

University of Basrah

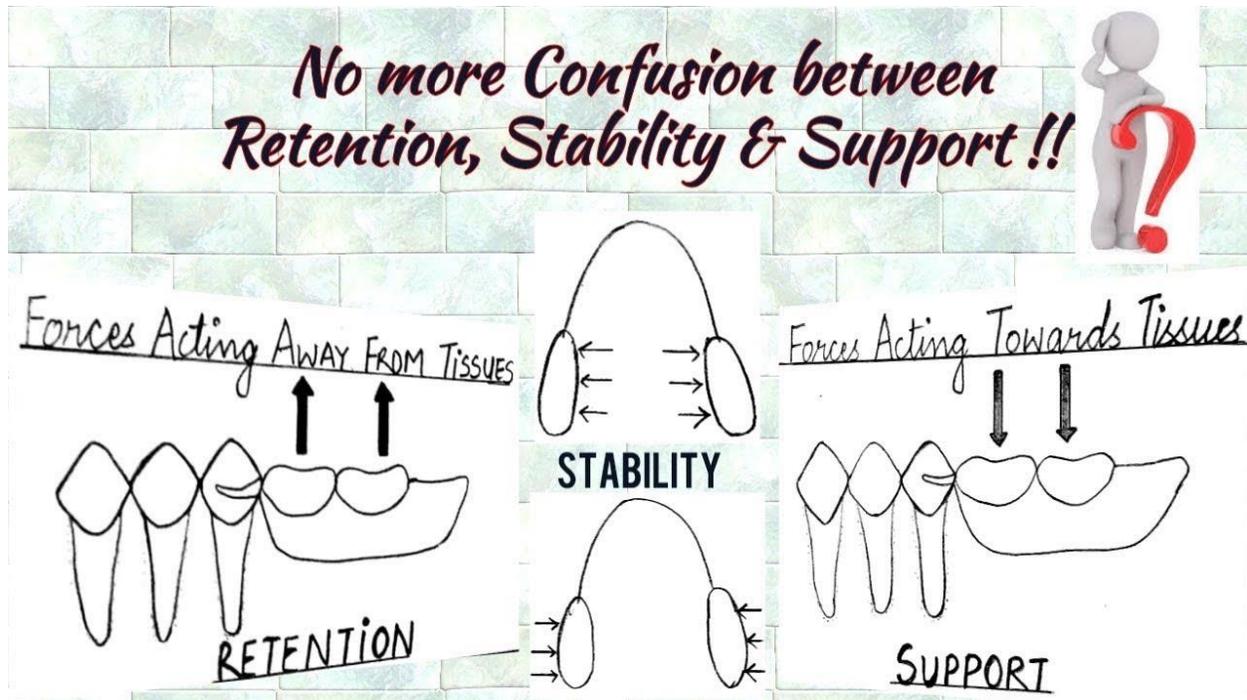
College of Dentistry

Department of prosthetic dentistry

5th stage / lec 6

Dr. Hasanein Al-namel

Retention, stability, and support of complete denture



1. Retention:

This is the quality of a denture that resists movement of the denture away from the tissue against vertical force. It is checked by firmly seating the denture in the mouth and trying to displace it with force at a right angle to its occlusal surface, if the denture resists displacement it is said that it has retention.

2. Denture surface: Retentive forces offer resistance to vertical movement of a denture away from the underlying mucosa and act through the three surfaces of a denture. These surfaces may be defined as follows:

- **Occlusal surface:** That portion of the surface of a denture that 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 that is usually polished includes the labial, buccal, and lingual surfaces of the teeth, and is in contact with the lips, cheeks, and tongue.

