Balanced occlusion

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Good
morning

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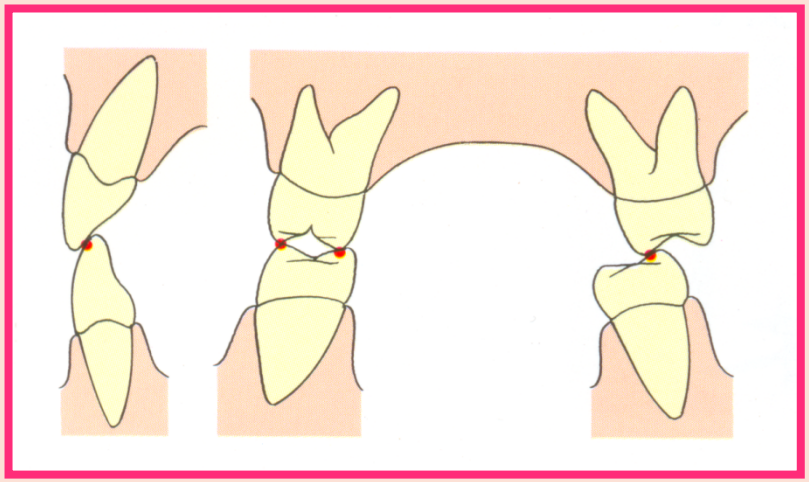
Introduction

- The study of occlusion…
- One of the chief aims of preventive and restorative dentistry
- Balance in complete denture is unique..
- It does not occur in natural teeth ..



DEFINITIONS

- **Occlusion:GPT8**

  The static relationship between the incising or masticating surfaces of the maxillary or mandibular teeth.

- **Articulation:**

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

Balanced occlusion :

"Bilateral simultaneous, anterior, and posterior occlusal contact of teeth in centric and eccentric positions". (According to Glossary of Prosthodontics)

"Balanced occlusion in complete denture can be defined as stable simultaneous contact of the opposing upper and lower tooth in centric relation position and a continuous smooth bilateral gliding from this position to any eccentric position within normal range of mandibular function". (Winkler)

DIFFERENCES BETWEEN NATURAL & ARTIFICIAL OCCLUSION

Natural teeth	Artificial teeth
Function independently and each individual tooth disperses the occlusal load.	Function as a group and the occlusal loads are not individually managed.
Malocclusion can be non-problematic for a long time.	Malocclusion is problematic.
Non-vertical forces are well tolerated.	Non-vertical forces damage the supporting tissues.

Incising does not affect the posterior teeth.	Incising will lift the posterior part of the denture.
The second molar is the favoured area for heavy mastication.	Heavy mastication over the second molar can tilt or shift the denture base.
Bilateral balance is not necessary and is usually considered a hindrance	Bilateral balance is mandatory to produce stability of the denture.
Proprioceptive impulses give feedback to avoid occlusal prematurities. This helps the patient to have a habitual occlusion away from centric relation.	There is no feedback and the denture rests in centric relation. Any prematurities in this position can shift the base.

IDEAL REQUIREMENTS OF COMPLETE DENTURE OCCLUSION

- Stability in both centric and eccentric relations.
- Tripod contact during all eccentric movements.
- Unlocking the cusps mesiodistally.
- Reduction of cuspal height to control the horizontal forces.
- Functional lever balance should be obtained.

Cutting, penetrating and shearing efficiency of the occlusal surface should be equivalent to that of natural dentition.

Incisal clearance during posterior functions like chewing.

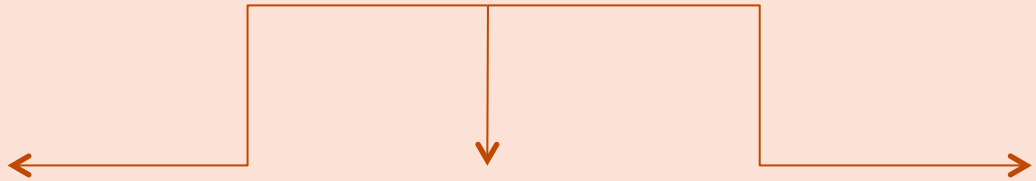
Minimal area of contact to reduce pressure while crushing food (Lingualized occlusion).

Sharp ridges, cusps and sluiceways to increase masticating efficiency.

- These requirements can be easily applied if occlusion is divided into 3 distinct units. Occlusion can be divided into three distinct units
    - Incising units.
    - Working units.
    - Balancing units.

OCCLUSAL SCHEME REQUISITES TO FULFILL THE REQUIREMENTS

Each occlusal scheme has three characteristics



Incising Unit
(4 incisors)

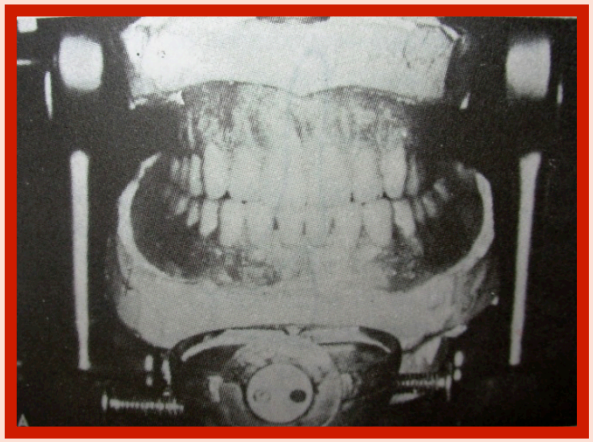
Working Unit
(canine & post. teeth on working side)

Balancing Unit
(canine &post. teeth on non working side)

Incisal Units

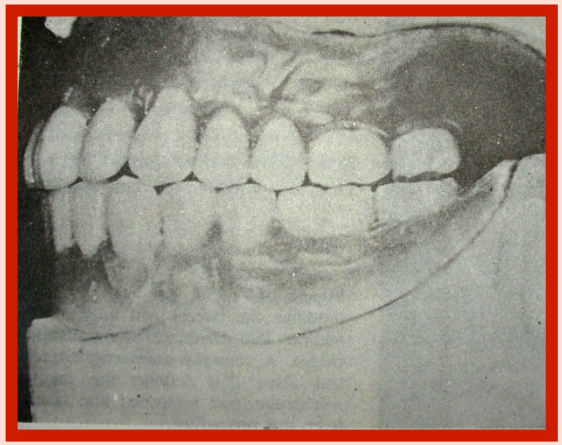
- Sharp units for improved incising efficiency.
- The units should contact during protrusion not during mastication.
- Shallow incisal guidance.
- Increased horizontal overlap

to avoid interference during settling



Working Units

- Cusps for good cutting and grinding efficiency
- Smaller buccolingual width to decrease the occlusal load transferred to the tissues.
- Group function at the end of the chewing cycle in eccentric positions.

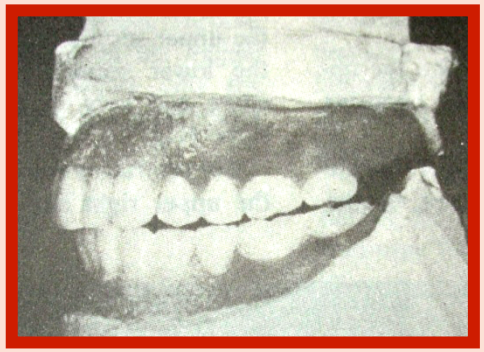


- The occlusal load should be directed to the anteroposterior centre of the denture.

- The plane of occlusion should be parallel to the mean foundation plane of the ridge.

Balancing Units

- The second molars should be in contact during protrusive action (Protrusive balance).



- They should have contact along with the working side at the end of the chewing cycle.

