouring the flange.

2.The flange can also be stippled to reproduce stippling of the keratinized gingiva. These features are most useful when the patient has a high smile line and is likely to have a visible flange. A potential problem with anatomical contouring is the difficulty in keeping the flanges clean, particularly when extensively stippled.

3. Finally, the appearance of the oral mucosa can be reproduced using color tints in the acrylic resin. This is time consuming for a dental technician and will be facilitated by the technician seeing the patient or a photograph of the oral mucosa. Nonetheless, the appearance of the denture will be enhanced if the flange is visible due to a high smile line.

Anatomical features reproduced in the appearance of a denture flange.

Characterization

To alter by application of unique markings, indentations, coloration and similar custom means of delineation on a tooth or dental prosthesis thus enhancing the natural appearance.

Characterizing the dentures without deviating grossly from the principles of teeth setting to suit the individual's appearance. The possible effect is that all dentists may give almost identical complete dentures to their patients. All complete denture wearers were looking similar possessing a monotony of sameness. They understandably do not ask for what they don't know. It is the duty of the dentist to inform the patient that his or her complete denture can be characterized to suit his/her wish and appearance. Characterization helps the dentist to incorporate his artistic skills along with theoretical knowledge in the fabrication of denture. Size and shade

of the teeth can be selected to match the patients natural teeth. The aim is that the teeth should harmonize with the facial features, and it should be functionally acceptable. Characterization should have some amount of realistic perception rather than incorporating unrealistic features.

According to Frush and Fisher dentogenic concept includes effects of three main factors such as age, sex and personality in sequence of esthetic planning. Various means like minor irregularities in tooth arrangement, overlapping, tilting, depth grinding, modification of incisal edges, rotations of teeth, stippling, staining, tinting of the denture base, crowding and fixing dental jewelry etc., can be incorporated

depending on patient's desire towards achieving natural illusion.

Final Decision for Esthetics depends upon:

- Maxillomandibular relationships
- Patient's appearance

- Patient's mental attitude
- Functional requirements

Denture flanges mimicking gingival color along with Stippling

Tobacco staining on complete denture

Crowding and overlapping of the maxillary anterior teeth.

The End

Best Wishes

Maxillofacial prosthesis

The face is a significant social stimulus also it is considered as a clue to identity and personality through various facial expressions.

Maxillofacial prosthodontics: is an art and science of anatomic, functional and esthetic reconstruction by means of non-living substitutes of those regions in the maxilla, mandible and the face that are missing or defected.

Maxillofacial prosthesis: artificial device use to replace missing facial or oral structures.

Causes of facial and oral tissue loss:

1. Congenital deformations.
2. Traumatic(gun shot or accidental).
3. Pathological with radical surgery.

These causes result in defect in:

1. Intra-oral (maxilla and mandible) which will effecting the speech, mastication, swallowing, &esthetic.
2. Extra-oral (eye, nose, ear, cranial bones) which will effecting the esthetic.

<u>Aim of maxillofacial prosthodontist:</u>

Reconstruction of missing parts in maxilla, mandible and face with nonliving substitutes (prosthesis) to achieve:

1. Improvement in esthetic.
2. Restoration of function (as in cleft palate).
3. Preservation of residual structure.
4. Therapeutic of healing effect(such as with splint).
5. Psychological therapy.
6. Protection of tissues with such as a radium protective shield.

Maxillofacial prosthesis are classified according to location into:

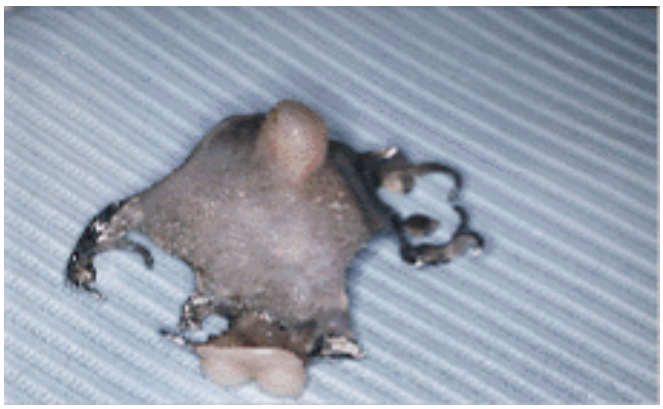
Extra-oral prosthesis: includes:-

1. Ocular prosthesis-eye.
2. Nasal prosthesis –nose.
3. Auricular prosthesis- ear.
4. Part of the face.
5. Nasal stent-prevent nasal septum collapse.
6. Cranial prosthesis – cranial bone.
7. Radiation stent- direct the radiation beam.

All the above are either fabricated as hard material(acrylic)(1,4,5,6) or soft material (silicon, RTV)(2,3).

Intra-oral prosthesis:

1. Obturators-simple palatal defect, hemi or total maxilloctomy.
2. Speech prosthesis for cleft palate patients.
3. Palatal lift prosthesis for incompetent palate patient.
4. Mandibular prosthesis to replace any missing part of the mandible may be guiding flange to direct mandible to normal closure.



☒ **Extra-oral prosthesis:**

Facial prosthesis replacement:

The choice between surgical reconstruction and prosthetic restoration of large facial defects remains a difficult one &depends on the size and etiology of the defect, as well as on the wishes of the patient. Rehabilitation efforts can be successful only when patients can appear in public without fear of attracting unwanted attention. A replacement Facial prosthesis made from the original mold. A replacement prosthesis does not require fabrication of a new mold in most of facial prosthesis replacement. Generally, several prosthesis can be made from the same mold assuming no changes occur in the tissue bed due to further surgery or age related topographical variations. Since long time; these prosthesis are retained by an adhesive. These adhesives may give good result but the duration of their activity &care for the adherence to prosthesis may complicate the treatment. Facial prosthesis using dental implant &ball attachments, bars or magnetic abutments may improve the results greatly; although these attachments may requires additional surgical & technical steps.

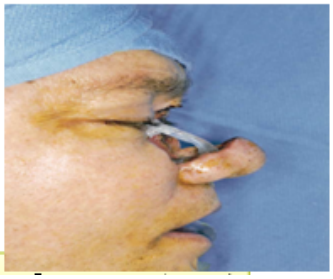
Osseointegrated implants have various advantages over either adhesive or spectacle retained prosthesis for the reconstruction of the facial defects:-

1. They provide better retention of the prosthesis, so that the prosthesis is properly positioned and the patient can wear it more confidently.
2. There is no skin irritation from adhesive and the prosthesis does not need to have adhesive cleaned off each time it is used.
3. The prosthesis can be made thinner, with feathered edges that blend with the skin, which offers the patient improved aesthetics.
4. A pre-operative planning meeting with the patient and working team shows not only different prosthetic options but also e.g. cleaning of the abutments and prosthesis.

Furthermore reports have shown that implants are not uniformly successful, the failures and complications appear to be site specific and time dependent.

Nasal prosthesis(artificial nose)

A removable prosthesis attached to the skin which artificially restores part or all of the nose. Fabrication of a nasal prosthesis requires creation of an original mold. Additional prosthesis usually can be made from the same mold, &assuming no further tissue changes occur, the same mold can be & assuming no further tissue changes utilized for extended periods of time.


Auricular prosthesis:

An artificial ear produced from a previously made mold. A replacement prosthesis does not require fabrication of a new mold. Generally, several prosthesis can be made from the same mold, &assuming no further tissue bed changes occur, due to surgery or age related topographical variations. Unfortunately, the presence of hair &the absence of anatomic irregularities often result in unfavorable adhesive retention of an auricular prosthesis. Endosseous implants, may permit positive retention of auricular prosthesis.

Cranial prosthesis,skull plate,cranioplasty prosthesis,cranial impact:

A biocompatible, permanently implanted replacement of a portion of the skull bones; an artificial replacement for a portion of the skull bone.

Orbital prosthesis:

In smaller defects adhesive retention of the prosthesis may be satisfactory &the limited size of the defect may prevent implant placement without interference with the prosthesis margins. As orbital defects increase in size, the need for implant support becomes greater.

Radiation carrier:

Synonymous terminology: radiotherapy prosthesis, carrier prosthesis, radiation applicator, radium carrier, intracavity carrier, intracavity applicator. A device used to administer radiation to confined areas by means of capsules, beads or needles of radiation emitting materials such as radium or cesium. Its function is to hold the radiation source securely in the same location during the entire period of treatment. It achieves close approximation and controlled application of radiation to a tumor deemed to eradication.