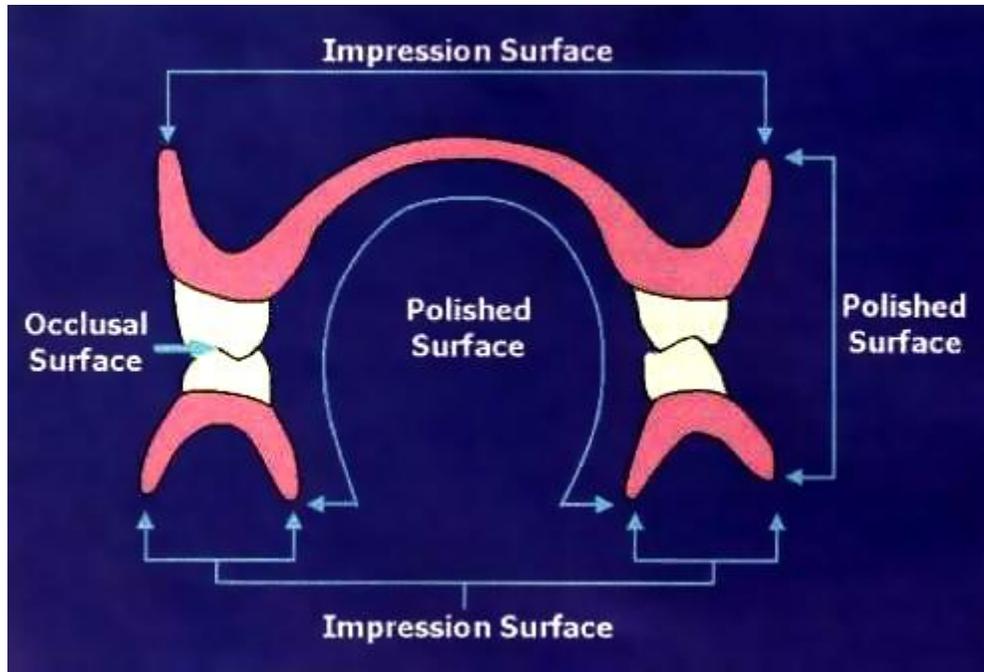
Proper contour and design of the polished surfaces should be in harmony with the function of the tongue and cheeks to keep the denture in its position. for example, the buccal flanges of the maxillary denture slope Up and out from the occlusal surface's teeth, and the buccal flanges of the mandibular denture slope down and 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 and perfect the border seal on the lingual

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

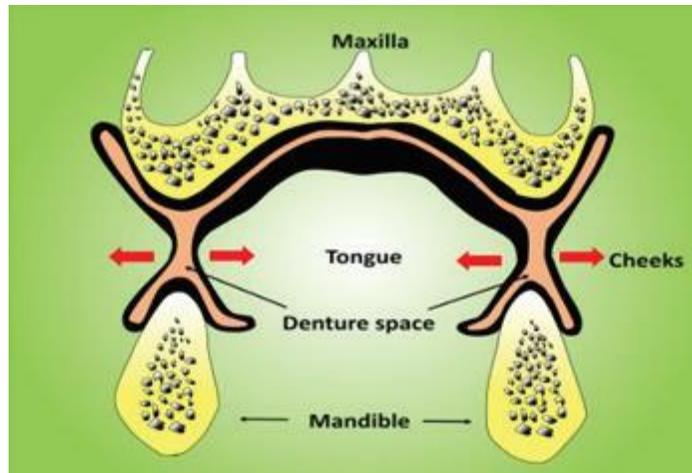


3. Factors affecting the retention of CD

- **Anatomical factors.**

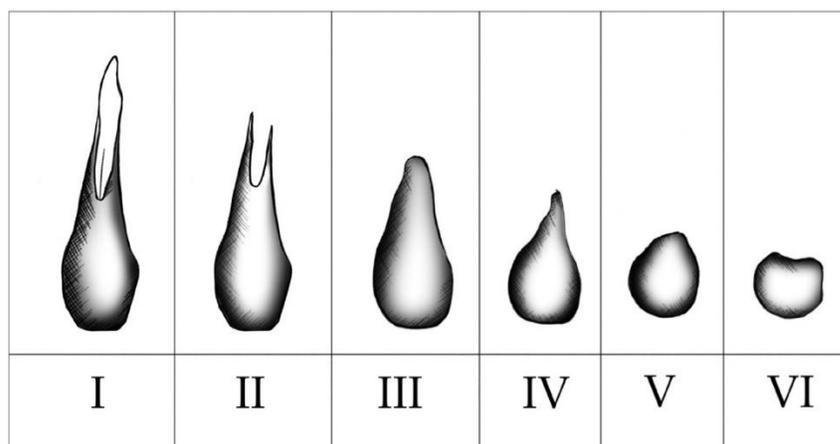
The various anatomical factors that affect retention are:

1. Size of the denture bearing area, and quality of the denture bearing area It mainly affects lower dentures. Arch size Retention increases with an increase in the size of denture denture-bearing area. The size of the maxillary denture bearing area is about (24 cm²) & that of the mandible is about (14 cm²).