- Smooth gliding contacts should be available for uninterfered lateral and protrusive movements

SEARS AXIOMS OF COMPLETE DENTURE OCCLUSION

Smaller the occlusal surface

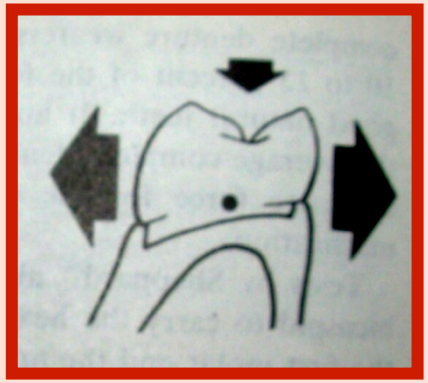
↓

Lesser the occlusal load transmitted

Vertical force on a tilted occlusion

↓

Non-vertical force on the denture



Vertical forces acting on a tilted tissue support

↓

non vertical forces on the denture.

Vertical force on the denture base lying over the resilient tissues

↓

lever forces on the denture.

Vertical forces acting outside the ridge crest will

↓

tipping of the denture.

Review of literature

- The first description of the occlusal relationships of the teeth was made by Edward angle in 1809.
- Occlusion became a topic of interest and much discussion in the early years of modern dentistry, as the restorability and replacement of teeth became more feasible. Many authors laid down theories of occlusion
- Bonwill in 1858 described the equilateral triangle theory . He was the one who coined the word articulation.

- Spee in 1890 introduced the concept of curve of spee.
- Alfred gysi in 1914 designed first porcelain anatomical teeth and also described lingualized occlusion.
- Monson 1918 put forth the spherical theory of occlusion.
  R E Hall gave conical theory of occlusion.
- Balanced occlusion was based on the 3 theories of occlusion.
- This concept advocated bilateral and balancing tooth contacts during all lateral and protrusive movements.

- Hanau in 1926 formulated laws of balanced articulation (called hanau's quint).
- Box, miller, sorrin in 1950 pointed out the importance of balanced occlusion and emphasized the need for wide distribution of stresses.
- Sears 1952 published some axioms for planning complete denture occlusion.
- Trapazzano in 1963 and Levin in 1978 laid down laws called triad and quad of articulation.

- Devan in 1954 suggested the concept of neutrocentric occlusion which embodies the centralization of occlusal forces which act on the basal seat when the mandible is in centric relation to the maxilla

- Organic occlusion concept was put forth by stuart, stallard in 1961 and Thomas in 1967.

- Schweitzer in 1963 put forward the theory of transographics. Payne in 1941 and pound in 1973 described the lingualized concept of occlusion.

- Swenson in 1964 , yurkstas in 1968 , bruce in 1971 described methods of establishing occlusion in single complete denture.

- Different concepts and opinions have been expressed by various authors depending on various tooth forms to obtain an occlusion, which offers maximum efficiency within physiologic limits.

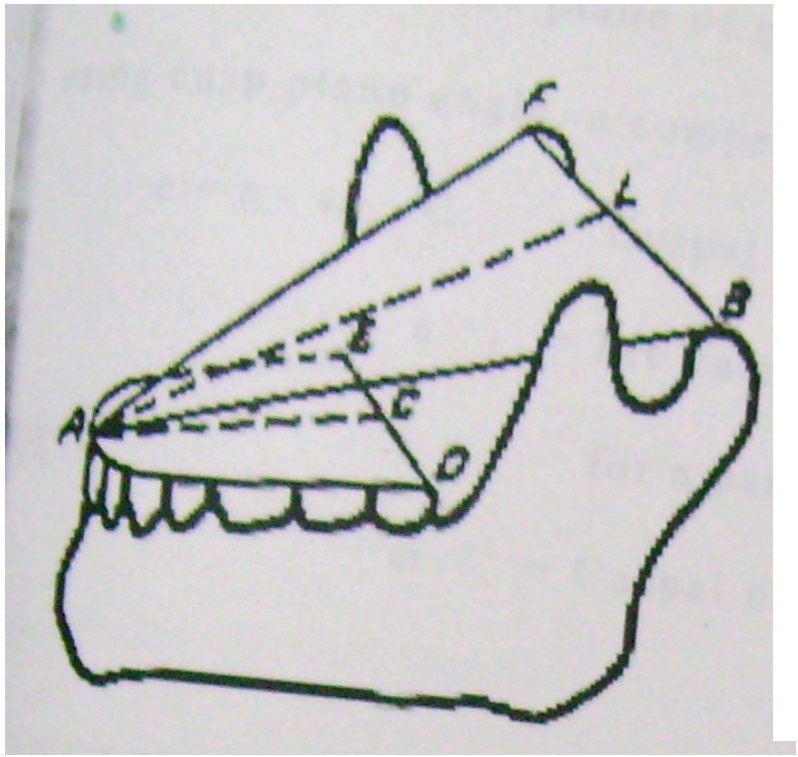
Theories of occlusion

Equilateral triangle theory

Many authors laid down theories of occlusion

- Bonwill a mathematician and dentist , began his studies of human occlusion around 1850.

- Bonwill in 1885 described the equilateral triangle theory based on 3 points of occlusal balance.



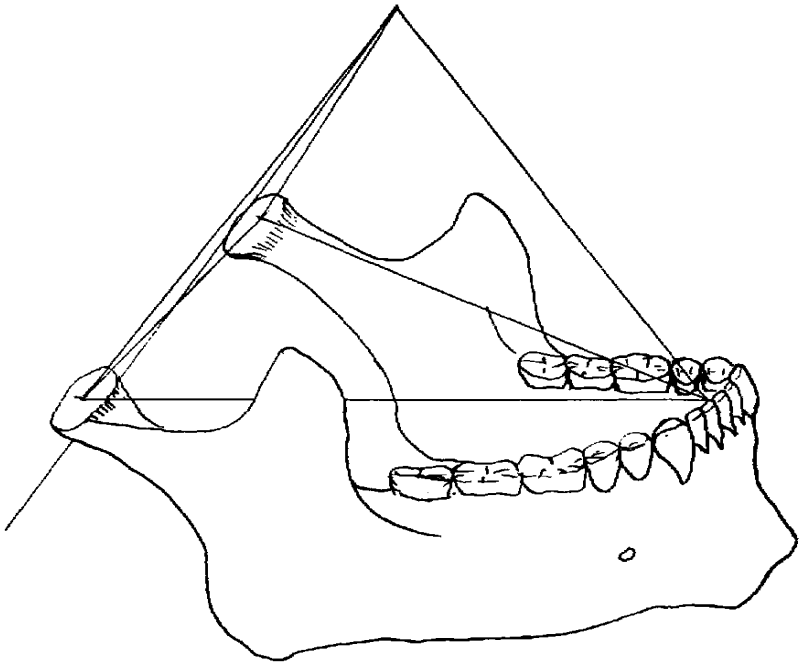
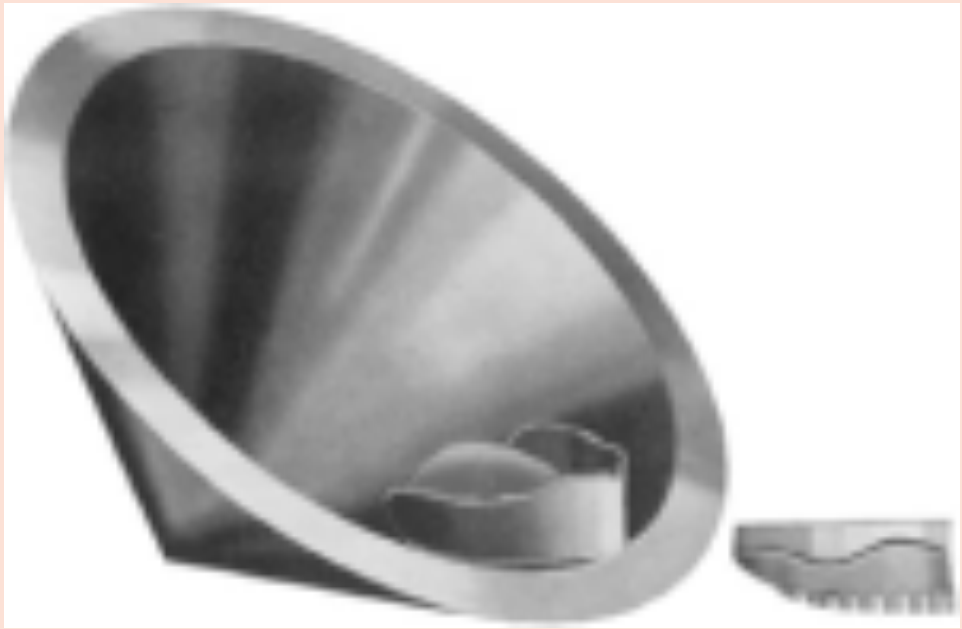


Figure 3. Bonwill's 4-inch triangular theory of 1858.

