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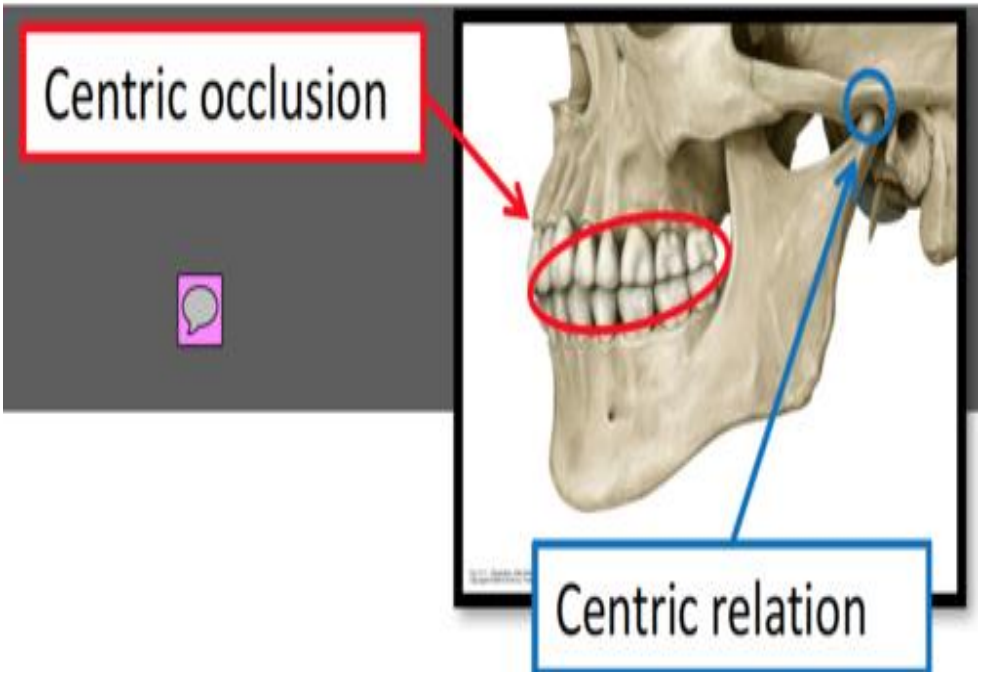
5th stage / lec 5 ***Dr. Hasanein Al-namel***

Occlusion in Complete Denture

1. **OCCLUSION**: the static relationship between the incising and masticating surfaces of the maxillary or mandibular teeth or tooth analogs. It is also called the Maximal intercuspal position the complete intercuspation of the opposing teeth, independent of two condylar positions. Occlusion, in a dental context, means simply the contact between teeth. More technically, it is the relationship between the maxillary (upper) and mandibular (lower) teeth when they approach each other, as occurs during chewing or at rest. It could be:

- Static occlusion refers to contact between teeth when the jaw is closed and stationary (centric occlusion)
- dynamic occlusion refers to occlusal contacts made when the jaw is moving. (eccentric occlusion) Mandibular movement can be: opening closing, protrusive, and lateral it may be Working side is the side that the mandible moves toward in the lateral excursion. The nonworking side is the side that the mandible moves away from during lateral excursion

2. **ARTICULATION**: It is the contact relationship of maxillary and mandibular teeth as they move against each other. The contact relationship of the occlusal surfaces of the upper and lower teeth when moving into and away from centric occlusion.
3. **CENTRIC RELATION CR**; a maxilla mandibular relationship, independent of tooth contact, in which the condyles articulate in the anterior-superior position against the posterior slopes of the articular eminences.it is a clinically useful, repeatable reference position. (bone to bone)
4. **CENTRIC OCCLUSION CO:** the occlusion of opposing teeth when the mandible is in centric relation; this may or may not coincide with the maximal intercuspal position. (tooth to tooth)



5. occlusal balance: a condition in which there are simultaneous contacts of opposing teeth or tooth analogs on both sides of the opposing dental arches during eccentric movements within the functional range.
6. occlusal harmony: a condition in maximal intercuspal position and eccentric jaw relation in which there are no interceptive or deflective contacts of occluding surfaces.
7. occlusal interference
   - Any tooth contact that inhibits the remaining occluding surfaces from achieving stable and harmonious contacts.
   - Any undesirable occlusal contact

Requirements of ideal complete denture occlusion:

1. Stability of denture in both centric and eccentric relation.
2. Balanced occlusal contact bilateral.
3. Cusp height reduced to control horizontal force.
4. Cutting, penetrating, and shearing efficiency of the occlusal surface.
5. Incisal clearance during posterior function like chewing.

