

**National O.Bogomolets Medical University
Prosthetic Dentistry Department**

“Approved”
at the Methodist Council
of the Prosthetic Dentistry Department
“__” _____ 2024, protocol № _____

Head of Prosthetic Dentistry Department
Professor _____ Nespryadko V.P.

**Study Guide for Practical Study
(for Teachers and Students)**

Subject	Propedeutics of Prosthetic dentistry
Lesson topic	Biomechanics of masticatory apparatus. Devices used for lower jaw movement simulation. Articulation and occlusion.
Course	Course II (term 3)
Faculty	Stomatological

Foreign Students of Stomatological Faculty

Authors – Parii V.V.

Kyiv – 2024

1. TOPIC RELEVANCE

The masticatory apparatus is the initial part of the digestive system and consists of maxillary and mandibular bones with dental rows, temporomandibular joints and chewing muscles, whose activity is regulated by the central nervous system and is in close structural and functional unity. The main functions of the masticatory apparatus are chewing and speech. Knowledge of structure and function required by the dentist for the formation of professional competence in the diagnosis and effective rehabilitation of patients with occlusal and TMJ disorders and full mouth restorations.

2. Main goals of the lesson

Students must have an understanding of (α I):

- upper and lower jaws anatomy
- temporo-mandibular joints anatomy
- dental rows anatomy
- teeth occlusal surface anatomy

Students should know (α II):

- Peculiarities of TMJ function, biomechanical parameters of lower jaw movement.
- Functional occlusion, the map of occlusal contacts for different types of normal occlusion.
- Principles of occludators and articulators design.

Students should be able to (α III):

- To determine type of occlusion according to teeth contacts map.
- To determine articulator type depending on construction.

3. EDUCATIONAL OBJECTIVE

To form students' understanding of the importance and necessity of theoretical knowledge on such issues as:

- Harmony between masticatory apparatus parts during and after dental procedures.
- Individual approach in question of occlusion restore for successful prosthetic rehabilitation.
- Filling of Responsibility during prosthetic rehabilitation of patients and understanding of possible complications due to non-compliance of functional occlusion principles using.

4. INTERDISCIPLINARY INTEGRATION

Discipline	To know	To be able to
<u>Preliminary:</u> 1. <i>Anatomy</i>	1. Anatomy of all parts of masticatory apparatus	1. To recover harmonic interaction of masticatory apparatus parts using teeth and dental rows anatomy restore.
2. <i>Physiology</i>	2. Patterns of physiological processes during occlusal deprogramming og chewing muscles and TMJ function.	2. Deprogramming of chewing muscles function.
3. <i>Physics</i>	3. Biomechanics of lower jaw movements, occlusal contacts during articulation.	3. To analyze diagnostic models in articulator.

<u>Interdisciplinary integration between topics in this discipline</u>	Basic principles of teeth modeling	Modeling of occlusal surface of teeth and dental rows
---	------------------------------------	---

5. LESSON TOPIC CONTENTS

Biomechanics in dentistry is a science what explorer the structure and function of the musculoskeletal system of man and animals.

Gnatology is a section of biomechanics that studies the structural relationship and functional interaction between the components of the masticatory system - the temporomandibular joints, teeth and dental rows, masticatory muscles.

list of abbreviations:

MA – masticatory system

TMJ - temporomandibular joint

DR – dental row

LJ – lower jaw

UJ – upper jaw

CO – central occlusion

CR – centric relation

MIP – maximum intercuspation position

A – articulator

DCP – distal contact position

I. Glossary

Occlusion is a contact between teeth. This term used to show any static (in some period of time) contact between teeth. The term **dynamic or functional occlusion/articulation** used to the teeth contacts during all chewing movements (protrusive, retrusive, lateral)

Occlusion is the dynamic biological relationships of components of the masticatory system that control tooth contacts during function and dysfunction. It is essentially the integrated action of the jaw muscles, temporomandibular joints and teeth. (**I.Klineberg**)

Central occlusion is a relation of jaws when it is a maximum possible contacts between upper and lower dental rows are present during central position of mandibular condyles in articular fossae

Central occlusion is a start and finish point of all functional jaw movements

Centric occlusion (CO) can be described as the occlusion the patient makes when they fit their teeth together in maximum intercuspation (MIC). Common symptoms for this are Intercuspation Position (ICP), Bite of Convenience or Habitual Bite. It is the occlusion that the patient nearly always makes when asked to close their teeth together, it is the bite that is most easily to recorded. It is how unarticulated models fit together. Finally, it should be remembered that it is the occlusion to which the patient is accustomed is the habitual bite.

The **central position** of mandibular condyles is a position of the condyles, in which anterior, posterior and upper gaps are approximately equal to each other, as well as right and left.

Centric Relation (CR) is not an occlusion at all. CR has nothing to do with teeth because it is the only centric that is reproducible with or without teeth present. Centric relation is a jaw relationship: it describes a conceptual relationship between the maxilla and mandible. All attempts to lay down rigid definitions of centric relation are plagued by the fundamental difficulty that there is no sure or easy way of proving that the locating criteria have been achieved.

Intercuspal contact (IC) is the contact between the cusps, fossae and marginal ridges of opposing teeth.

Intercuspal position (ICP) is the position of the jaw when the teeth are in IC.

ICP and CO are not usually the same tooth contact positions, that is, there is a slide from CO to ICP.

MIP is the most closed complete interdigitation of mandibular and maxillary teeth irrespective of condylar centricity.

Central occlusion it is a start and finish moment for all functional movements and consist of *vertical* and *horizontal* components.

