

PROSTHESIS

COMPLETE DENTURE



Lec. 11

Articulator

Dr / Zeena Farhan

Articulators

- 60-80 min contact between teeth in the 24 hour
- **Occlusion** : the static relationship between the incising or masticating surface of the maxillary and mandibular teeth
- **Articulation** : dynamic relationship of the tooth surface to their opponents during movement of the mandible in function
- **Def:** mechanical device or instrument that represents the temporomandibular joints and jaws, to which maxillary and mandibular casts may be attached to simulate some or all mandibular movements
- ✓ Mounting the cast: attaching it to the members of the articulators using plaster and/or the mounting ring
- **Functions of articulators: (purpose)**
 - 1) To hold the maxillary and mandibular cast determined fixed relationship
 - 2) Act as a patient in the absence of the patient
 - 3) Articulators can simulate, but they cannot duplicate, all the possible mandibular movements.:
 - ✓ Due to mucosa resiliency but cast is rigid
 - ✓ Oral environment like tongue and saliva not present in articulator
 - ✓ Shape of condylar element and condylar guidance not similar to TMJ
 - 4) Mounting dental casts for diagnosis and treatment planning.
 - 5) Fabrication of occlusal surfaces for dental restoration.(adjustment of occlusion)
 - 6) Arrangement of artificial teeth for complete and removable partial dentures.
- **Uses :**
 - 1) To diagnose the state of occlusion in both the natural and artificial dentition
 - 2) To plan the dental procedure based on the relationship between opposing natural and artificial teeth (evaluation of balance occlusion)
 - 3) To aid in the fabrication of restoration and prosthodontics replacement
 - 4) To correct and modified complete restoration
 - 5) To arrange artificial teeth
- **Advantages**
 - 1) Visualization of the patient's occlusion especially from the lingual side.
 - 2) Patient cooperation is not a factor once the appropriate inter occlusal records is obtained from the patient.
 - 3) Considerable chair time and patient appointment time is saved.

- 4) The patient's saliva, tongue, and cheeks are not factors when using an articulator
- 5) The refinement of complete denture occlusion in the mouth is extremely difficult because of shifting denture base and resiliency of the supporting tissue (clinical remount) inter occlusal record can be obtained and complete denture occlusion can be refined outside the mouth on an articulator
- 6) More procedure can be delegated to auxiliary personal when utilizing an articulator for development of patient occlusion

➤ **Limitation :**

- 1) Metal , plastic articulator show error in tooling (manufacturer)
- 2) It not exactly simulate the intraborder and functional movement of the mandible
- 3) Errors in jaw relation procedure are reproduced as errors in denture occlusion , articulator do not have any provision to indicate or correct these errors
- 4) Actual hinge axis different from arbitrary hinge axis on the articulator (the large the difference the more disadvantage)

Mandible	Articulator
Protrusive	Upper arm move in a posterior direction
Right lateral	Upper arm move to left direction
Left lateral	Upper arm move to right direction

N.B:

- ❖ **Condylar Path:** is the true Path traveled by the patient's condyle
- ❖ **Condylar guidance:** is the artificial representation of the path on the articulator
- ❖ **Incisal path:** path traveled by the lower incisor edge from palatal surface of the maxillary incisor till edge to edge contact.
- ❖ **Incisal guidance:** artificial device representing this path on the articulator

➤ **Minimal articulator requirements:**

- 1) The articulator must accurately maintain the correct horizontal and vertical relationship of the patient's casts.
- 2) The casts must be easily removed and attached to the articulator without losing their correct relationship.
- 3) The articulator should have an incisal pin with a positive stop to preserve the patient's vertical dimension.
- 4) The articulator should be able to open and close in a hinge like fashion.
- 5) The construction should be accurate, rigid, and of non-corrosive material.

6) The moving parts should resist wear. The adjustment should be able to move freely and be definitely secured. The articulator should be stable on the laboratory bench and not too bulky and heavy.

7) The non-moving parts should be of a rigid construction

8) The articulator should accept a face-bow transfer utilizing an anterior reference point

9) The design should be such that there is adequate distance between the upper and lower member

10) The articulator should be stable on the laboratory bench and not too bulky and heavy

➤ **Additional (advanced) requirements**

- Needed to make balanced occlusion

1- The articulator should accept a face bow transfer.