Intra-oral prosthesis:

Obtur

A maxillofacial prosthesis used to close, cover or maintain the integrity of the oral and nasal compartments resulting from a congenital, acquired or developmental disease process. The prosthesis facilitates speech &deglutition by replacing those tissues lost due to the disease process &can, as a result, reduce nasal

regurgitation & hypernasal speech, improve articulation, deglutition & mastication.

Feeding aid; feeding prosthesis:

A prosthesis which maintains the right &left maxillary segments of an infant cleft palate patient in their proper orientation until surgery is performed to repair the cleft. It closes the oral- nasal cavity defect, thus enhancing sucking &swallowing. Used on an interim basis, achieves separation of the oral &nasal cavities in infants born with wide clefts necessitating delayed closure. It is eliminated if surgical closure can be affected or alternatively, with eruption of the deciduous dentition, a pediatric speech aid may be made to facilitate closure of the defect.

A removable maxillofacial prosthesis used to restore an required or congenital defect of the soft palate with a portion extending into the pharynx to separate the [illegible]uring phonation &deglutition, thereby completing

Speech

Mandibular

A maxillofacial prosthesis used to maintain a functional position for the jaw, improve speech and deglutition following trauma or/and surgery to the mandible or/and adjacent structures.

Palatal lift

A maxillofacial prosthesis which elevates the soft palate superiorly and aids in restoration of soft palate functions which may be lost due to an acquired, congenital or developmental defect.

Teamwork for maxillofacial prosthetics :

1. Maxillofacial prosthodontist-play a major role in the treatment planning & rehabilitation.
2. Skilled general dentist

3. Maxillofacial surgeon.
4. Neurosurgeon-cranail defect.
5. Special nursing team.
6. Radiologist.
7. Chemotherapeutics.
8. Maxillofacial good technician.
9. Speech pathologist.
10. Biocomunication therapy (community).
11. Psychotherapist.

Psychological consideration in maxillofacial patient:

Maxillofacial patients are classified according to the etiology into acquired, congenital &developmental. Patient with acquired maxillofacial defect are usually resulted from trauma or cancer, both of them were have normal anatomy &physiology but these are changed or impaired due to the trauma or cancer. Usually patients with small defect frequently appear more demanding &have higher expectation than patients with larger defect. Patients with cancer may face chemotherapy, radiotherapy, recurrence &more surgical procedure. Patient with congenital defects may understand that they are different from norm &they may face a knowledge that there may be genetic predisposition. Those patients usually face multiple surgeries, orthodontics &prosthodontics procedures over several years in an attempt for correction of the defect, again in cleft lip &palate patients you may expect variations from simple cleft lip with minimal loss of function to extensive bilateral cleft lip &palate with sever impairment in function. Patient with developmental defect may display some emotional response similar to patients with congenital defects.

Requirement of ideal materials used for facial prosthesis:

Prostheses can be made from a variety of materials, such as Poly(methyl) methacrylate, polydimethylsiloxane, &polyetherurethanes.

Ideal physical &mechanical properties:-

1. High elongation strength.

2. High tear strength.
3. Softness, compatible to the tissue.
4. High edge strength.
5. Translucent.

Ideal processing properties:-

1. Chemically inert after processing.
2. Long working time.
3. Ease of intrinsic &extrinsic coloring with commercially available colorant.
4. No color changes after processing, retain intrinsic &extrinsic colors .
5. Reusable mold.

Ideal processing properties:-

1. Biologically compatible.
2. Cleansable with disinfectant.
3. Color stability.
4. Resistance to the growth of the micro-organisms.

Prosthesis fixation:

These prostheses are retained with adhesives, tissue undercuts, or in some cases extra-oral osseointegrated implant. Facial &intraoral prostheses can be connected with magnets. The aesthetic result depends on the amount of tissue removed, type of reconstruction, morbidity adjunctive treatment, and the physical characteristics of the tissue base available to support and retain the prosthesis.

Primary factors that affect prosthetic success:

All prostheses must resist a variety of forces that may displace it &generate stress to the residual structure of the orofacial complex. Prostheses success is often dependent upon methods of compensation for diminished anatomic capacity for support, retention &stability of a prosthesis.

In order to achieve a favorable level of retention, remaining teeth and the remaining soft and hard tissues must be used to the optimal degree. This may be gained by:-

A. It is prudent to extend impressions as much as possible without interfering with movable tissue.

B. Border molding is performed whenever a prosthesis depends on tissue support whether that tissue is located within the defect or is part of the remaining structures.

C. In addition, close adaptation to the underlying tissue results in a thin fluid film between the prostheses &the tissue, the thinner the intervening fluid, the greater the prosthetic retention.

Frequently, the means of retention is used, and may encompass surrounding structures such as adjacent tissues, teeth, dental/craniofacial implants or a combination of such, thus appropriate terminology and classification of the prostheses in relation to the retention means are:-

1. Tissue retained maxillofacial prostheses.

2. Tooth retained maxillofacial prostheses.

3. Implant retained maxillofacial prostheses.

4. Tissue/implant retained maxillofacial prostheses.

Teeth are the greatest asset for providing retention of the obturator prosthesis. The amount of stress generated by the movement of the obturator may be great. The number, position and periodontal status of the remaining teeth are the most critical factors in evaluating the amount of stress that remaining teeth may be able to absorb.

Support is the ability to resist displacement of the prosthesis towards the supporting structure. Remaining teeth, remaining edentulous areas &the

postsurgical defect are the supporting tissues for prosthesis & prosthesis loads are generated through these tissues to the underlying supporting bone.

A. Since the tissue has limited capacity for displacement, the greater the surface area of tissue contact, the less the displacement of the prosthesis towards the tissue.

B. Maximum peripheral extension combined with an accurate adaptation to the remaining teeth, the residual ridges & the postsurgical site will provide the most favorable support for prosthesis.

Stability it is the physical force that is called upon most frequently in maxillofacial prosthetics because alteration in the normal structures results in diminished potential for support &retention. Since the majority of forces are not directed towards or away from the tissue, but generated at an angle to the tissue, it is stability that is tested most frequently in function.

An alternative method of prosthetic retention has been developed. Endosseous implants may be used to address the concerns of diminished support, retention and stability.

Use of similar implants in extra-oral sites is growing in popularity especially for the retention of auricular prosthesis and for bone anchored hearing aids.

-The use of endosseous implant support in maxillofacial defects can be complex. As seen in most maxillofacial prosthetic patients, alterations in normal anatomy reduce the opportunities for the clinician to place &restore endosseous implants. This situation occurs when supporting bone is lost due to surgical resection or when tissue is altered due to therapeutic modalities such as radiation.

-prosthetic designs &strategic implant placement must anticipate the functional demands of the prosthesis while also recognizing the dislodging forces applied to the prosthesis.

Sequence of treatment for pateints with intra-oral defect(maxilla or mandible):

1. Pre-operative stage.
2. Post-operative stage.
3. Definitive and follow-up stage.

✓ **Pre-operative stage:**

1. **Close consultation** : between the prosthodontics and surgeon (x-ray, study cast) to outline the defect location and size. The discussion involve the possible preservation of teeth and supporting structures that may be used for retention and stability of the prosthesis(obturator). A compromise is necessary and preservation of teeth and structures should not interfere with the surgical procedure to eliminate the disease.
2. **Full dental treatment** : for better oral hygiene which helps healing of surgical sight &successful of future prosthesis:

a. Hopeless teeth.

b. Filling of caries teeth (abutment for prosthesis).

c. Proper periodontal health care.

3. **Construction of pre-operative obturator, surgical splint**. This prosthesis is placed immediately after surgery to:

1. Serve as matrix for surgical pack –to be removed 3-10 days.
2. Eliminate the need for naso-gastric tube feeding.
3. Better hygiene for surgical sight –better healing.
4. Improve patient speech.
5. Better psychological status of patient.

Obturator: a prosthesis used to close a congenital or acquired defect in the palate.

<u>Requirement:</u>

1. Light weight.
2. Strong.
3. Easy to alter(addition, removal to fit the surgical splint).
4. Made from acrylic with or without teeth.

✓ **Post-operative stage:**

Construction of temporary post-operative obturator:

- Transitional prosthesis , interim prosthesis.
- Used during the healing period of the surgical sight and the tissue conditioning material .
- Has the same advantage as surgical prosthesis.
- Constructed by obtaining a new post-operative impression or modification of the surgical prosthesis by adding teeth &clasp.