Vertical component of occlusion is a Vertical Dimension (VD) (controls by the teeth), Horizontal – central position of condyles in temporal fossae (controls by the TMJ ligaments).

Rest position (neutral position) of lower jaw – is a position of it without any function and controls by chewing muscles static tension. In rest position lower jaw located lower than central occlusal plane on 2-4 mm, teeth not in the contact, but lips closed.

Retruded jaw position (RP) is the guided jaw position with the condyles in a physiologically acceptable position for recording transfer records.

Retruded contact position (RCP) is the tooth contact position when the jaw is in RP.

Occlusal vertical dimension (OVD) is the vertical height of the lower third of the face with the teeth in ICP.

Lateral jaw positions:

- **Mediotrusive (non-working) side** contact arises when the jaw is moved or guided to the opposite side, and the mediotrusive side moves medially, that is, towards the midline.
- **Laterotrusive (working) side** contact occurs when the jaw is moved or guided to the side, that is, laterally to the right or left. The tooth contacts on that side are termed laterotrusive (or working) contacts.

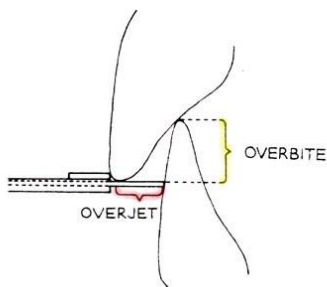
In orthognatic bite in lateral movement present only canine contacts (*canine guidance*) or canines with some premolars and molars (*group function*). On laterotrusive (non-working) side and in frontal area full disclusion.

A particular aspect of laterotrusive jaw movement is the number and arrangement of the teeth which are in contact in lateral or laterotrusive jaw movement. This is also termed *disclusion*. Disclusion may involve the anterior teeth only, which may be the canine tooth (*canine disclusion*), or incisor and canine teeth (*anterior disclusion*); or it may involve posterior teeth only - bicuspid and/ or molar teeth (*posterior disclusion*); or it may involve both anterior and posterior teeth (*group function*).

Canine guidance during lateral movement is a very important component what limits TMJ ligaments in horizontal plane and forms *lateral bounding component*.

Protrusive jaw movement (Anterior guidance) describes a forward (straight line) jaw movement, and protrusive tooth contacts include incisal tooth contact and disocclusion in distal area.

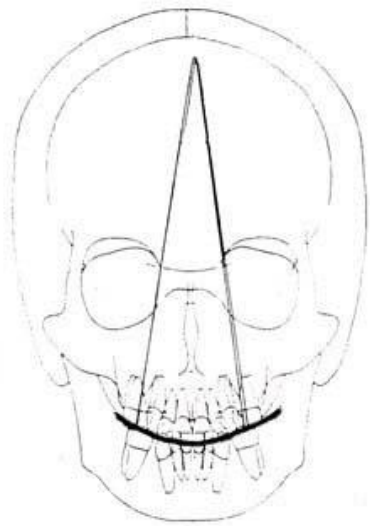
Incisal overlap (frontal guidance) is a limit component of TMJ in sagital plane and prevents molars excessive wearing.



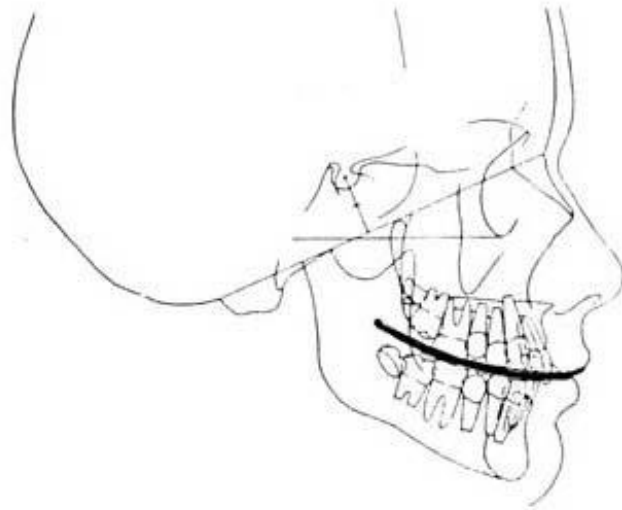
Anterior guidance is provided by the vertical (overbite) and horizontal or anteroposterior (overjet) relationships of anterior teeth. Posterior guidance is determined by the relationships of supporting cusp inclines, particularly of opposing molar teeth. Posterior guidance may be increased in the presence of missing teeth, with tilting and drifting of teeth, and by the curvature of the occlusal plane anteroposteriorly (**curve of Spee**) and laterally (**curve of Wilson**).

Curve of Spee: Allows for the normal functional protrusive movement of the mandible.

Curve of Wilson: Allows for those exquisite movements which are used in chewing functions.



Curve of Wilson



Curve of Spee

Bennett movement is a term that describes lateral movement of the condyle, that is, condyle movement to the laterotrusive (or working) side.

Bennett angle is the angle of the condyle formed with the sagittal plane on the mediotrusive side as the condyle moves forward downwards and medially.

Properly formed or restored dental rows provide occlusal protection of TMJs.

The ideal bite (P.Dowson):

- Should have **point contacts** of the maxillary posterior lingual cusp tips and the mandibular posterior buccal cusp tips to the central fossa or marginal ridges of opposing posterior teeth.
- Forces exerted on the posterior teeth should be directed through the long axis of the teeth.
- 'Normal' buccal positioning of the maxillary buccal cusps should be 'outside' or buccal to the mandibular teeth.
- Note 'U' shape of dental arches.

