

MYOFUNCTIONAL APPLIANCES

DEPARTMENT OF ORTHODONTICS AND
DENTOFACIAL ORTHOPAEDICS



LEARNING OBJECTIVE

1. To understand the importance of growth modulation.
2. To know the indications, contra-indications, limitations of myofunctional appliances.



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7. ACTION OF FUNCTIONAL APPLIANCES
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PART 3

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Activator



HISTORY AND EVOLUTION OF ACTIVATOR

- *KINGSLEY* in 1879 devised a vulcanite palatal plate to be used in patients having Retruded mandible. This vulcanite plate consisted of an anterior incline that guided the mandible to a forward position as the patient closed on it.
- *HOTZ* modified the kingsley's plate into a vorbissplatte (used it for deep bite and retrognathism).
- From Kingsley's concept, *VIGGO ANDRESEN* 1908 developed a loose fitting appliance on his daughter as a retainer during summer vacations which gave remarkable results. He called it **BIOMECHANICAL RETAINER**.

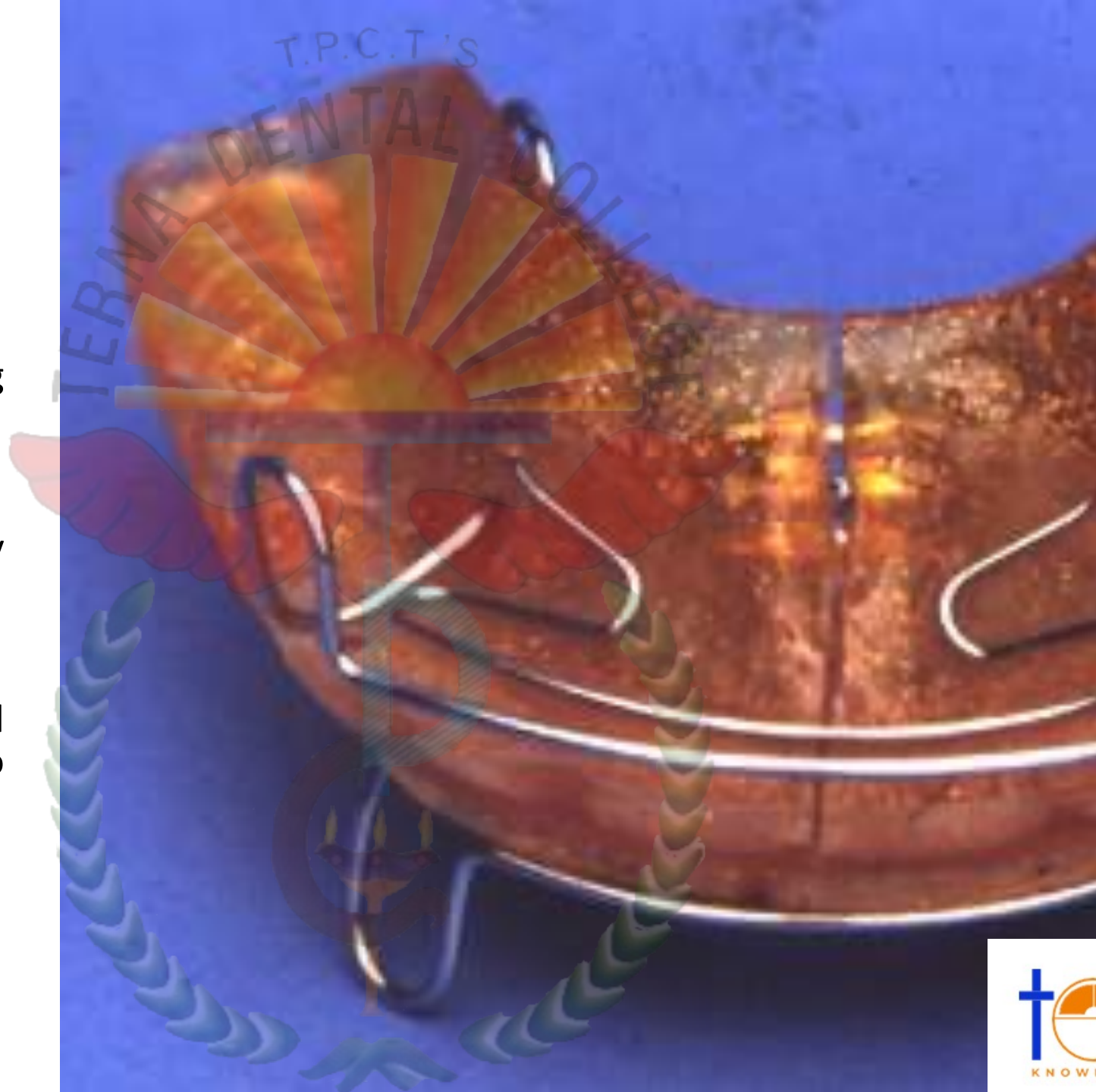
- *PIERRE ROBIN* - monobloc to position the mandible forward to prevent occluding the airway in patients of GLOSSOPTOSIS.
- *KARL HAUPL* (a periodontist and histologist) became convinced that appliance induced growth changes in a physiological manner.
- Then the name **ACTIVATOR** was coined due to its ability to activate muscle forces.



Activator

Synonyms

- Biomechanic working retainer
- Andersen appliance
- Nocturnal airway patency appliance
- Norwegian appliance
- First removable functional appliance – Viggo Andersen

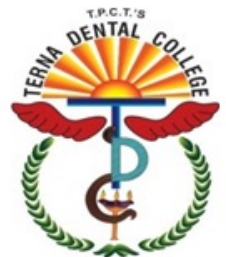


DESIGN



INDICATIONS

1. Class II, Division 1 malocclusion
2. Class II, Division 2 malocclusion
3. Class III malocclusion
4. Class I open bite malocclusion
5. Class I deep bite malocclusion
6. As a preliminary treatment before major fixed appliance therapy to improve skeletal jaw relations
7. For post-treatment retention
- Children with lack of vertical development in lower facial height



• CONTRAINDICATIONS

- Class I problems of crowded teeth caused by disharmony between tooth size and jaw size,
- In children
 - with excess lower facial height and extreme vertical mandibular growth.
 - whose lower incisors are severely procumbent.
 - with nasal stenosis caused by structural problems within the nose or chronic untreated allergy.
- Limited application in non-growing individuals.



MODE OF ACTION:

1. Acc. To Andresen & Haupl

□ induce musculoskeletal adaptation by introducing a **new pattern of mandibular closure.**

→ **stretching of elevator muscles of mastication** → **contraction** → **myotactic reflex set up** → **kinetic energy** which causes:

- prevention of forward growth of max. dento-alveolar process
- movement of max. dento-alveolar process distally
- reciprocal forward force on mandible.

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- Another factor is force generated while swallowing and during sleeping.

- According to *Harvold, Woodside and Herren*

Stretching of soft tissues, muscles and tendinous tissues

Passive tension

Responsible for action

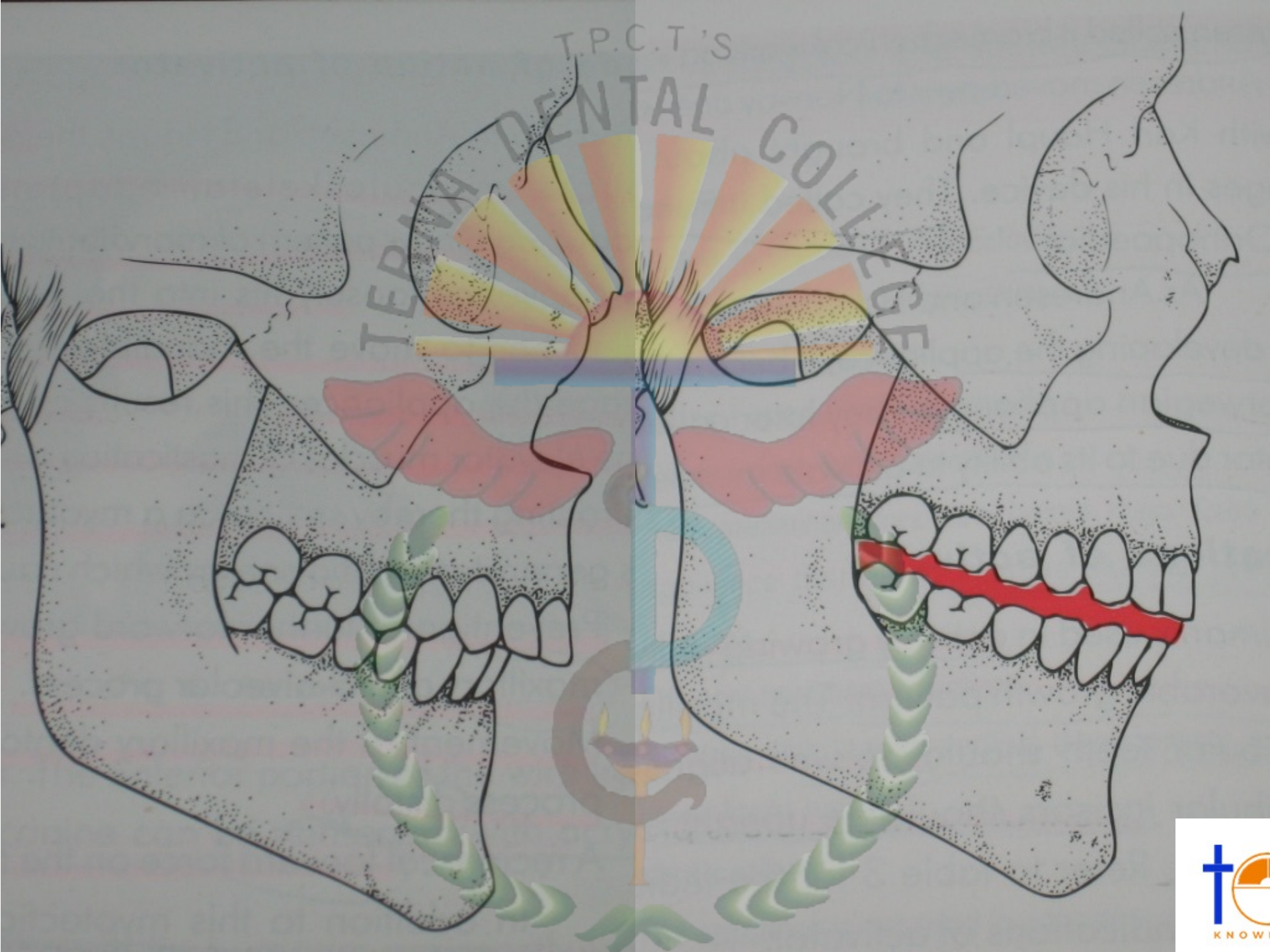
- They called it viscoelastic property.