✓ **Definitive stage:**

- Construction definitive prosthesis(obturator)
- Construction after complete healing of surgical sight.
- Usually chrome-cobalt.
- Periodic follow-up.

There are several reasons for constructing a new definitive obturator:-

1. The periodic addition of interim lining material increases the bulk &weight of the obturator &this temporary material may become rough &unhygienic.
2. If teeth are included in the resection, the addition of anterior denture teeth to the obturator can be of great psychological benefit to the patient.
3. If retention &stability are inadequate, occlusal contact on the defect side ,may result in improvement of these aspects.

Approximately 6months after surgery consideration may be given to the construction of a definitive obturator prostheses, but this period may be extended

depending on the case. It is constructed from the postsurgical maxillary cast. This obturator has a false palate, false ridge, teeth &closed bulb which is hollow. Changes associated with healing &remodeling will continue to occur in the border areas of the defect for at least 1 year. Dimensional changes are primarily related to the peripheral soft tissues rather than to bony support areas.

Treatment plan:

Primary impression: A gauze pack may be placed in the defect undercut area and the preliminary impression was made in a stock tray using irreversible hydrocolloid impression material as the tissues were in the healing phase, be careful because in certain cases alginate may be tear in the defect area during removal and a primary cast is retrieved out of it. Proper border molding is done on the non-defect side of the denture, by following the conventional methods of denture fabrication.

Final impression of the defect area is made in rubber base impression materials. Sectional trays or double trays technique can be used but this might complicate the procedure .A master cast is procured out of it and the borders are outlined for the record bases. The undercuts on the sides of the defect are blocked with wax and also, the internal part of the cavity is painted with a thin layer of wax before making the acrylic record bases.

Jaw relation record is made by a conventional method, an attempt must made to compensate for the loss of facial support on the defect side to improve the esthetics. Estimation of the occlusal plane &wax level is difficult in most of the cases due to the tissue scar &block out procedure. The record jaw relation was transferred to a semiadjustable articulator. Teeth are selected &arranged according to principles. It is advisable to choose cuspless teeth may allow for freedom in movement & give a negative overlap especially on the surgical site.

Verification of jaw relation &esthetic try in: Waxed up dentures are tried and checked for retention, stability and comfort in the mouth. It must ensure that there is simultaneous contact of posterior teeth at centric relation position. Adjust

the occlusal plane &teeth alignment, scars &asymmetry of the face due to surgery may require some modifications &extra-care. The patient approval regarding esthetics must also obtain.

Flasking: The wax up denture is flasked and dewaxed, finally during the procedure, a layer of acrylic in dough stage should be packed to the walls of the defect. The center space is filled with salt and an acrylic lid is placed over which acrylic is packed as for a conventional denture. The obturator is cured and retrieved. A small perforation is made in cured bulb of the obturator and salt is flushed out using water in a syringe then the perforation is sealed with auto-polymerizing resin.

Insertion: all the border must be adjust, the pressure areas must be removed. Jaw relation &occlusion must be checked; premature occlusal contact must be eliminated to have smooth occlusion. The patient must be instructed that mastication might be difficult in early time &it is better to use a non-surgical side; soon the patient will adapt &tolerate the limitations. Adhesives may be given but concentrate about its used.

Design of maxillary obturator:

Depend on :1. Size 2. Location (defect). 3. Number &position of the remaining teeth.

General principles in designing of maxillary obturator:

1. Maximum clasping of remaining teeth with multiple occlusion rest (for retention & stability).
2. Maximum tissue coverage.
3. Maximum use of favorable undercut in the defect region.
4. Flat occlusion to eliminate deflective occlusion.
5. Hallow obturator (bulb) in case of large defect.

Prosthodontics treatment for irradiated patients:

Radiotherapy is a common primary or surgical adjuvant treatment for cancer of the head and neck. While the radiotherapy is effective in destroying residual cancer cells, the side effects to adjacent tissues are well documented. The bone forming cells, osteoblasts and osteocytes, within the direct path of irradiation are damaged and killed in bone, reducing the capacity for new bone synthesis. The periosteum loses cellularity &vascularity with impairment of osteoid formation. Osteoclast continue resorption after radiotherapy, patients who have had radiation therapy in or above oral cavity should be carefully evaluated prior to prosthetic service, since the duration , methods & dosage of radiation effect the soft and hard tissues. The use of radiation stent may reduce the side effect. The amount and viscosity of saliva is an important determinant of prosthodontics success. Compromised salivary function leads to more friction at the denture mucosal interface and more mucosal irritation. Retention of CD may be compromised because of diminished salivary quantity &change quality, such as the increased film thickness of the scanty &more mucinous saliva.

☒ ***Factors that should be taken in consedration in denture or partial construction for irradiated patient:***

1. Evaluation of psychological status and general health.
2. Tumor is under control.

3. Red, inflamed, edematous mucosa, one year after therapy is contraindicated for prosthetic treatment(unhealthy denture foundation).
4. Avoidance of pre-prosthetic surgery(tori, bony spicules)due to low body resistance and slow repair mechanism which may lead to osteradionecrosis.
5. Rubber base is material of choice for impression ,zinc oxide eugenol is contra-indicated (eugenol is irritant).
6. Good occlusion without disharmony.
7. Wetting of mouth with artificial saliva(due to xerostomia will help in decreasing friction &improve retention).
8. Continuous follow-up &adjustment.

The End

Best Wishes

Over Denture

Lecture: 9

Extraction of teeth is followed by continuous ridge resorption and poor denture foundation. Which will lead to loss of periodontal receptors responsible for proper masticatory function and accurate jaw movements.
Retention of few remaining teeth to support denture will preserve alveolar bone and preserve periodontal receptors.

OVER DENTURE:

Complete or partial denture constructed over existing teeth, roots or implants for providing additional support, stability and retention.

Types of over denture:
1. Tooth supported over denture.
2. implant supported over denture.

TOOTH SUPPORTED OVER DENTURE

OBJECTIVES:- to distribute stress concentration between retained teeth abutments and denture supporting tissues.

INDICATIONS:-
1. Major tooth wear, cannot use remaining teeth as abutments for fixed or removable prosthesis.
2. Congenital tooth wear, hypodontia or cleft palate.
3-Sequalae of maxillofacial trauma.
4-Patient with flat ridge.

CONTRAINDICATIONS:-

1. Mentally or physically handicapped
2. Patient can't be motivated to develop good oral hygiene

3-Inadequate inter-maxillary space

4-Teeth with grade III mobility or insufficient zone of attached gingival.

ADVANTAGES:-

1- Preservation of edentulous ridge form, especially for lower jaw.

2- It will provide support and promoting stability of denture.

3- Preserve labial undercut: better retention and stability.

4- Minimize horizontal forces on abutment teeth.

5. Improve appearance: more bone support, prevent labial and lip collapse.
6. Preservation of sensory input: better occlusal awareness, biting force and neuromuscular control from the periondontal tissue
7. Allows scope of attachments. Eg; magnetic, telescopic crown or bar.

DISADVANTAGES:- •

1. Root canal therapy: increase cost, long treatment.
2. Limitation of space: may require design modification.
3. Potentially fracture of denture base materials at thin/weak base.
4. Risk for further disease on abutments: caries and periodontal disease.

5-Periodontal attachment loss.

6. Root caries.
7. May need additional or extra laboratory steps.

TYPES OF ABUTMENT TEETH SUPPORTING OVERDENTURE

1. Submerged Roots

a- Abutments roots are endodontically treated.

b-Reduced in height to a level below gingival margin.

2. dome shaped abutment with amalgam plug

- Abutments reduced to be 1-2 mm above gingival margin to reduce lateral force and torque.
- Endodontic treatment is necessary.
- The root canal is filled with gutta percha. The opening is sealed with amalgam plug.
- The abutment is contoured as dome- shape.
- Used in patient with low caries index &good oral hygien.

3. Dome shaped abutments with cast copings

- Abutment are endo-dontically treated and reduced to 1-2 mm above gingival margin
- Metal dome shaped cast coping constructed to cover abutment.
- The metal coping has a short post cemented into root canal to retain the coping.

4. abutments with telescopic crowns

- Abutment teeth are either vital or endodontically treated and contoured to tapered configuration
- Tapered metal copings constructed and cemented over abutments
- Denture constructed with metal crowns having veneered facings

5. Abutments with slight tooth reduction & cast copings

- Abutments are minimally reduced with or without endodontic treatment.
- Covered with cast metal coping “long coping abutment”. This type is rarely used because it requires adequate ridge space.