Campers horizontal plane is an anatomical orienteer in a sagittal aspect of cranium, based on a plane passing through the anterior nasal spine (acanthion) and the upper margin of each ear canal or external auditory meatus.

Frankfurt horizontal plane is the an anatomical orienteer in a sagittal aspect of cranium, based on a plane passing through the inferior margin of the orbit and the upper margin of each ear canal or external auditory meatus.

Occlusal plane – is a plane passing through occlusal contacts between upper and lower teeth in MIP. The angulation of this plane is close to the Camper plane, but not the same (not parallel to each other)!

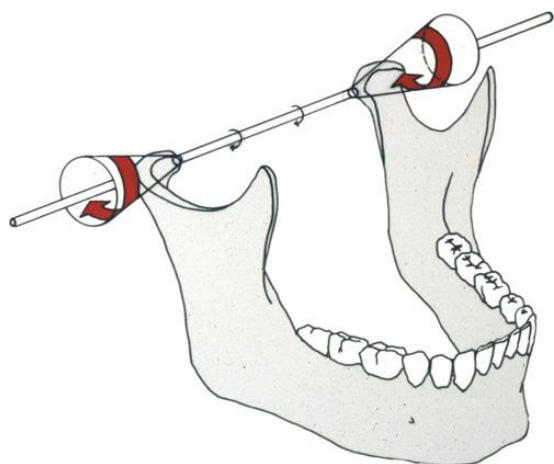
Prosthetic plane – is a plane passing through occlusal contacts on artificial teeth of dentures.

If the patient have partial dental row defect we use the natural teeth as orienteer for artificial teeth arrangement. For fully edentulous patients term prosthetic plane used because it's a occlusal plane of artificial dental rows in complete dentures.

- Fully edentulous patients don't have any oral orienteer for artificial teeth arrangement that's why external orientiers used. Most popular orienteer is the Camper plane (trago-nasal line) as a mot close to occlusal plane in a cranium. So the terms occlusal plane and prosthetic plane are not the same! First we use for natural teeth, second one to artificial only!

Biomechanics of the lower jaw movements.

Functional movements of the mandible occur during speech, mastication, and swallowing and take place within three-dimentional limits known as the border positions. The limits are determined by the morphology of the TMJ components and the associated neuromuscular system. Normal functional movements may frequently extend to these borders, provided there is no limitation from teeth contacts. Border positions and movements have been shown to be relatively stable and reproducible over a period of time, and such provide valuable reference points for use in diagnostic and treatment procedures.



Rotation movement:

- Rotation: “The process of turning around an axis: movement of a body about its axis.”
- Rotation is movement between the superior surface of the condyle and the inferior surface of the articular disc.

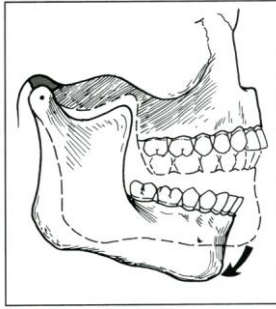


FIG. 4-1 Rotational movement around a fixed point in the condyle.

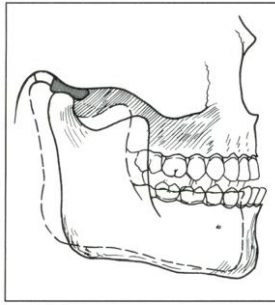
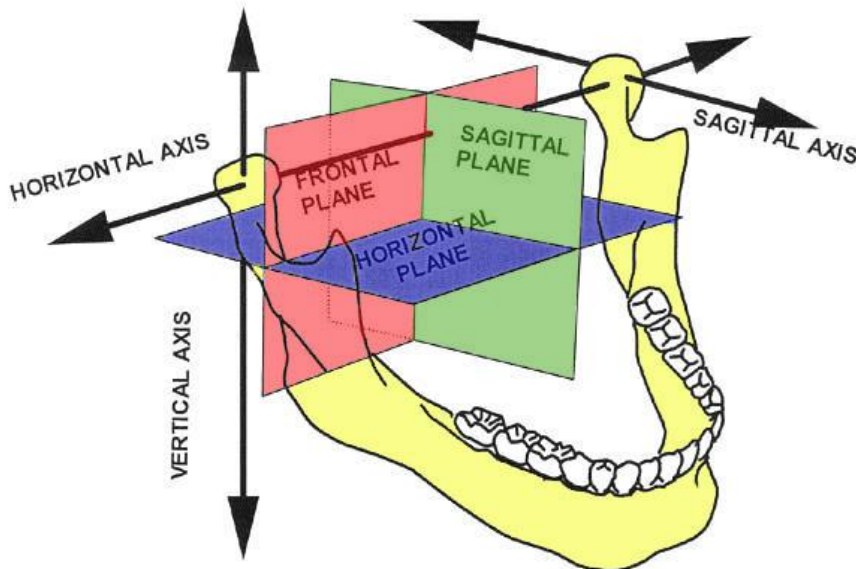


FIG. 4-5 Translational movement of the mandible.

Translational Movement:

- Occurs when the mandible moves forward (protrusion)
- Teeth, condyles, and rami, all move in the same direction and to the same degree
- Occurs within the superior cavity of the joint

All movements of the mandible can be registered in three dimensions and better evaluated when they are projected and viewed in orthogonal spatial plans. These projections and traces document the mandible border movements. All movements are examined in sagittal, frontal and horizontal planes. Sagittal plane bisects the skull into two symmetric mirror images anteroposteriorly. Frontal (coronal) plane is positioned toward the face perpendicular to the horizontal plane and intersects head in different points. Horizontal plane is parallel to the floor.



