Occlusion

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Acknowledgments:

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We would like to thank **Prof.Sabah Al- Sharkawi** the General Coordinator of General Directorate of Technical Health Education, **Dr. Azza Dosoky** the Head of Central Administration of HR Development, **Dr. Seada Farghly** the General Director of THE and all share persons working at General Administration of the THE for their time and critical feedback during the development of this course.

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Contents

Course Specifications

توصيف مقرر دراسى

١ ـ بيانات المقرر		
الرمز الكودى :	اسم المقرر : Occlusion	الفرقة /المستوى : ٢
التخصص :	عدد الوحدات الدراسية : نظرى 2 عملى 0	

2- Overall Aim of Course: 2 هدف المقرر:	This course is intended to provide information to the students about the mechanism of normal occlusion & its discrepancies.
3- Intended learning outcomes of the course (ILOs): 3 -المستهدف من تدريس المقرر	
i. Knowledge and Understanding: ا. المعلومات والمفاهيم :	By the end of this course, students should be able to: 1. List important terms related to occlusion. 2. Identify principles of occlusion. 3. Describe the relationship between the upper and the lower teeth. 4. Describe the mechanism of mandibular movement. 5. Describe the centric and the eccentric relation. 6. Describe the group guidance and the canine guidance. 7. Identify difference between natural and artificial occlusion. 8. How to make balanced occlusion
ii. Intellectual Skills: ب- المهارات الذهنية :	By the end of this course, students should be able to: 1. Be aware of important terminology. 2. Detect the factors affecting the patient's occlusion. 3. Recognize the basic mandibular movements. 4. Distinguish between the canine guidance and group guidance.
iii. General and Transferable Skills: د- المهارات العامة :	By the end of this course, students should be able to: 1. Assess problems. 2. Work efficiently with others. 3. Practice independent learning by using information technology tools. 4. Evaluate information from various standard sources to improve professional skills.
4- Course content ٤ - محتوى المقرر:	1. Introduction and terminology. 2. Principles of occlusion. 3. Basic mandibular movements. 4. Laws of articulations 5. Natural and artificial occlusion.

	6. Balanced occlusion

5- Teaching and Learning Methods: **٥- أساليب التعليم والتعلم**	1. **Lectures.** 2. **Group discussions**
6- Teaching and learning methods for students with limited abilities **6 - أساليب التعليم والتعلم للطلاب ذوى القدرات المحدودة**	
7- Student Assessment:	**٧- تقويم الطلاب :**
a- Assessment methods: **أ- الأساليب المستخدمة**	**a. Class work:** **1. Quizzes** **2. Assignments** **3. Participation** **b. Final exam:** • **Written theoretical exam**
b- Assessment schedule: **ب- التوقيت**	**a. Class work:** **1. Quizzes:** **Quiz I (4th week)** **Quiz II (10th week)** **2. Assignments** **3. Participation** **b. Final exam** • **Written theoretical exam (13th week)**
c-Weight Of Assessments: **ج- توزيع الدرجات**	**1. Quizzes (10%), 10 marks** **2. Assignments (5%), 5 marks.** **3. Participation (5%), 5 marks.** **4. Final written theoretical exam (80%), 80 marks.** **Total percentage 100%**
7- List of References:	**٨- قائمة الكتب الدراسية والمراجع :**
a- Course notes: **أ- مذكرات**	**Lecture and practical notes**
b- Essential books (text books) **ب- كتب ملزمة**	**- Winkler S. Essentials of complete prosthodontics, Third Edition. WB Saunders Company, 2003.** **- Zarb GA, Bolender CL, Carlsson GE. Boucher's Prosthodontic treatment for edentulous patients, Eleventh Edition. St Louis; CV Mosby CO, 1997.**

c- Recommended books ج- كتب مقترحة	**- Rahn AO, Heartwell CM. Textbook of complete dentures. Fifth Edition. Philadelphia ; Lea and Fibiger, 1993.**
d- Periodicals, web sites, ,,,,, د- دوريات علمية أو نشرات ..... الخ	

Course Description

The course includes the preclinical procedures for complete denture construction and their interdependence procedures will be stressed.

The candidate should learn the basic principles of clinical removable prosthodontics treatment for completely edentulous patients, and the different laboratory steps for complete denture construction. They will also gain practical experience by applying the knowledge gained during the first academic year to better understand their audience and create more effective laboratory work.

Core Knowledge

By the end of this course, students should be able to:

- List important terms related to occlusion.
- Identify principles of occlusion.
- Describe the relationship between the upper and the lower teeth.
- Describe the mechanism of mandibular movement.
- Describe the centric and the eccentric relation.
- Describe the group guidance and the canine guidance.
- Identify difference between natural and artificial occlusion.

Core Skills

By the end of this course, students should be able to:

- Be aware of important terminology.
- Detect the factors affecting the patient's occlusion.

- Recognize the basic mandibular movements.
- Distinguish between the canine guidance and group guidance.

- Assess problems.
- Work efficiently with others.
- Practice independent learning by using information technology tools.
- Evaluate information from various standard sources to improve professional skills.

Course Overview

		Methods of Teaching / Training with Number of Total Hours per Topic				
ID	**Topics**	**Interactive Lecture**	**Field Work**	**Class Assignments**	**Research**	**Lab**
1	**Introduction and terminology**	2				
2	**Principles of occlusion**	4				
3	**Basic mandibular movements**	4		√		
4	**Natural and artificial occlusion**	4				
5	**Laws of Articulation**	2				
6	**Balanced occlusion**	8		√		
TOTAL HOURS (24)		**24**				

Chapter 1
INTRODUCTION

Objectives

- Provide an overview on occlusion
- List important terms related to occlusion
- Understand basic tooth structure
- Describe the structures around the tooth
- Identify surfaces of the tooth
- Identify the types of teeth and their functions

An overview on occlusion

Masticatory system composes of the teeth, the skeletal, and the neuromuscular components. The occlusion of the teeth is the key to oral function. They play the integral part in maintain occlusal harmony. Occlusion is the act of closure or being closed. It is the way the teeth meet when the lower jaw (mandible) and upper jaw (maxilla) come together. It is how the teeth contact in any type of functional relationship.

