



Retention in complete denture

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- Definition
- Review of literature
- Factors affecting retention
- Checking retention
- Conclusion

Introduction


- Successful integration of the prosthesis with the patient's oral functions plus psychological acceptance of the dentures by the patient.
- Denture must meet the functions of esthetic, mastication , phonetics and maintain health of underlying tissues.

Physiologic comfort

Stability

Retentiveness is one of the prerequisites of success in complete denture prosthetics

Ps
comfort



“Denture retention will be a subject perplexing and perpetual, until its troubles find their logical solution in understanding of its physics...”

R. E. Hall (1918)

Definition

- Retention is that quality inherent in the dental prosthesis acting to resist the forces of dislodgment along the path of placement.
- Retention of the denture is the resistance of a denture to dislodgment.

Review of literature

In 1500's

Two arch-shaped templates
of bone, crudely carved from
an ox's femur



- **Fauchard 1700s**, used steel springs to hold the upper and lower dentures together.



- **Pfaff (1756)** developed more effective impression technique
Improved the fit and shape of dentures

Factors affecting retention

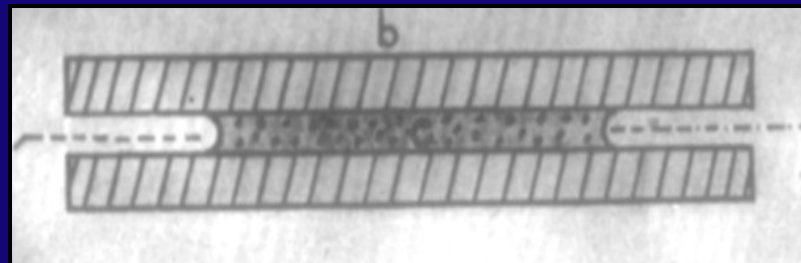
- Physical
- Physiological
- Psychological
- Surgical
- Mechanical

Physical

- Adhesion
- Cohesion
- Interfacial surface tension
- Atmospheric pressure
- Gravity

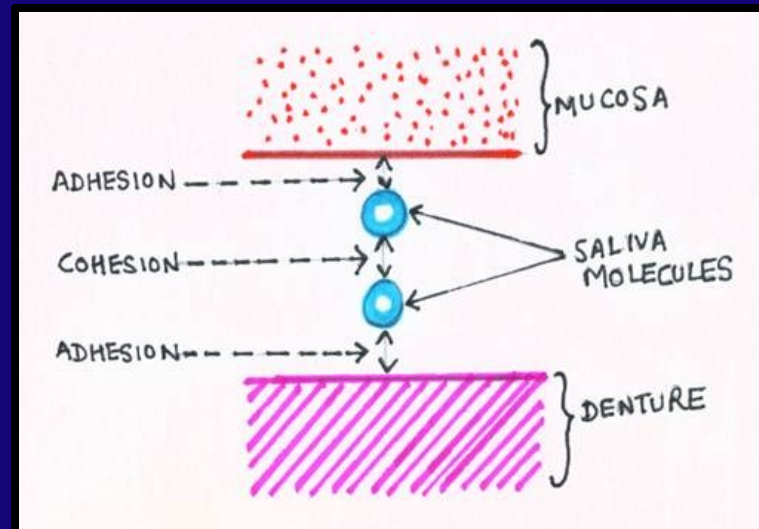
Adhesion

- Attraction between two unlike molecules.
 - Saliva to the mucous membrane
 - Saliva to denture base
- Effectiveness of adhesion – close adaptation of denture base and fluidity of saliva
- Amount of retention \propto Area covered by the denture



Cohesion

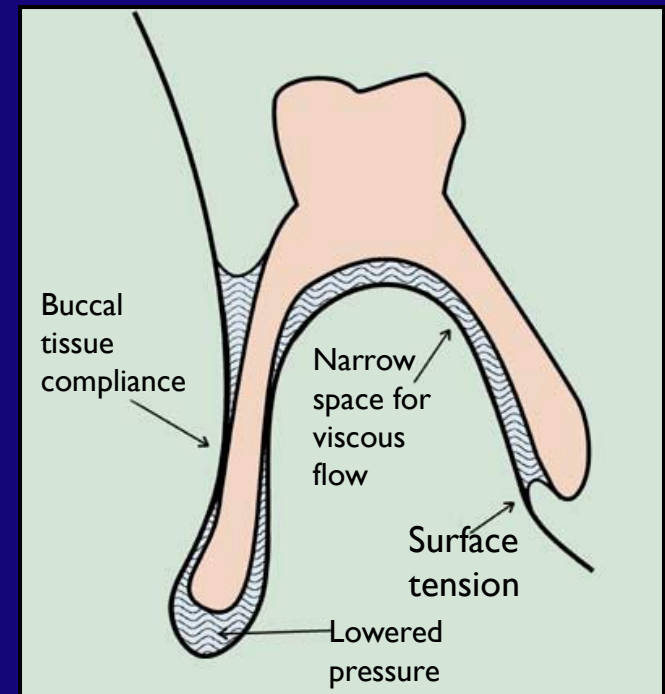
- Physical attraction of like molecules for each other
- Responsible for maintaining the continuity of water droplet