6. abutments with an added form of attachment

- Endodonticaly treated, reduced & covered with metal coping
- Coping has a long post to help retention
- Attachment added either by soldering or during wax pattern

ATTACHMENTS

- Constructed with an incorporated attachment to improve retention.
- More expensive & more time for construction.
- Indicated for patient with good oral hygiene & low caries index.
- The abutment teeth should have good periodontal condition and adequate bone support.

IT COULD BE IN THE FORM OF:-

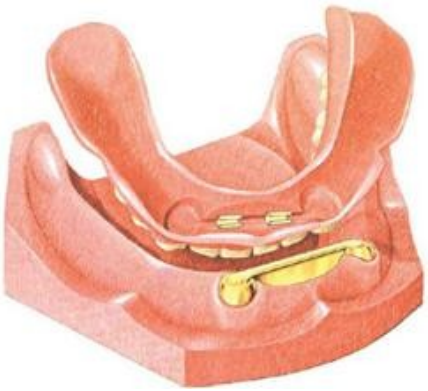
1. Stud attachment.
2. Bar attachment.
3. Magnetic attachment.

1. **STUD ATTACHMENT**

- Consists of 2 parts
    - The stud usually attached to metal coping cemented over prepared abutment.
    - Housing embedded in the fitting surface of over denture.

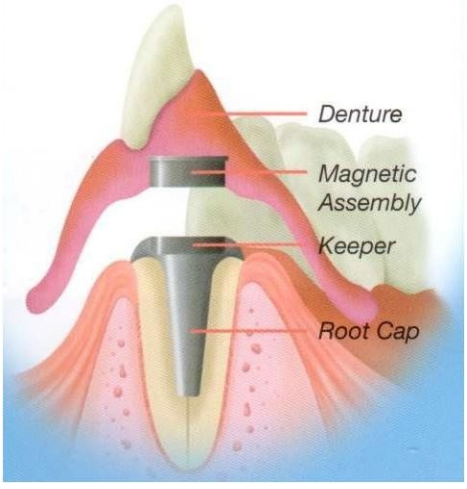
2. **BAR ATTACHMENT**:-

- A bar contoured to connect abutment teeth together , run parallel and overlie residual ridge
- Provide support and retention for over denture and splint abutment teeth
- Bars may be in form of preformed metal or plastic



3. **MAGNETIC ATTACHMENT**

- Small, strong mini magnets.
- One of poles cemented in a prepared cavity in endodontically treated abutment and the other attached to denture base.



STEPS OF CONSTRUCTION OF OVER DENTURE

1. Examination & diagnosis

a) Medical history : debilitating diseases are contraindicated
b) Dental history: patient with acceptable oral hygiene has better prognosis
c) Pre-treatment records: diagnostic cast is prepared and mounted on articulator

Examination:

a) Visual and digital exam of oral cavity.
b) Dental exam. For carious lesions, defective restorations, adequate denture space.
c) Periodontal exam… pocket depth and grade of mobility
d) Radiographic exam: Panorama and periapical radiographs to evaluate bone support of abutment, status of endodontic treatment and periodontium.

The success of tooth- supported overdenture depends on:

1- Proper selection of abutments.
2- Preparation of abutments.
3- Design.

Abutment Selection:

1. Periodontal condition.
    a. Good periodontal condition.
    b. Surrounded by sufficient alveolar bone at least 6 mm of bone .
    c. Exhibit minimal mobility not more than grade II

2- Positional considerations.
    a. Preferable to retain ant. teeth,(the anterior part is more susceptible to resorption.)
    b. Preferable to retain Canines (central strategic position, many nerve receptors ,single root.
    c. separate abutments better than neighboring.

3. Number of abutments.
    a. The more number, the better support, stability and retention.
    b. The ideal distribution by retaining 2 teeth in each quadrant “canines and 1st molars” or even one tooth in each quadrant.
4. Endodontic factors.
    a. RCT usually necessary to allow for proper reduction in height and contour. Selection of single rooted teeth is preferable.
    b. Teeth with periapical lesions may have poor prognosis.

ABUTMENT PREPARATION

A-endodontic abutment preparation: R.C.T. is required to allow for sufficient reduction and contouring.

B-periodontal preparation

- Supra gingival scaling.
- Root planning.
- Elimination of periodontal pockets by curettage or gingivectomy.

C-abutment reduction and contouring

- Reduction in height: to provide a favorable crown root ratio, decrease forces falling on abutment and provide space for overdenture. By disking or using a tapered fissure bur

Tooth contouring:

- Dome shaped configuration reduce stresses and provide maximum support.

- Sharp edges should be rounded and undercuts eliminated.

Clinical Procedures:-

- Preliminary impression Stock trays… alginate…primary casts… special trays.
- Final impression: Rubber base poured into stone

Jaw relations records:

- Face bow record to mount upper cast. Centric relation to mount lower cast.

Try in:

- Insure proper fit, support and stability
- Should be relieved over abutments to insure seating
- Check vertical dimension and occlusion

Denture insertion:

- Fitting surface overlying abutment should be relieved to avoid pressure on gingival margin.
- Steps for overdenture insertion are similar to conventional C.D.
- Post insertion care(oral &denture hygiene instruction)

The End

Best Wishes

Occlusion concept of complete denture

Lecture: 15

Introduction

Definition and terminology (GPT-8):

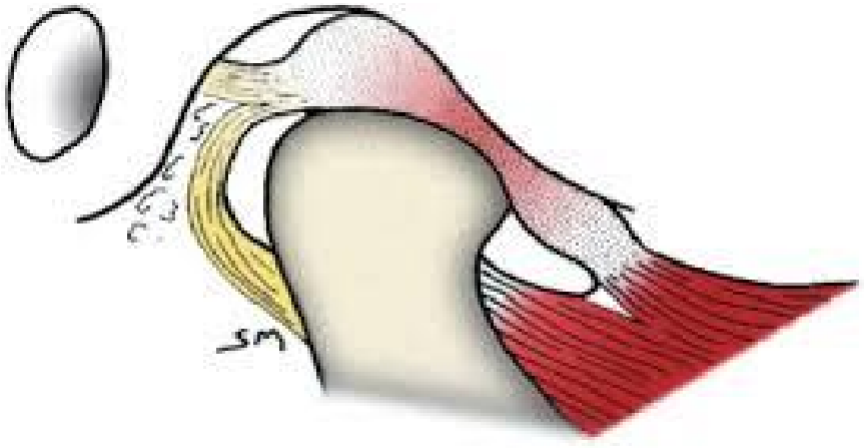
Occlusion : the static relationship between the incising and masticating surfaces of the maxillary and mandibular teeth or tooth analogues .

Articulation : The static and dynamic contact relationship between the occlusal surfaces of teeth during function.

Centric relation: The glossary of prosthodontics terms(GPT) enumerate seven different definitions for centric relation (The most accepted definition) is (GPT-5) which is:

maxillomandibular relationship in which the condyles articulate with the thinnest avascular portion of their respective disks with the complex in the anterior-superior position against the slope of the articular eminencies.

This position is independent of tooth position (bone to bone relation).



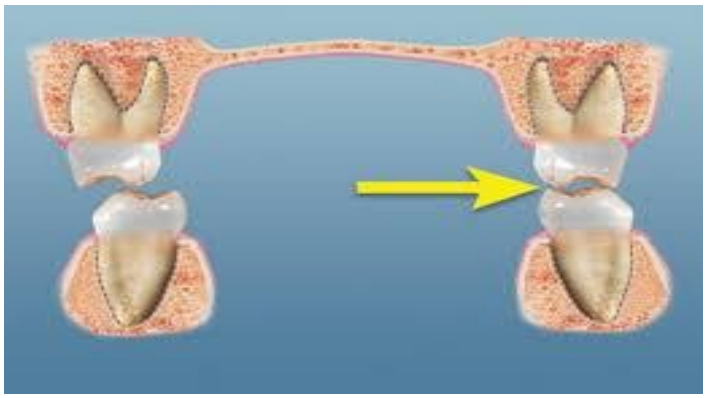
OR: is the most retruded position of mandible to maxilla when the condyles are in the most posterior unstrained position in the glenoid fossa from which lateral movement can be made.

centric occlusion : the occlusion of opposing teeth when the mandible is in centric relation. This may or may not coincide with the maximal intercuspal position (tooth to tooth relation).

