Lec.7 retention continuue

4. vacuum device:

a suction chamber Alternative name is rubber disk or palatal window in the past suction chamber in the maxillary dentures were used to aid in retention by create an area of negative pressure which increase retention. They are avoided now due to their potency for creating palatal hyperplasia.

I. MUSCULAR FACTOR

The oral and facial musculature supply supplementary retentive forces, provided :

1) The teeth are positioned in the "neutral zone" between the cheeks and tongue and

2) Polished surfaces of the dentures are properly shaped.

For the oral and facial musculature to be most effective in providing retention for complete dentures, the following conditions must be met:

(1) The denture bases must be properly extended to cover the maximum area possible, without interfering in the health and function of the structures that surround the denture;

(2) The occlusal plane must be at the correct level.

(3)The arch form of the teeth must be in the "neutral zone" between the tongue and the cheeks.

The muscles which affected on retention are:

A- Buccinators

B- Orbicularis oris

C- Muscle of tongue

The accurate approximation of tongue, cheeks and lip to a denture controls the flow of saliva under the denture, thereby increasing the effective area of retention. Inaccurate extension of denture may allow

increased saliva & air to enter under the denture & cause loss of retention. Active muscle fixation of dentures may be obtained by careful attention to the form of those surfaces which contact their environmental tissue.

Denture surface:

1) Occlusal surface
2) Polished surface
3) Impression surface

Occlusal surface:That portion of the surface of a denture which makes contact or near contact with the corresponding surface of the opposing denture or dentition) .

Polished surface:It is that part of the denture base which is usually polished, includes the labial, buccal and lingual surfaces of the teeth, and is in contact with the lips, cheeks and tongue. Proper contour & design of the polished surfaces should be in harmony with the function of tongue & cheeks to keep the denture in its position.

Craddock described the gripping action of the buccinators muscle on the buccal flange of the mandibular denture:

If the buccal flanges of the maxillary denture slope Up & out from the occlusal surfaces teeth & the buccal flanges of the mandibular denture slope down &out from the occlusal plane, the contraction of the buccinators will tend to seat both dentures on their basal seats.

Impression surface: That portion of the surface of a denture that had its shape determined by the impression. It includes the borders of the denture and extends to the polished surface. The lingual surfaces of the lingual flanges should slope toward the center of the mouth so the tongue can fit against them & perfect the border seal on the lingual side of the denture.

Lingual flanges turn laterally in posterior part toward the ramus. Also helps ensure the border seal at the back end of mandibular denture."

II. SURGICAL FACTORS

1) Vestibuloplasty 2) Tuberoplasty 3) Ridge augmentation

It is the resistance to the displacement forces in a direction other than that which is opposite to insertion. A denture is retained satisfactorily in function when retentive forces greater than unstabilizing forces(which can be achieved by lips, cheeks, &tongue) depend upon the shape of the polished surface. In general, stability during function is related to the occlusion &articulation of teeth.

The various factors that affecting the stability are:

1-Vertical height of the residual ridge
2-Quality of the impression
3-Occlusal rims
4-Arrangement of the teeth
5-Contoure of the polish surface
6- Shape of the palatal Vault
7- Retention
8- Proper relief
Width of the occlusal table >>must be less than normal teeth >> to get god stability and retention.

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 the impression:

An impression should be as 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. The impression should not warp on removal. The impression should be dimensionally stable and the cast should be poured as soon as possible.

3) Occlusal plane:

The occlusal plane should be oriented parallel to the ridge .if the occlusal plane is inclined then the sliding force may act on reduce its stability. The occlusal plane should divide the inter arch space equally

4) Teeth arrangement (balanced occlusion and neutral zone):

The position of the teeth and their occlusion play an important role in the stability of the denture .Balanced occlusion facilitates the even distribution of force across the denture. Absence of the balanced occlusion may produce unbalanced lever type of force of any one side of the denture leading to loss of stability. The teeth in the denture should arrange in the neutral zone.

It is important that there should be even contact of opposing occlusal surfaces in the intercuspal position(centric). Any premature or deflective contact will cause displacement of denture away from tissue. Hence balanced occlusion or even contact between two dentures is important for stability of CD. During chewing movements, the teeth will be separated initially by the food layers, but when mastication proceeds, they may come in contact, it is important that they should be able to glide smoothly upon denture ridges. When teeth interfere &contact is limited to one or two teeth or cusps, then lateral pressure in their area become high. As a result rotation of the denture about the ridge is promoted, they is pulled away from the tissues on the opposite side of the jaw when the retention forces are sufficient to prevent it's displacement, usually the lower denture is the 1^{st} to be displaced.

Neutral zone: the potential space between the lips and cheeks on one side and the tongue on the other.

Natural or artificial teeth in this neutral zone are subjected to equal and opposite force from the surrounding musculature""

5) Contour of the polished surface:

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

6) Shape of palatal vault:

A steep palatal vault may enhance stability by providing greater surfaces area of contact & long inclines approaching .a right angle to the direction of force

Hard palate:

Hard palate can be classified as :

1 -U-shaped: ideal for both retention and stability.

2-V-shaped: retention is less as the peripheral seal is easily broken.

3-roundt: reduced resistance to lateral and rotator force

Stability decrease with:

1-Loss of vertical height of the ridge,

2- Increase in the movement of flabby tissue.