Surface tension

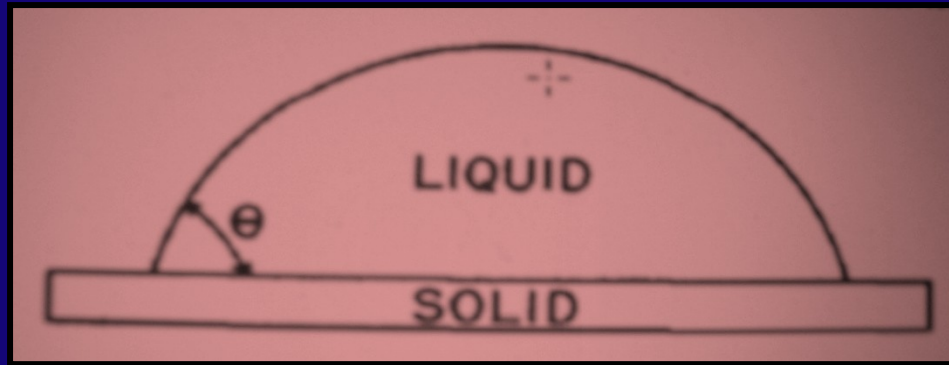
- Resistance to separation of two parallel surfaces that is imparted by a film of liquid between them.

- *Interfacial surface tension*
- *Interfacial viscous tension*



- *Interfacial surface tension*


- Dependent on the ability of the fluid to “wet” the rigid surrounding material



θ : Contact angle of wetting

- *Interfacial viscous tension*

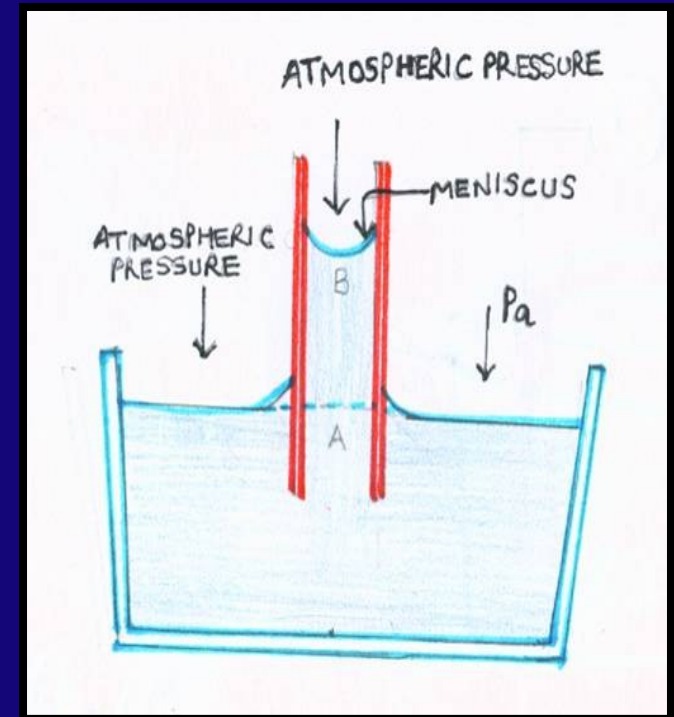
- Force holding two parallel plates together that is due to the viscosity of the interposed liquid.

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- **Bohannan (1954)** stated that the interfacial surface tension is inversely proportional to the thickness of moisture layer between two surfaces. This indicates that better the fit, the more the attraction .
{JPD1954;4 (2), 232}

- **Oslund (1960)** found that the greater the surface tension of saliva of the thinner fluid film, the greater was the retention of the denture .
{JPD1960; 10(4) 658}