6. Unlocking (removing interference) of cusps mesiodistally.

Objectives of occlusion in complete denture:

1. Preservation of the remaining tissues
2. Proper masticatory efficiency
3. Enhancement of denture stability, retention and support
4. Enhancement of phonetics and esthetics

Types of occlusions

1. Balance occlusion
2. Lingualized occlusion
3. Monoplane occlusion

1. Balance occlusion

Balance occlusion in complete dentures can be defined as stable simultaneous contact of the opposing upper and lower teeth in a centric relation position and a continuous smooth bilateral gliding from this position to any eccentric position within the normal range of mandibular function.

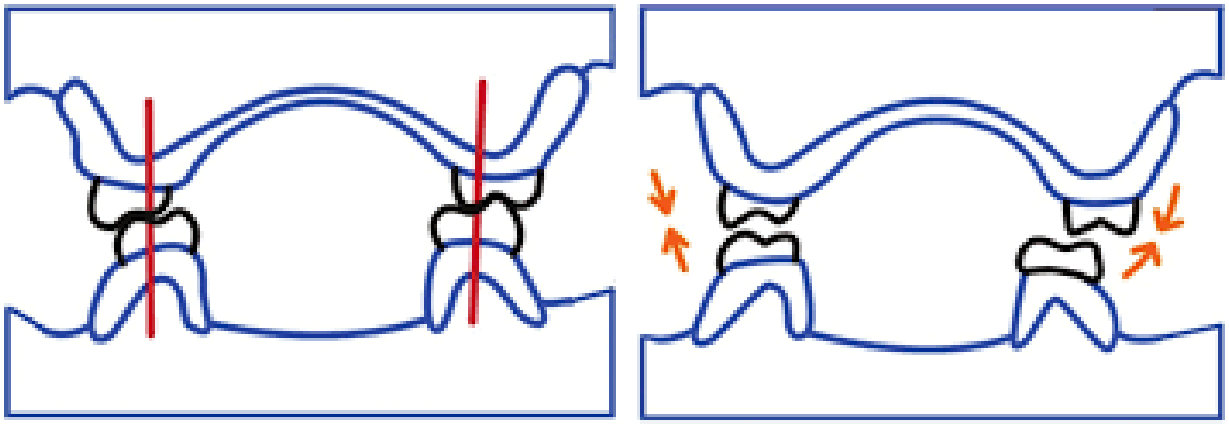
In lateral excursion: (working side)

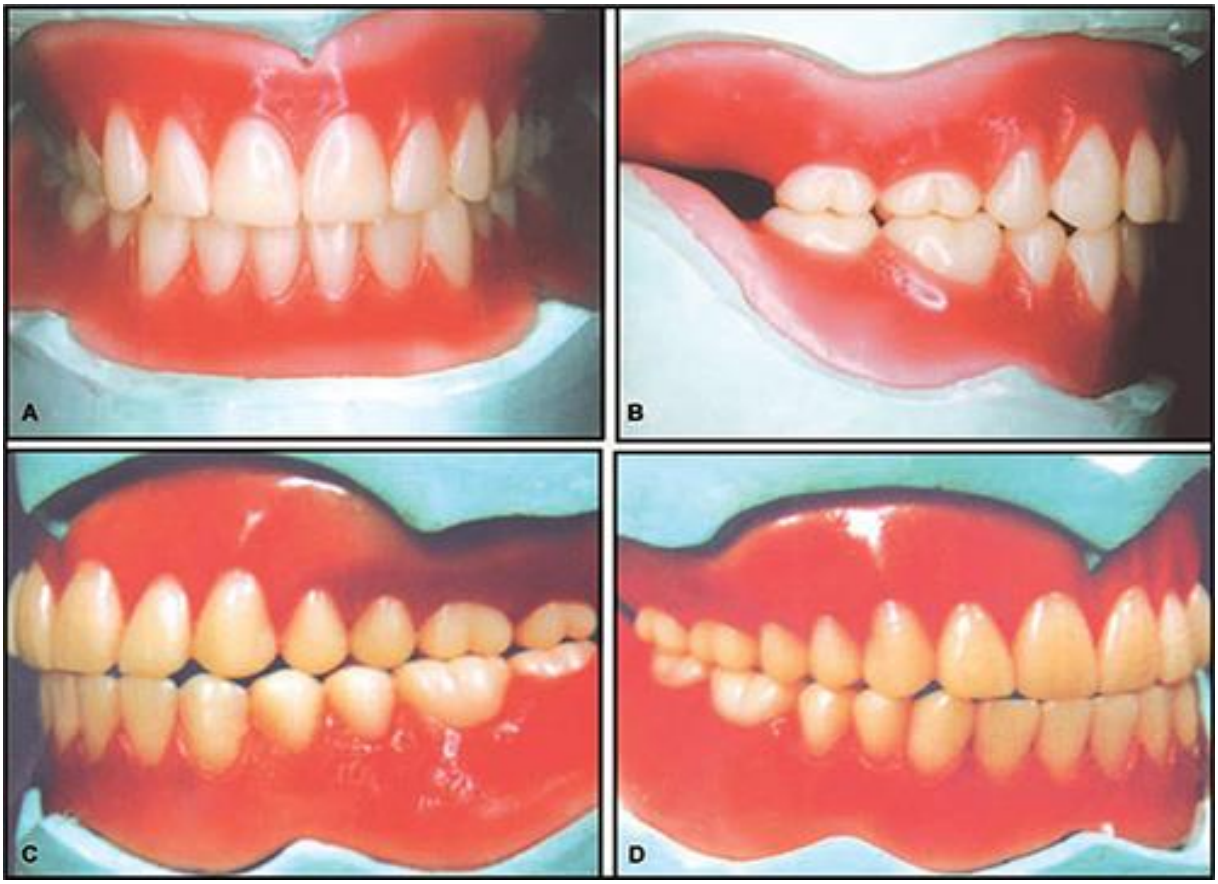
- **Anterior teeth**: the maxillary & and mandibular anterior teeth contact on the working side.
- **Posterior teeth:** the buccal & and lingual cusps of the maxillary & and mandibular posterior teeth are in contact.
- If lingualized occlusion, the maxillary lingual cusp will be in contact with the mandibular lingual cusp.