TMJ are a bilateral diarthroidal synovial hinge joints which consist of two articulations connected by the mandible. They are known as coupled- because both joints act together to produce synchronized jaw movements. The temporomandibular joints are formed by articular fossa (fossa mandibularis) of the temporal bone and condyles of the mandible and these articular surfaces are covered with avascular fibrous tissues. A synovial membranes and an articular cavities are present between them.

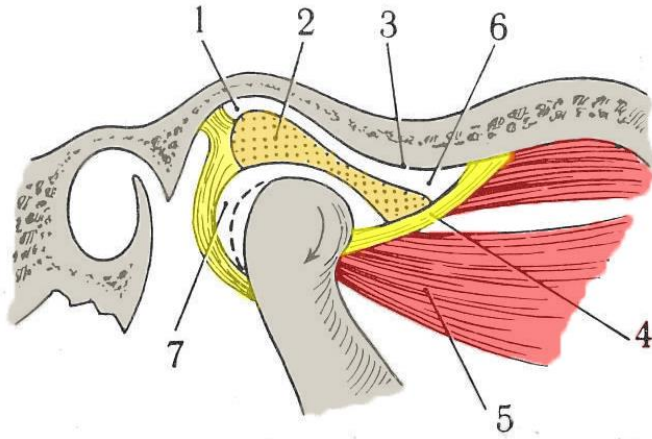


Diagram of temporomandibular joint.

1 – articular fossa; 2, – intraarticular disc; 3 – articular eminence; 4 –articular capsule; 5 – fibres of the lateral pterygoid muscle; 6 – superior articular space (upper joint compartment); 7 – inferior articular space (lower joint compartment).

Each of two articulations has an intraarticular cartilage disk, an articular capsule, and ligaments. Intraarticular disk separates joint space to upper and lower levels. Thanks to intracapsular disk it is possible to exhibit two types of movements in joints: rotation and translation. The upper compartment of the joint produces translation and the lower – rotation. During translation the condyle with disk moves against the glenoid fossae and the rotation of the mandible is the result of the condyle movement against the articular disk and glenoid fossa (Fig.2-2).

The disk consists of the dense connective tissues attached in posterior part to vascularized and innervated connective tissues “bilaminare zone”, which are known as the retrodiscal tissues or posterior attachment. Distally this part is placed to the posterior wall of the articular capsule. Medially and laterally the disk is attached to the poles of the condyle firmly. Anteriorly it fuses to the capsule and superior band of lateral pterygoid muscle. The extreme periphery of the disk is slightly innervated. The disk is avascular and without nerves in articulation part.

In the sagittal plane it can be divided in thickness into three parts: anterior and posterior parts are thick and intermediate part is thin and named as intermediate zone. In normal joint the articular surface of the condyle is located in the intermediate zone.

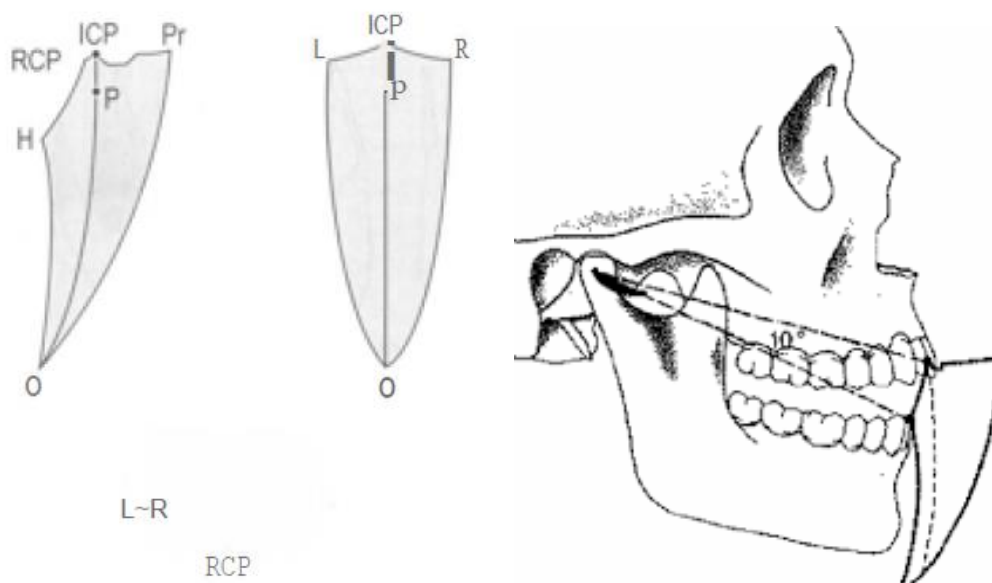
The condylar eminence is a plane that directs jaw movement. Deep distal wall limits the jaw retrusion (distal bounding component). The height of frontal and lateral walls of condyle fossa is less therefore frontal (protrusion) and lateral (laterotrusion) movements limited mainly with by ligaments tension and teeth. The incisors overbite forms frontal bounding component and canine guidance forms lateral bounding component.