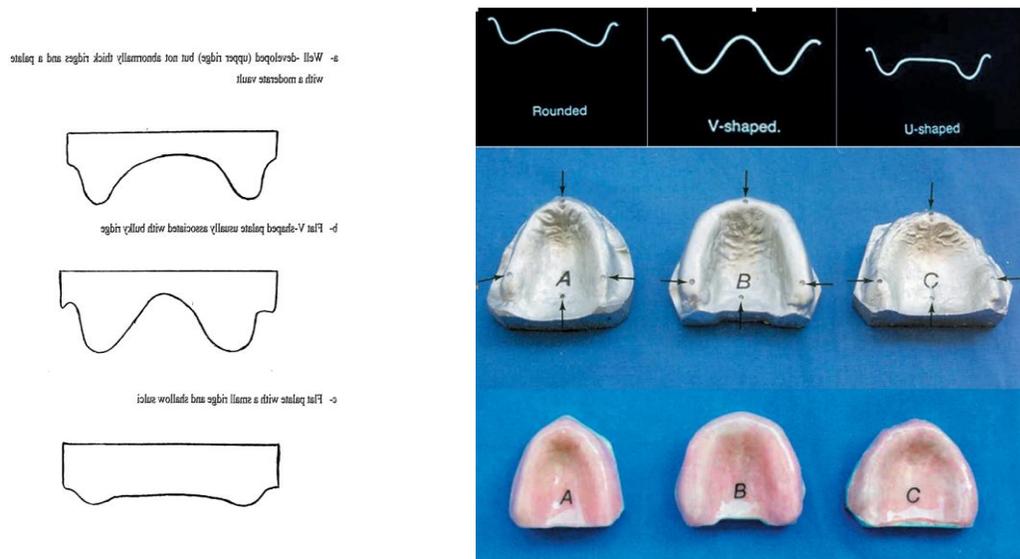
2. Ridge form: which includes

- a. High and flat crest and well-formed in recent extraction. The problem only is no space for the setting of teeth.
- b. Flat one is difficult and has no retention and stability so in taking the impression try to extend it beyond the mylohyoid area to gain more stability and retention. 3)
- c. Ridge with undercut is more common in the upper (bilateral maxillary tuberosity) so we do surgery on one side and block out the other and we have to change the path of insertion.
- d. Knife ridge is difficult and causes lacerations and pain so we do relief.
- e. Flabby ridge fibrous tissue and movable, no good seal so we either modified the impression technique or did surgical correction.