CONSTRUCTION BITE

- Diagnostic preparation
 - Patient compliance
 - Clinical assessment + Patient's motivation potential
- Study model analysis
 - Molar relationship
 - Nature of midline discrepancy
 - Symmetry of dental arches
 - Curve of Spee
 - Crowding and other dental discrepancies





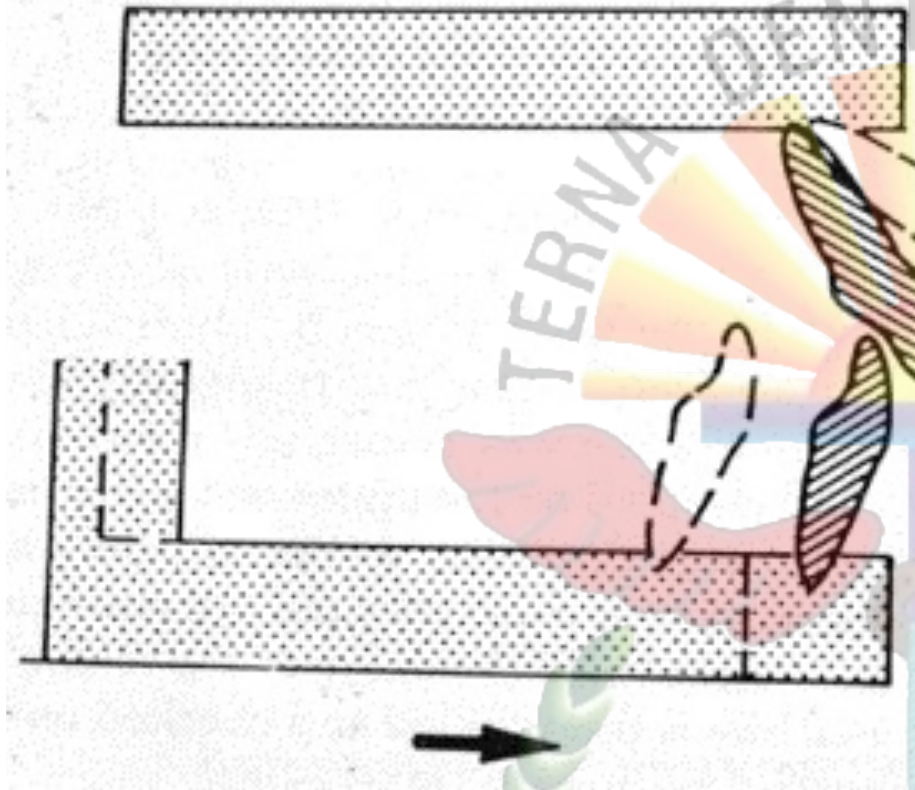
TREATMENT PLANNING

- Anterior positioning of the mandible
- Opening the bite

General rules for construction of the bite

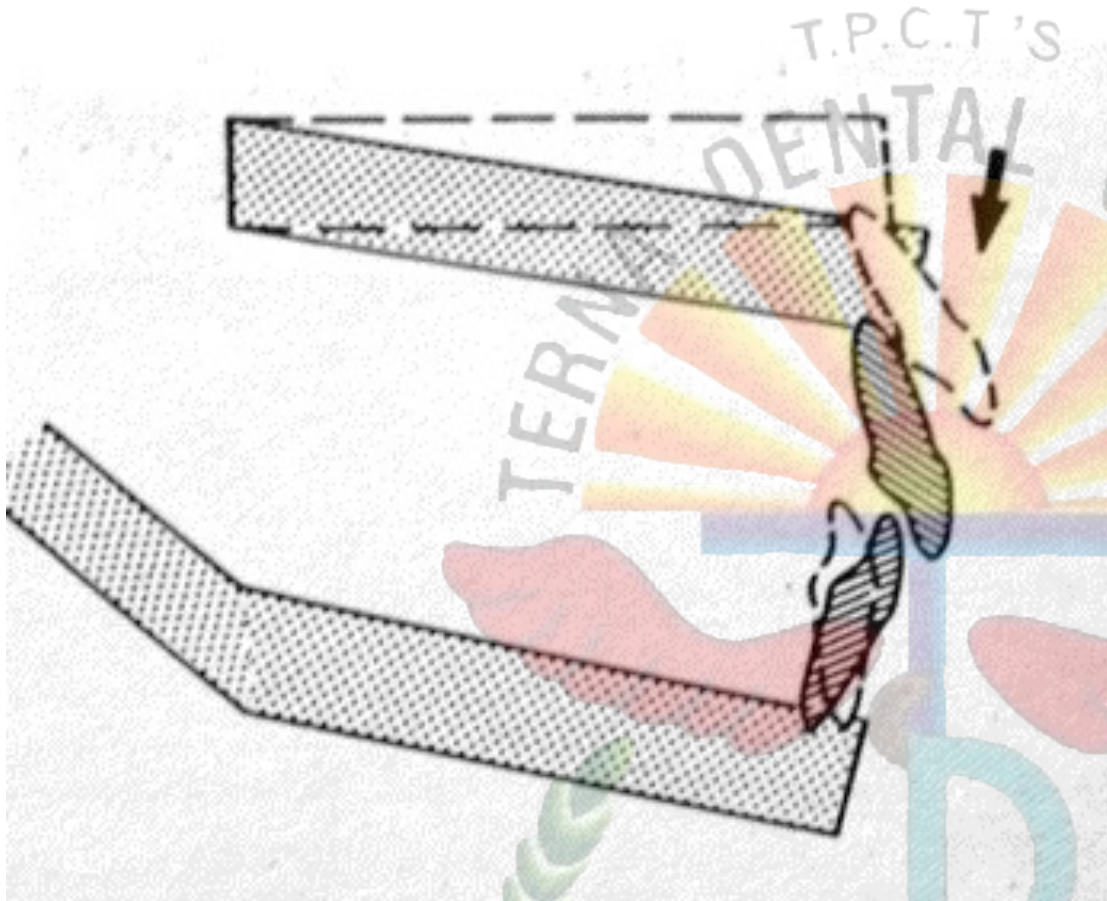
- Forward positioning of mandible 7-8mm ; vertical opening = 2-4 mm
- Forward positioning 3-5 mm; vertical opening = 4-6 mm
- Large overjet = stepwise advancement