Posselt's border movement diagram

Posselt (1952) described the full range of jaw movement in three planes by tracing the path of the lower incisor teeth as the jaw is guided through the border paths. The border path is the maximum range of jaw movement which is determined by the jaw muscles, ligaments, movement limitations of the temporomandibular joints, and the teeth. The teeth define the top of the border diagram which is of particular interest in restorative dentistry, as the relationship between ICP (IP) and CO (RCP) is diagrammatically

indicated. In the absence of teeth (as in complete edentulism) the top of the border diagram does not differentiate ICP (IP) and CO (RCP). The border diagram may be displayed in the sagittal, frontal and horizontal planes. The sagittal plane view of the border movement of the jaw in dentate individuals, as defined by the movement of the lower incisor teeth, shows features of particular interest:

- The top of the border path is defined by the position and cuspal inclines of the teeth (Fig. 1.2: K'P to RCP, rcr to Prj).
- The retruded path is defined by the anatomy of the temporomandibular joints (Fig. below: RCP to H; H to O).



Picture shows the sagittal (or profile) view of the border diagram with the anteroposterior relationships of ICP, RCP and Pr. The view also shows that the lower incisor tooth movement from ICP to RCP requires the jaw to be guided into RCP. Lower incisor movement from RCP to H follows a curved path that reflects the initial rotatory movement of the condyles. This is also described as rotation around the intercondylar or terminal hinge axis, that is, the axis of rotation between the condyles when they are guided around centric relation. The movement changes from rotation to translation (H to O) after approximately 15-20 mm of jaw opening at the lower incisors. B Shows the frontal view and C the horizontal view of the movement of the lower incisors along the border path. The sagittal view is the most informative. ICP, intercuspal position; RCP, retruded contact position; Pr; protruded jaw position; p. postural jaw position; O, maximum jaw opening; H, hinge arc of opening. Approximate range of jaw movement in adults: RCP-ICP 0.5-2.0 mm; ICP-O 40-70 mm; RCP-H 15-20 mm; P-ICP 2-4 mm; ICP-Pr 5-10 mm.

The jaw functional movements can be investigated in different ways on the level of TMJ or teeth. Axioigraphy is an extraoral method of jaw movements investigation. Functionography is the method used for intraoral jaw motion recording.

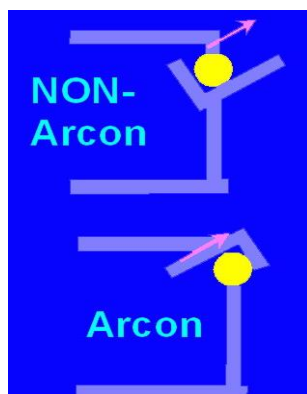
Optimal functional occlusion (Okeson J., 2008)

1. When the teeth close the condyles are in their most superoanterior position, resting on the posterior slopes of the articular eminences with the disks properly interposed. All teeth are in contacts but the anterior teeth contacts are slightly.
2. All teeth contacts provide axial loading of occlusal forces.
3. In laterotrusion the adequate teeth-guided contacts on the laterotrusive (working) side are present to disocclude the mediotrusive (non-working) side immediately. The most desirable guidance is provided by the canines (canine guidance).
4. When the mandible moves into protrusion the adequate tooth-guided contacts on anterior teeth are present to disocclude all posterior teeth immediately.

Artuculators in dental practice

Articulators are the devices which can reproduce jaws position and range of motions. The movements of the mandible are managed by the bones and ligaments of the TMJs which include hard and soft tissues function. The articulator movements with hard mechanics can be only relatively constant and reproducible. Most of the articulators are adjustable to simulate these movements. As a result, they can be used for diagnostics and treatment of a jaws and TMJ dysfunctional condition and teeth restoration. All articulators have different functional and mechanical restrictions and occlusal theories influence the design, construction and indication for using.

There are two main types of such devices: arcon and non-arcon (Pic.). They differ in condyle mechanism construction. Arcon articulator condyle part consists of condylar housing attached to the upper frame and the condylar balls connected to each side of the vertical bearing of the lower frame. Non-arcon articulator condyle constructed with condylar balls attached to the upper frame and the condylar housing are attached to the vertical stands of the lower frame. Non-arcon articulators do not precisely reproduce the anatomic features of the human skull, that's why arcon articulator is the most commonly used in dental practice (Fig. 2-43; 2-44).



There are many designs of articulators, but in general there are four different types according to possibility of customization:

- Simple hinge
- Average value (plane-line)
- Semiadjustable
- Fully adjustable

Simple hinge articulators provide a single hinge vertical movement without lateral movements. The distance of the maxillary arch to the intercondylar axis is much less than in the patient, and therefore intercuspal position recordings are an approximation. They have a limited application.



Average value articulators have their condylar angle fixed at 30°. There is no provision for an adjustment for condylar side shift but they may have an adjustable incisal guidance

Semi-adjustable articulators allow adjustment of condylar inclination and side shift (Bennett angle or progressive side shift) and in some designs for Bennett movement or immediate side shift. Intercondylar width is usually fixed at 110 mm, but some articulators allow different intercondylar width settings.



Fully adjustable articulators are more complex in their mechanical design and mechanism of data transfer from a patient and are believed to allow closer reproduction

of condylar movements. These articulators are designed to duplicate TM joint features by a series of condylar adjustments and also allow curved condylar translation paths. The condylar settings may be determined by axiographic investigation.

Many restorations are made on small non-adjustable articulators. Their use often leads to occlusal discrepancies in restorations, because these instruments do not have the capacity to reproduce the individual range of mandibular movement. Some discrepancies can be corrected intraorally.

The differences between the hinge closure of a small articulator and the patient are of practical significance. The distance between the hinge and the tooth to be restored is significantly less on this device than in the patient. Such articulator range of motion results in premature contacts, because cusp position is affected. This is important to note before treatment planning.