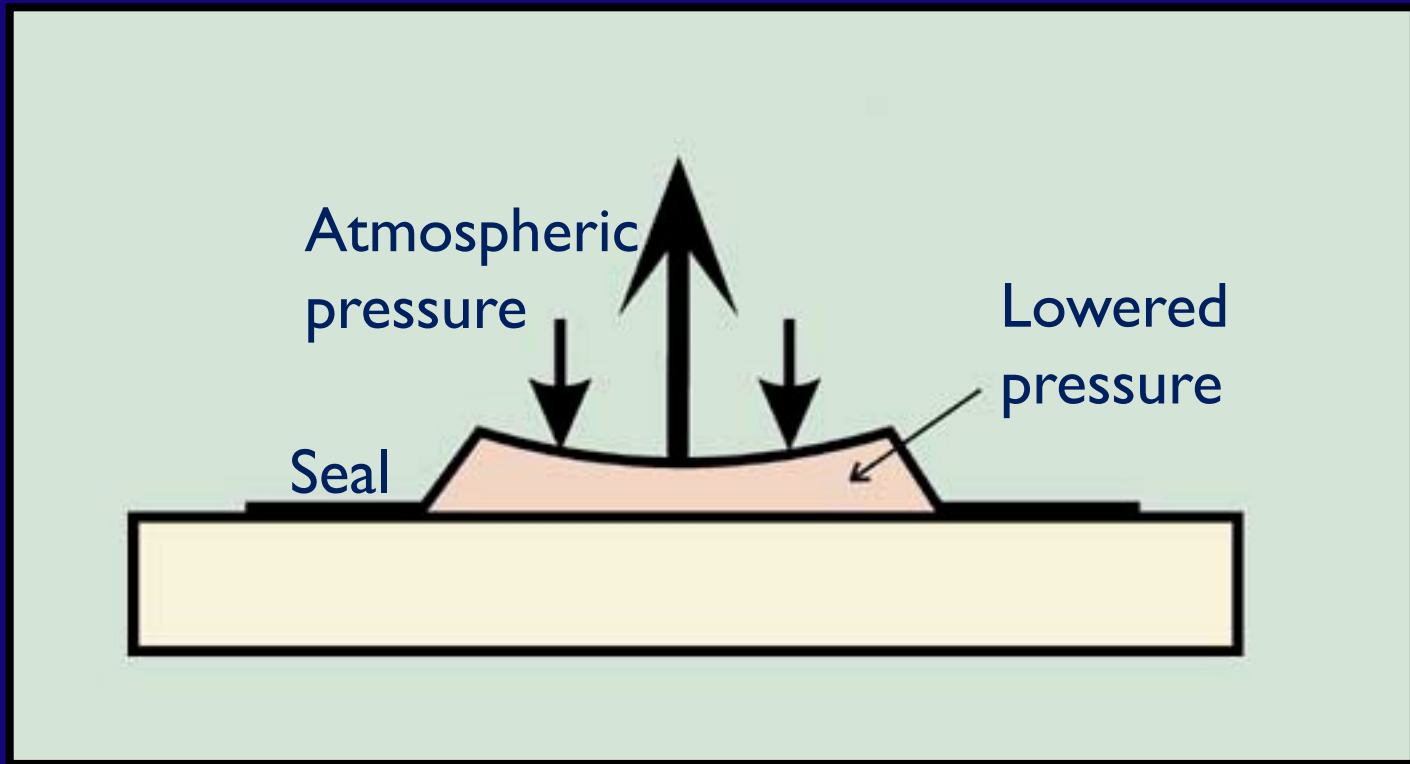
Capillarity

- Causes liquid to rise in a capillary tube.
- Space between denture base and oral mucosa filled with saliva acts like a capillary tube.




Atmospheric pressure

- Introduced by **Ames and the Greene brothers** in **1833**.
- Use of functional denture borders as opposed to passive borders in the fabrication of complete dentures.



Pressure difference created when denture is dislodged pushes the denture against the basal seat.

- **Page(1940)** considered atmospheric pressure unimportant in retention . He stated that most important retentive force in complete denture is in interfacial surface tension and considers that this alone is necessary to retain the denture.
- **Snyder etal (1945)** states that reduction in atmospheric pressure concomitantly reduces the retention , with 70%decrease in atmospheric pressure , there was 50% loss in retention.

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- **Hardy and Kapur (1958)** mentioned that adhesion , cohesion and interfacial surface tension can aid in resisting only perpendicular forces and not horizontal and lateral. These forces can be resisted by the retention provided by the atmospheric pressure .

Gravity

- Force with which the earth attracts all object in its vicinity towards its center.
- Retentive force for the mandibular denture and a displacing force for the maxillary denture

Physiologic factors

- Saliva
- Orofacial musculature
- Peripheral seal
- Neuromuscular and Neurosensory control

Saliva

- Major factor to contribute the retention

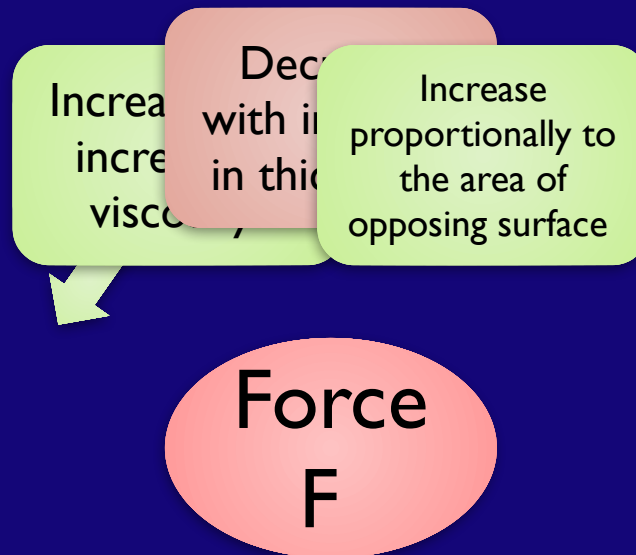
Depends on


- Viscosity of saliva
- Volume of saliva
- Thickness of salivary film
- Saliva denture contact angle