- Bonwill analyzed mandible and described in terms of equilateral triangle with 10- cm side connecting both the condyles and mesioincisal angles of mandibular central incisors.

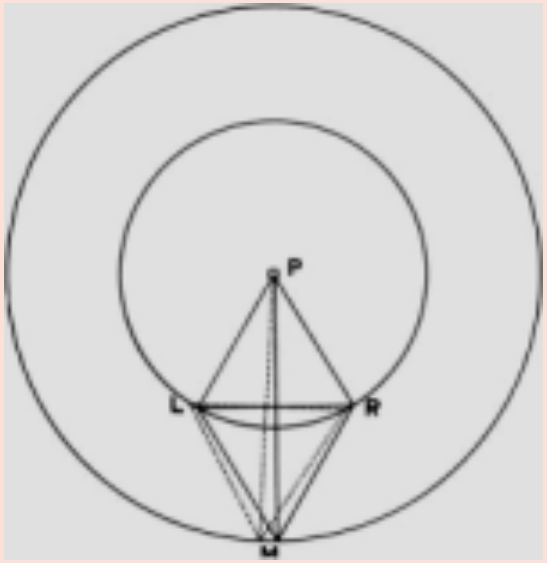
Conical theory.

- Lower teeth move over the surface of upper teeth as over the surface of a cone , at a generating angle of 45 degrees .

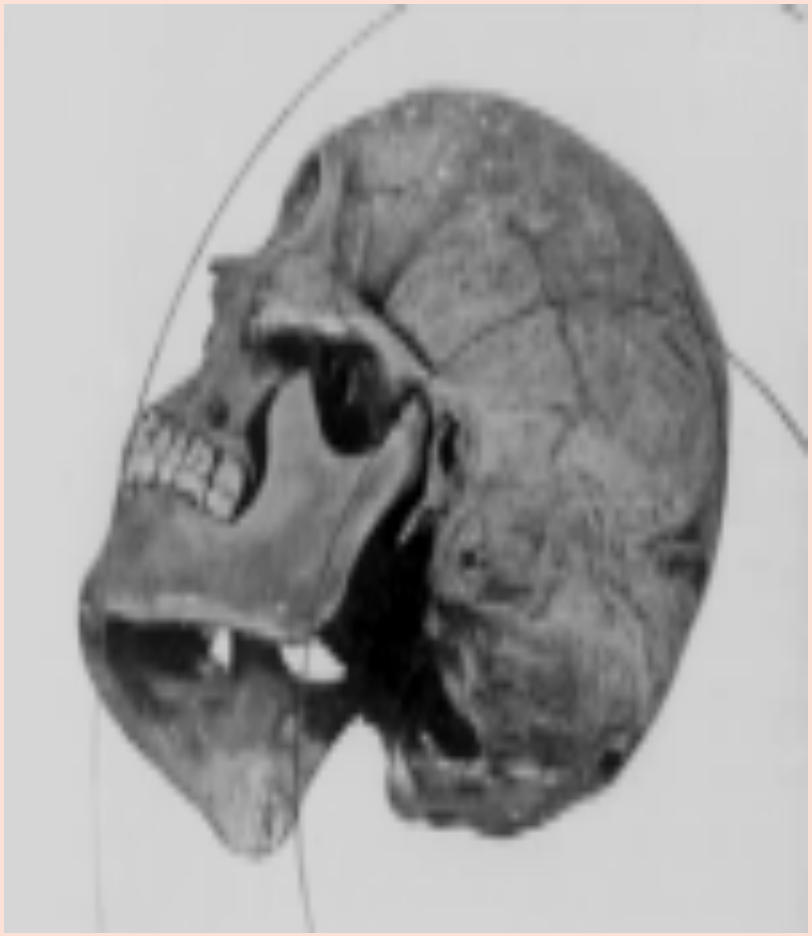


- To explain his theory of mandibular movement, Hall envisioned that if 2 equilateral triangles (constructed on Bonwill's principles) were placed back to back, they would share a common base that represented the condylar axis.

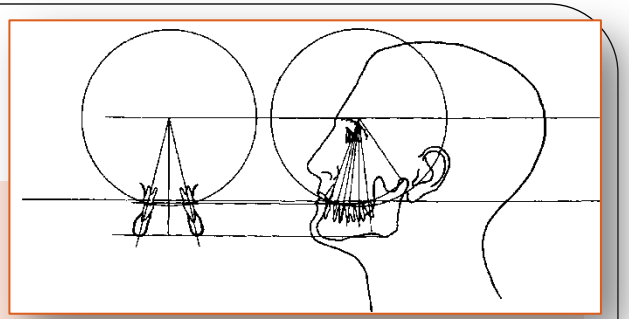
- The vertex of the anterior triangle would be located at the incisor point, and the posterior vertex would be located in the region of the external occipital protuberance.



- Hall also believed that the mandible opened and closed on arcs concentric to a point at the external occipital protuberance .



Spherical theory of occlusion



- Proposed by Monson in 1918.

- Monson formulated a three-dimensional occlusal philosophy by combining the concepts of Bonwill's 4-inch triangle and bilateral balanced occlusion, Von Spee's compensating curve, this occlusal model was named the *Spherical Theory*

GENERAL CONCEPTS OF COMPLETE DENTURE OCCLUSION

Unlike natural teeth, the artificial teeth act as

↓

Single unit

↓

So for even distribution of force

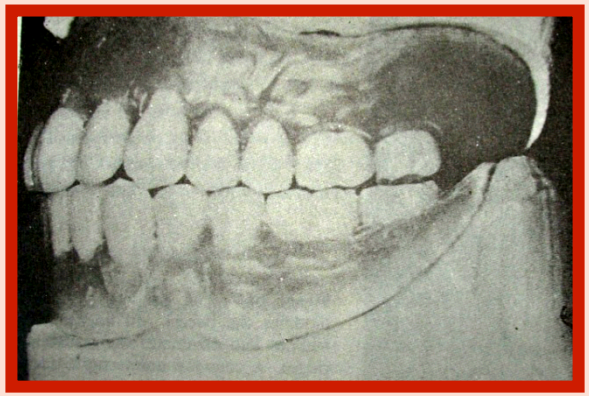
↓

Three point contact (usually one anterior and two posterior)

- Balanced occlusion should have tripod contact even in eccentric relation.