2- Have adjustable condylar guidance (should allow right lateral , left lateral and protrusive movement)

3- The condyle guides should be adjustable horizontally

4- The articulator should have provision for adjustment of Bennett movement

5- Have adjustable Incisal guidance (the incisal guide table should be mechanical table that can be adjusted in the sagittal and frontal plane or a table that can be customized with auto-polymerizing resin or by grinding)

6- Has adjustable inter condylar distance

➤ **Records transferred from patient for balanced occlusion:**

1- Inter occlusal record (centric relation + vertical dimension)

2- Face bow record (to mount upper cast)

3- Protrusive record

4- Right lateral record

5- Left lateral record

Classification of Articulators

➤ **Classification According to according to the instrument capability and record acceptance into:**

Class I: Simple holding instruments:

🕒 Instruments in this class accept a single inter-occlusal record (centric relation) vertical motion may or may not be possible. The first articulator was a plaster slab articulator followed by a simple hinge articulator.

A- Plaster slab articulator: (Relator) (cast holder)

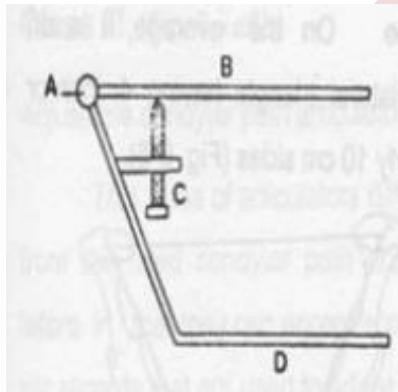
✓ Don't allow opening and closing.

✓ Only preserve the centric maxilla-mandibular relation.

- ✓ It was formed extending plaster index from the rear of the casts. The casts were keyed to each other by means of their indices
- ✓ All articulator are relator but not all relator are articulator

B- Simple hinge articulator: (Plane line) → non adjustable

- ✓ Component: It consists of two bows united by a hinge and a posterior screw adjustment that can raise or lower the distance between the bows
- ✓ Allow only opening and closing.
- ✓ Maintain vertical dimension
- ✓ Accept only centric occlusion and vertical dimension record
- ✓ Wear may take place at the hinge so it should be discarded.
- ✓ It can provide Balanced occlusion by using plaster and pumice occlusion rims depending on compensatory curves of patient
- ✓ Example : barn door , bonwill brass wire anatomical articulator



Class II: Mean value articulators → (fixed value) (nonadjustable)

➤ Component:

✓ These articulators have two jaw members, joined by two joints representing the TMJ.

✓ This joint consist of condylar element and condylar groove (slot) represent condylar guidance

✓ Have incisal guidance and incisal pin (to maintain vertical dimension)

✓ Non-arcon ex. Gysi articulator , mahdy articulator , arttek pro-articulator

➤ **Allow** opening, closing, lateral, protrusive movements.(all movement)

➤ **Accept:** inter occlusal record (centric relation and vertical dimension) and face bow records

➤ Have:

✓ Fixed sagittal condylar guidance from 30° - 33° .

✓ Fixed incisal guidance (10-15) $^{\circ}$

✓ Fixed bennet angle 7.5° - 12.5°

✓ Fixed inter-condyler guidance (100 -110 mm)

☒ This type of articulator can be used with or without face bow record.

☒ The upper cast can be mounted either by face bow record or according to an average making use of the Bonwill triangle which is:

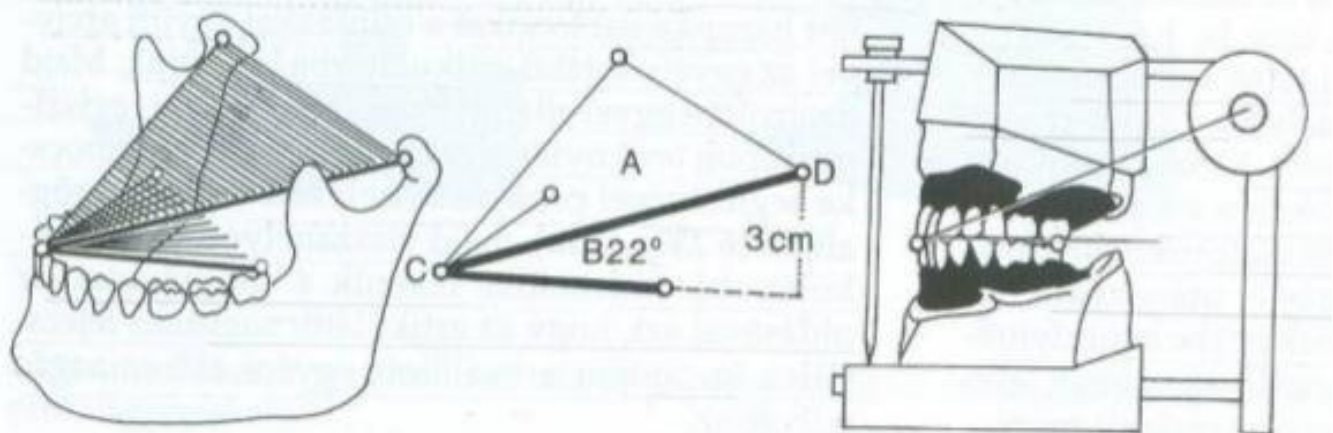
✓ On a dried mandible, if three lines are drawn to join both condyles and the tips of the lower central incisors, they will form a triangle. On the average, it is an equilateral triangle having 4 inch or nearly 10 cm sides

✓ Occlusal plane must make an angle to bonwill triangle , this angle called balkwill angle (15 degree)

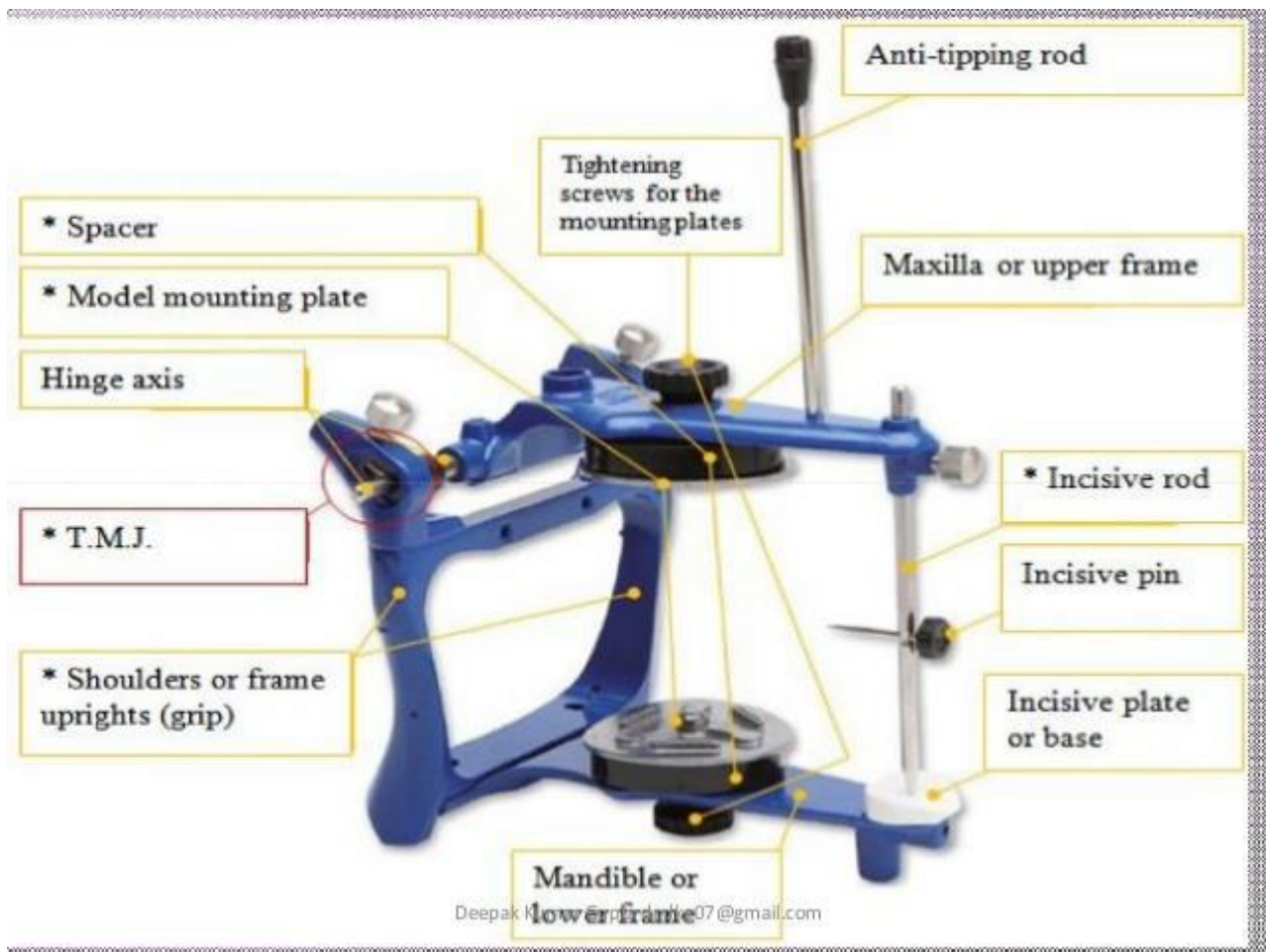
☒ It is so designed for ease of handling .Gysi and Mahdy articulators are representatives of this type