Low Construction Bite with Markedly Forward Mandibular Positioning

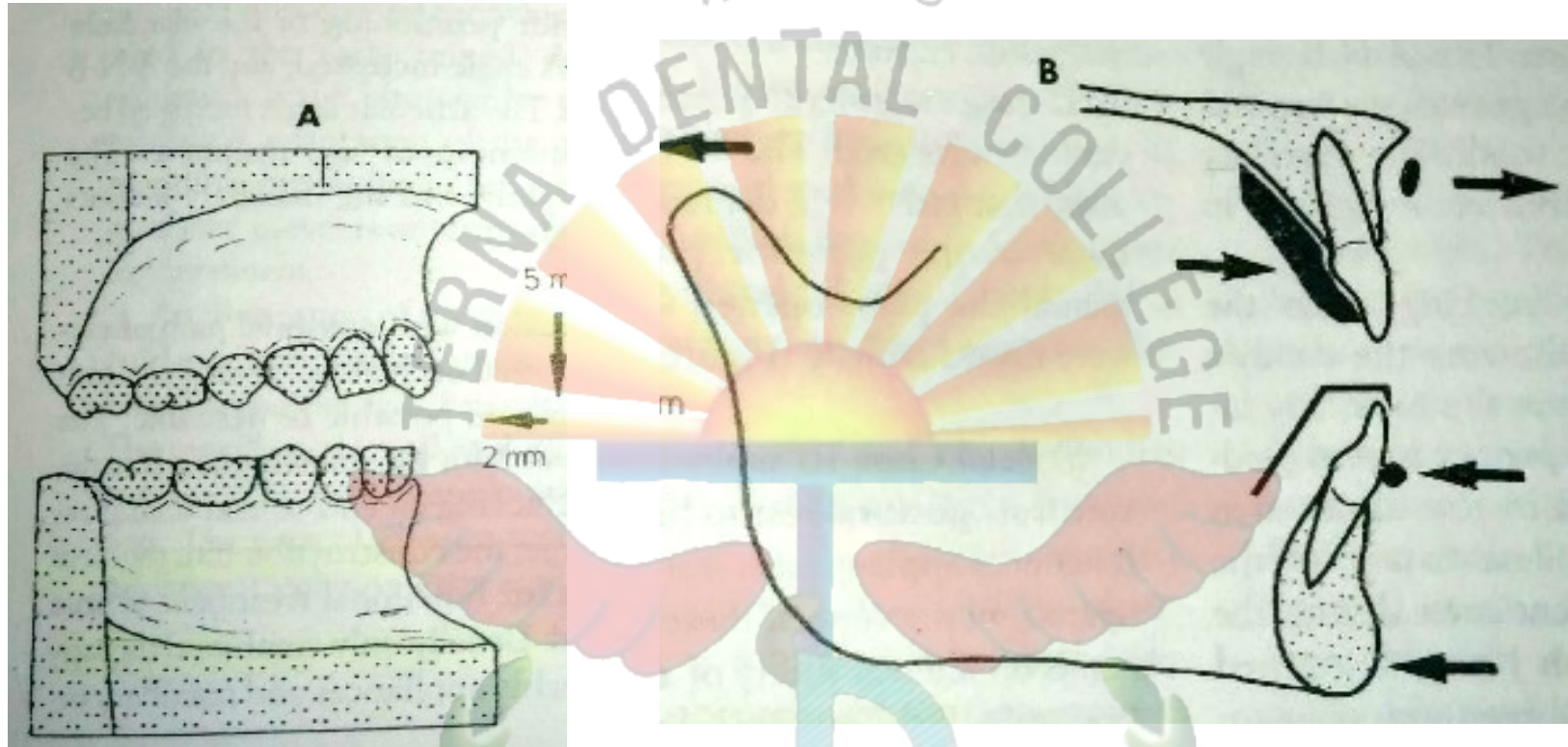
- Designated as the horizontal H activator.
- Class II, division 1 malocclusions with sufficient overjet having horizontal growth pattern
- As a rule of thumb= advancement should not exceed more than 3mm posterior to the most protrusive position
- Vertical opening= minimal and within limits of occlusal clearance



- Indicated in cases with vertical growth patterns and can be properly designated as the vertical "V" activator.

- High construction bite the mandible is positioned anteriorly by 3 to 5 mm and vertically by 4-6mm or 4mm beyond the resting position.

High Construction Bite with Slightly Anterior Mandibular Positioning



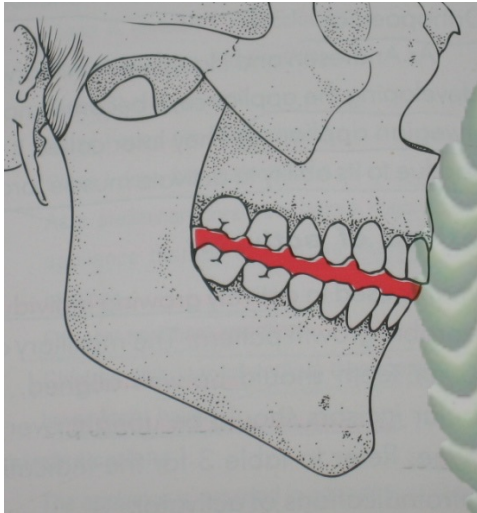
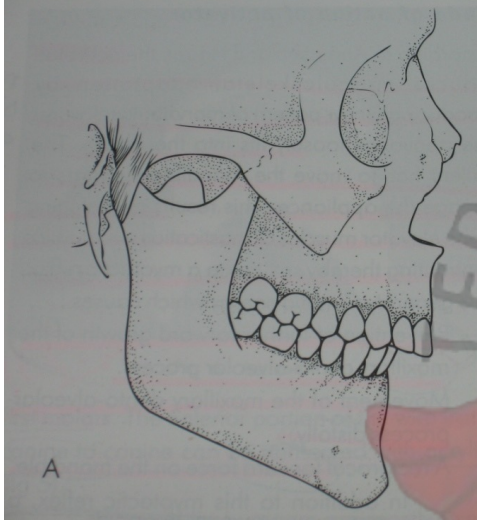
Construction Bite
without Forward
Mandibular Positioning

- Used primarily in vertical dimension problems (deep overbite and open bite) and in selected cases of crowding

Execution of the Construction

Bite technique

- A horseshoe-shaped wax bite rim
- Patient position
- Gently guiding the mandible into the predetermined position
- The softened wax bite rim is placed in the mouth
- The edge-to-edge incisal relationship and midline registration.
- Wax cut away from the labial of the central incisors- midline observed and a correct reproduction of the incisal relationship established.



Fabrication and Management of the Activator

LABORATORY PROCEDURES

Combination of acrylic and wire components.

Accurate transfer of the construction bite onto the activator

More appliance failures

- improper construction bites
- improper fabrication



Preparation of the Wire Elements

- The conventional activator design- an upper
- Either passive or active
 - Pass freely through the canine-first deciduous molar or premolar embrasures to anchor in the acrylic.
- Thickness of wire
 - Active bow – 0.9mm
 - Passive bow – 0.8mm



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Fabrication of the Acrylic Portion

3 parts : maxillary part,
mandibular part, interocclusal
part

Heat cure or cold cure.



Trimming of the Activator

- The direction of the desired force – selective grinding
- After careful evaluation for proper fit in the patient's mouth, an exact plan of required tooth movement is developed
- Trimming should be done in stepwise progression

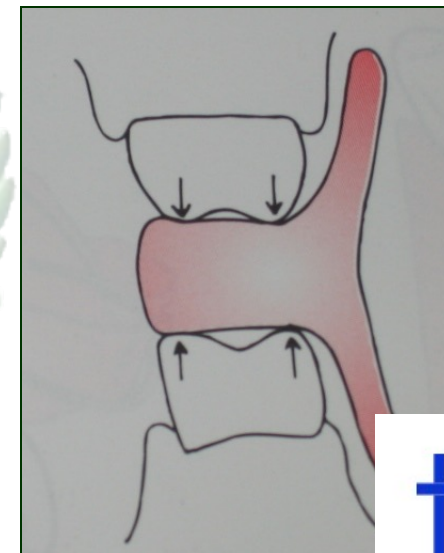
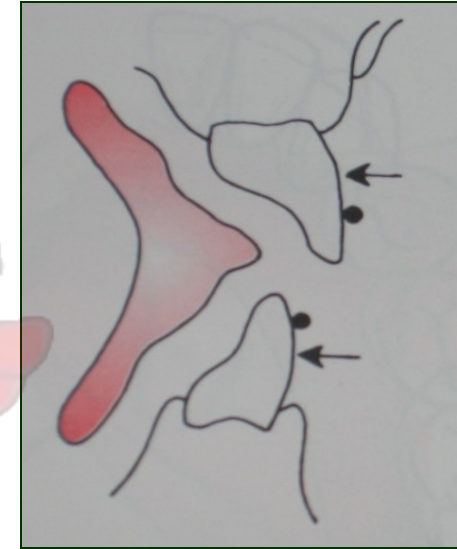


TRIMMING THE ACTIVATOR FOR VERTICAL CONTROL

- Two movements occur in activator therapy—intrusion and extrusion

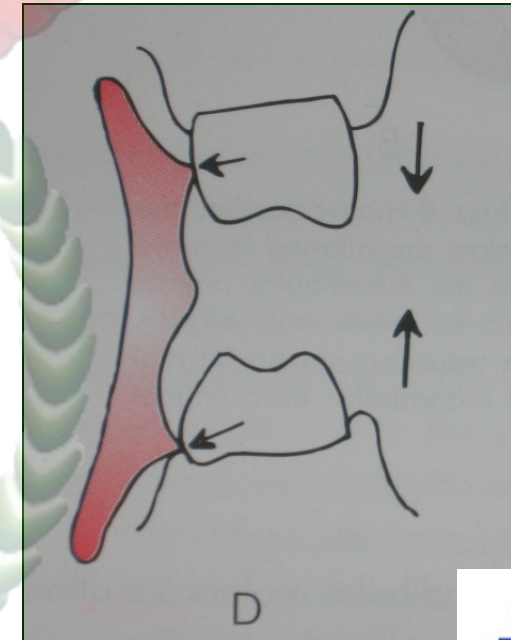
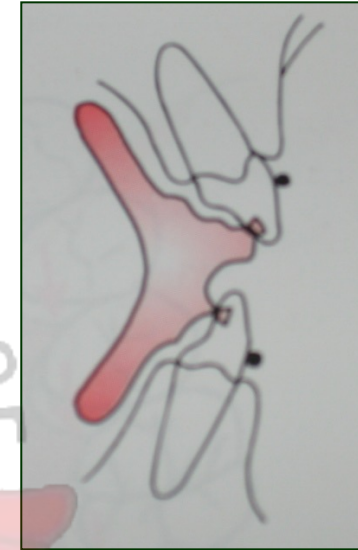
Intrusion of Teeth