Teeth Selection

- Anatomic teeth → Balanced Occlusion
- Non anatomic teeth → Monoplane Occlusion



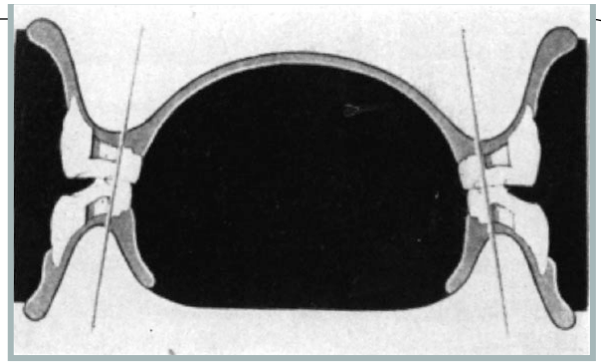
Five basic occlusal shemes in use today acc to Gregory Parr and Gerald Loft :

- Anatomic; Balanced occlusion
- Semi anatomic; Balanced occlusion
- Non anatomic ; Balanced occlusion
- Lingualised occlusion ; balanced or non balanced
- Neutrocentric occlusion

The different concepts of occlusion:

- Balanced occlusion
- Lingualised occlusion (Gysi, Payne, Pound and Murrel)
- Spherical concept of occlusion (Monson)
- Physiologically generated occlusion
- Organic concept of occlusion
- Neutrocentric concept of occlusion (De-Van)
- Monoplane occlusion
- Linear occlusion

LINGUALIZED OCCLUSION



- First described by S. Howard Payne, in 1941, this form of denture occlusion articulates the maxillary lingual cusps with the mandibular occlusal surfaces in centric working and nonworking mandibular positions. The term is attributed to Earl Pound.

- It was originally given by alfered Gysi (1927) and Payne in 1941 familiarized it. Pound and Murrel (1973) also advocated this concept of occlusion.

- It is an attempt to maintain the esthetic and food penetration advantages of the anatomic form while maintaining the mechanical freedom of the non-anatomic room.

- This concept utilizes anatomic teeth for the maxillary denture and modified non-anatomic or semi-anatomic teeth for the mandibular denture.

- So, maxillary lingual cusp of posterior teeth contact with mandibualr teeth in all centric and eccentric movements.

SPHERICAL CONCEPT OF OCCLUSION (MONSON)

- According to this concept, the anteroposterior and mesiodistal inclines of the artificial teeth should be arranged in harmony with a spherical surface.

PHYSIOLOGICALLY GENERATED OCCLUSION

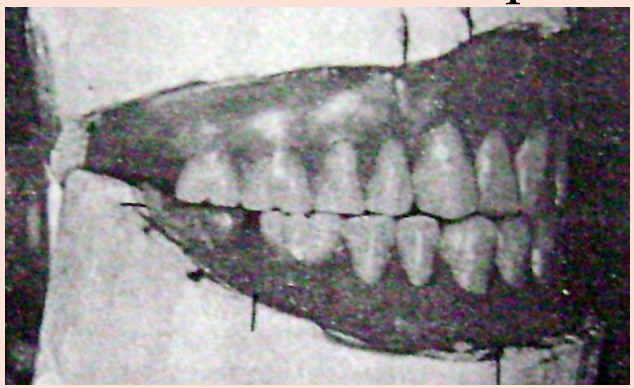
- Mehringer J E(1973) developed this occlusion to harmonize complete denture occlusion neuromuscular system and Rt and Lt TMJ.

- It is mainly indicated for patients having adequate foundation with stable record bases.
- And good neuromuscular control & can give functional movements consistently.

- The main advantages are, it is comfortable to patient as it is built physiologically, and swallowing and masticatory movements are taken into consideration along with CR and CO.
- But it is time consuming and has no scientific evidence of its efficiency in attaining the goal.

NEUTROCENTRIC CONCEPT OF OCCLUSION

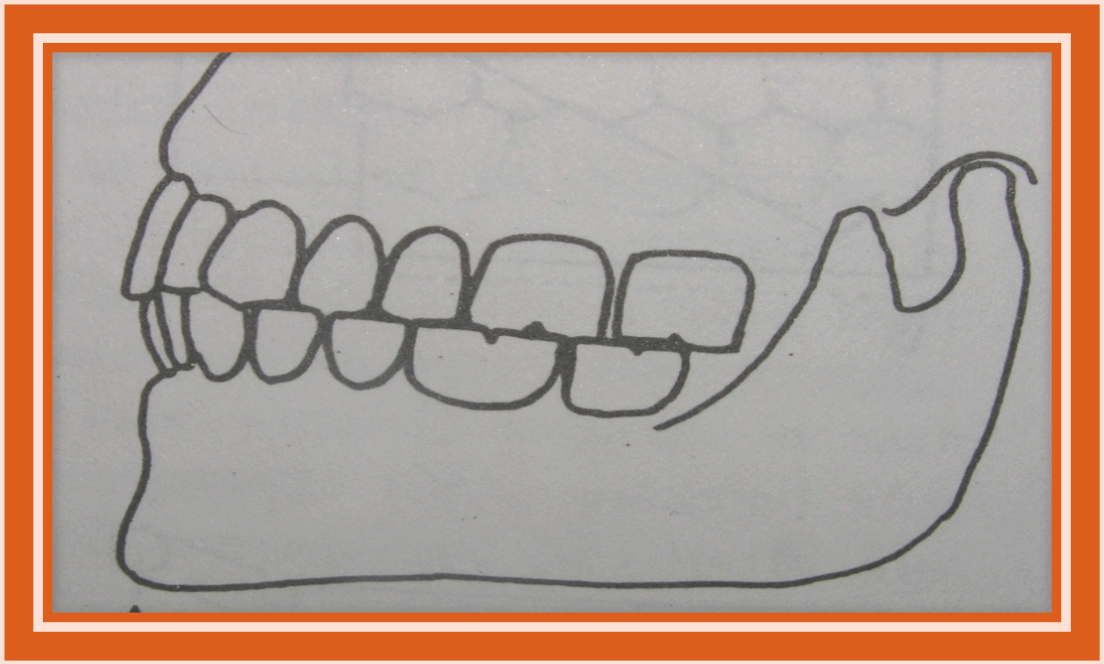
- The plane of occlusion should be flat and parallel to the residual alveolar ridge.
- This concept is similar to the monoplane occlusion used to set non-anatomic teeth.
- The term neutrocentric denotes an occlusion that eliminates the anteroposterior and buccolingual inclines in order to direct the forces to the posterior teeth



- It mainly uses the concept of arranging teeth on a plane (flat) parallel with bony support.
- It is independent of horizontal condylar guidance and has no compensating curves.
- It eliminated anteroposterior and mediolateral inclination of teeth, which directs force of occlusion on posterior teeth. There are no balancing contacts. The total number of teeth used is decreased with use of posterior protrusive balancing ramp, and the buccolingual width of teeth are also reduced.
- The main disadvantage is its poor stability when teeth make eccentric contacts. It also results in chopping masticatory movements.

MONOPLANE OCCLUSION

It is a type of nonbalanced occlusion where posterior teeth have masticatory surfaces that lack any cusp height.



Advantages: -

- More adaptable to class II and III malocclusions.
- Used more easily when variations in the width of upper and lower jaws indicate a cross bite set-up.
- 0^0teeth provide sense of freedom in mandibular movement.
- 0^0teeth –occlude in more than one position. CR is not that critical.
- It is simple, less time-consuming .
- They accommodate better, to inevitable negative changes in ridge height that occurs with aging

LINEAR OCCLUSION

GPT-7 " the occlusal arrangement of artificial teeth, as viewed in the horizontal plane, where in the masticatory surfaces of the mandibualr posterior artificial teeth have a straight, long, narrow occlusal form resembling that of a line, usually articulating with opposing monoplane teeth" –FRUSH (1996)

- **Balanced occlusion :**

  "Bilateral simultaneous, anterior, and posterior occlusal contact of teeth in centric and eccentric positions". (According to Glossary of Prosthodontics)

- "Balanced occlusion in complete denture can be defined as stable simultaneous contact of the opposing upper and lower tooth in centric relation position and a continuous smooth bilateral gliding from this position to any eccentric position within normal range of mandibular function". (Winkler)

CHARACTERISTIC REQUIREMENTS OF BALANCED OCCLUSION

- 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

GENERAL CONSIDERATION FOR BALANCED OCCLUSION

- Ideal occlusion can achieved on wide & large ridges
- Teeth arranged on lingual side of ridges will provide better occlusal support than on buccal side .
- There should be bilateral & simultaneous contact of teeth during centric & eccentric movements of mandible

Advantages of Bilateral Occlusal Balance

- Esthetic

- Bilateral simultaneous contact help to seat the denture in a stable position during mastication, swallowing and maintain retention and stability of the denture and the health of the oral tissues.