In lateral excursion: balancing side

- **Anterior teeth**: the maxillary & and mandibular anterior teeth may contact with the balancing side.

- **Posterior teeth**: the lingual cusps of the maxillary teeth will be in contact with the buccal cusps of the mandibular teeth. With monoplane-balanced occlusion, usually only the second molars are in contact or the balancing ramp.





Advantages of Balance occlusion:

1. Distribution of load
2. Stability
3. Reduced trauma
4. Functional movement
5. Efficiency
6. Comfort

Factors affecting the balanced occlusion (Laws of Articulation Hanau quint)

1. Condylar guidance
2. Incisal guidance
3. The occlusal plane
4. The compensatory curves
5. Cusp angulation

Interrelation between these factors may be described by Theilman's formula.

$$\text{Balanced occlusion} = \frac{\text{condylar inclination} * \text{Incisal guidance s}}{\text{Occlusal plane} * \text{compensatory curve} * \text{cusps angulation}}$$

According to this formula

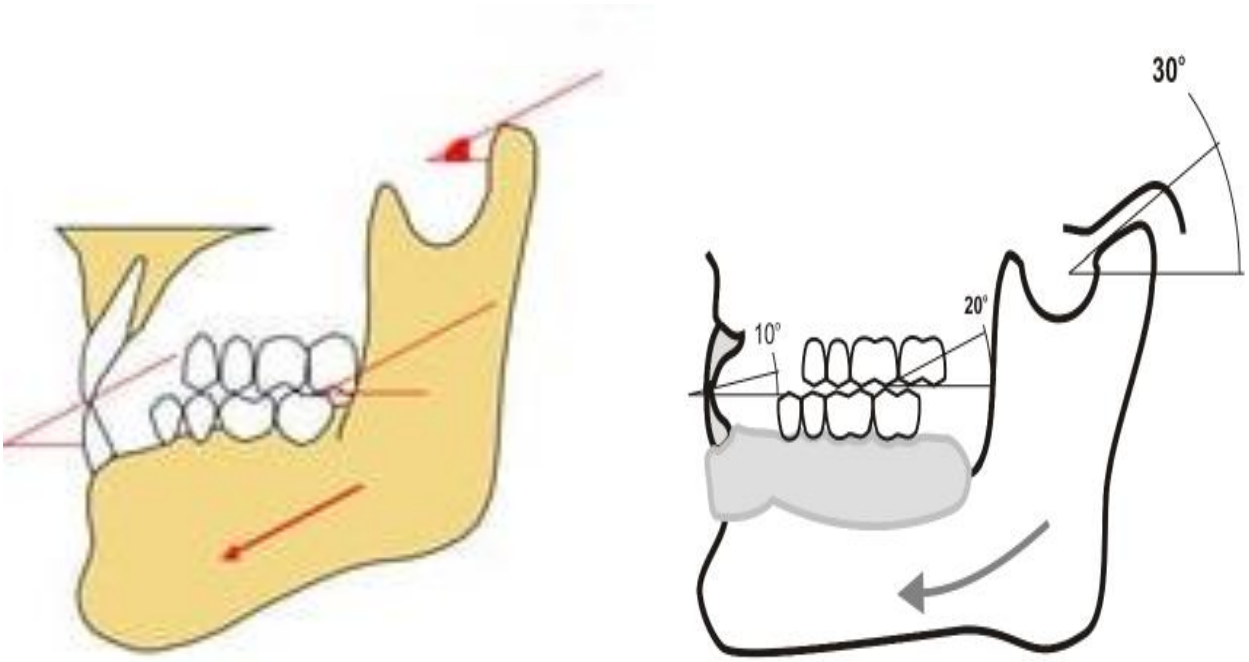
1. **Condylar guidance**:

It could be defined as

1. The angle is formed by an imaginary horizontal line at the superior head of the condyle and the path that the condyle will pass through during function. It varies from individual to individual because of anatomical differences. It's About 30^{o}-33^{o}.
2. condylar guidance: mandibular guidance generated by the condyle and articular disc traversing the contour of the articular eminence [GPT9]

3. condylar guidance: the mechanical form located in the posterior region of an articulator that controls the movement of its mobile member [GPT9]

The first factor of occlusion is the condylar guidance, this factor is recorded by the patient so it is a fixed factor that cannot be modified by the dentist.