- Indicated in deep overbite cases.
- Intrusion of incisors by loading the incisal edges
- Active labial bow below the area of greatest convexity or on the incisal third
- Intrusion of molars is performed by loading only the cusps



Extrusion of Teeth

- Open-bite
 - Extrusion of incisors requires loading their lingual surfaces
- **Deep-bite problems**
 - Extrusion of molars can be facilitated by loading the lingual surfaces



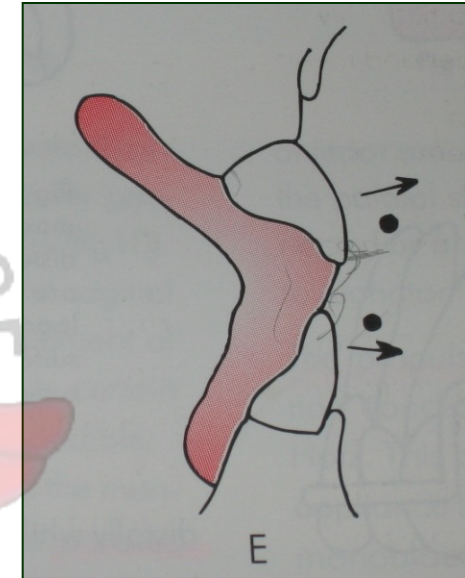
TRIMMING THE ACTIVATOR FOR SAGITTAL CONTROL

- Protrusion or retrusion of the incisors
- Changing the molar relationship(sagittal plane) mesially or distally



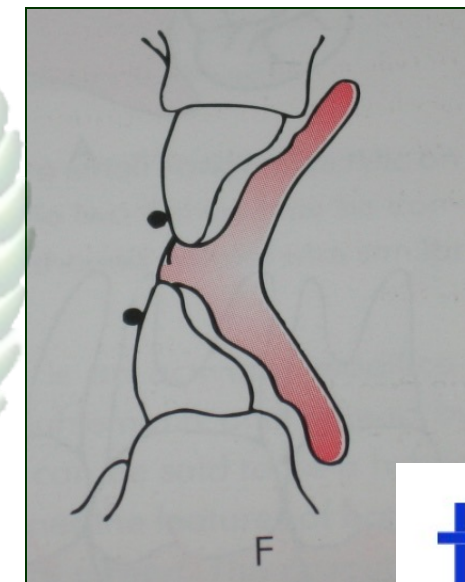
Protrusion of Incisors

- By loading their lingual surfaces with acrylic contact
- Screening away the lip strain with a passive labial bow or lip pads.



Retrusion of Incisors

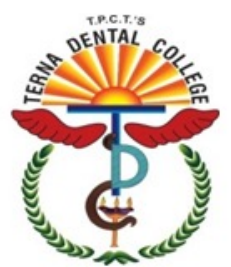
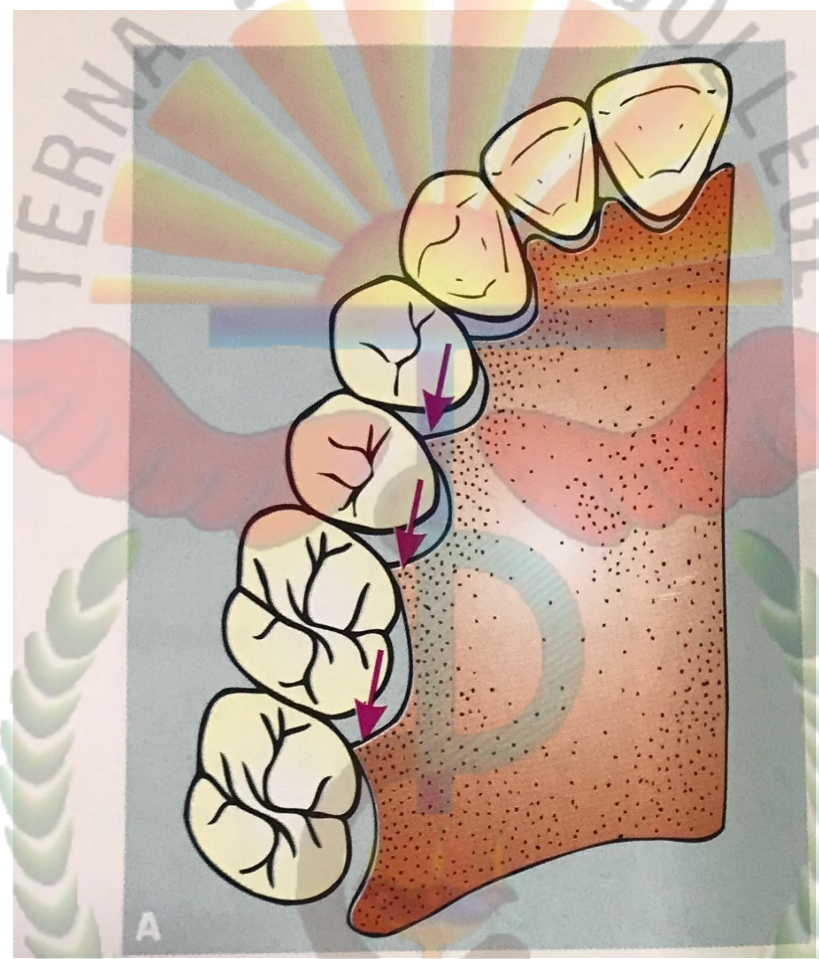
- The acrylic is trimmed away from the backs of the incisors.
- The active labial bow, provides the force for moving these teeth.



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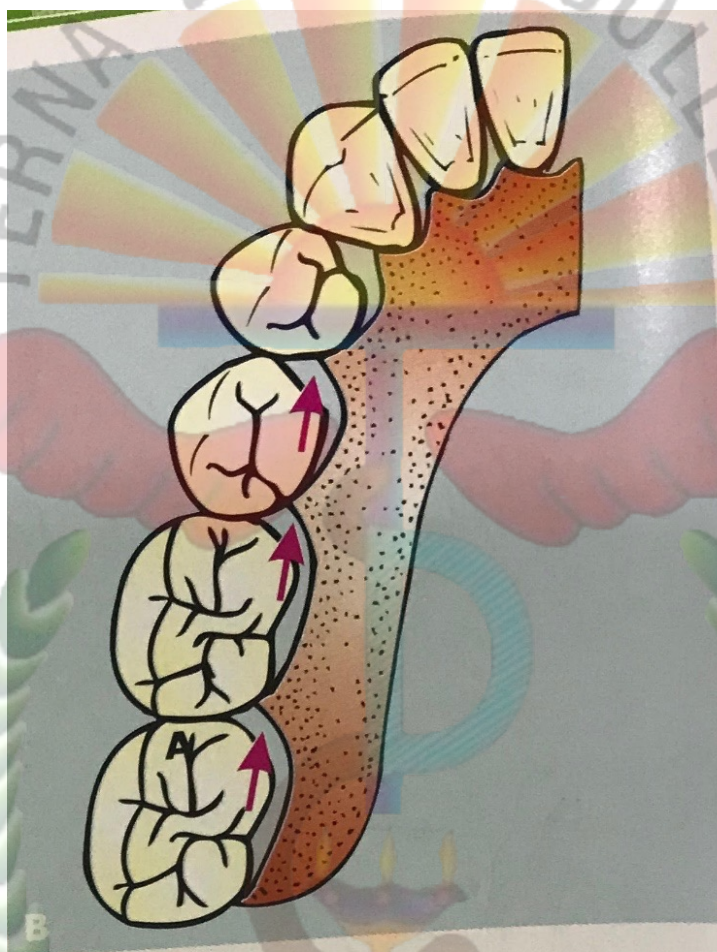
DENTAL