- Due to cross-arch balance, as the bolus is chewed on one side, the balancing cusps will come close or will contact on the other.
- Denture bases are stable even during bruxing activity
- Anatomic teeth used in balanced occlusion penetrate bolus better requiring less chewing force and therefore decreasing the vertical force on the ridges

- The ability of the cusped teeth to be arranged in harmony with the temporomandibular joint and muscles of mastication during speech, swallowing and chewing supposedly will improve the occlusion which is mechanically and physiologically balanced and therefore more acceptable to the oral environment

- The interdigitation of the denture teeth is believed to resist rotation movement of the denture thus encouraging a more vertical chewing pattern and greater denture stability

Disadvantages of Balanced Occlusion

- Precise exact reproducible records are required to generate this occlusion on a semi or fully adjustable articulator there by requiring a more careful and time consuming technique.
- A semi adjustable or fully adjustable articulator is required.

- The denture remains in good occlusal position until slight resorption occurs at which time the denture will be more difficult to adjust .

- While balanced occlusion can be used for crossbite situations and for class II and class III relationships. The limitations placed on the tooth positions by the tight interdigitation of the cusps makes the use of this occlusal scheme difficult

- The antirotational element of the anotomic occlusion may be effiective in the young healthy edentulous patients with good ridges and healthy oral mucosa, it is not that effective in the patients with poor ridges and friable unhealthy oral mucosa

IMPORTANCE OF BALANCED OCCLUSION

- Balanced occlusion is one of the most important factors that affect denture stability

- Absence of occlusal balance will result in leverage of the denture during mandibular movement.

- Sheppard stated that, "Enter bolus, Exit balance". According to this statement, the balancing contact is absent when food enters the oral cavity. This makes us think that balanced occlusion has no function during mastication; hence, it is not essential in a complete denture. But this is not true.

- Brewer reported the importance of balanced occlusion. He stated that on an average, a normal individual makes masticatory tooth contact only for 10 minutes in one full day compared to 4 hours of total tooth contact during other functions.
- So, for these 4 hours of tooth contact, balanced occlusion is important to maintain the stability of the denture. Hence, balanced occlusion is more critical during parafunctional movements.

PRINCIPLES FOR BALANCED OCCLUSION

- Ideal-balanced occlusion can be achieved in cases with wide and large ridges and in complete dentures, with teeth having narrow buccolingual width arranged close to the ridge.

- Complete dentures that have teeth arranged away from the ridge and those that rest on narrow and short ridges will have poor balanced occlusion.

- Ideal balance can be achieved by arranging the teeth slightly on the lingual side of the crest of the ridge.
- Arranging the teeth buccally will lead to poor balanced occlusion. If the teeth are set outside the ridge the denture may elevate on one side during tooth contact. Stability of the denture against these lever forces is called as lever balance.
- The complete denture should be designed in such a way that the forces of occlusion are centered anteroposteriorly in the denture.

Hanau's Quint:

Rudolph L. Hanau proposed nine factors that govern the articulation of artificial teeth. They are:

- Horizontal condylar inclination
- Compensating curve
- Protrusive incisal guidance
- Plane of orientation
- Buccolingual inclination of tooth axis
- Sagittal condylar pathway
- Sagittal incisal guidance
- Tooth alignment
- Relative cusp height

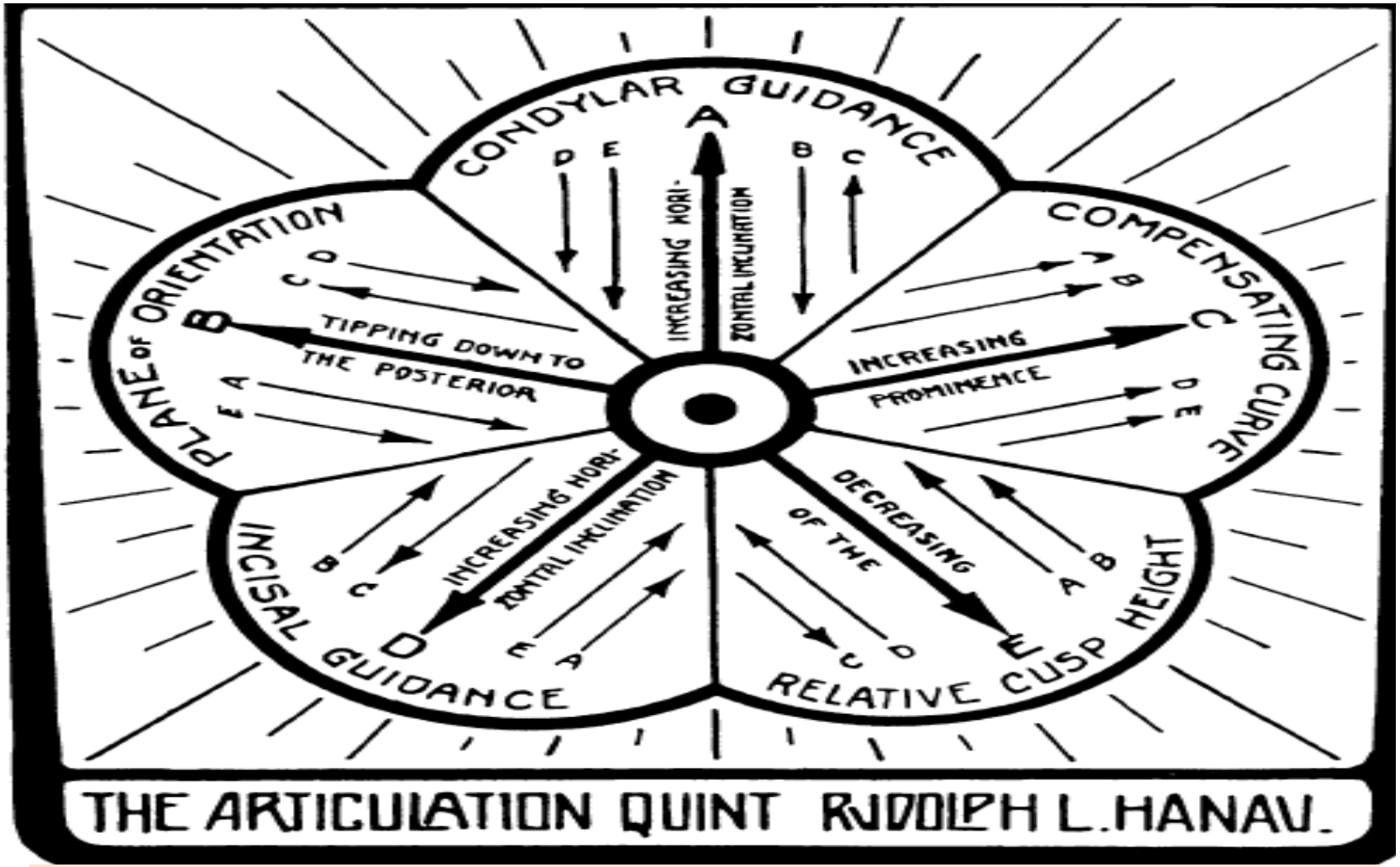


Fig. 10.76: Hanau's quint
Arrows away from the centre
increase jaw separation

- These nine factors are called the laws of balanced articulation. Hanau later condensed these nine factors and formulated five factors, which are commonly known as Hanau's quint:

- Condylar guidance
- Incisal guidance
- Compensating curves
- Relative cusp height
- Plane of orientation of the occlusal plane