2. Incisal guidance:

- Incisal guidance:

the influence of the contacting surfaces of the mandibular and maxillary anterior teeth on mandibular movements. It is usually expressed in degrees of angulation from the horizontal by a line drawn in the sagittal plane between the incisal edges of the upper and lower incisor teeth when closed in centric occlusion.

- Incisal guidance:

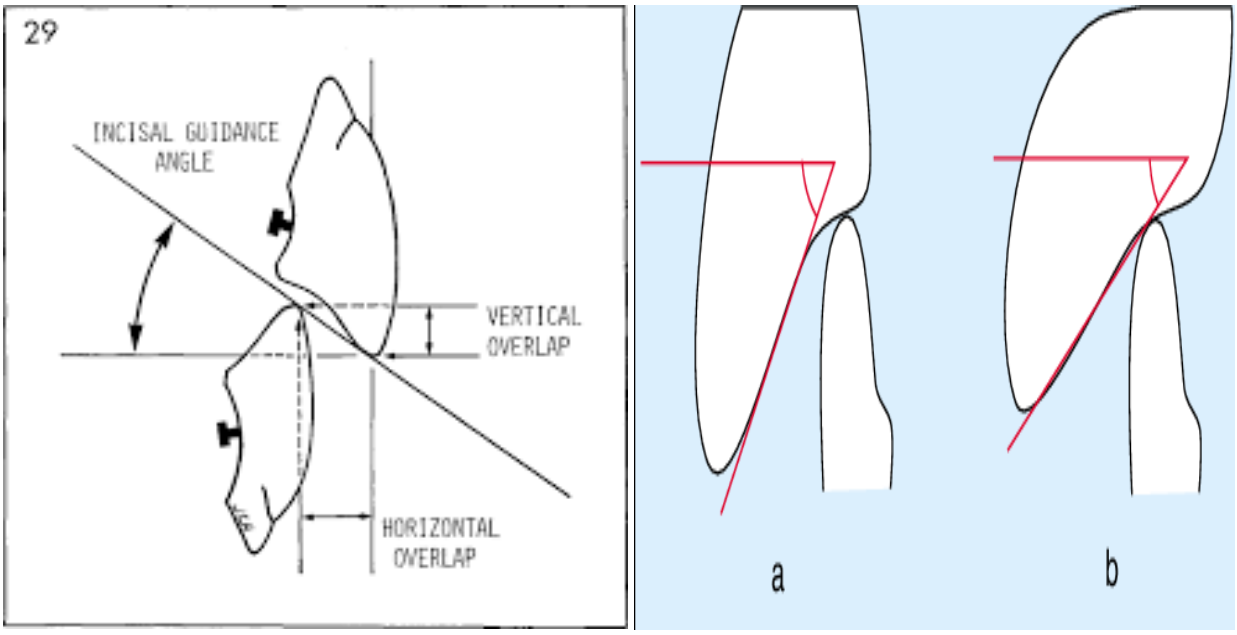
the influences of the contacting surfaces of the guide pin and guide table on articulator movements. Incisal guidance depends on the:

a. Desired over jet.
b. Overbite.

This angle varies directly with the vertical overbite and inversely with the horizontal overjet.

This angle is set to 10˚ in CD and not exceeding 20˚

This angle is determined by esthetic, phonetic, ridge relation, and inter-alveolar distance, this means it is under the control of the dentist.