COLLEGE



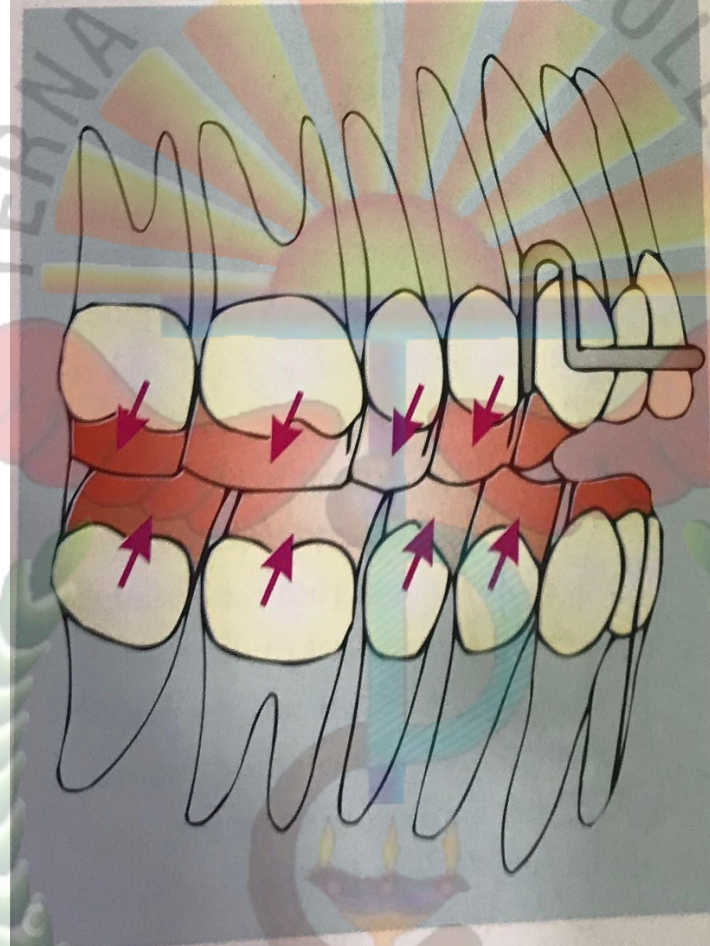
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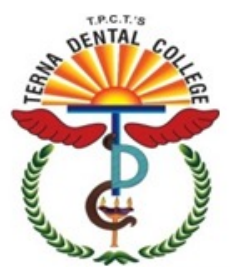
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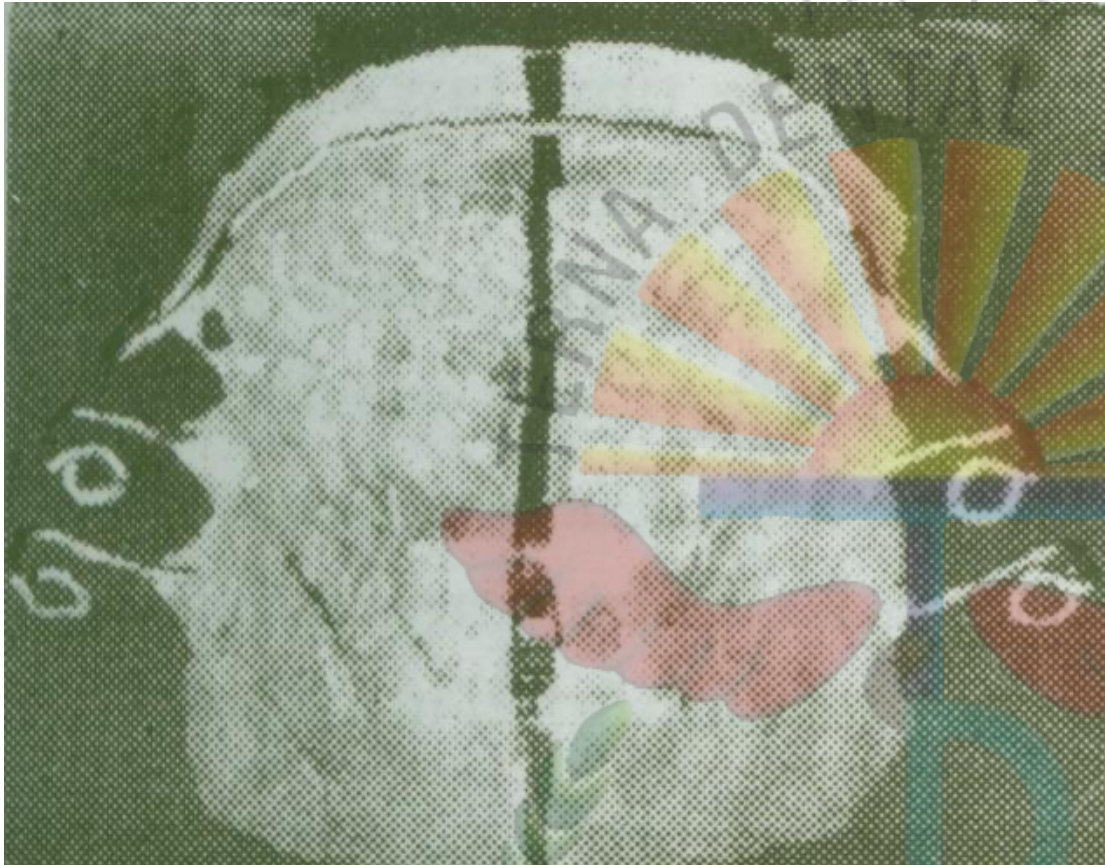
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MODIFICATIONS OF ACTIVATOR



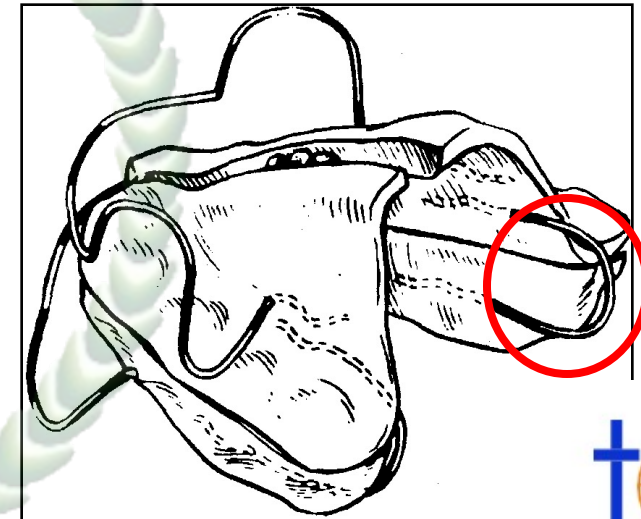


- Herren modified the activator in two ways :
- By over-compensating the ventral position of the mandible in the construction wax bite.
- By seating the appliance firmly against the maxillary dental arch by means of clasps (arrowhead, triangular or Jackson's).

Herren Shaye
activator :

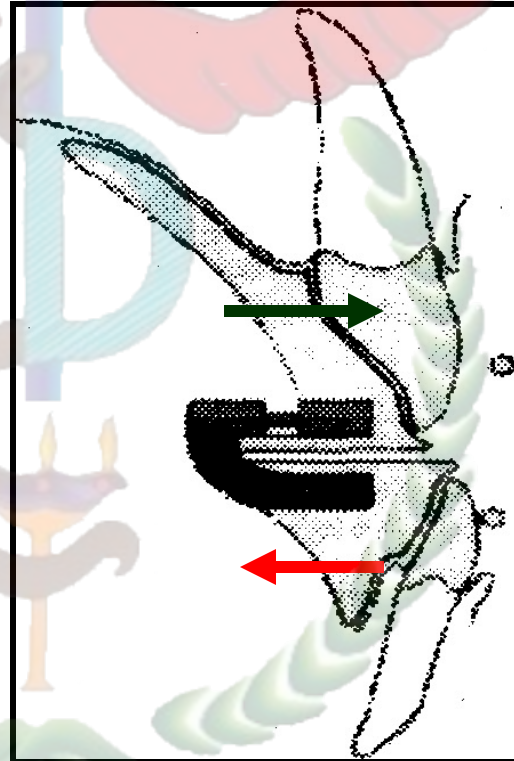
The Bow activator of A.M Schwarz :

- Horizontally split activator
- maxillary portion and a mandibular portion connected together by an elastic bow.
- allows step wise sagittal advancement of the mandible by adjustment of the bow.



Wunderers modification

- This is an activator modification that is mostly used in treatment of Class III malocclusion.
- Opening --Anterior screw





- Professor G.P.F. Schmuth.
- Resembles a bionator with the acrylic portion of the activator reduced from the maxillary anterior area leaving a small flange of acrylic on the palatal slopes.
- The two halves may be connected by an omega shaped palatal wire similar to bionator.