maximal intercuspal position: the complete intercuspation of the opposing teeth independent of condylar position, sometimes referred to as the best fit of the teeth regardless of the condylar position—called also maximal intercuspation.

lateral movement:

a movement from either right or left of the midsagittal plane (GPT-4).
In the lateral movement we have two sides:
-Working side.
-Non-working side (Balancing side).
working side (functioning side): the side toward which the mandible moves in a lateral excursion.



nonworking side (balancing side) : that side of the mandible that moves toward the median line in a lateral excursion , the condyle of that side called non – working side condyle.

occlusal harmony: a condition in centric and eccentric jaw relation in which there are no interceptive or deflective contacts of occluding surfaces .

occlusal interference : any tooth contact that inhibits the remaining occluding surfaces from achieving stable and harmonious contacts

Occlusion in natural teeth

To understand occlusion in complete and partial dentures, we have to understand occlusion in natural dentition. The pathways taken by teeth dependent on the cusps and morphology of the occlusal surfaces of the teeth , as well as on the morphology of the joints. In chewing, the lower teeth move across the uppers, passing though the intercuspal position, usually without stopping. The intercuspal position is used during chewing, swallowing and during deliberate clenching of the teeth. During function, the presence of cusps usually results in separation of the teeth on one side, whilst the teeth contact on the other side of the arch. This is observed most obviously during lateral movement, but also occurs in protrusive movement when anterior teeth contact and posterior do not.

Concepts of natural occlusion:

1. Mutually Protected Occlusion.
2. Group Function Occlusion.
3. Balanced occlusion.

Mutual protected occlusion :

An occlusal scheme in which the posterior teeth prevent excessive force on the anterior teeth in maximum intercuspation and the anterior teeth disengage the posterior teeth in all mandibular excursive movements.(GPT-8)

- **Characters**:
- 1-There is no posterior occlusal contacts occur during lateral and protrusive excursions.
- 2- Centric relation coincide with maximum intercuspation position.

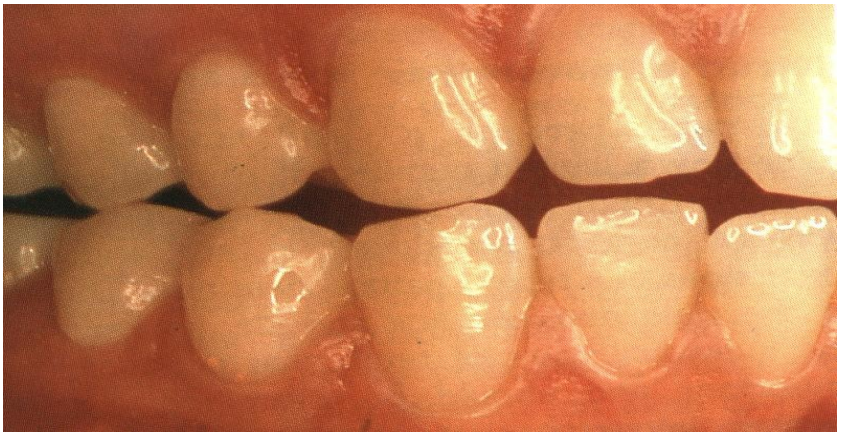
- Also it is called ***canine protected occlusion*** in which:

-On laterotrusive movement of mandible , only the canines (possibly first premolar) contact and therefore; protect the remaining dentition from adverse occlusal forces on contact to and from centric occlusion.

-Furthermore, it is considered that CPO is the ideal type of occlusion for natural dentition, and it is the type of occlusion toward which the restorative and orthodontic treatment is directed.

-The advocated of CPO argued that the human has long and dominant canine, further is the strongest tooth and has the most sensitive proprioceptive fibers.

Group function: multiple contact relations between the maxillary and mandibular teeth in lateral movements on the working side whereby simultaneous contact of several teeth acts as a group to distribute occlusal forces



Characters:

1. Occlusal contacts occur between all posterior teeth on working side only.
2. No contacts on non-working side until the mandible reach the centric relation.

3-In protrusive movement no posterior teeth contacts occur.

Balanced occlusion

Characters:

1. Maximum number of teeth contact in all excursive positions of mandible
2. Rare in natural dentition, and considered as an occlusal interference.
3. Consider as pathologic condition.

Differences between natural and artificial occlusion

Natural occlusion	Artificial occlusion
Natural teeth function independently and each tooth disperses the occlusal load	Artificial teeth function as a group and the occlusal loads are not individual managed
Malocclusion can be non-problematic for long time	Malocclusion pose immediate drastic problems
Non vertical force are well tolerated	Non vertical forces damage the supporting tissue
Incising does not affect the posterior teeth	incising will lift the posterior part of the denture
The second molar is the favored area for heavy mastication	Heavy mastication over second molar can tilt or shift the denture base
Bilateral balance is not necessary and usually considered a hindrance	Bilateral balance is mandatory to produce stability of the denture
Proprioceptive impulse give feedback to avoid occlusal prematurities	There is no feedback and the denture rest in centric relation ,any premature contact can shift the denture

Occlusion in complete denture

Unlike natural teeth, the artificial teeth act as a single unit. Hence, there should be a minimum of three contact point (usually one anterior and two posterior)between upper and lower teeth at any position of the mandible for even force distribution and stabilization of denture.

Requirements of ideal complete denture occlusion *for incisal unit*

1. These units should be sharp to improve incising efficiency.
2. They should not contact during mastication only during protrusion .
3. They should have shallow incisal guidance considering esthetics and phonetics.

For working occlusal units

1. They should be efficient in cutting and grinding
2. They should have decreased buccolingual width to decrease occlusal load transmitted to the tissues.

3. They should function as a group with simultaneous harmonious contacts at the end of the chewing cycle and during eccentric excursion.

4. They should present a plane of occlusion as parallel as possible to the mean foundation plane.

for balancing units

1. They should contact on the second molars when the incising units contact in function.
2. They should contact at the end of the chewing cycle when the working units contact.
3. They should have smooth gliding contacts for lateral and protrusive excursions.

Objectives of occlusion in complete denture:-

- Preservation of remaining tissues.
- Proper masticatory efficiency.
- Enhancement of denture retention, support and stability.
- Enhancement of phonetics and esthetics.

Concepts of occlusion in complete dentures include:

- **Balanced occlusion.**
- **Lingualized occlusion.**
- **Monoplane occlusion (neutrocentric concept).**
- **Organic occlusion.**

Balanced Occlusion

Definition : *Bilateral simultaneous anterior and posterior occlusal contact of upper and lower teeth in centric and eccentric.*(GPT).

We should use anatomic teeth and fully adjustable articulator.

The records form the patient required for balanced occlusion include: centric jaw relation record, protrusive record, working and balancing records.

A balanced occlusion should have the following characteristics:

- All the teeth of the working side (central incisor to second molar) should glide evenly against the opposing teeth
- No single tooth should produce any interference or disocclusion of the other teeth.
- There should be contacts in the balancing side, but they should not interfere with the smooth gliding movements of the working side.
- There should be simultaneous contact during protrusion.

Objectives of Balanced Occlusion

- To improve the stability of denture.
- To reduce resorption of the residual ridge and soreness.
- To improve oral comfort & well being of the patient.

General consideration for balanced occlusion :

1. Ideal balanced occlusion can be achieved in case with wide and large ridge
2. Complete denture that has teeth arranged away from the ridge and those that rest on narrow and short ridge will have poor balanced occlusion
3. Teeth that have narrow buccolingual width and those that rest on wide ridge provide ideal balanced occlusion
4. Ideal balanced occlusion can be achieved by arranging teeth slightly on lingual side of the crest of the ridge

5. The complete denture should be designed in such a way that the force of occlusion are centred anterioposteriorly in the denture.

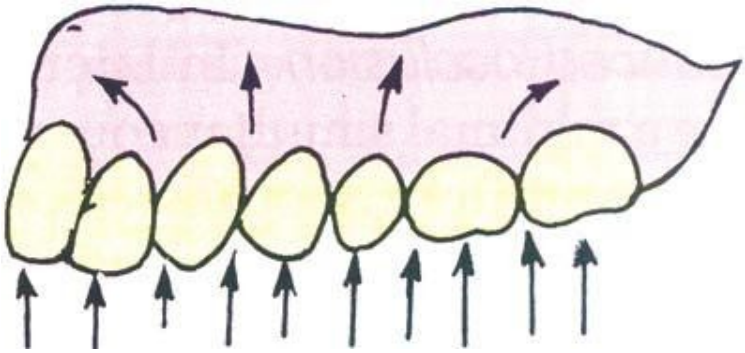
Type of balanced occlusion

Bilateral balanced occlusion

This type seen when simultaneous contact occur on both sides in centric and eccentric positions

Bilateral balanced occlusion help in distribute the occlusal load evenly across the arch and therefore help to improve stability of denture during centric , eccentric and Para functional movement.