3. Volt Form:

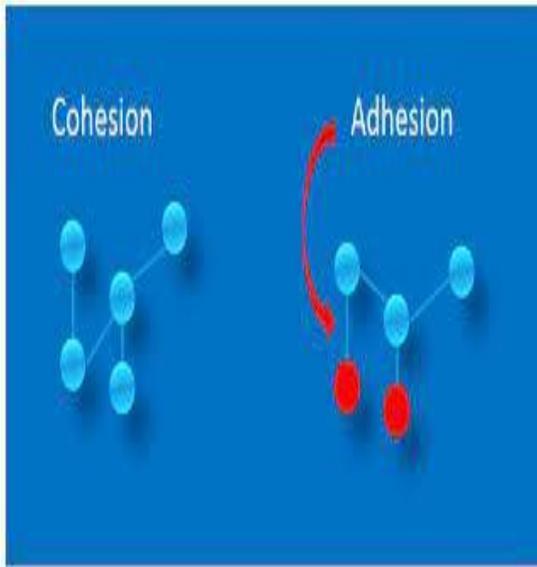
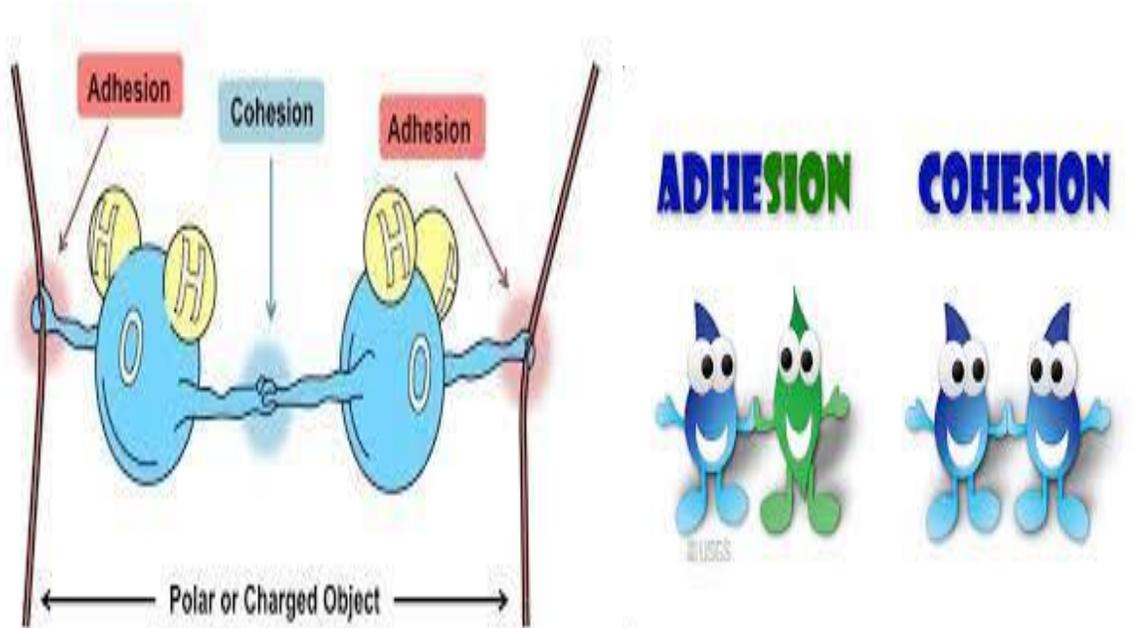
- a. U-shaped >>> good in retention and stability.
- b. V-shaped >>> have retention but no stability and any pressure on it could break the seal.
- c. flat shaped not enough depth, so no retention and stability.



4. Arch Form: Squared, ovoid, tapered and the best one is the squared. This is because of: -
 - a. there are 4 points of contact with the denture.
 - b. Resistant the lateral forces.
5. Arch relationship Most edentulous patients have class III >>> because of the pattern of bone resorption of the ridges. So, the limited movement only opening and closing. (No protrusive movement) Some have class II and it isn't favorable because they have a small surface area, and difficult to get the upper and lower in contact.
6. Interarch distance: Small interarch space more retention.
7. Tongue: If too big >> it could interfere with a denture. So, dislodging of the lower and upper.

8. Mucosa: We need it Firm, compressible, and even thick. Not to be thick and flabby.

- **Physical factors.**



1. **Adhesion:** It's a physical attraction between unlike molecules like the contact of saliva to both oral tissue and denture base. The amount of retention provided by adhesion depends on:

- a) Close adaptation of the denture base

b) type of saliva (viscosity and wet ability) Thin serous saliva provides better adhesion than thick ropy saliva, it builds up pressure & and pushes the denture out of position C. Area covered by the denture. The size of the maxillary denture bearing area is about (24 cm²) & that of the mandible is about (14 cm²) Mandibular foundation has decreased surface area and hence decreased adhesion. V V-shaped palate induces sliding or deflection, hence retention by adhesion is less.

2. Cohesion: Its physical attraction between Like molecules. Several factors affect cohesion:

- a. Area covered by the denture
- b. Thickness of the salivary film (saliva film should be thin, watery serous saliva can form a thinner film and is more cohesive than thick mucus saliva
- c. Adaptation to denture base to mucosa (close adaptation of denture to the mucosa is needed so that only a thin of saliva is present.
- d. Interfacial surface tension: A property of liquids in which the exposed surface tends to contract to the smallest possible.