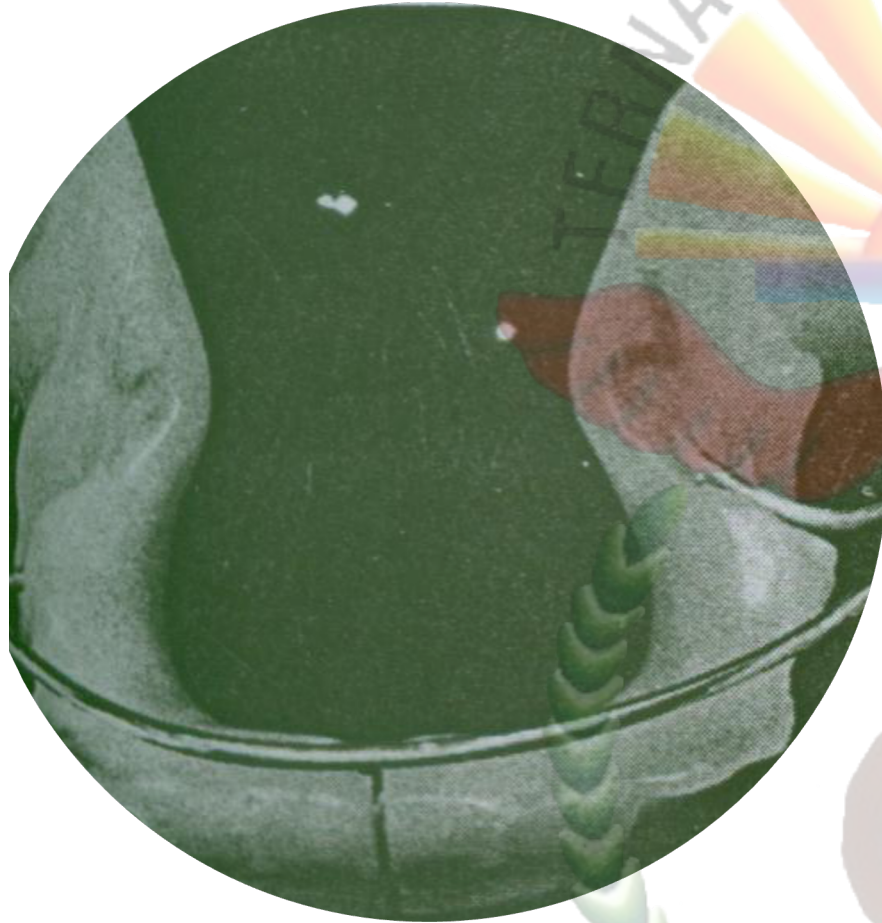
Reduced activator or
cybernator of Shmuth :

PROPULSOR ACTIVATOR

- Modification conceived by Muhlemann and refined by Hotz
- hybrid appliance.
- No wire configuration are used with propulsor, acrylic connecting the upper buccal segment to the lower lingual flange also serves as occlusal support to stabilize the appliance



Cut out or Palate free activator



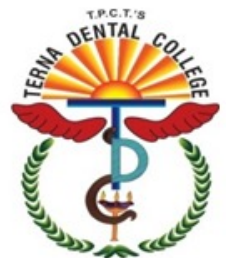
- **Metzelder** -- advantages of bionator and the Andresen's activator.
- Mandibular portion resembles an activator
- Maxillary portion has acrylic covering only the palatal aspect of the buccal teeth
- Palate remains free of acrylic -- more convenient to wear the appliance for longer hours.
- TMJ dysfunction cases – best in mandibular positioning

The Karwetzky modification:

- This consists of maxillary and mandibular plates joined by a 'U' bow in the region of the first permanent molar.

Type I:

- Class II, Division 1.
- The larger lower leg placed posteriorly.
- Two arms of the U bow squeezed the lower plate moves sagittally forwards



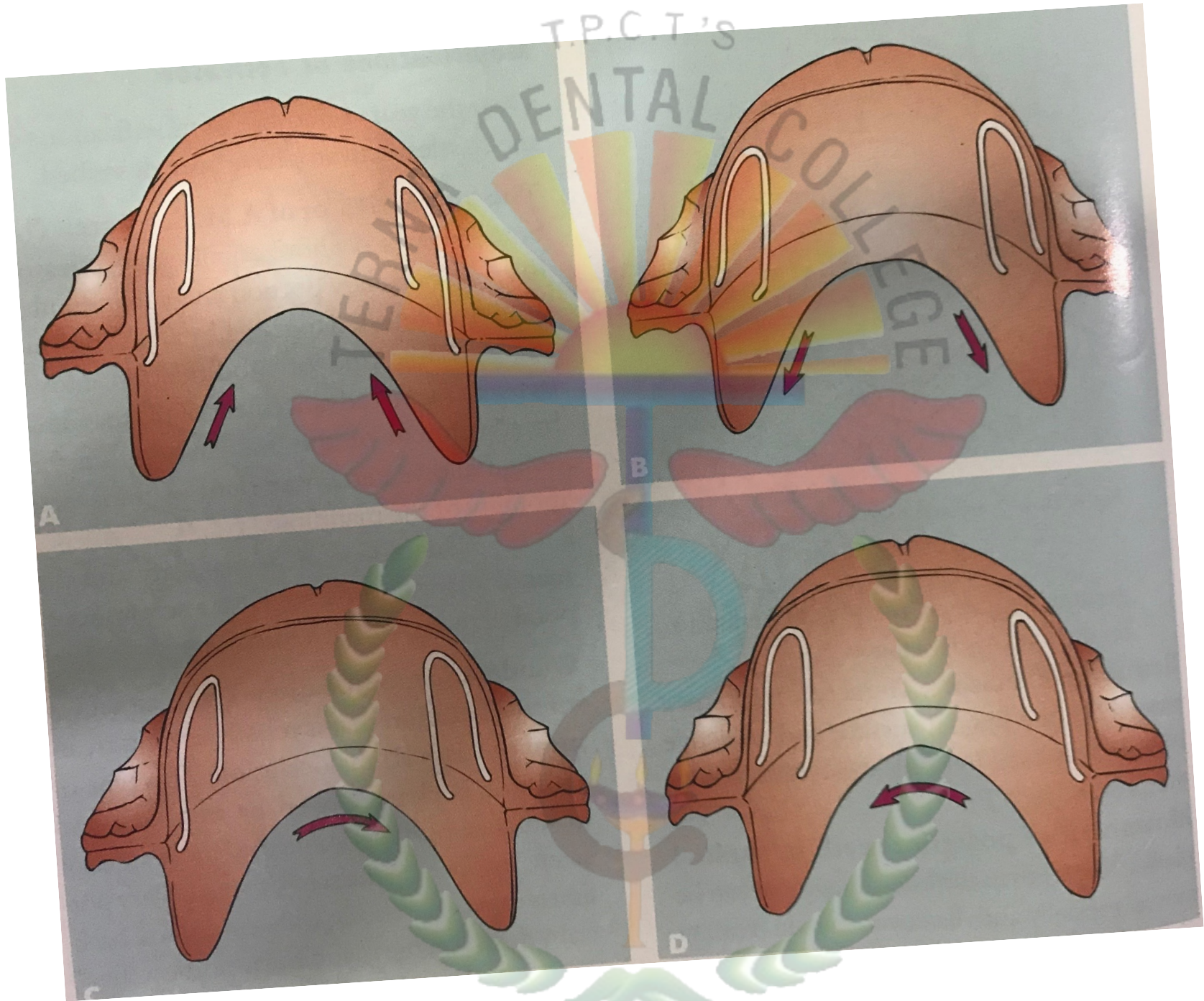
Type II :

- Class III malocclusion.
- the larger lower leg placed anteriorly.
- when the U bow squeezed the mandibular plate moves distally.

Type III:

- asymmetric advancements of the mandible.
- U bow attached anteriorly on one side and posteriorly on the other side





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Bionator



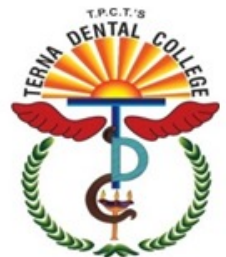
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The Bionator—a Modified Activator



- Developed by Balter
- Less bulky

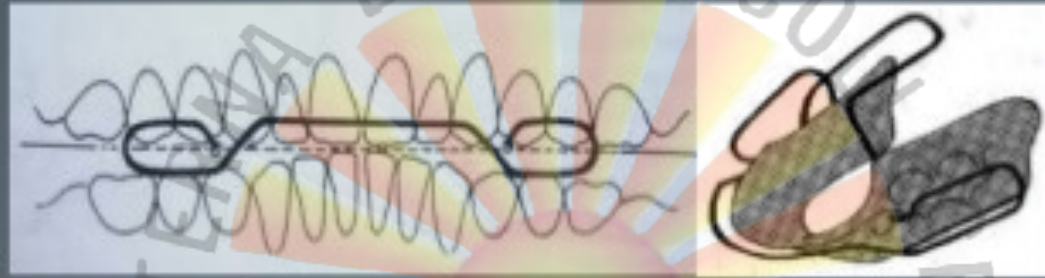


BIONATOR TYPES



- Standard Appliance.
- Open-Bite Appliance.
- Reversed bionator/ Class III bionator.