For routine fixed prostheses fabrication the semi-adjustable articulator is a practical approach to provide the necessary coincidence and to minimize clinical correction. This articulator can represent the anatomic structures properties and movements.

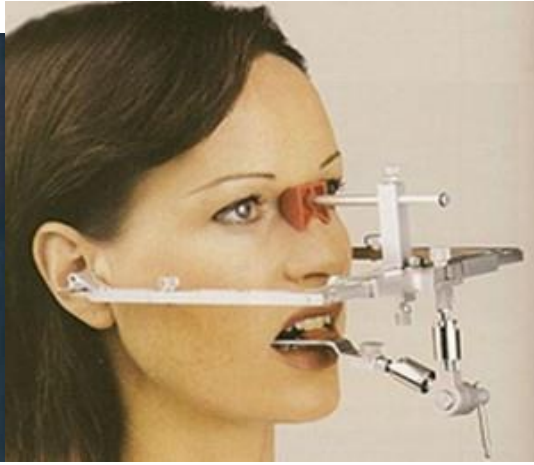
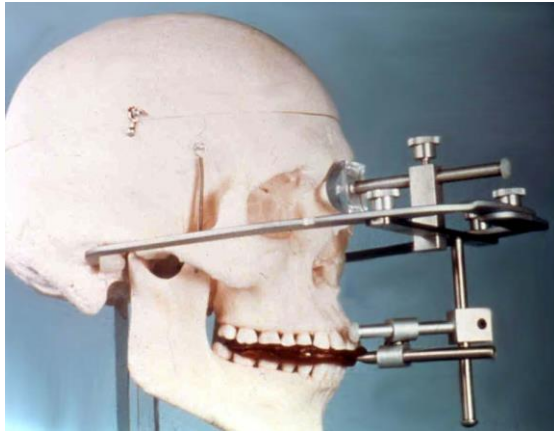
Parts of articulator:

1. Upper and lower frame
2. Condylar mechanism
3. Incisal pin
4. Incisal table
5. Model mounting plate



For transferring the casts to articulator start point is used - arbitrary hinge axis, which is located as virtual horizontal transverse axis of rotation of condyles and represents the fixed axis of the mandibular rotation. This point is located with face-bow. Each type of articulators has the own face-bow. Two main types of face-bow are manufactured- arbitrary face-bow and hinge axis face-bow (Fig.2-41; 2-42).

The arbitrary face-bow is positioned by orientation to reference points: two earpieces to external meatus (or styli to hinge axis position) and nose or face support (anterior point of reference). A face-bow consists of metal frame with ear of face extentions, face reference point, and transfer assembly (bite fork with fixating device).



The Gypsum casts can be molded in to articulator in different ways:

-with help of face-bow

-in mounting device

-on mounting table

6. План та організаційна структура заняття

1	Basic lesson stages and their contents	Tasks	Methods of education and their control	Materials for the methodic supply		Duration
1	2	3	4	5		6
	Preliminary stage					10% - 25%
	Organization process					
	Educational goals					
	Initial level of knowledge and practical skills control	II	Methods of theoretical knowledge control: - Individual theoretical survey, discussion, educational conference; - solving of typical tasks; - tests control; - writing and theoretical control	Issue problem Tasks Tests Written and theoretical tasks	Table, chart, schemes, presentations, pictures, phantoms	
	Basic stage					60% - 90%
	Formation of professional skills: list of main practical skills.	IV	Typical and atypical Problem solving training (real, clinical,	Algorithms for professional skills formation; stuff; instruments; situational tasks, role-playing games, protocols,		

7.1 Control of initial stage of lesson

1. To describe the anatomy of dental rows and teeth occlusal surface.
2. To describe anatomy and function of masticatory apparatus.
3. To list and describe mechanism of lower jaw functional movements. To describe scheme of occlusal contacts between teeth.
4. To explain features of different types of articulators according to construction.
5. To describe methods of models transferring in to articulator and settings on individual function.

Tests:

1. What movements are carried out in human TMJ?
 - A. transversal
 - B. sagittal
 - C. diagonal
 - D. sliding and rotating
2. What settings can be customized in articulator?
 - A. Bennett angle
 - B. sagittal and transversal condylar angle
 - C. terminal axis
 - D. vertical
3. What movements are being made in Average Value articulator?:
 - A. transversal
 - B. sagittal
 - C. in all directions
 - D. Vertical
4. There are such types of occlusion:
 - A. functional
 - B. dynamic
 - C. frontal, central, lateral

Material for methodical supply of individual work with literature: Basic literature:

1. Occlusion and Clinical practice 2005 Iven Klineberg, Rob Jagger.
2. Functional occlusion: from TMJ to Smile Design 2006 Peter Dawson.
3. Хватова В.А. Клиническая гнатология / В.А. Хватова - АМЛ, - 2011. – 296 с.
4. A colour Atlas of Occlusion and Malocclusion 1991 A.P.Howat, N.J.Capp, N.V.J.Barrett.
5. Станислав В. Маевский. Стоматологическая гнатофизиология. Нормы окклюзии и функции стоматологической системы. - Л.: Гал Дент, 2008. - 143 с.

6. Хватова В.А. Функциональная окклюзия в норме и патологии. // М.: Полиграфсервис, - 1993.- 159 с.