To obtain maximum interfacial surface tension

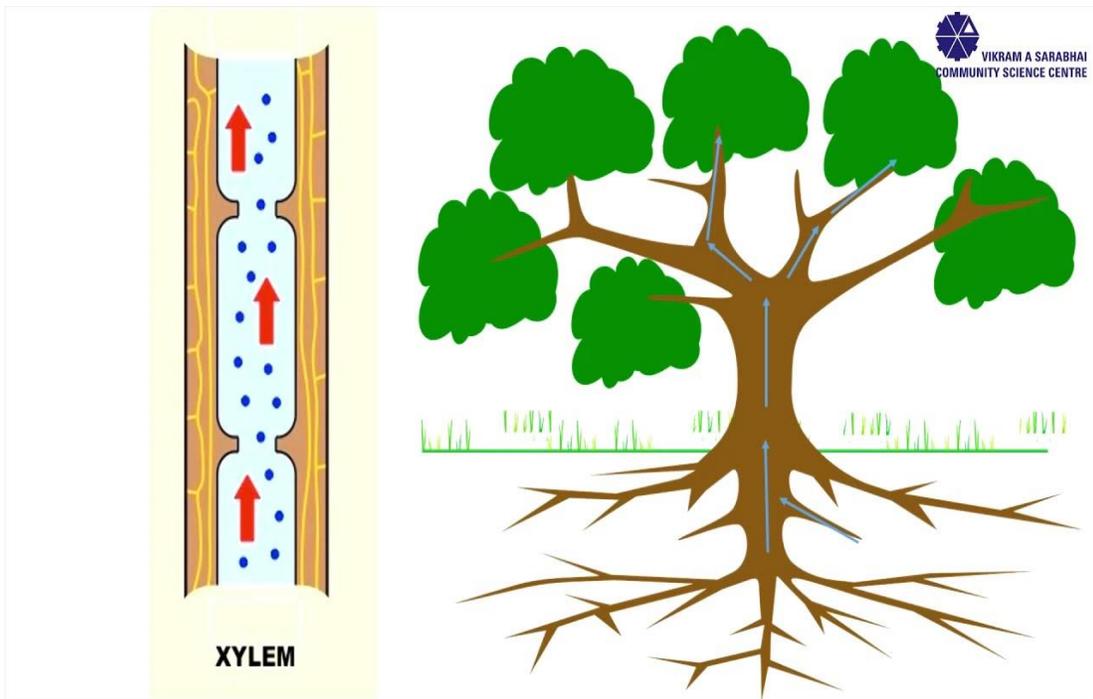
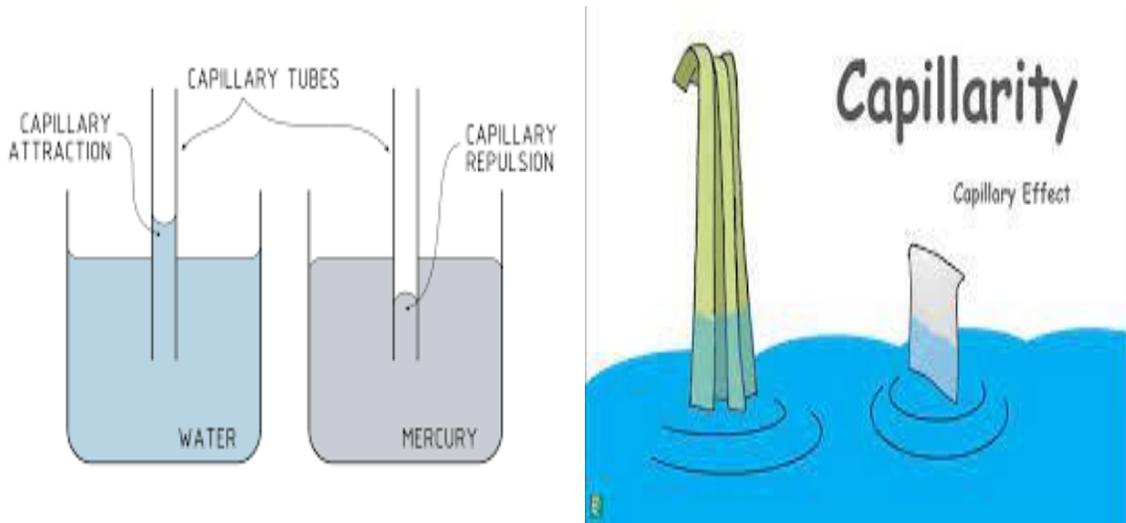
- ❖ Saliva should be thin and even
- ❖ Perfect adaptation should be present between the tissues and denture
- ❖ The denture base should cover a large area.
- ❖ The denture should have good adhesive and cohesive force to aid in the enhancement of interfacial surface tension