1. THE STANDARD BIONATOR



2. THE OPEN BITE BIONATOR



3. CI III OR REVERSED BIONATOR



CONSTRUCTION BITE

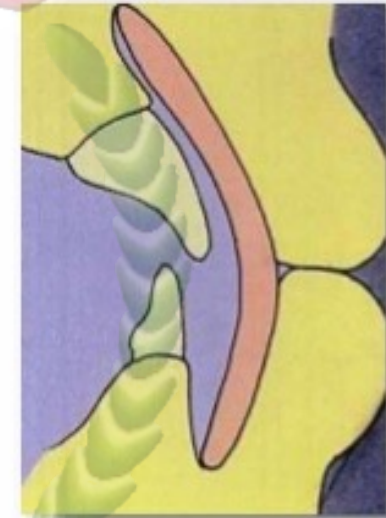
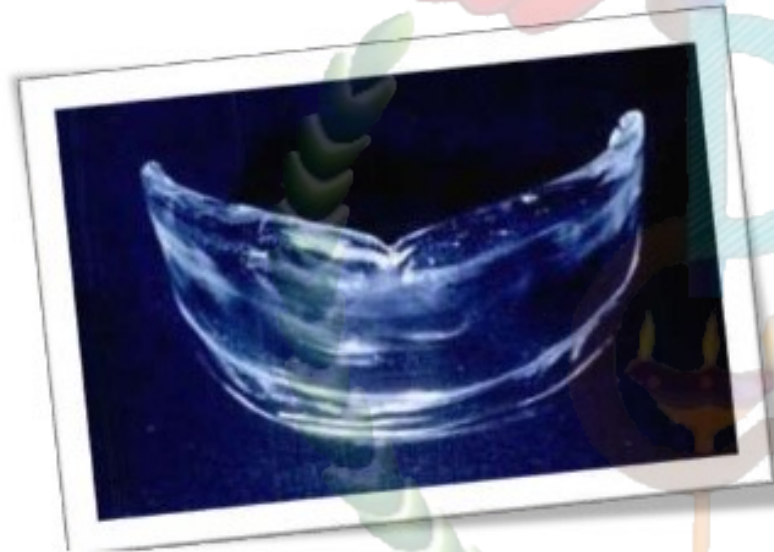
Objective

- To achieve a class I relation
- Edge to edge relation of incisors – to provide maximum functional space for tongue
- If overjet is too large – step by step procedure is followed



VESTIBULAR SCREEN

- Introduced by Newell in 1912.
- Takes the form of a curved shield of acrylic placed in the labial vestibule.



PRINCIPLE

Works on the principle of both force

APPLICATION

&

ELIMINATION.

Apply the forces of the circumoral musculature to certain teeth.

Relieve the forces of the circumoral musculature from the teeth thereby allowing them to move due to forces exerted by the tongue.



• INDICATIONS:

- (a) to intercept mouth breathing, thumb sucking, tongue thrusting, lip biting & cheek biting.
- (b) to correct mild disto-occlusions.
- (c) to perform muscle exercises to help in correction of hypotonic lip & cheek muscles.
- (d) to correct mild anterior proclination.

• MANAGEMENT:

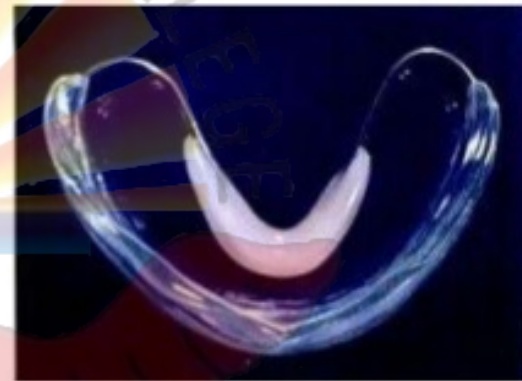
- Patient is instructed to
 - (i) wear the appliance at night and 2-3 hours during the day
 - (ii) maintain lip seal.
- Areas of irritation in sulcular and the frenal areas should be carefully trimmed.



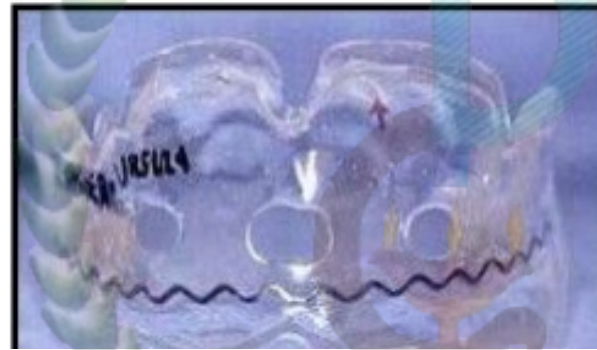
•MODIFICATIONS:



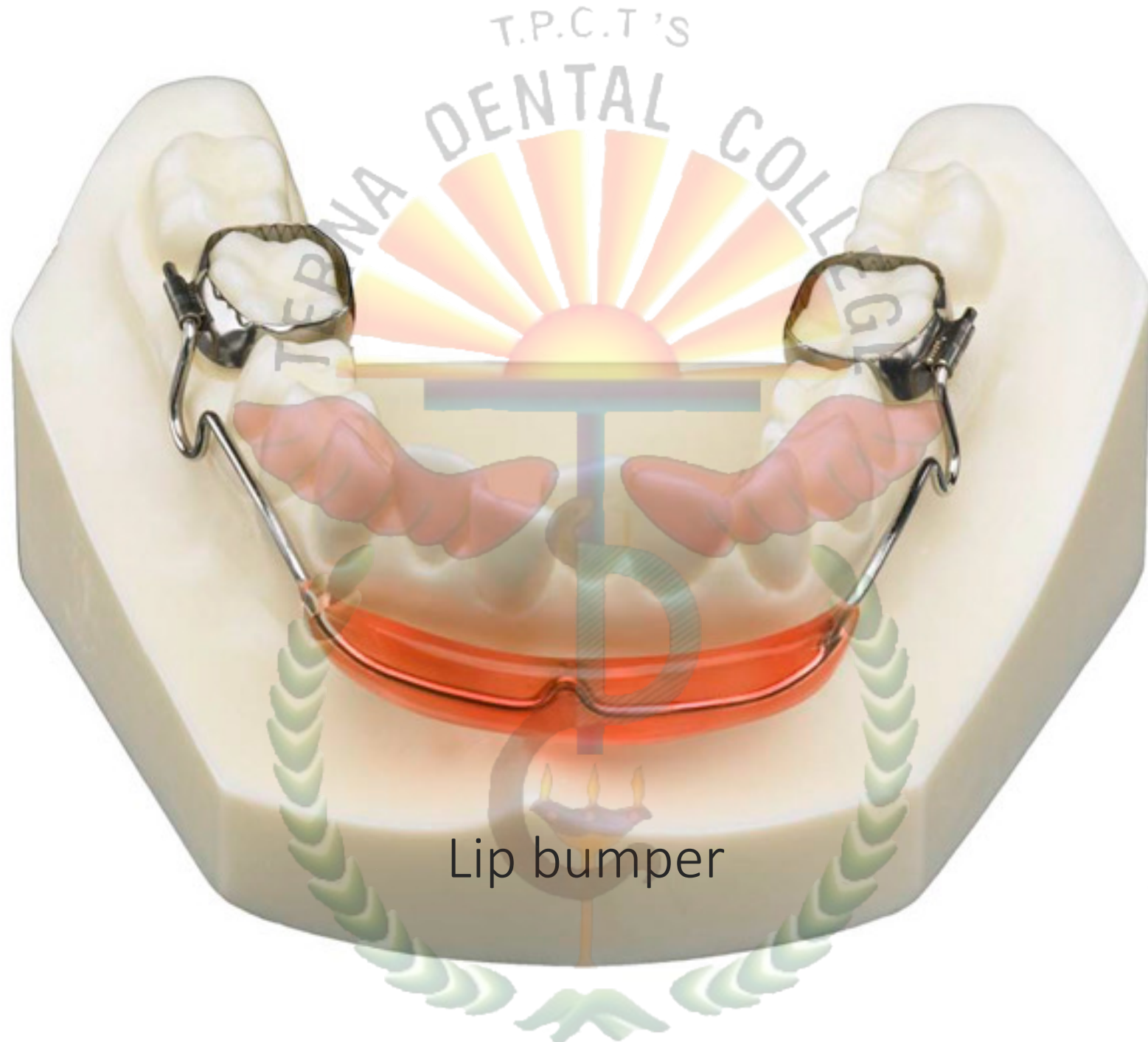
HOTz
MODIFICATION



DOUBLE ORAL SCREEN
(With additional tongue
shield)