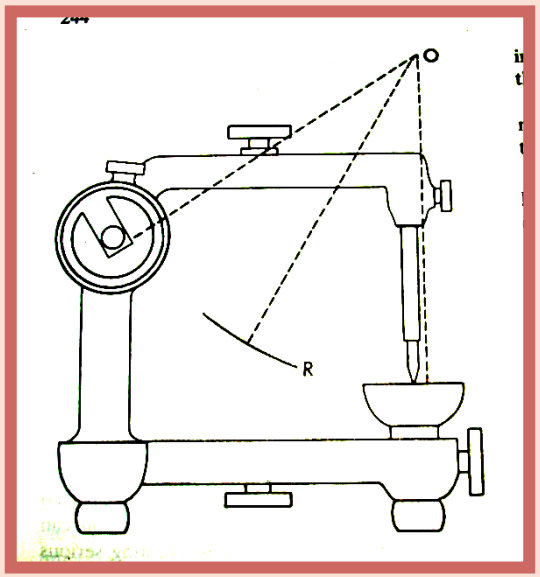
FACTORS INFLUENCING BALANCED OCCLUSION

- Inclination of the condylar path or condylar guidance
- Incisal guidance
- Orientation of the plane of occlusion or occlusal plane
- Cuspal angulation
- Compensating curves.

Incisal guidance

- This is defined as, “The influence of the contacting surface of the mandibular and maxillary anterior teeth on mandibular movements”.

- It is determined by the dentist and customized for the patient during anterior try-in.



- It should be set depending upon the desired overjet and overbite planned for the patient.
- If the overjet is increased, the inclination of the incisal guidance is decreased.

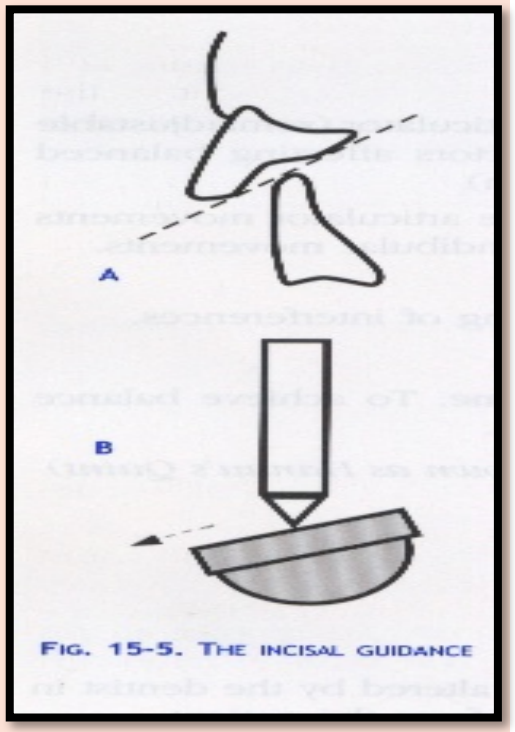


FIG. 15-5. THE INCISAL GUIDANCE

- If the overbite is increased, then the incisal inclination increases.

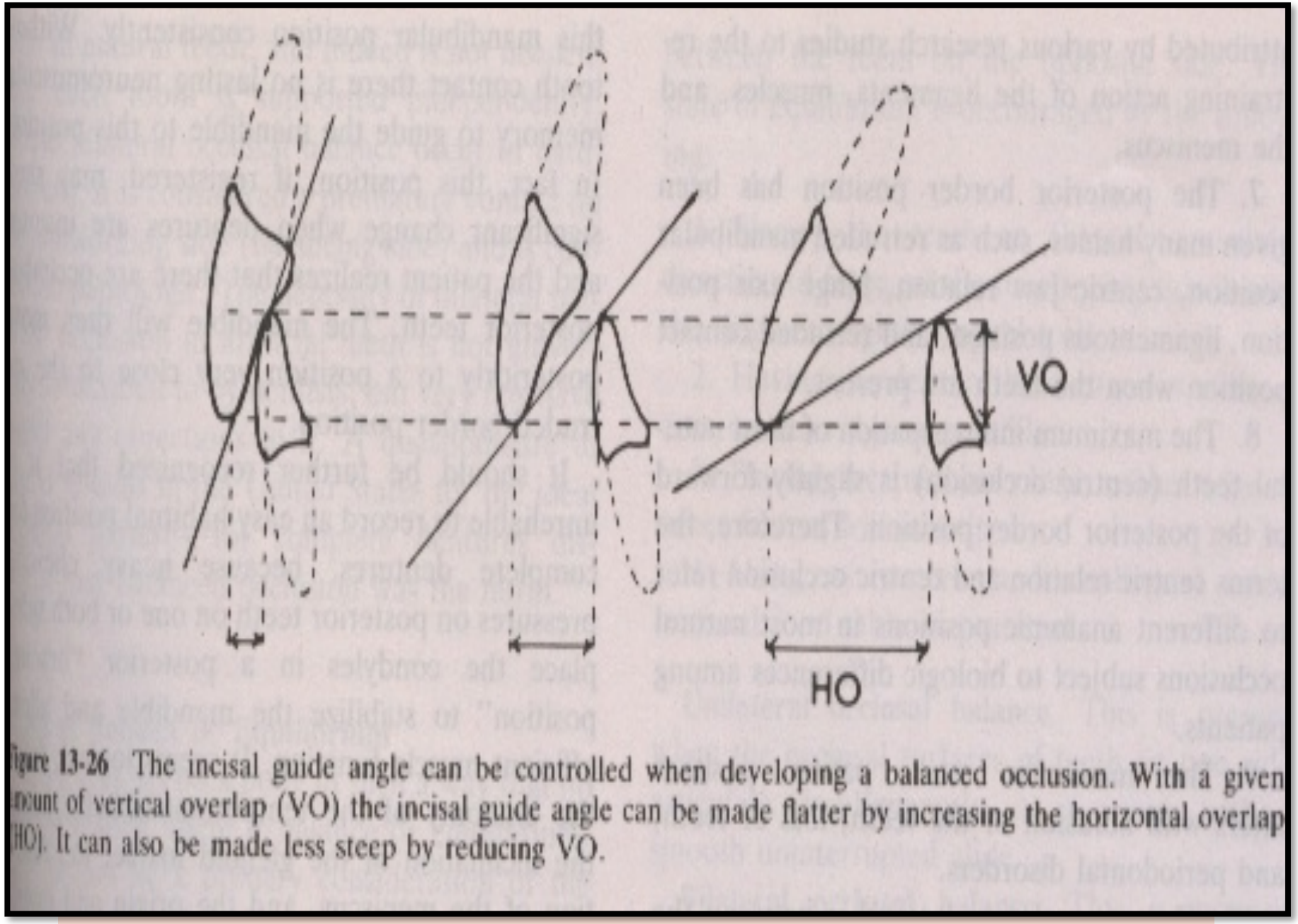
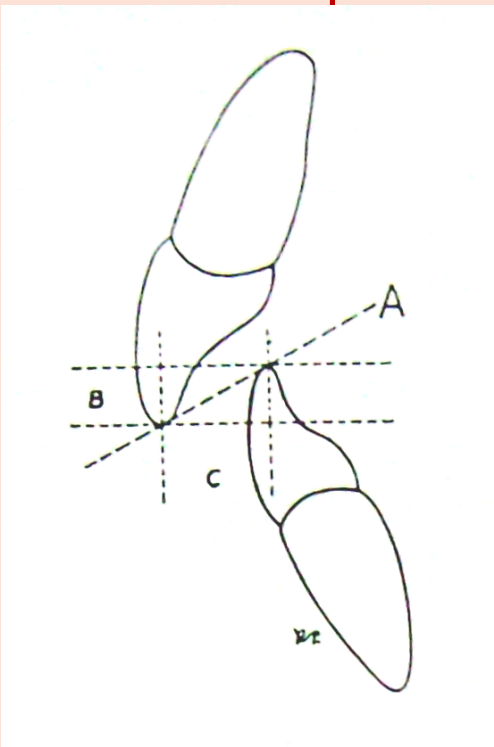


Figure 13-26 The incisal guide angle can be controlled when developing a balanced occlusion. With a given amount of vertical overlap (VO) the incisal guide angle can be made flatter by increasing the horizontal overlap (HO). It can also be made less steep by reducing VO.