Stefan's Law:

$$F = \frac{(3/2)\pi k r^4 v}{h^3}$$

F=force
r=radius
k=viscosity
h=thickness of liquid
v=velocity



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- **Oslund (1960)** indicated an increase in retention varying from 57% to 150% after stimulation of the palatal mucous secretion

{JPD1960; 10(4) 658}

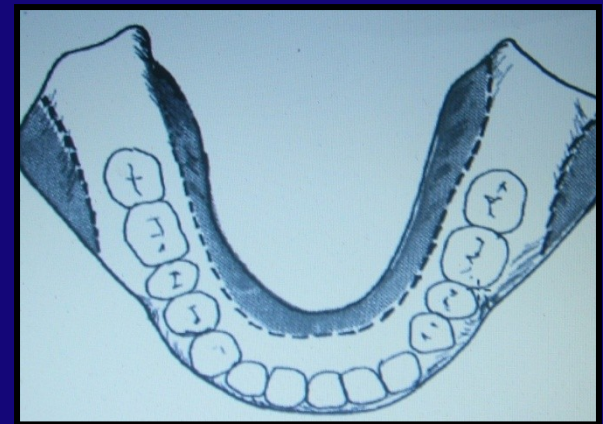
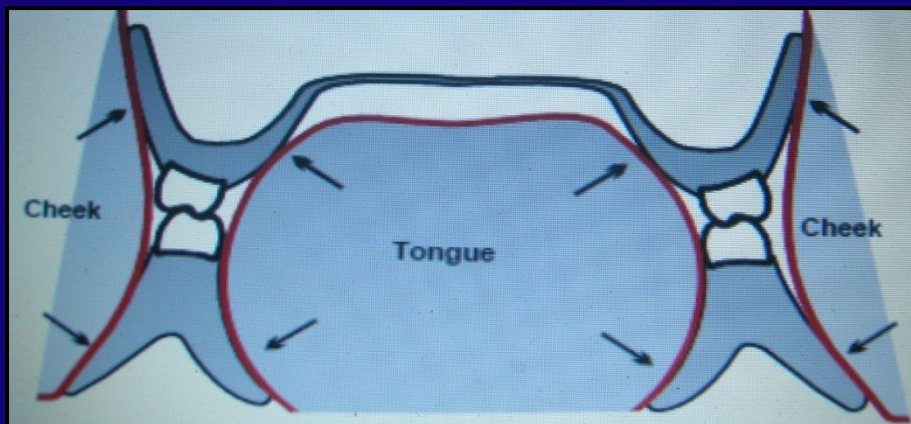
- **Abdulla(1972)** – Increase in the film thickness of saliva reduces the surface tension and also retention was inversely proportion to the salivary film thickness


{JPD1972: 28 (2), 141}

Orofacial musculature

Supply supplementary retentive forces

- Teeth are positioned in the neutral zone
- Polished surfaces of the denture



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- **Brill et al(1959)** showed experimentally that the oral musculature have an appreciable effect on denture retention.

{JPD 1959, Vol 9 :761 }

- **Fish (1964)** explained the importance of shaping the polished surfaces of the dentures.

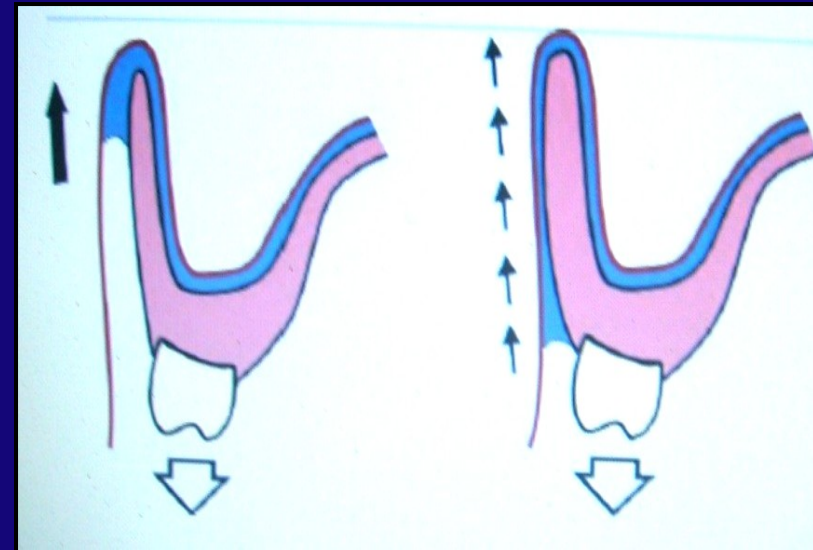
{ JPD 1983 ,49 ,1 }

Peripheral seal

- The contact of the denture border with the underlying or adjacent tissues to prevent the passage of air or other substances

{GPT 8}

Border and facial seal is effectively and efficiently maintained by draping effect of the lip, cheek and tongue.