Briefly stability depend on three surfaces of the dentures:

1. Relation of impression surface or inner surface to the underlying tissues (intimate contacts) &border seal of the dentures.
2. Leverage position of the teeth &occlusal plane which should be achieved in right place.
3. Location &form of polished surface (outer surface) should be constructed in proper way for laying at the outer surrounding tissues &inner one.

Occlusal plane &the placement of artificial teeth should be located in the neutral zone (bucco-lingually) to avoid cheek &tongue bite.

The level of occlusal planeshould be with the lateral border of the tongue &should not exceed 2/3 of the retromolar pad area posteriorly. This is crucial to prevent the tongue during action to displace the denture during it's movement in upward direction, the mylohyiod muscle will be raised &consequently denture lifted &stability, retention will be lost.

The resistance to the forces of mastication, occlusal forces & other forces applied in a direction towards the denture bearing area.

The resistance to vertical forces of mastication, occlusal forces & other forces applied in a direction towards the denture bearing area. Initial denture support is achieved by using impression procedure that provide optimal extension & functional loading of the supporting tissue.

Nature of the Supporting tissue in the edentulous person, the ***soft tissue*** should be:

1- the mucosa covering the hard palate and the crest of the residual ridge, including the residual attached gingiva, is classified as masticatory mucosa. It is characterized by a well-defined keratinized layer on its outermost surface that is subject to changes in thickness depending on whether dentures are worn and on the clinical acceptability of the dentures

2-the submucosa is firmly attached to the periosteum of the underlying supporting bone and will usually withstand successfully the pressures of the dentures.

(The thickness and consistency of the submucosa are largely responsible for the support that the mucous membrane affords a denture because in most instances, the submucosa makes up the bulk of the mucous membrane. When the submucosal layer is thin, the soft tissues will be nonresilient, and the mucous membrane will be easily traumatized. When the submucosal layer is loosely attached to the periosteum or it is inflamed or edematous, the tissue is easily displaceable, and the stability and support of the dentures are adversely affected.).

3- Covered by keratinized mucosa.

Hard tissue should be:

Relatively resistance to remodeling & resorptive changes.

Consideration must be given to the maintenance of alveolar ridge height in the conventional complete denture patient.

Minimizing the pressure in those region most susceptible & directing the forces toward those region relatively resistance to resorption can maintain healthy residual ridge.

There are two types of osseous tissue that form bones:

Cortical bone: It is harder, stronger and stiffer than cancellous bone

Cancellous bone: is less dense, softer, weaker, and less stiff. It typically occurs at the ends of long bones,

Mandibular anatomical consideration:

1-Buccal shelf area

The surface of the mandible from the residual alveolar ridge or alveolar ridge to the external oblique line in the region of the lower buccal vestibule. It is covered with cortical bone.

Buccal shelf area is the primary support area for the mandibular denture because

1) it's usually covered by mucosa with an intervening sub mucous layer containing glandular connective tissue & buccinators muscle fibers

2) It is parallel to occlusal plan.

3) It lined by cortical bone.

MANDIBULAR RESIDUAL RIDGE:

It is covered by a keratinized layer and is attached by its submucosa to the periosteum of the mandible. The extent of this attachment varies considerably. In some people, the submucosa is loosely attached to the bone over the entire crest of the residual ridge, and the soft tissue is quite movable. In others, the submucosa is firmly attached to the bone on both the crest and the slopes of the lower residual ridge.

The ridges crests are reserved as secondary support areas.

1) The lack of the muscle attachment

2) Presence of cancellous bone

MAXILLARY ANATOMIC CONSIDERATION

1) Horizontal portion of the hard palate is consider as primary stress bearing area

-It have keratinized masticator mucosa overlies a distinct Sub mucosa layer everywhere

2) *In the region of the medial palatal suture*, the submucosa is extremely thin, with the result that the mucosal layer is practically in contact with the underlying bone. For this reason, the soft tissue covering the medial palatal suture is nonresilient and may need to be relieved to avoid trauma from the denture base.

3) In the area of the rugae, the palate is set at an angle to the residual ridge and is rather thinly covered by soft tissue. This area contributes to the stress-bearing role, though in a secondary capacity. The submucosa covering the incisive papilla and the nasopalatine canal contains the nasopalatine vessels and nerves

4) Crest of maxillary ridge

The crest of the edentulous ridge is an important area of support. However, the bone is subject to resorption, which limits its potential for support, unlike the palate, which is resistant to resorption. Because of this, the ridge crest should be looked on as a secondary supporting area, rather than a primary supporting area. The inclined facial surface of the maxillary ridge provides little support, although the peripheral tissues should be contacted to provide a border seal. The configuration of the bone that provides the support for the maxillary denture varies considerably with each patient.

Factors that influence the form and size of the supporting bone include

(1) Its original size and consistency;

(2) The person's general health;

(3) Forces developed by the surrounding musculature;

(4) The severity and location of periodontal disease (a frequent cause of tooth loss).

(5) Forces accruing from the wearing of dental prostheses.

(6) Surgery at the time of removal of the teeth.

(7) The relative length of time different parts of the jaws has been edentulous. In addition, a number of anatomical features influence the shape of the hard palate and residual ridge.

Methods used for improving the retention stability and support, these are described in the following :

- Dental implants improve the support, retention and stability of a full or partial denture reducing the slip and movement while speaking or eating
- **Mini-implants have become a common treatment option for improving retention of lower dentures**