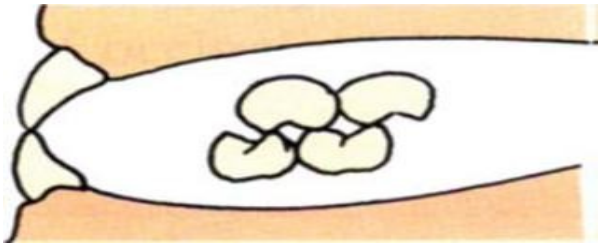
For balanced occlusion there should be minimum of three contact point on the occlusal plane.



Protrusive balanced occlusion

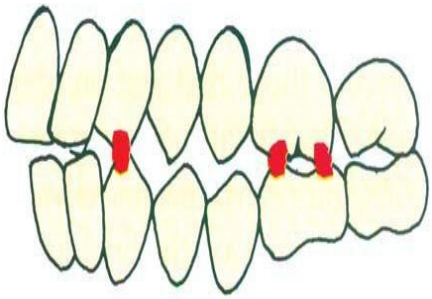
This type is present when mandible move in forwared direction with smooth and simultaneous occlusal contact anteriorly and posteriorly.

There should be at least three point of contact two posteriorly and one anteriorly located, this is absent in natural dentition.

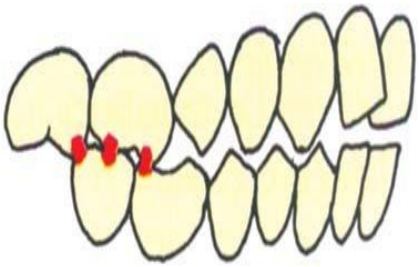


Lateral balanced occlusion

In this type there will be minimum three simultaneous contact point one anteriorly and two posteriorly located present during lateral movement , lateral balanced occlusion is absent in natural dentition because the canine will disocclude the all remaining teeth.



Working side



Balancing side

Unilateral balanced occlusion

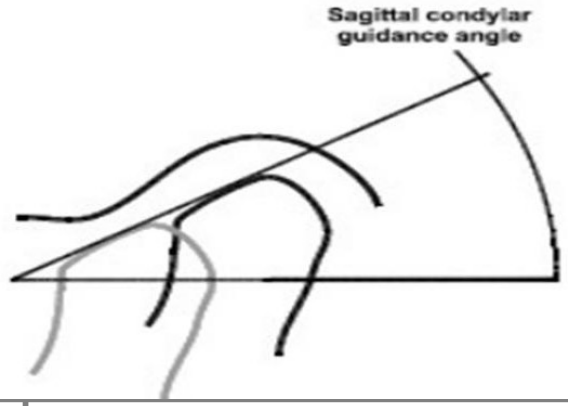
This type seen on occlusal surface of teeth on one side when they occlude simultaneously with a smooth and uninterrupted glide. This is not followed in complete denture construction, it is more pertained to fixed partial dentures.

Factor influencing balanced occlusion:

The five basic factors that determine the balance of an occlusion are:

1/ Inclination of the condylar path or condylar guidance.

Condylar guidance: mandibular guidance generated by the condyle and articular disc traversing the contour of the glenoid fossae(GPT-8).



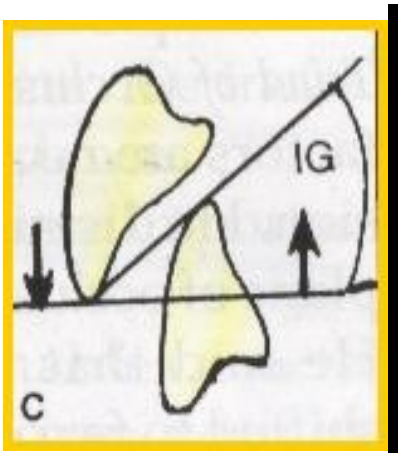
This is the only factor, which can be recorded from the patient. It is registered using protrusive registration (i.e the patient is asked to protrude with the occlusal rims). Inter-occlusal record material is injected between the occlusal rims in this position. The occlusal rims with the inter occlusal record are transferred to the articulator. Since the occlusal rims are in a protrusive relation, the upper member of the articulator is moved back to accommodate them, The inter-occlusal record is carefully removed and the upper member is allowed to slide forward to its original position, The condylar guidance should be adjusted (rotated) till the upper member slides freely into position. it is transferred to the articulator as the condylar guidance.

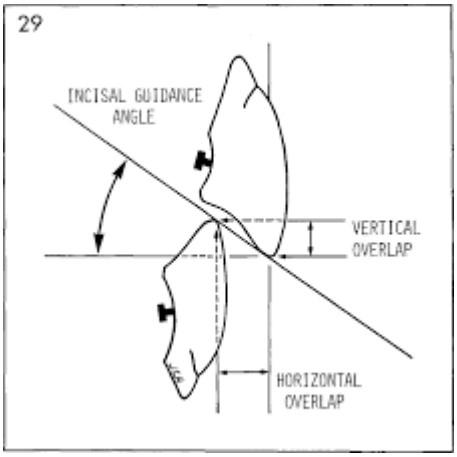
Increase in the condylar guidance will increase in the jaw separation during protrusion. This factors of balanced occlusion cannot be modified .all the other factors of occlucion should be modified to compensate this factor. In patient with steep condylar guidance, the incisal guidance should be decreased to reduce the amount of jaw separation produced during protrusion and vice versa.

2/ Incisal guidance:

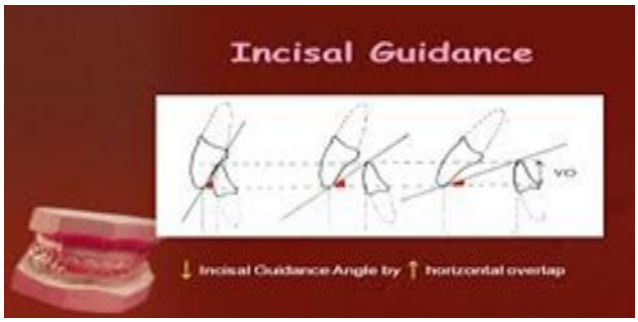
"The influence of the contacting surfaces of the mandibular and maxillary anterior teeth on mandibular movements" (GPT-8).

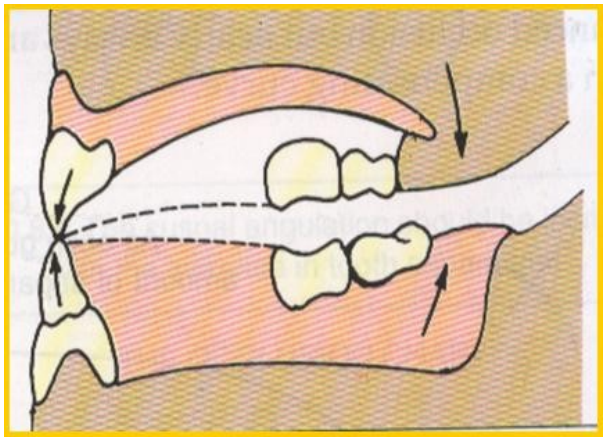
It is usually expressed by degrees of angulation from horizontal by a line drawn in sagittal plane between incisal edges of upper and lower incisor teeth when closed in centric.





The incisal guidance can be raised by altering the labial proclination, overjet and overbite of the maxillary anteriors, so that the incisal guide angle becomes steeper When the patient with a steep incisal guidance brings his mandible forward, there will be more jaw separation. This is because the movement of the mandible is controlled by the lingual surface of the upper anteriors (The upper incisors are more vertically placed in cases with a steep incisal guidance).