Answers to the test questions for topic № 2

«Biomechanics of masticatory apparatus. Devices used for lower jaw movement simulation. Articulation and occlusion»

	1	2	3	4	5	6	7	8	9	10
I variant	C	B	B	C	D	C	D	B	C	C
II variant	C	A	D	B	D	C	D	D	D	A
III variant	C	A	C	B	D	A	D	C	A	C
IV variant	A	C	C	D	C	C	A	D	D	A
V variant	D	B	C	B	B	C	D	B	C	D
VI variant	C	A	A	C	B	A	C	A	D	C

The test questions for topic № 2: «Biomechanics of masticatory apparatus. Devices used for lower jaw movement simulation. Articulation and occlusion»

Variant №1

1. Device for lower jaw movement simulation called:
A Axiograph
B Condylograph
C Articulator;
D Face bow;

2. The imaginary plane from the anterior nasal spine to external auditory meatus called:
A. Frankfurt plane
B. Camper plane
C. Pound line
D. Prosthetic plane

3. What is the angle of sagittal incisal path to Camper plane?
A. 110
B. 45
C. 60
D. 33

4. Articulators with customizable according to individual settings condylar mechanism called:
A Simple hinge
B Average value
C Fully-adjustable
D Semi-adjustable

5. Articulators used for:
A Prosthetic Restorations making
B Prosthetic treatment planning
C Examination of occlusion
D All right.

6. A forward jaw movement with included incisal tooth contact and disocclusion in distal area called:
A Mediotrusion
B Bennett movement
C Protrusion
D Lateritrusion

7. According to construction of condylar mechanism devices for jaw movement simulation can be divided on:

- A Arcon
- B Non-Arcon
- D All right

8. What is the Bennett angle?

- A. 60
- B. 17
- C. 45
- D. 33

9. Upper and lower Dental rows ratio with contacts in central occlusion called:

- A. Central relation
- B. Bite
- C. Maximum intercuspation position (MIP)
- D. Articulation

10. The occlusion with multiple intercuspation contacts of teeth during central position of condyle process in articular fossae of temporal bone?

- A. Lateral
- B. Frontal
- C. Functional
- D. Central

The test questions for topic № 2: «Biomechanics of masticatory apparatus. Devices used for lower jaw movement simulation. Articulation and occlusion»

Variant № 2

1. Device for lower jaw movement simulation called:
 - A Condylograph
 - B Axiograph
 - C Articulator
 - D Electromyograph

2. The imaginary plane from the lower orbital ridge to external auditory meatus called:
 - A Frankfurt plane
 - B Pound line
 - C Curve of Spee
 - D Camper plane

3. Gothic angle is synonym to:
 - A Angle of sagittal condyle path
 - B Bennett angle
 - C Angle of sagittal incisal path
 - D Angle of lateral incisal path

4. Articulators with fixed condylar angles value called:
 - A Semi-adjustable
 - B Average value
 - C Fully-adjustable
 - D Simple hinge

5. According to construction of condylar mechanism devices for jaw movement simulation can be divided on:
 - A Average value
 - B Fully-adjustable
 - C Semi-adjustable
 - D All right

6. How called the movement than both condyle processes move down and forward on distal eminence surface at the same time?
 - A Lateral condylar path
 - B Bennett movement
 - C Sagittal condylar path
 - D Laterotrusion

7. How to mold the models into articulator?

- A Via face-bow
- B Via molding table
- C Via molding device
- D All righti.

8. The occlusion with multiple intercuspation contacts of teeth during central position of condyle process in articular fossae of temporal bone called:

- A. Lateral
- B. Frontal
- C. Functional
- D. Central

9. What is the lateral incisal path angle?

- A. 150
- B. 33
- C. 60
- D. 110

10. How called the plane on natural teeth between these three points: middle contact point of lower central incisors incisal edge and right and left distal buccal cusps of second lower molars?

- A. Occlusal plane
- B. Prosthetic plane
- C. Frankfurt plane
- D. Mid-sagittal plane

**The test questions for topic № 2: «Biomechanics of masticatory apparatus.
Devices used for lower jaw movement simulation. Articulation and occlusion»
Variant № 3**

1. The method used for determination of hinge axis, individual condyle angles, lower jaw motion recording called:
 - A Electromyography
 - B Gnathodinamometry
 - C Axiography
 - D Orthopantomography

2. The imaginary plane from the inferior orbit ridge to external auditory meatus called:
 - A Frankfurt plane
 - B Pound line
 - C Curve of Spee
 - D Camper plane

3. An angle equal to 45 degrees is called:
 - A Lateral condyle path angle
 - B Bulkwill angle
 - C Sagittal incisal path angle
 - D Lateral incisal path angle

4. The articulators that require customization with help of axiographic investigation called:
 - A Semi-adjustable
 - B Fully adjustable
 - C Average value
 - D Simple hinge

5. The occlusion with multiple intercuspation contacts of teeth during central position of condyle process in articular fossae of temporal bone called:
 - A. Lateral
 - B. Frontal
 - C. Functional
 - D. Central

6. The imaginary plane from the anterior nasal spine to external auditory meatus called:
 - A. Camper plane
 - B. Frankfurt plane
 - C. Terminal hinge axis
 - D. Prothetic plane

7. How the upper cast can be molded in to articulator? With help of:

- A Wax rims
- B Rubbers
- C Gypsum bites
- D Facebow

8. What is the angle of sagittal incisal path to Camper plane?

- A. 110
- B. 11
- C. 45
- D. 33

9. The path of lower incisors on palatal surface of upper incisors during laterotrusion movement of lower jaw called:

- A. Lateral incisal path
- B. Sagittal incisal path
- C. Lateral condylar path
- D. Bennett movement