3. Capillary attraction: It is defined as "the quality that causes elevation or depression of the surface of the liquid that is in contact with the solid “.

Factors that aid in improving capillary attraction:

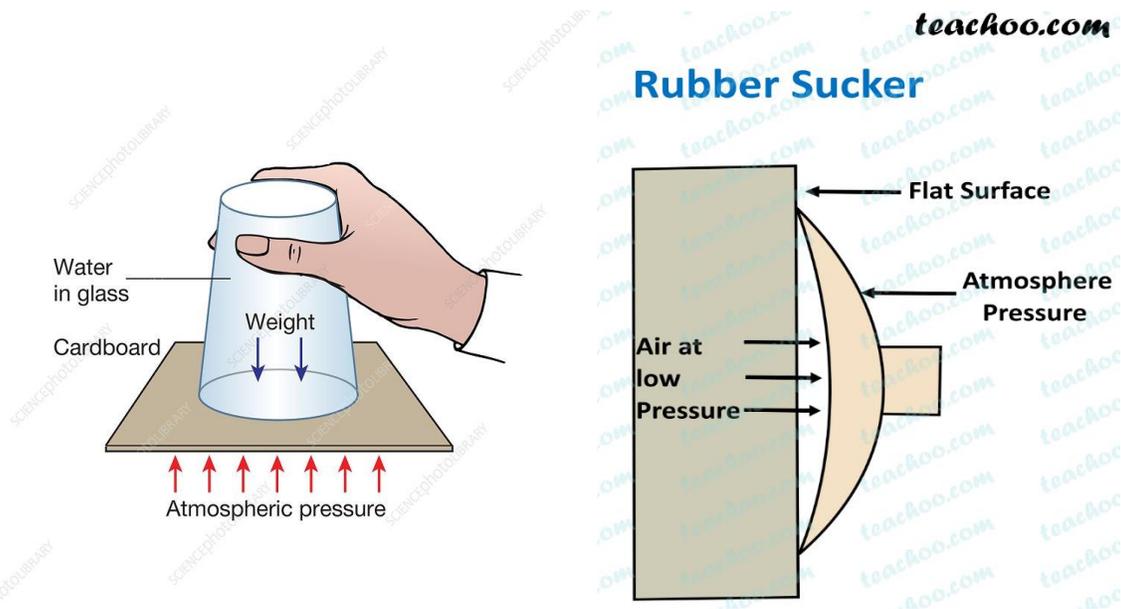
- a. Close adaptation of denture base to soft tissue. Greater the distance less the capillary force

b. The greater the size of the denture-bearing area greater the Capillary attraction retention



4. Atmospheric pressure and peripheral seal: When a dislodging force is applied to the denture having a good border seal, a negative pressure develops in the space created between the denture base and the mucous membrane. When the negative pressure develops inside, the atmospheric

pressure from outside pushes the denture towards the basal seat helping in the retention of the denture.



Factor affecting atmospheric pressure

- a. **Closeness of adaptation** to keep air out of tissue contact depends mainly on the I. impression technique. II. An impression material that places slight generalized pressure on soft tissue is preferred. III. Proper border molding.
 - b. **Peripheral seal** Is defined as the area of contact between the mucus membrane & and peripheral polished surface of the denture base to have a good peripheral seal.
 - c. **Posterior palatal seal area** It is defined as "The soft tissue at or along the junction of the hard and soft palates on which pressure within the Physiological limits of the tissues can be applied by the denture to aid in the retention of the denture.
5. **Gravity:** Gravity acts as a retentive force for the mandibular denture and displacement for the maxillary denture when the patient is in an upright posture.