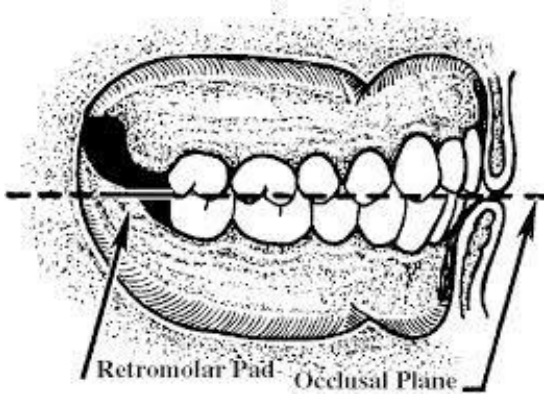




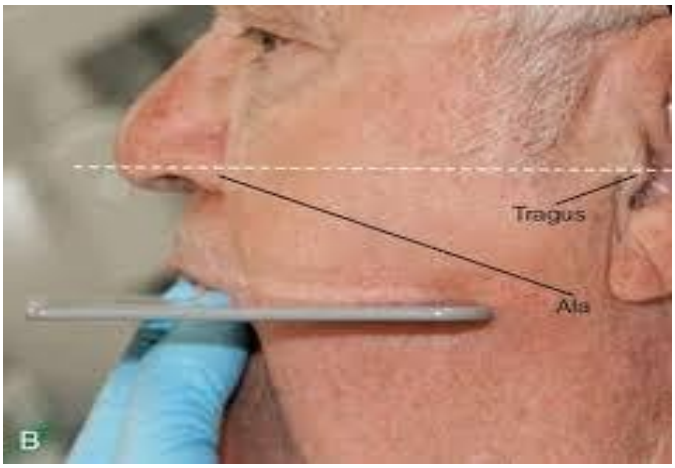
Increase in jaw separation will lead to disocclusion of the posterior teeth leading to loss of tripod contact which will in turn lead to lifting of the posterior part of the denture during incising function and it is called (Christiansens phenomenon). If the posterior part of the denture lifts during incisal function, it simply means that the balanced occlusion is absent. The condylar guidance has a similar effect on the denture.

3/ Orientation of the plane of occlusion or occlusal plane:

it is defined as: "An imaginary surface which is related anatomically to the cranium and which theoretically touches the incisal edges of the incisors and tips of the occluding surfaces of the posterior teeth, it is not a plane in the true sense of the word but represents the mean curvature of the surface" - GPT.

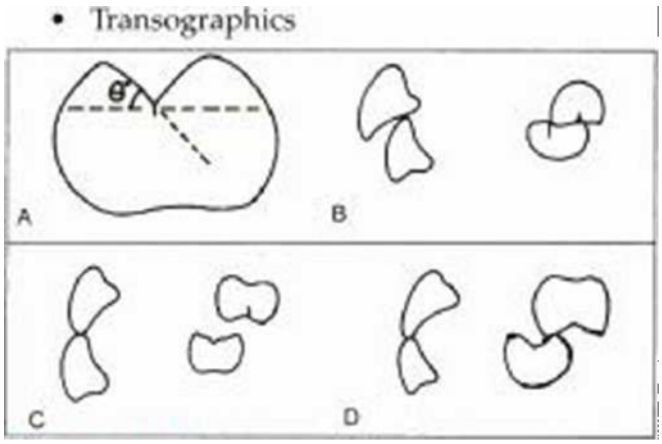


It is established anteriorly by the height of the lower canine, which nearly coincides with the commissure of the mouth and posteriorly by the height of the retromolar pad. It is usually parallel to the ala-tragus line or Camper's line posteriorly and interpupillary line anteriorly . It can be slightly altered and its role is not as important as other factors.



4/ Cuspal angulation

The angle made by the average slope of cusp with the cusp plane measured mesiodistally or buccolingually . (GPT-8)



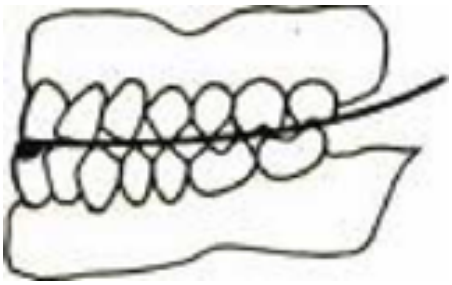
The cusps on the teeth or the inclination of the cuspless teeth are important factors that modify the effect of plane of occlusion and the compensating curves. The mesiodistal cups lock the occlusion, such that repositioning of teeth does not occur due to settling of the base .

In order to prevent the locking of occlusion, the mesiodistal cups are reduced during occlusal reshaping. In the absence of mesiodistal cusps, the buccolingual cusps are considered as a factor for balanced occlusion.

In cases with a shallow overbite, the cuspal angle should he reduced to balance the incisal guidance. This is done because the jaw separation will be less in cases with decreased overbite. Teeth with steep cusps will produce occlusal interference in these cases.

In cases with deep bite (steep incisal guidance), the jaw separation is more during protrusion, teeth with high cuspal inclines are required in these cases to produce posterior contact during protrusion.

5/ Compensating curves:
It is defined as," The anteroposterior and lateral curvatures in the alignment of the occluding surfaces and incisal edges of artificial teeth which are used to develop balanced occlusion" (GPT-8)



It is an important factor for establishing balanced occlusion. It is determined by the inclination of the posterior teeth and their vertical relationship to the occlusal plane. The posterior teeth should be arranged such that their occlusal surfaces form a curve. This curve should be in harmony with the movements of the mandible guided posteriorly by the condylar path.

A steep condylar path requires a steep compensatory curve to produce balanced occlusion. If a shallow compensating curve is given for the same situation, there will be loss of balancing molar contacts during protrusion (explained before).

There are two types of compensating curves namely:

1/ Anteroposterior curves

2/ Lateral curves

Curve of Spee, Wilson's curve and Monson curve are associated only with natural dentition, In complete dentures compensating curves similar to these curves should be incorporated to produce balanced occlusion.

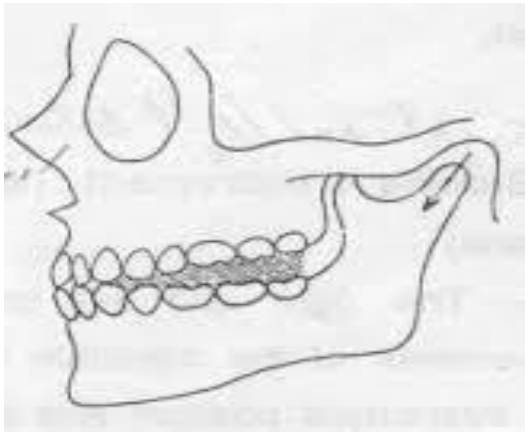
Anteroposterior Compensating Curve *:*

These are compensatory curves running in an anteroposterior direction. They compensate for the curve of Spee, seen in natural dentition.

Compensating Curve for Curve of Spee

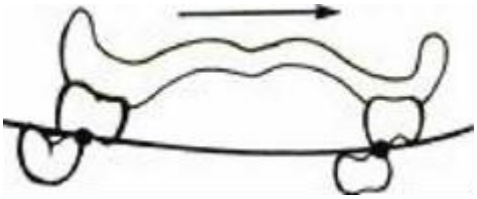
Curve of Spee is defined as, "Anatomic curvature of the occlusal alignment of teeth beginning at the tip of the lower canine and following the buccal cusps of the natural premolars and molars, continuing to the anterior border of the ramus as described by Graf von Spee" GPT.

It is an imaginary curve joining the buccal cusps of the mandibular posterior teeth starting from the canine passing through the head of the condyle. It is seen in the natural dentition and should be reproduced in a complete denture. The significance of this curve is that, when the patient moves his mandible forward, the posterior teeth set on this curve will continue to remain in contact. If the teeth are not arranged according to this curve, there will be disocclusion during protrusion of the mandible. (Christiansens phenomenon).



Lateral Compensating Curves

These curves ran transversely from one side of the arch to the other. The following curves fall in this category



Compensating Curve for Monson Curve

Monson's curve is defined as, "The curve of occlusion in which each cusp and incisal edge touches or conforms to a segment of a sphere of 8 inches in diameter with its center in the region of the Glabella"-GPT .

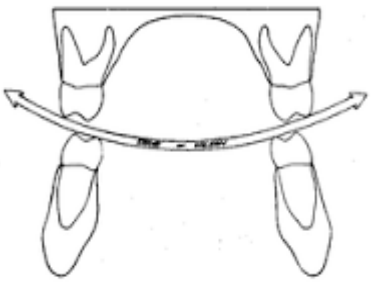
This curve runs across the palatal and buccal cusps of the maxillary molars. During lateral movement the mandibular lingual cusps on the working side should slide along the inner inclines of the maxillary buccal cusp. In the balancing side the mandibular buccal cusps should contact the inner inclines of the maxillary palatal Cusp, This relationship forms a balance.