KRAUS'S
MODIFICATION



Lip bumper



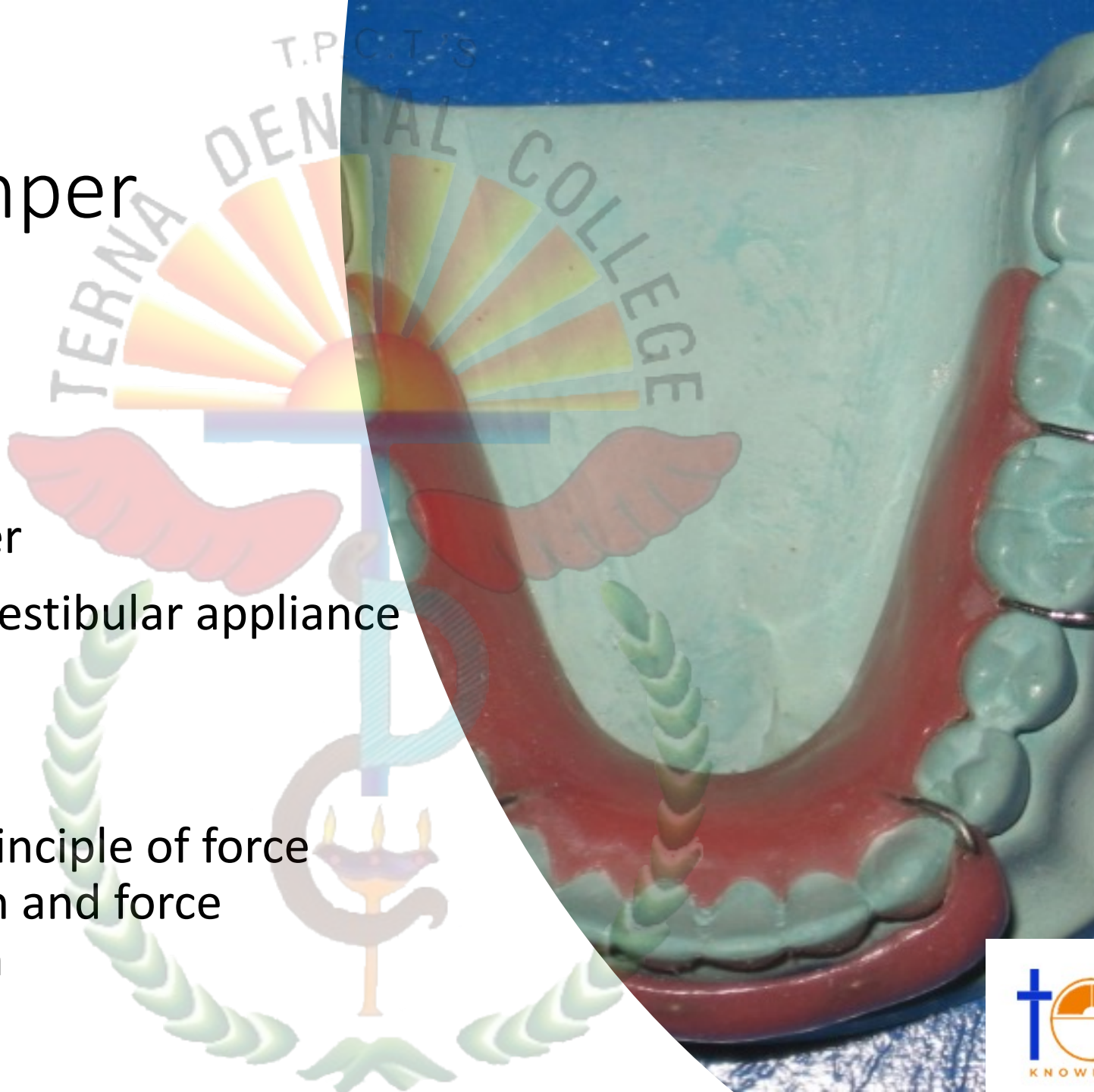
Lip bumper

Synonyms

- Lip plumber
- Modified vestibular appliance

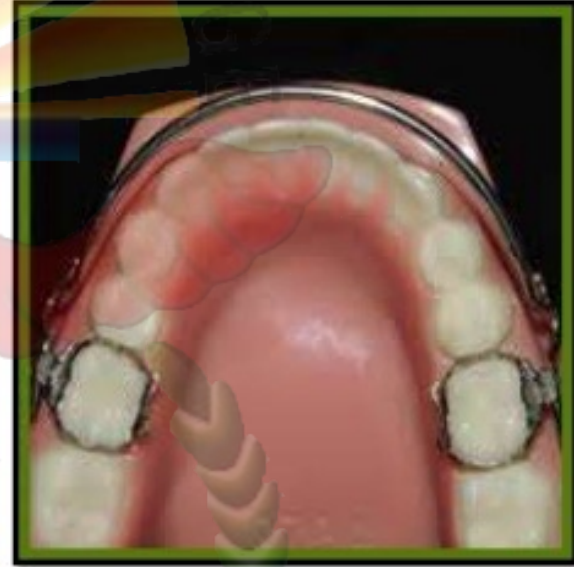
Principle

- Both on principle of force elimination and force application



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APPLIANCE DESIGN



LIP BUMPER

- “combined-removal-fixed appliance”.
- Used in both maxilla & mandible to shield the lips away from the teeth.
Maxillary appliance → Denholtz appliance.



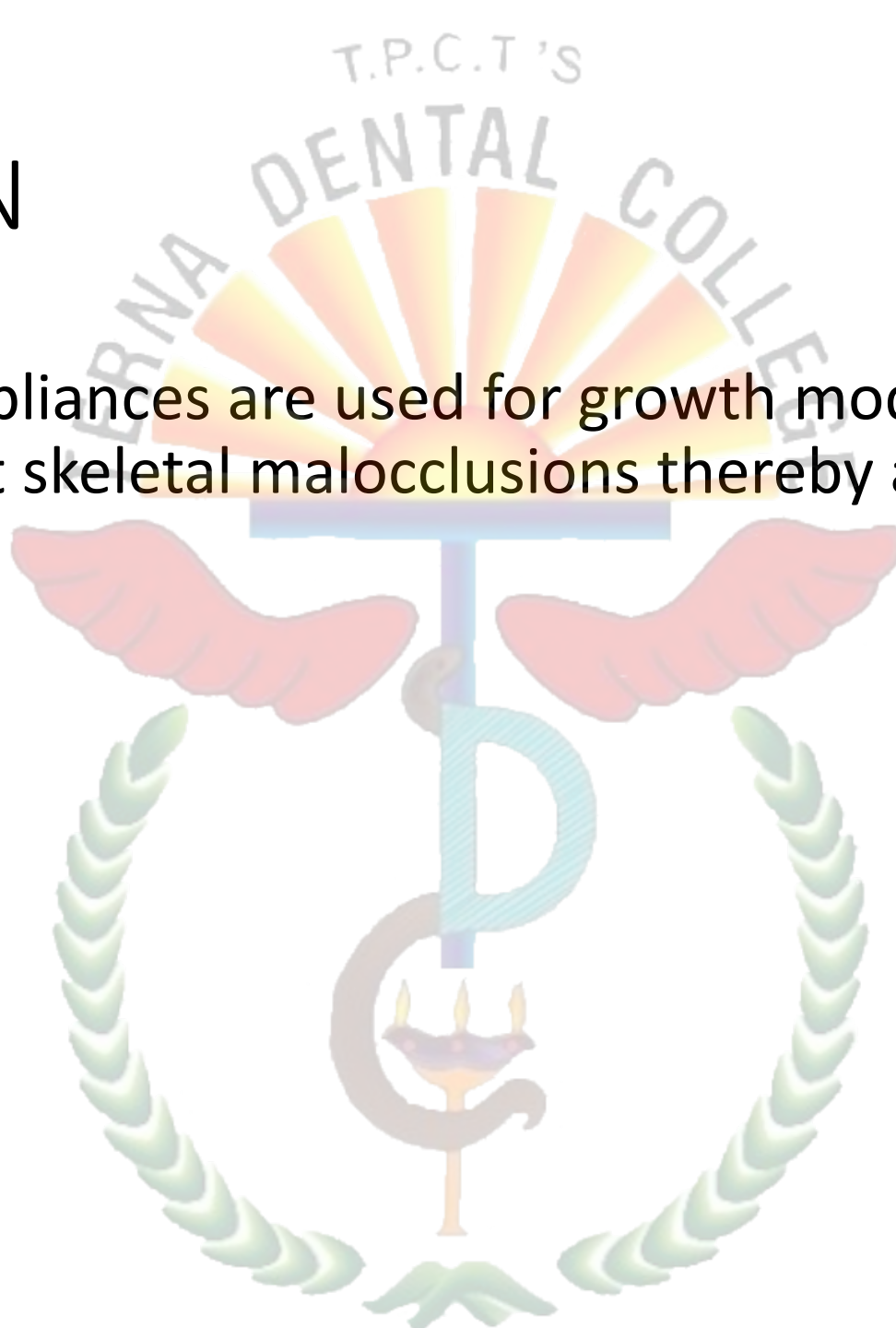
USES:

- i. Patient exhibiting lower lip habits such as lip sucking. The lip bumper shields the lower lip away.
- ii. Patients exhibiting hyperactive mentalis activity.
- iii. To augment anchorage.
- iv. Distilization of molars.
- v. As a space regainers.



CONCLUSION

- Myofunctional appliances are used for growth modulation in young children to correct skeletal malocclusions thereby avoiding its severe consequences.



TAKE HOME MESSAGE:

Diagnosis and treatment of skeletal malocclusion can be initiated at an early age by the use of myofunctional appliance.

Hence identification of malocclusion at an early age can prevent the possible consequences at a later age.



PROBABLE LAQS AND SAQS

LAQ:

1. DEFINITION AND CLASSIFICATION OF MYOFUNCTIONAL APPLIANCES, HISTORY AND MODE OF ACTION OF ACTICATOR.

SAQ:

1. BIONATOR
2. LIP BUMPER
3. ORAL SCREEN