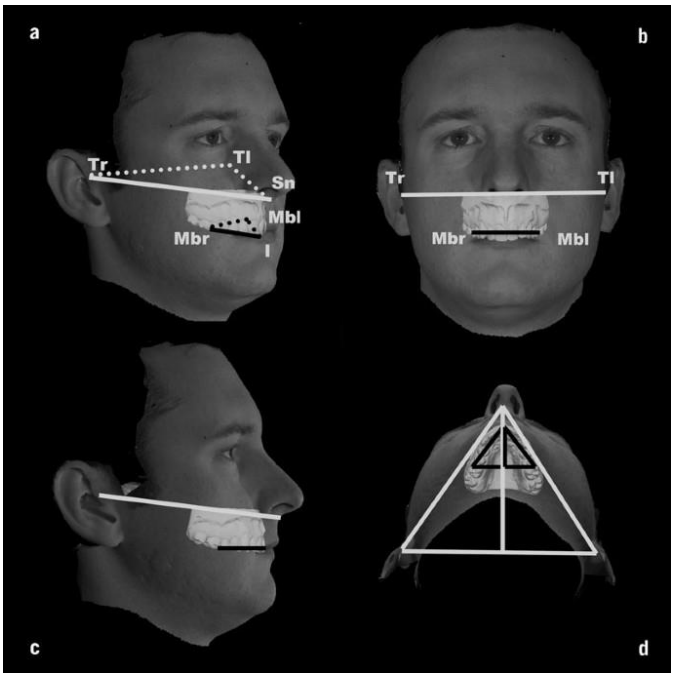


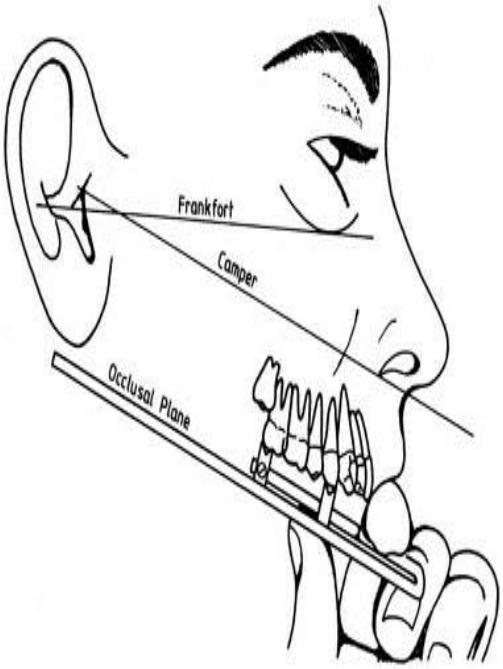
3. plane of occlusion (occlusal plane):

it is an imaginary surface related anatomically to the cranium and theoretically touches the incisal edge of incisors and the tip of the occluding surface of posterior teeth

The maxillary occlusal plane should parallel to the interpapillary line, posteriorly usually parallel to the ala-tragus line

The mandible is established anteriorly by the cusp height of the lower canine near the commissure of the mouth(corner) and posteriorly by the retromolar pad.





4. The compensating curve:

The curvature of the occlusal plane of dentures, created to permit balanced occlusion, to compensate for the paths of the mandibular condyles as the mandible moves from centric to eccentric positions, the arc introduced in the construction of complete removable dental prostheses to compensate for the opening influences produced by the condylar and incisal guidance during lateral and protrusive mandibular eccentric movements [GPT9].

- The compensating curve incorporated in a properly oriented plane of occlusion.
- Compensating curve in artificial dentition is the anteroposterior curve.

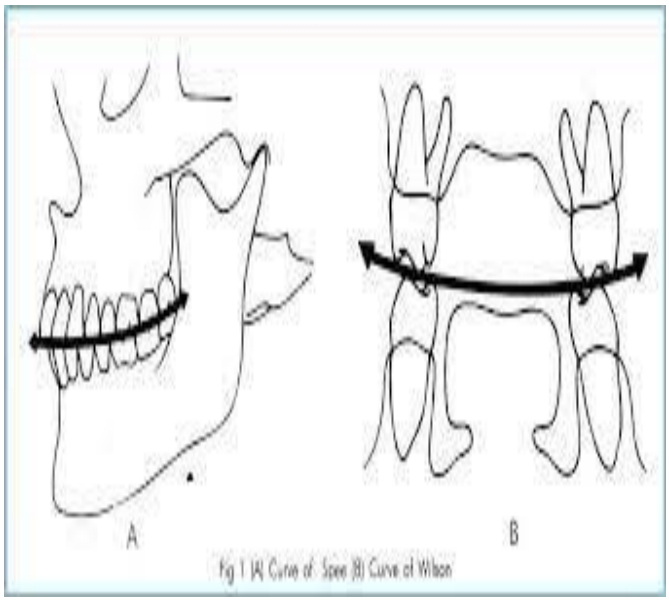
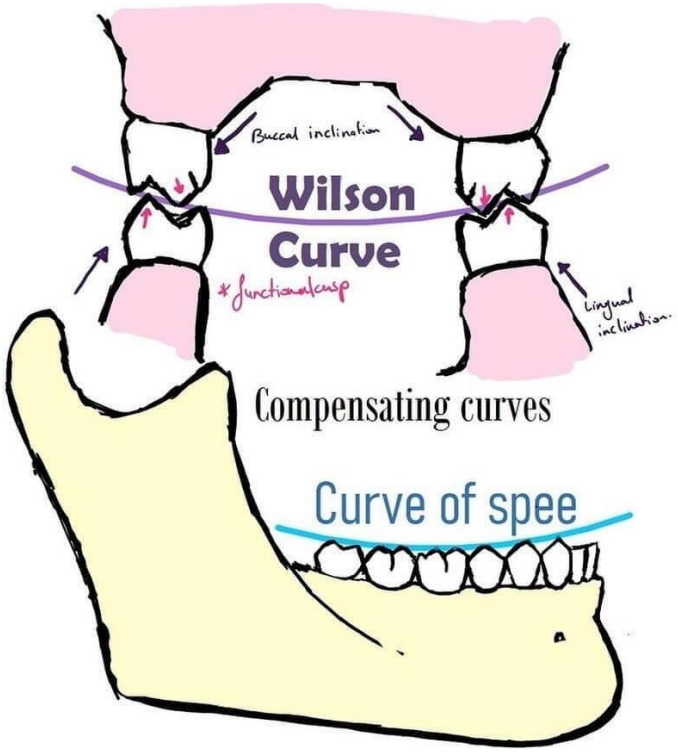
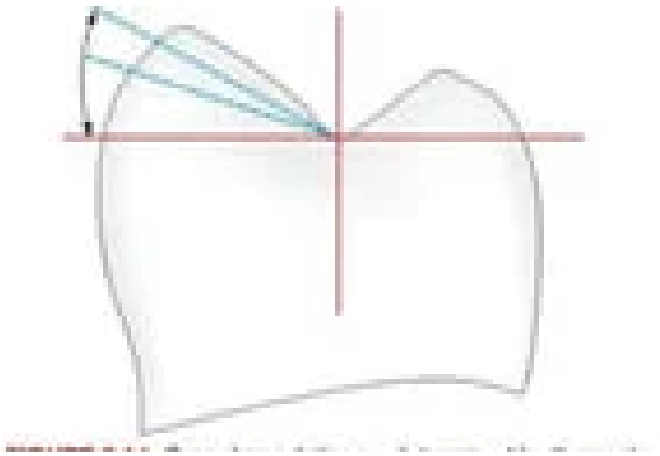