Neuromuscular and Neurosensory control

- A learned biological phenomenon.
- **Brill et al (1959)** stated that normal muscle activity was dependant upon the impulses originating in proprioceptors in muscle and tendons and exteroceptors recording changes in the external environment

Anatomic Influences on Maxillary Denture Retention –

- Posterior palatal seal
- Shape of palatal vault
- Retrozygomatic space



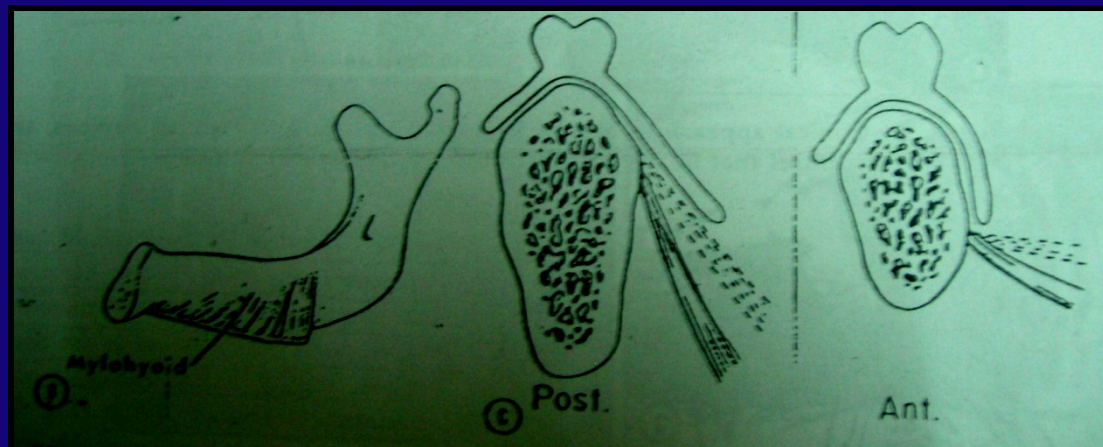
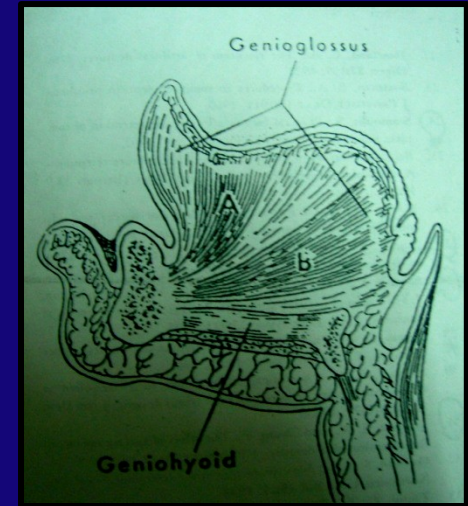
Anatomic Influences on Mandibular Denture Retention –

- Movable floor of the mouth
- Tongue
- Lack of ideal ridge height



- **Lingual Mandibular Anatomic Influence**

- Retromylohyoid space
- Mylohyoid muscle
- Anterior lingual border



Psychological factors

Requires adaptation of learning , muscular skill, and motivation and is related to patient expectation

Learning – acquisition of new activity

Muscular skill- capacity to coordinate muscular activity so as to execute movement

Surgical

To obtain a more favorable denture bearing area.

- **Ridge corrective procedure:**

- **Soft tissue corrective procedure**

- ☞ High Frenum attachments and pendulous maxillary tuberosities

- **Bone corrective procedure**

- ☞ Shaping unfavorable bony ridges

- ☞ Elimination of undesirable undercut

- ☞ Resection of mylohyoid ridge

- ☞ Excision of tori



- **Ridge extension procedure**

- Vestibuloplasty

- **Ridge augmentation procedure**

- Augmentation by bone graft , cartilage graft , alloplastic materials or combination of these .

- **Correction of abnormal ridge relationship**

- Mandibular osteotomy

- Maxillary osteotomy

- Combination

Mechanical

- Undercuts
- Denture adhesives or fixatives
- Rubber suction discs
- Magnets
- Implants

Undercuts

The contour of a cross-sectional portion of a residual ridge or dental arch that prevents the insertion of a dental prosthesis- **GPT 8**

- Unilateral or bilateral
- Labial or lingual



Common location of undercuts :

- 1) Labial portion of Maxillary anterior ridge
- 2) Buccal to the maxillary tuberosity region
- 3) Retromylohyoid area of the lower ridge
- 4) Labial or lingual slopes of the mandibular anterior ridge.