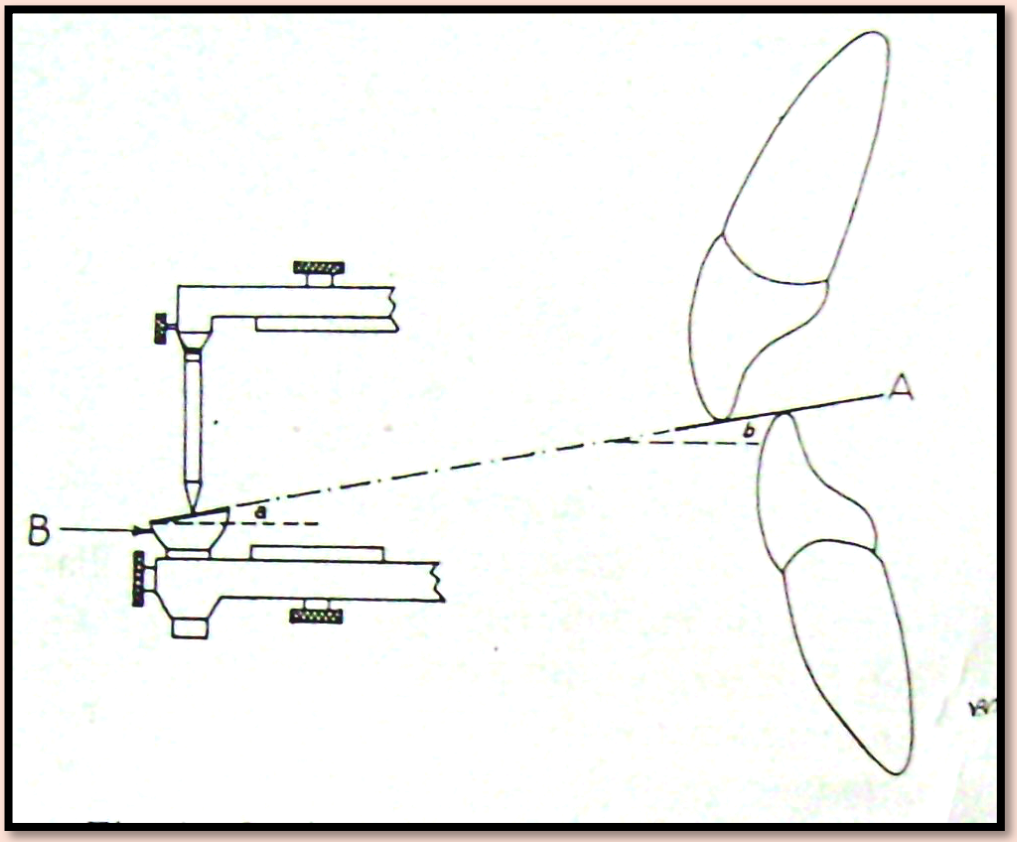
- The incisal guidance has more influence on the posterior teeth than the condylar guidance.
- During protrusive movements,

the incisal edge of the mandibular anterior teeth move in a downward and forward path corresponding to the palatal surface of the upper incisors.



This is known as the protrusive incisal path or incisal guidance.

- The angle formed by this protrusive path to the horizontal plane is called as the protrusive incisal path inclination or the incisal guide angle



- If the incisal guidance is steep, it requires steep cusps, a steep occlusal plane, or a steep compensating curve to effect the occlusal balance. Because of steep inclined planes, this type of occlusion is detrimental to the stability and equilibrium of the denture base.

- In a complete denture, the incisal guide angle should be as flat as possible.

- The location and angulation of the incisors are governed by various factors like esthetics, function and phonetics, etc.

Condylar guidance

- Condylar guidance is a mandibular guidance generated by the condyles traversing the contours of the glenoid fossa.

- The condylar guidance and incisal guidance → end controlling factors.

- It acts as a posterior control factors.

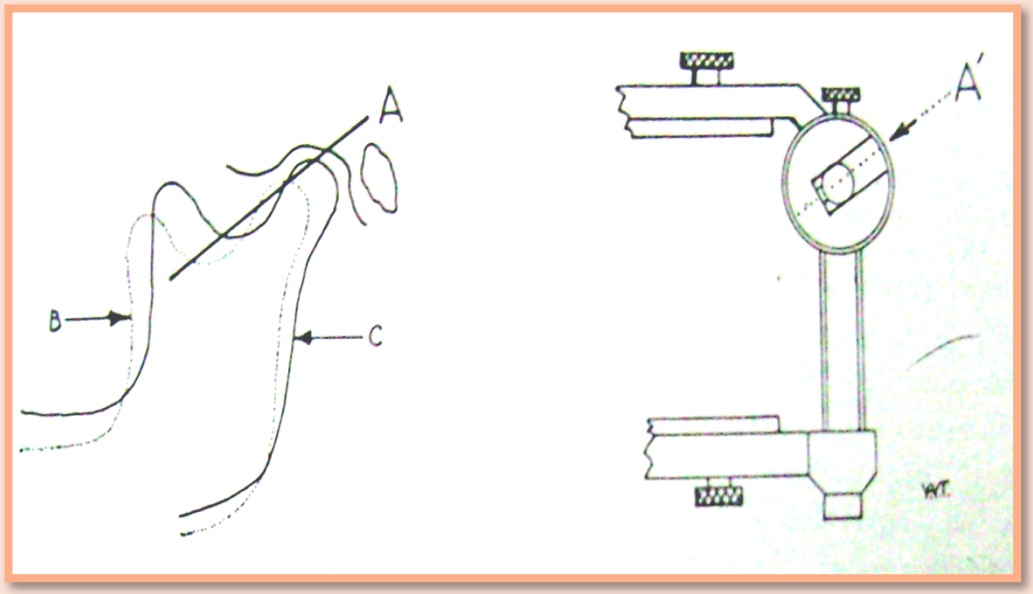
- It is the one factor which the edentulous patient presents and can in no way be modified by the operator.

- The condylar path is determined on the patient by a protrusive record and set on the instrument.

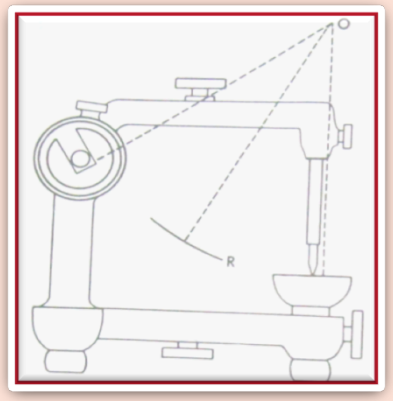
- The degree of condylar inclination registered results from:

1. The shape of the bony contour of the TMJ.
2. Action of muscles attaching the mandible.
3. Limitations of movements effected by the attaching ligaments.

- Among all the factors condylar inclination is most important in securing balanced articulation and form one of the end-controlling factor.



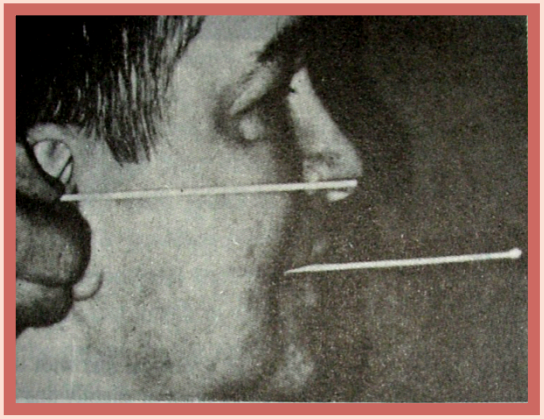
Plane of occlusion



- 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 the tips of the occluding surface of the posterior teeth."