Fig 1 (A) Curve of Spee (B) Curve of Wilson



5. Cuspal angulations

or inclination of cuspless artificial teeth It depends on several factors residual ridge, neuromuscular control, esthetics) however, it's better to reduce the Cuspal inclination to help reduce horizontal forces of occlusion.



Interaction of the five factors:

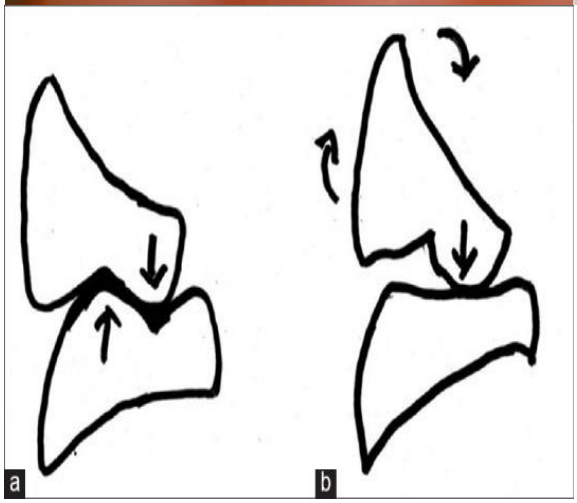
Three of them can control two of them (the incisal guidance and the plane of occlusion) can be altered only a slight amount because of esthetic and physiologic factors. The important working factors for the dentist to manipulate are the compensating curve and the inclinations or cusp on the occlusal surfaces of the teeth.

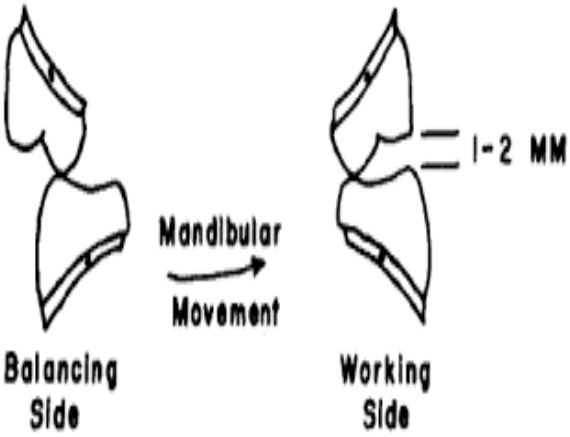
The cusp angulation also could be altered by monoplane artificial teeth.

2. Lingualized occlusion:

It involves the use of a large upper palatal cusp against wide shallow lower central fossa.

- The buccal cusps of the upper and lower teeth do not contact each other.
- The maxillary palatal cusp tip should contact the opposite mandibular central fossa.
- The cusp incline of mandibular teeth is relatively flat resulting in less lateral force and displacement during function





Indication:

1. High esthetic needed.
2. Week muscle of mastication.
3. Displaceable supporting tissue.
4. Sever alveolar bone resorption.
5. Discrepancy in ja size. Narrow upper arch and wide lower arch
6. implant supported over denture.
7. Previous successful denture with lingualized occlusion.