10. What is the Bennett angle?

- A. 33
- B. 110
- C. 17
- D. 60

The test questions for topic № 2: «Biomechanics of masticatory apparatus. Devices used for lower jaw movement simulation. Articulation and occlusion»

Variant № 4

1. The device used for the molding of casts in articulator called:
 - A Face-bow
 - B Axiograph
 - C Gnathodynamometr
 - D Electromyograph

2. A forward jaw movement with included incisal tooth contact and disocclusion in distal area called:
 - A Mediotrusion
 - B Bennett movement
 - C Protrusion
 - D Laterotrusion

3. The method used for determination of hinge axis, individual condyle angles, lower jaw motion recording called:
 - A Electromyography
 - B Gnathodinamometry
 - C Axiography
 - D Orthopantomography

4. Articulators can be used for:
 - A Diagnostic wax-up
 - B Laboratory stages of fixed and removal dentures fabrication
 - C Diagnostic teeth grinding on casts;
 - D All right.

5. According to construction of condylar mechanism devices for jaw movement simulation can be divided on:
 - A Arcon
 - B Non-Arkon
 - C All right

6. What is the transversal condylar angle?
 - A. 33
 - B. 110
 - C. 17
 - D. 60

7. What is sagittal condylar path angle?

- A. 33
- B. 110
- C. 17
- D. 60

8. Average anatomical landmarks for casts molding in articulators are recommended to use in case of fabrication:

- A Complete dentures
- B Single crowns
- C Small dental bridges
- D All right

9. How called the occlusion with multiple intercuspation contacts?

- A. Lateral
- B. Frontal
- C. Functional
- D. Central

10. With help of molding table molding process starts from:

- A Upper jaw cast
- B Lower jaw cast
- C Both upper and lower jaw casts
- D The sequence does not matter

The test questions for topic № 2: «Biomechanics of masticatory apparatus. Devices used for lower jaw movement simulation. Articulation and occlusion»

Variant № 5

1. What parameters are used to customize the articulator on individual function?
 - A Prosthetic plane
 - B Distal contact position
 - C Central occlusion
 - D Bennett angle

2. The dental rows ratio in maximal frontal position called:
 - A. Distal contact position
 - B. Protrusion
 - C. Bite
 - D. Central occlusion

3. An angle equal to 45-50 degrees is called:
 - A Sagittal condylar path
 - B Bennett angle
 - C Sagittal incisal path angle
 - D Lateral incisal path angle

4. For the full occlusion restore used:
 - A Simple hinge occludators
 - B Fully-Adjustable articulators
 - C Semi-adjustable articulators
 - D All right

5. How called the path of lower incisors on palatal surface of upper incisors on the way from central occlusion to frontal?
 - A. Lateral incisal path
 - B. Sagittal incisal path
 - C. Lateral condylar path
 - D. Bennett movement

6. According to construction of condylar mechanism devices for jaw movement simulation can be divided on:
 - A Simple hinge
 - B Arcon and Non-Arcon type
 - C Average value
 - D There is no right answer

7. What methods of casts molding in articulator are used? With help of:
- A Face-bow
 - B Molding table
 - C Molding device
 - D All right
8. What is the lateral incisal angle (Gothic angle)?
- A. 150
 - B. 110
 - C. 47
 - D. 33
9. What is the Bennett angle?
- A. 33
 - B. 110
 - C. 17
 - D. 60
10. The imaginary plane from the anterior nasal spine to external auditory meatus called:
- A. Frankfurt plane
 - B. Pound line
 - C. Occlusal plane
 - D. Camper plane

The test questions for topic № 2: «Biomechanics of masticatory apparatus. Devices used for lower jaw movement simulation. Articulation and occlusion»

Variant № 6.

1. What is the Bennett angle?
 - A. 33
 - B. 110
 - C. 17
 - D. 60

2. Dental rows ratio in central position of condyle processes in condylar fossae of temporal bone called:
 - A. Central relation
 - B. Occlusion
 - C. Bite
 - D. Central occlusion

3. The imaginary plane from the inferior orbit ridge to external auditory meatus called:
 - A. Frankfurt plane
 - B. Pound line
 - C. Curve of Spee
 - D. Camper plane

4. The method used for determination of hinge axis, individual condyle angles, lower jaw motion recording called:
 - A. Electromyography
 - B. Gnathodinamometry
 - C. Axiography
 - D. Orthopantomography

5. An angle equal to 17 degree is called:
 - A. Bulkwill angle
 - B. Bennett angle
 - C. Sagittal incisal path angle
 - D. Lateral incisal path angle

6. How called the movement of lower jaw when both condyles moves up and back on distal part of eminence in one time:
 - A. Retrusion
 - B. Bennett movement
 - C. Protrusion
 - D. Sliding to the center

7. How called the movement than both condyle processes move down and forward on distal eminence surface at the same time?

- A Mediotrusion
- B Sliding to the center
- C Protrusion
- D Laterotrusion

8. What methods of casts molding in articulator used? With help of:

- A. Face-bow
- B. Prosthetic plane
- C. Gothic angle
- D. Benett angle

9. The plane used for prosthetic plane formation and artificial teeth arrangement in complete dentures is parallel to:

- A. Occlusal plane
- B. Pound line.
- C. Curve of Spee
- D. Camper plane

10. A forward jaw movement with included incisal tooth contact and disocclusion in distal area called:

- A Mediotrusion
- B Sliding to the center
- C Protrusion
- D Laterotrusion