Denture Adhesives

Enhance the retention through

- Increasing adhesive and cohesive properties
- Eliminating voids



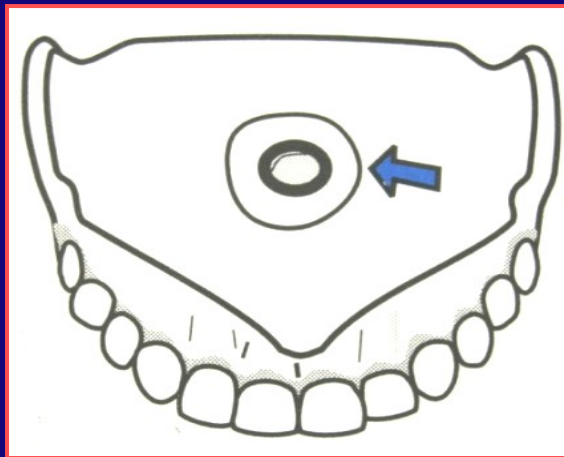


Indication :

- Patient with salivary dysfunction
- Neurological disorders
- Undergone surgical or traumatic modification

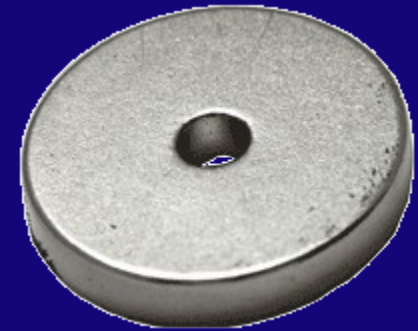
Rubber Suction disc

- Rubber disc is fixed into intaglio surface
- Partial vacuum created within perimeter of this disc
- **Drawbacks** – Palatal perforation
 - Tissue hyperplasia



Magnets

Small magnets fixed on the maxillary and mandibular denture



Disadvantage –

Loss of effect of magnet

Soreness of mucous membrane and excessive bone resorption



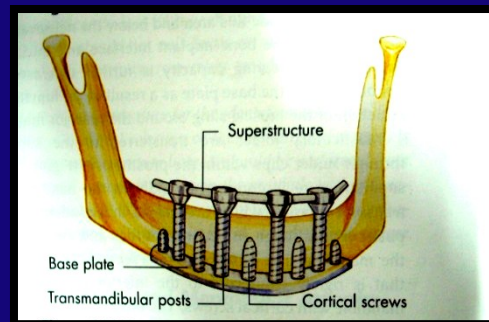
Implants

Endosteal Dental Implant

Epoosteal Dental Implant

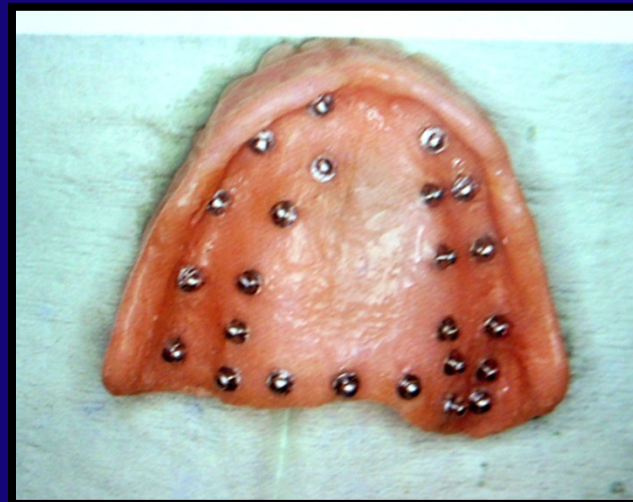
Transosteal Dental Implant

Mucosal Insert Implant



Mucosal Inserts

Any metal form attached to the tissue surface of a removable dental prosthesis that mechanically engages undercuts in a surgically prepared mucosal site.