Advantages:

1. Simpler technique. Less precise CR records

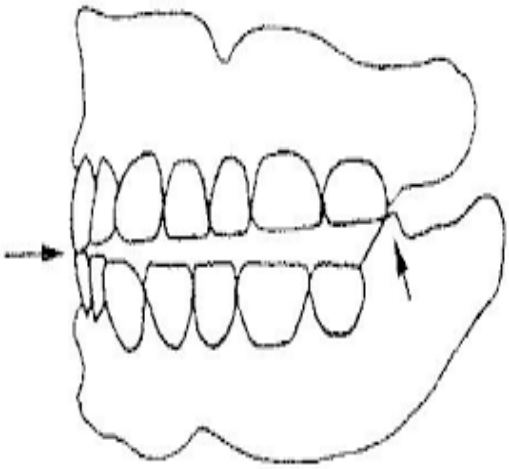
2. Esthetics.
3. Better penetration of the food bolus.
4. easier to adjust occlusion
5. it may be used in classII, and classIII and cross-bite.
6. Centralization of vertical forces.
7. Minimizing tipping force.
8. Potentially bilateral balance

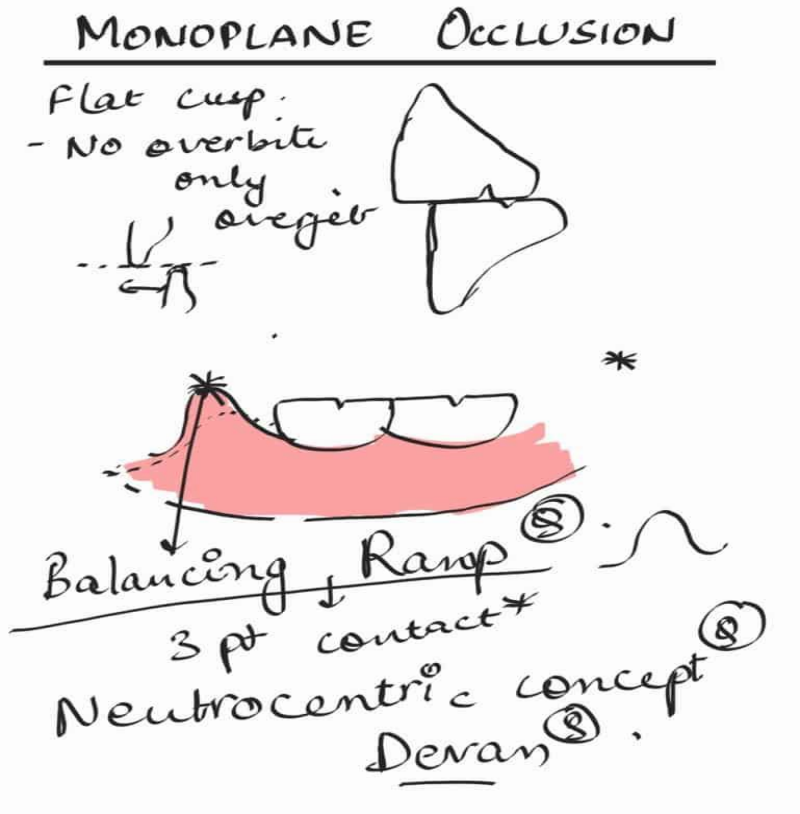
Disadvantages:

1. Difficulty in obtaining repeatable centric record (incoordination of jaw relation)
2. Severe ridge resorption (lateral forces displace the denture) may more easily be handled with a monoplane scheme

3. Monoplane occlusion or (neutrocentric):

- Flat occlusal plane set with non-anatomic teeth.
- The anteroposterior occlusal plane is parallel to the denture foundation area.
- There is no vertical overlap of anterior teeth.
- Tooth Contact should occur only when the mandible is in centric relation.
- Opposing artificial teeth should not contact when jaws are in eccentric relation.
- In protrusion there is the disclosure of posterior teeth as a result of arrangement in a single plane. The patient is instructed not to incise the bolus
- There is no curve of spee or curve of Wilson (compensating curves).





Indications

1. Jaw size discrepancies Class II, and Class III malocclusion and cross bite.
2. Uncoordinated jaw movement.

3. Mostly for geriatric patients.
4. In the case of the minimal ridge or ridge resorption
5. it reduces horizontal forces indicated for minimal implant number; it may help.

Advantages:

1. Simple technique and less time-consuming.
2. Less precise jaw relation records.
3. Lateral forces are reduced by eliminating Cuspal inclines.
4. Simpler and easier occlusal adjustments.
5. Occlusion is not locked.

Disadvantages:

1. Least esthetic.
2. Poor bolus penetration.
3. Cannot be balanced in eccentric excursions.

Types of Occlusal Scheme:

1. **Anatomic teeth**.