- It is not a plane in the true sense of the word but represents the mean curvature of the surface.

- 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.

- It can be slightly altered and its role is not as important as other factors. Tilting the plane of occlusion beyond 10^0 is not advisable.

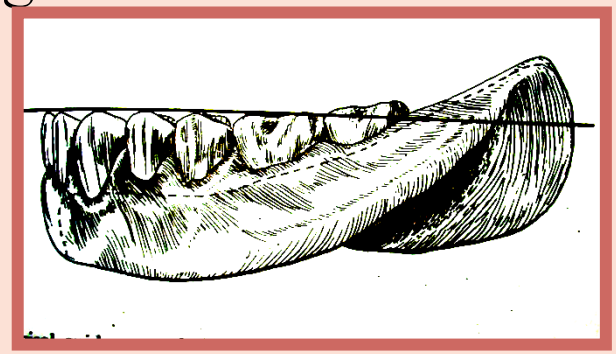
Compensating curve

- 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.
- There are two types of compensating curves namely:
  Anteroposterior curves
  Lateral curves

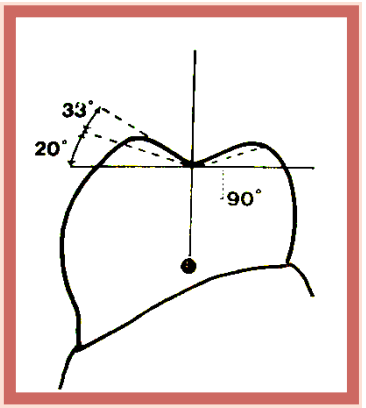
- A steep condylar path requires a steep compensatory curve. If a shallow compensating curve is given for the same situation, there will be loss of balancing molar contacts during protrusion.

- Curve of Spee, Wilson's curve and Monson's curve are associated only with natural dentition.

- In complete dentures compensating curves similar to these curves should be incorporated to produce balanced occlusion.



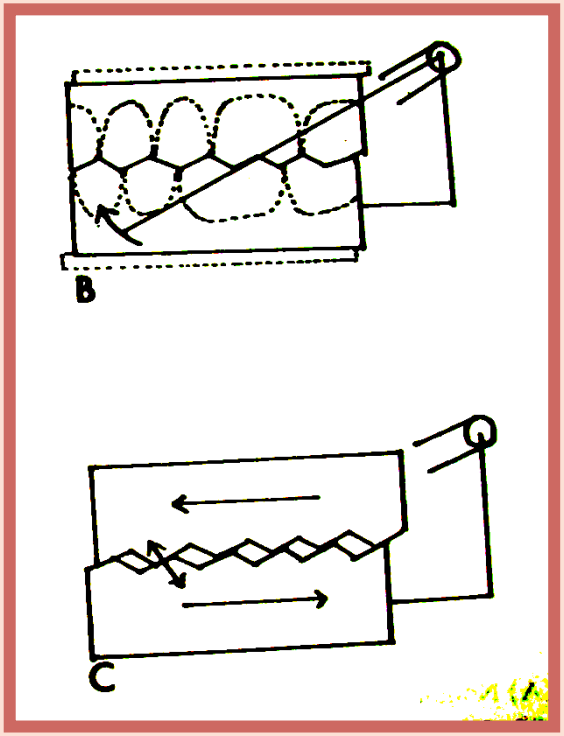
Cusps Height and inclination



- These are important determinants as they modify the effect of plane of occlusion and the compensating curve.

- Cuspal inclination refers to the angle between the total occlusal surface of the tooth and the inclination of cusp to that surface

- 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.



- In cases with a shallow overbite, the cuspal angle should be reduced to balance the incisal guidance. Teeth with steep cusps will produce occlusal interference in these cases.

- In cases with a 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.

Contacts in balanced articulation:-

- ***Working side:-*** the mandibular buccal cusp ridges make articular contact with the maxillary cusp ridges as the mandibular lingual cusp ridges are making contact with the maxillary lingual cusp ridges.

- ***Balancing side:-*** the mandibular buccal cups and their occlusal facing ridge, contacts maxillary lingual cusps and ridge.

- ***Protrusion:*** incisal edges of the mandibular anterior teeth contact with the lingual surfaces of the maxillary anterior teeth.
- The mesiobuccal and lingual cusp ridges of the mandibular teeth contact the distobuccal and lingual cusp ridges of the maxillary teeth

Balance in non-anatomic teeth:

- Can be accomplished in one of 2 ways.
- One can either set the teeth in a compensating curve as is done in anatomic forms
- or one can set the teeth in a flat plane, and utilize a balancing ramp just distal the 2nd molar.
- This ramp is adjusted so that the upper 2ndmolar will contact it in eccentric movements and thus provide three point contact.

- Pleasure (1937) set premolars and 1st molars in and anti-monson curve, this avoids a tipping force and sets the denture; in order to provide eccentric balance during tooth contacts the 2nd molar are set in the conventional monsoon curve.

- This combination of monsoon and anti-monson curve in posterior occlusion is often referred to as the pleasure curve.

SELECTIVE GRINDING:

The errors in occlusion seen in completed denture may result from

I) undetected error in jaw relation.

II) Errors in mounting casts.

III) Differences due to processing errors and

IV) changes in supporting structures.

- These are corrected by selective grinding. A clinical and lab remount is done.
- Errors are detected by a articulating paper and areas ground be means of no16, 11 mounted cheyes stone. Errors in centric occlusion are corrected first and then errors in lateral movements. In centric , if the opposing teeth are ling, deepen the fossa.

- In lateral movements, BULL’S law is followed i.e. only buccal cusps of the maxillary teeth and the lingual cusps of the mandibular teeth on the working side are reduced.

- On the balancing side, lower buccal cusp triangular ridge reduce. In protrusive movements distal inclines of buccal upper cusp ridges and mesial inclines of lingual lower cusps ridges are relieved.

ARRANGEMENT OF TEETH

Arrangement of anatomic type artificial teeth into balanced occlusion:

- Amount of overjet should not be less than 2mm in centric relation.
- Anterior teeth set according to best possible esthetics, phonetics and function.

- Steep condylar guidance or steep incisal guidance and combination of them suggest prominent compensating curve with steep anteroposterior and lateral cusp height.
- This is detrimental to the stability of denture.
- Condylar guidance must be accepted as recorded but the incisal guidance should be kept as flat as possible.

- The upper premolars should be positioned so as to present a normal dental arch outline.
- Practically a straight line from the canines to the mesiobuccal cusp of upper first molar, thus, contributing to esthetics.
- In other words, the buccal vestibule should be in evidence when the patient smiles.
- The lower first premolars may be positioned buccally to the crest of the ridge occasionally in order to occlude correctly with the upper premolars

- After artificial teeth have been satisfactorily arranged, the final waxing should be done in a manner which will provide the desired buccal, labial and lingual contours without destroying the occlusion, already established.

- Once the bases are sealed to their respective casts, all routine laboratory procedures are carried out.

Summary and conclusion

The nature of the supporting structures for complete dentures and the forces directed to them by the occlusion creates a special biomechanical problem. Following the pattern set by the natural teeth does not give us all the answers. Biologic, physiologic, and mechanical principles need to be considered and carefully coordinated in this new man-made occlusion. Through the years there have been many different solutions proposed to give the patient an ideal occlusion. To date, none has scientifically been proven the best, but this in no way' suggests that sound basic principles are of little concern.

The concern should be there for the health and preservation of the supporting structures. Apply all of the factors that favor the stability of the base, and design the occlusion to function optimally in relation to the forces of mastication.Occlusal designs can be varied according to the dentist's preference and can still control the force so that the loss of tissue attributed to occlusion can be minimized.

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