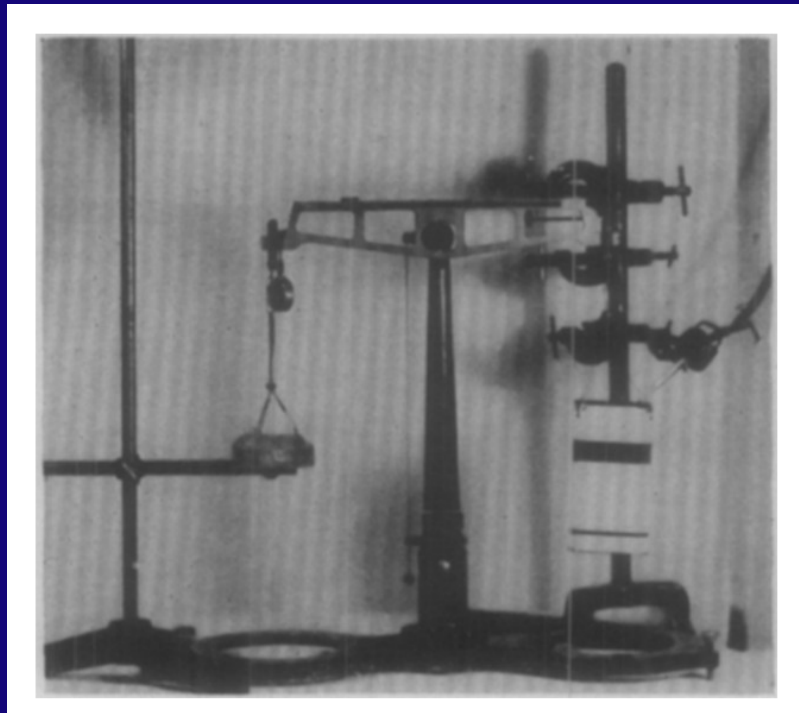
Checking retention

- Incisor region
- Canine region

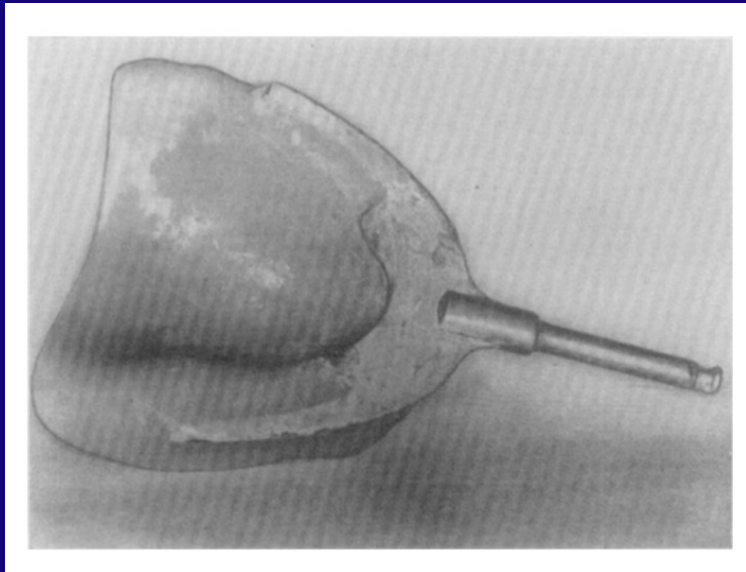


Various instruments to check retention

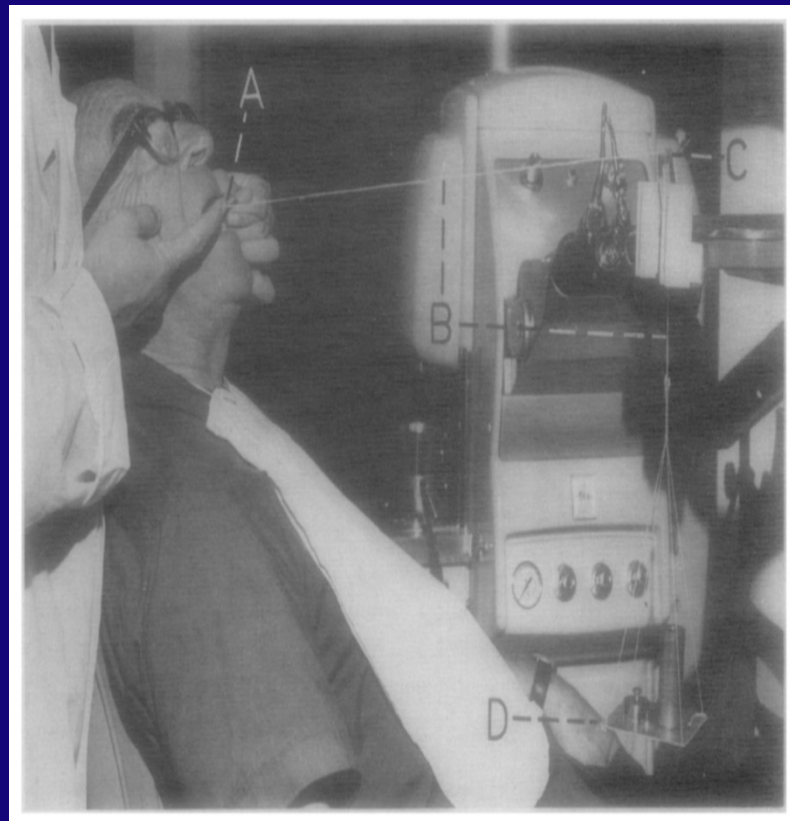
- E. W. Skinner,



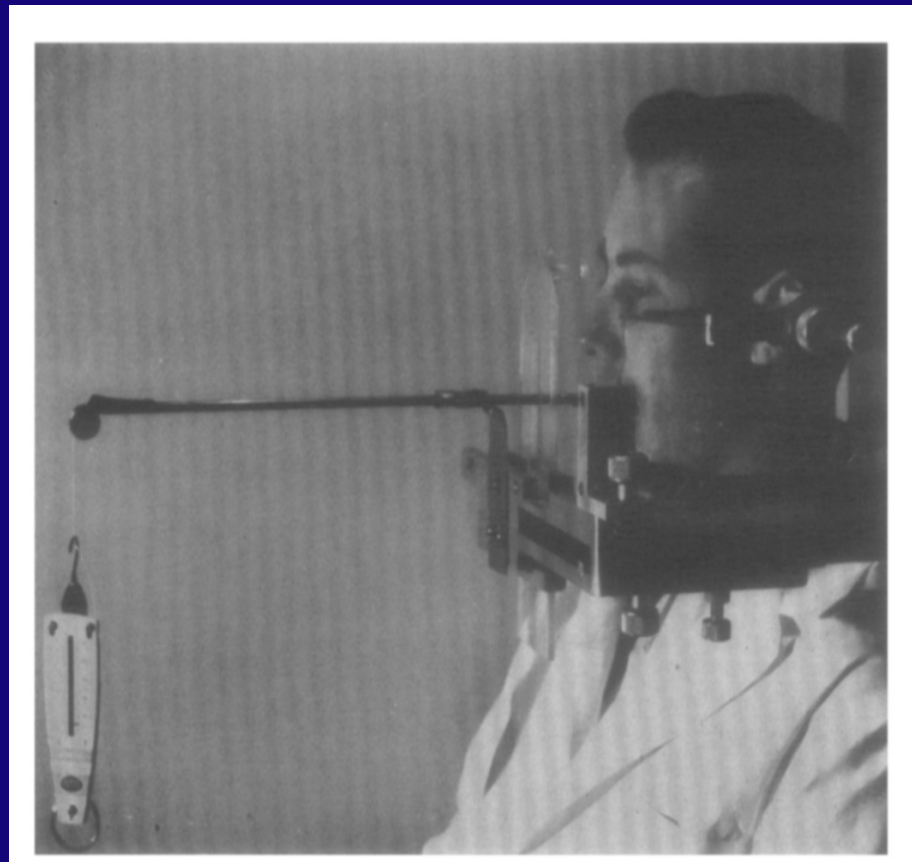
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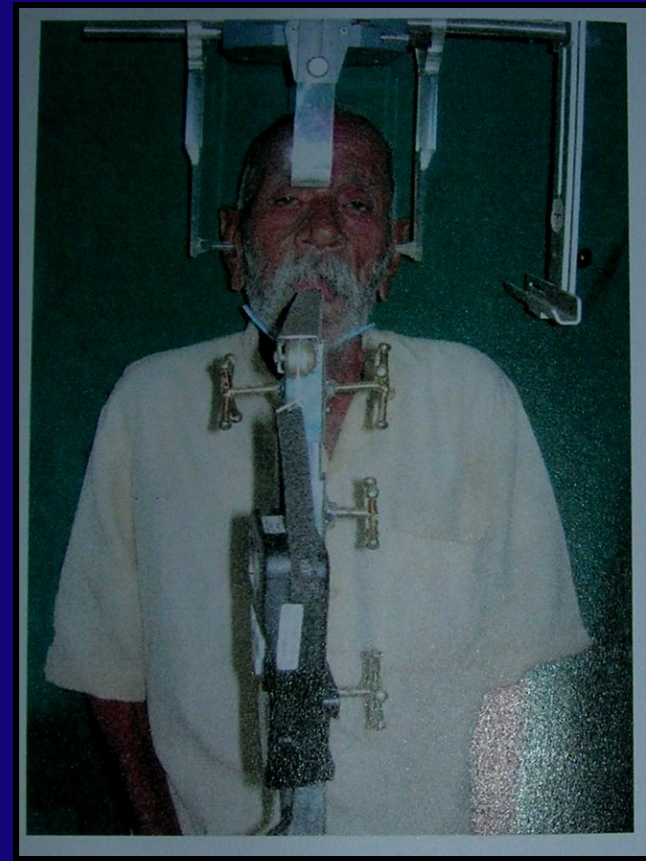


- **Andreas Cziggr**



- H. D. Gesser





By Dr. R. U. Thombare and Dr. Manmohit Singh

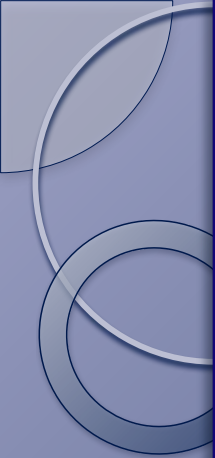
Dissertation submitted to the Nagpur university in 2007 .

Conclusion

- “Time will never come when dentures can be made without efforts”


A. H. Patterson

- Retention is a complex phenomenon controlled by a great number of factors.

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- Incorporation of these various factors into the prosthesis through proper design and technique contributes to the success of complete dentures.

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The image shows two ceramic vessels, possibly dental models or decorative pieces, with dental arches. The vessel on the left has a white base with a blue decorative band and a row of yellow teeth. The vessel on the right has a white base with a green and white decorative band and a row of yellow teeth. A red text box is overlaid in the center.

Thank you