Simulate the natural teeth form with an inclination of approximately 30-33 degrees

Advantages:

- Esthetic.
- Better food penetration.
- Vertical stress decrease.
- Harmony with TMJ and muscle of mastication.
- Balance occlusion in an eccentric position

Disadvantages:

- Precise technique required.

- More time.
- Difficult teeth position in Cass II &Class III
- Greater lateral force

2. **Semi-anatomic teeth**

The cusp incline is less steep than anatomical teeth called modified anatomical teeth (less than 30^{o})

Advantages:

- Esthetic.
- Good chewing efficacy
- Less lateral force.
- Balance occlusion.

Disadvantages

- least esthetic.
- poor bolus penetration.
- cannot be balanced in eccentric excursions

3. **Non anatomical teeth**:

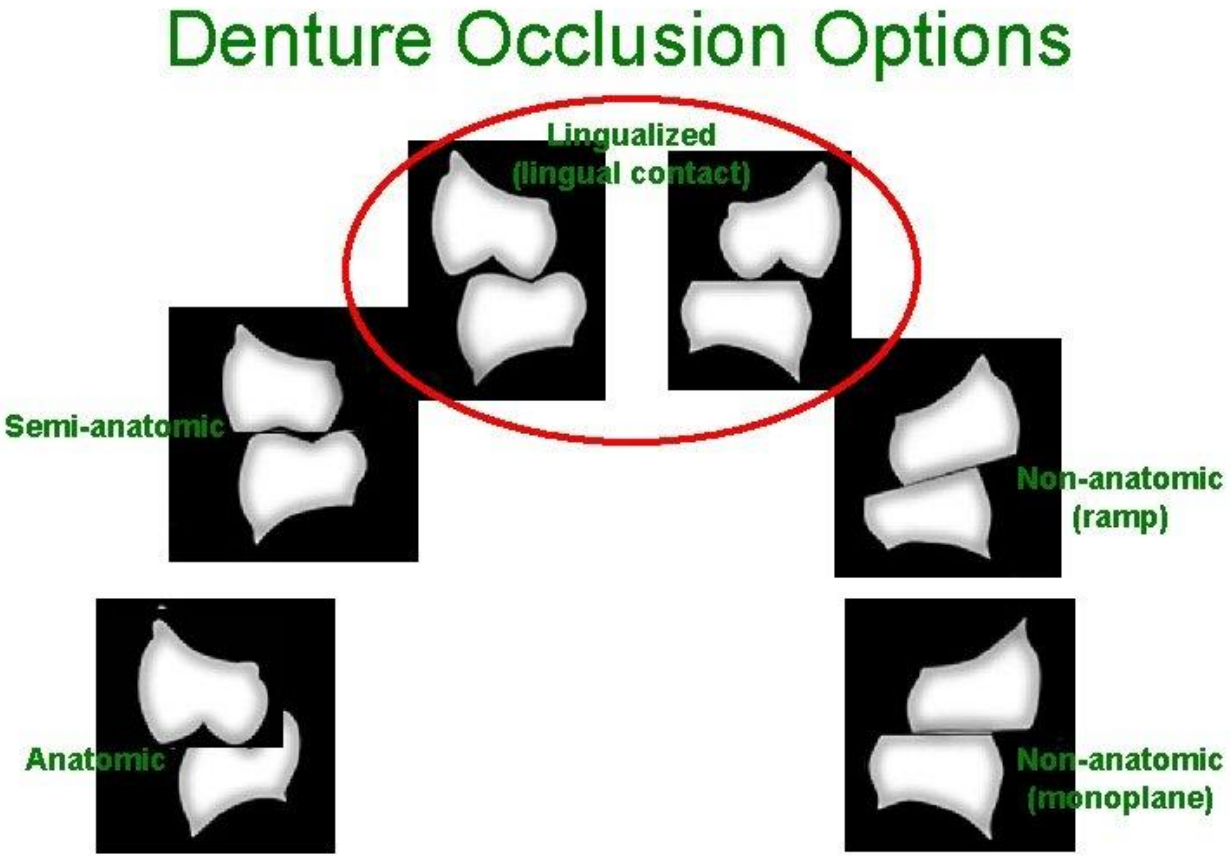
Flat and without cusp height.

Advantages

- Used for patients with poor neuromuscular coordination.
- Used for patients with malrelation jaws.
- Used for patients with crossbite or class III
- More comfortable.
- Less time required in setting up.
- slightly more esthetic than neutrocentric occlusion.

Disadvantages:

- Use of a compensatory curve may cause the same damaging effects as Cuspal inclines.
- Occlusal adjustment is more difficult to accomplish



Factors influencing the selection of occlusal scheme

1. Characteristics of occlusal scheme:
    - Tooth form and arrangement
    - Balanced or not
2. Characteristics of the patient:
    - Height and width of the residual ridge
    - Aesthetic demands of the patient

- Skeletal relations
- Neuromuscular control
- Tendency for parafunctional activity