Only if the teeth are set following the Monson's curve there will be lateral balance of occlusion.

Compensating curve for Wilson curve:

“In the mandibular arch, that curve, as viewed in the frontal plane, which is concave above and contacts the buccal and lingual cusps of the mandibular molars; In the maxillary arch, that curve, as viewed in the frontal plane, which is convex below and contacts the lingual and buccal cusps of the maxillary molars. The facial and lingual cusp tips on both sides of the dental arch form the curve.” -GPT

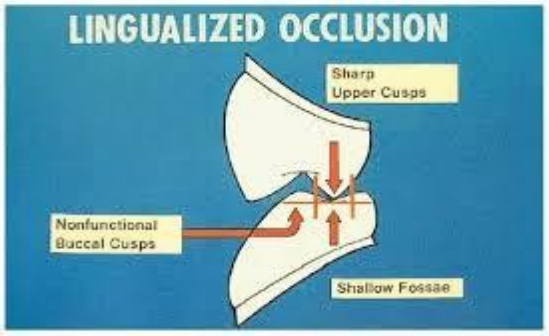
This curve is followed when first premolars are arranged. The premolars are arranged according to this curve so that they do not produce any interference to lateral movements.



Lingualized Concept Of Occlusion

The form of denture occlusion in which the maxillary lingual cusp articulate with mandibular occlusal surfaces in centric , working and balancing mandibular position.

The cusp inclines of mandibular teeth are relatively flat , resulting in less lateral forces and displacement during function.



Indications :

- When the patient places high priority on esthetics and a non anatomic occlusal scheme is indicated by severe alveolar resorption.
- Where complete denture opposes a removable partial denture.
- Displceable supporting tissue.
- Weak muscles of mastication.
- Lingualized occlusion is suitable for intra-coronal attachment to avoid breakage.
- Discrepancy between size of upper and lower jaw.
- Indicated for patient with implant supported overdenture to reduce lateral forces that can rock abutment and loose over time.

Principles of Lingualized Occlusion

- Anatomic posterior teeth are used for maxillary denture.
- Non anatomic or semi anatomic teeth are used for mandibular denture.
- Modification of mandibular posterior teeth is accomplished by selective grinding.
- Balancing and working contacts should occur only on the maxillary lingual cusps.
- Protrusive balancing contacts should occur only between maxillary lingual cusps and lower teeth.

Advantages of lingualized occlusion:

1. Bilateral mechanical balanced occlusion is readily obtained in a region around centric relation.
2. Vertical forces are centralized on the mandibular teeth.

3- It is easier to adjust than fully balanced occlusion.

4- Additional stability is imparted to the denture during parafunctional movements when balanced occlusion is used.

Monoplane occlusion (neutrocentric concept)

The monoplane concept of occlusion uses zero degree teeth for denture construction and employs a relatively simple technique for arrangement of teeth. The plane of occlusion should be parallel to the denture foundation area not dictated by condylar inclination and it is flat.

The term *neutrocentric* denotes an occlusion that eliminates the anteroposterior and buccolingual inclines in order to direct the forces to the posterior teeth.

There is no curve of Wilson or curve of Spee (compensating curve) incorporated and no vertical overlap of the anterior teeth. The patient with this type of occlusion is instructed not to incise food bolus. The teeth used should be flat teeth and lateral and horizontal condylar guidance should be zero and we use the cuspless teeth.

Indications:

- Jaw size discrepancies and malocclusion.
- Cross bite, class II and III jaw relationship.
- Uncoordinated jaw movement.
- Reduce horizontal forces, that may help implant.

Disadvantage

1. poor esthetic
2. decreased masticatory efficiency
3. more difficult to obtain balanced occlusion

Monoplane with balancing ramp

The balancing ramp give stability to the denture as the denture move in horizontal plane in protrusive or lateral movement.

Morphologically teeth can be classified as:

1/Anatomic teeth:

These teeth resembles normal erupted teeth, they provide esthetic and most commonly used artificial teeth. The cusp incline is 33 degree.

Advantages:

1. -Esthetic.
2. -Better penetration of food bolus.

3- -Decrease vertical stress.

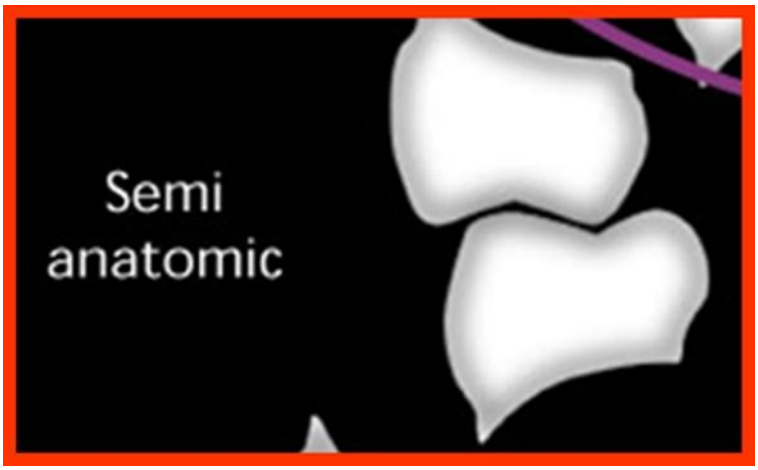
4- -Harmony with muscles of mastication and TMJ.

Disadvatages:

1- -Precise technique required.
2- -Greater lateral force.
3- -Difficult tooth position in class II and III jaw relationship.

2/Semianatomic teeth:

Cusp incline is less steep than conventional anatomic tooth of 33 degree, also called modified teeth.



Advantages:

1- -Esthetic more than cuspless teeth.
2- -Good chewing efficiency.
3- -Less lateral force.

Disadvantages:

1. -Same as for anatomic teeth.
2. -More difficult to achieve cross arch balance.
3- -Esthetic reduced than anatomic teeth.

3/Cuspless teeth:

They are also known as 0 degree, flat, or monoplane teeth. They have no cuspal angulation hence are very flexible to set.

Advantages:

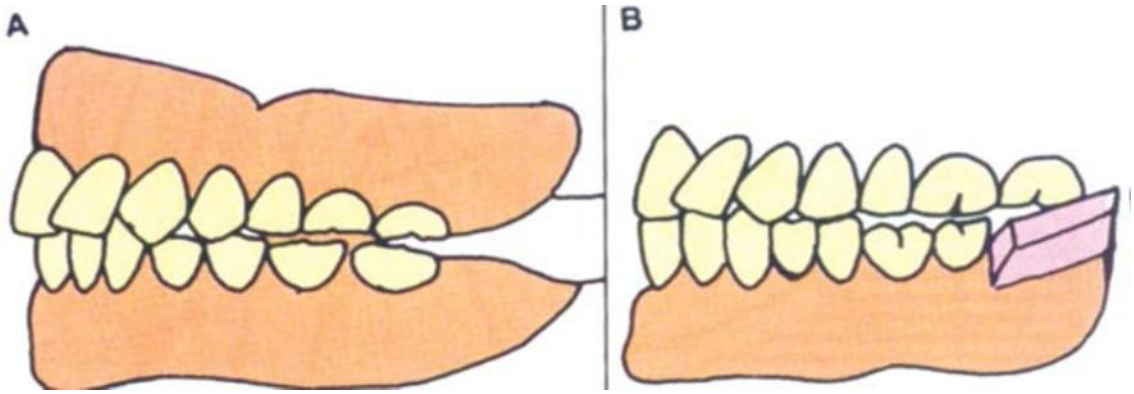
1. -Indicated for patient with poor neuromuscular coordination, difficult to obtain repeatable jaw relation.
2. -Less time needed for set up and articulation.
3. -Suitable for patients with cross bite or class III and II jaw relationship.

Disadvantages:

1. Use of compensating curve may cause the same damaging effect as cusp incline.
2. Occlusal adjustment difficult to accomplish.

Balanced occlusion for non-anatomic teeth can be made by:

1. Compensating curve.
2. Tilting the second molar.
3. Placing the balancing ramp.



In general:

- Anatomical teeth usually are selected for balanced occlusion
- Nonanatomical or cuspless teeth are generally the choice for monoplane occlusion.
- For the lingualized occlusal concept, a combination of upper anatomical and lower nonanatomical teeth has been introduced.

The End
Best Wishes