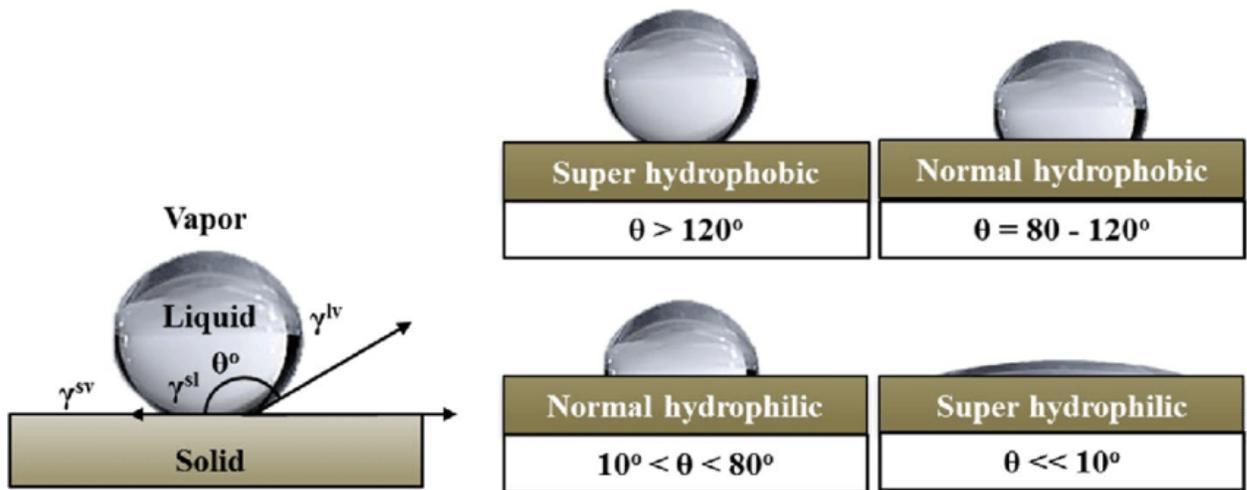
6. **Viscosity:** This is the resistance to the flow of fluid resulting from intermolecular forces acting within the fluid. Fluids having a high viscosity resist flow more effectively than those of lower viscosity. The additional saliva will cause loss of retention of the denture because of the resultant increase in distance between the denture & and mucosa.



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7. **Wettability** For adhesion to be accomplished between a solid & and fluid, wetting of solid by fluid must take place. The degree to which this occurs depends on relative surface tension. The wetting characteristics may be

described in terms of contact angle (high contact angle indicates poor wetting).

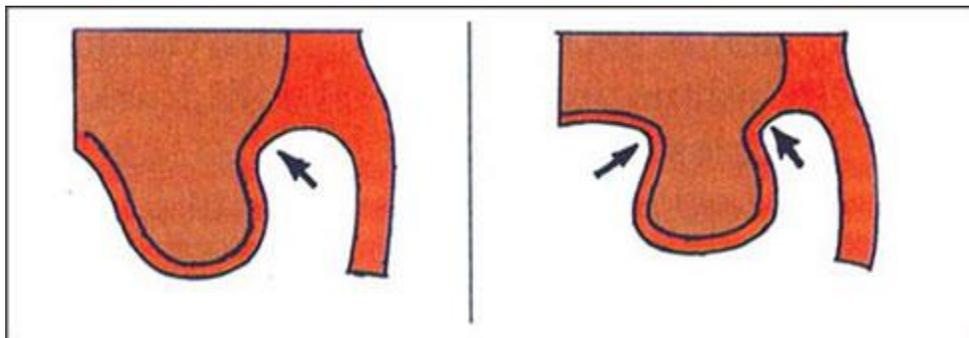


Young's equation

$$\gamma^{sv} - \gamma^{sl} = \gamma^{lv} \cos\theta$$

- **Mechanical factors.** The varicose mechanical factors that aid in retention are:

1. **Undercuts:** Engagement of undercut: Unilateral undercuts aids in retention while bilateral undercuts will interfere with denture insertion and require surgical correction. If bony undercuts exist, retention may be enhanced by designing a denture that utilizes these undercut areas. In order to achieve this without traumatizing the mucosa" on insertion and removal of the denture, special care is required in planning the path of insertion



2. Magnetic force: Magnets. Intramucosal magnetic aids in increasing retention of the highly resorbed ridge. Magnetic attachments can significantly improve the retention of mandibular complete overdentures. The location of magnetic attachments greatly influences the retentive force of the over denture Indication: Some metal alloys possess magnetic properties that can be utilized in the retention of over dentures or partial dentures.