☒ Limited and not compatible to mandibular movement

☒ Cannot use plaster and pumice to make balanced occlusion



Balkwill and Bonwill ▲s



Adjustable condylar path articulator:

- ✓ There is two types Semi adjustable and fully adjustable
- ✓ Both have

- 1- Accept inter occlusal record (centric relation and vertical dimensions)
- 2- Accept face bow records
- 3- Accept prostrusive records
- 4- Allow all movements
- 5- Adjustable incisal guidance

➤ **Class III : Semi adjustable condylar path articulator**

- 1- Don't accept the lateral interocclusal records but accept lateral movement
- 2- Fixed inter-condyler distance (not totally adjustable)
- 3- Maybe arcon or non-arcon
- 4- Arcon widely used for production of fixed restoration because of their accuracy &
- 5- lateral condylar guidance is adjusted according to the Hanau's formula

□ $L = (H/8)+12$

- ✓ L: The lateral condylar inclination

- ✓ H: The horizontal condylar inclination
- An example of this type is Hanau model H articulator (non-arcon)
- Wibmix (arcon) can accept lateral record

Arcon	Non-arcon
✓ condylar sphere attached to the lower component and the mechanical fossa attached to the upper membrane of the instrument	✓ Reverse
✓ It is anatomically correct so we understand the mandibular movement better	✓ Used in complete denture because the upper and lower members are rigidly attached , permitting easier control when positioning artificial teeth
✓ Constant relation between maxillary occlusal plane and condylar guidance	✓ Not constant
✓ Inter-occlusal record when removed will not change the condylar inclination	✓ Inter-occlusal record when removed will result in less steep condylar inclination



Non arcon

Arcon

- **Class IV : Fully adjustable condylar path articulators**
- ✓ Right lateral record, to adjust the right lateral condylar guidance
- ✓ Left lateral record, to adjust the left lateral condylar guidance.
- ✓ Use kinematic facebow

- ✓ Need panto graphic record to trace envelop movement
- ✓ Ex: House, Phillips, and Hanau kinoscope



Classification According to location of the condylar element

- **Arcon articulator: (articulating condyle)**
 - Condylar element (ball) that represent condylar head has attached to lower member
 - Condylar guidance (slot) (groove): attached to upper member
 - More simulating patient in mandibular movements due to the movable member is the lower as in patient mouth → (Hanau articulator) (fully adjustable)
 - **NB:** Arcon fully adjustable articulators is called (simulator)
- **Non Arcon articulator:**
 - Condylar element (ball) that represent condylar head has attached to upper member
 - Condylar guidance (slot) (groove): attached to lower member
 - less simulating patient in mandibular movements due to the movable member is the upper member

➤ **Comparison between different types of articulators**

	Realtor	Simple Hinge	Mean value	Semi adjustable	Fully adjustable
Maintain VD + CO	Yes	Yes	Yes	Yes	Yes
Accept face bow	X	X	Some types	Yes	Yes
Sagittal condylar guidance	X	X	Fixed (30 – 33)	Adjustable	Adjustable
Lateral condylar guidance	X	X	Fixed	Adjustable from hanua Equition	Adjustable from lateral record
Incisal guidance	X	X	Adjustable in some types	Adjustable	Adjustable
Available movements	X	Open and close	All	All	All
Inter condylar distance	X	X	Fixed	Fixed	Adjustable

Dr. Zeena