3. Denture adhesion: Denture adhesive:



Indications

- a. Denture adhesives are indicated when well-made complete dentures do not satisfy a patient's perceived retention and stability expectations.
- b. Patients who suffer from xerostomia.
- c. Neurological diseases like stroke and Orofacial dyskinesia

- d. patients who have undergone extensive surgery for the removal of Oral Neoplasia

Contraindication:

- a. A denture adhesive should not be used for patients with ill-fitting dentures.
- b. It should not be used with patients with worn-out dentures.
- c. It should not be used as a substitute for a relining or tissue conditioner.
- d. it should not be used for patients with a physical inability to clean dentures.
- e. It should not be used in patients with temporary or immediate dentures where infections could result.
- f. It should not be used in patients allergic to adhesive

Mode of action of adhesives: It enhances retention by optimizing interfacial forces by

- a. Increasing the adhesive and cohesive properties and viscosity of the interposed medium
 - b. Eliminating the voids between the denture base and its basal seat
 - c. Increases viscosity of saliva
 - d. Hydrated material swells up in the presence of saliva /water
 - e. Hydrated material formed by adhesives sticks readily to the tissue surface and the mucosal surface of the denture
- Forms of denture adhesive
- 1. Powder form Starts its action immediately with maximum effectiveness and decreases with time.
 - 2. Cream form Starts its action immediately with accepted effectiveness which increases to maximum within Time
- Side effect of denture adhesive:

Side effects

- High or Elevated Zinc Blood Levels.
- Symptoms of Nerve Damage.
- Numbness or Tingling in the Arms and Legs Paresthesia.

- Anemia
 - Bone Marrow Failure
- 4. Suction chambers and suction discs Vacuum device** -It's like a suction chamber Alternative name is a rubber disk or palatal window in the past suction chambers in the maxillary dentures were used to aid in retention by creating an area of negative pressure which increased retention. They are avoided now due to their potency for creating palatal hyperplasia



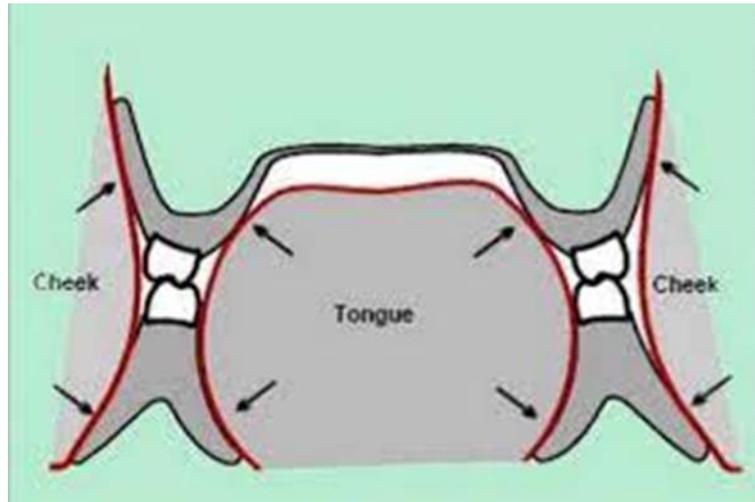
- **Muscular factors.**

The oral and facial musculature supply supplementary retentive forces provided

1. The teeth are positioned in the "neutral zone" between the cheeks and tongue
2. Polished surfaces of the dentures are properly shaped.
3. The denture bases must be properly extended to cover the maximum area possible, without interfering with the health and function of the structures that surround the denture.
4. The occlusal plane must be at the correct level.

The muscles affected by retention are the buccinators, orbicularis oris, and muscle of the 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. An accurate extension of the denture may allow increased saliva and air to enter under the denture and 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



- **Surgical factor.**
 1. Vestibuloplasty
 2. Tuberooplasty
 3. Ridge augmentation