Terms related to occlusion

The most common terms you need to know can be grouped into four sections:

A. Positions.
B. Planes.
C. Directions.
D. Structures.

A. Positions:

Occlusion:

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

Articulation:

- The dynamic contact relationship between the occlusal surfaces of the teeth during function.

Centric Relation:

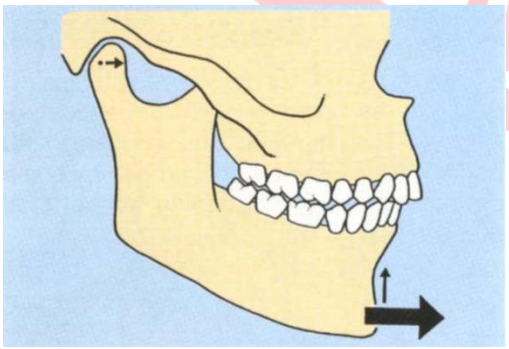
- The most retruded relation of the mandible to the maxillae when the condyles are in the most posterior unstrained position in the glenoid fossae from which lateral movement can be made at any given degree of jaw separation. (
- ***Fig. 1)***
- *Bone to bone relationship.*

Eccentric Relation:

- Any relationship of the mandible to the maxilla other than centric relation.

Maximum Intercuspation:

- The complete intercuspation of the opposing teeth independent of condylar position. (***Fig. 2)***



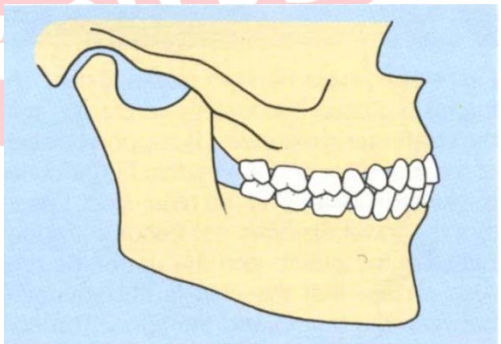


Fig. 1 *Fig. 2*

Centric Occlusion:

- The occlusion of opposing teeth when the mandible is in centric relation.

Protrusive Occlusion:

- An occlusion of the teeth when the mandible is protruded.

Lateral Occlusion:

- Refers to occlusal contacts that occur on the canine and posterior teeth on the side towards the mandible moves.

➢ *Canine guided occlusion:*

It is type of occlusion where only the maxillary and mandibular canines at the working side contact during lateral movement of the mandible. (***Fig. 3***)

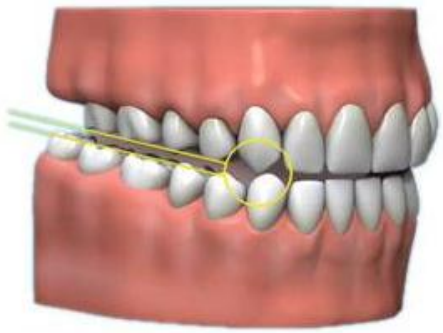


Fig. 3

➢ *Grouped lateral occlusion:*

It is type of occlusion where the maxillary and mandibular canines as well as the posterior teeth at the working side contact guiding the lateral movement of the mandible. (***Fig. 4Fig.*** *5*)

Fig. 4 *Fig. 5*

B. Planes:

Occlusal Plane:

- An imaginary curved plane formed by the incisal edges of the anterior teeth and the occlusal surfaces of the posterior teeth. It follows the natural curvature of the teeth, curving higher in back following the curve of Spee, and curving higher as it extends outward, following the curve of Wilson. *Fig. 6*

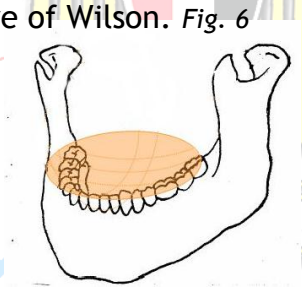


Fig. 6

Curve of Spee

- The curve which extends from anterior to posterior on each side of the arch. (***Fig. 7, 8***)

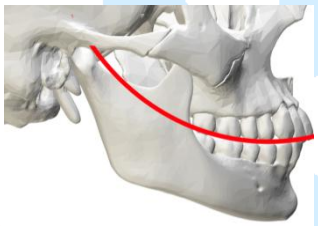


Fig. 7

Fig. 8

Curve of Wilson

- The curve which extends from one side of the mouth to the other, and follows the natural inclination of the teeth toward the tongue. ***(Fig. 9)***

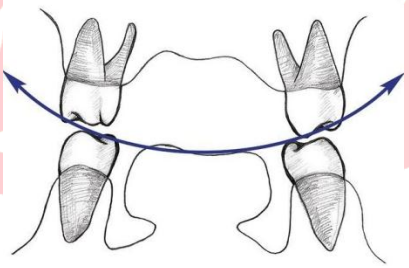
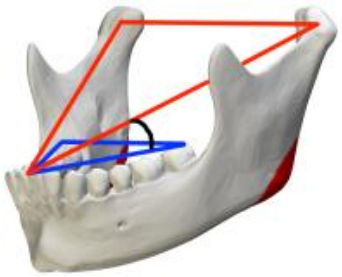


Fig. 9

Bonwill Triangle

- An equilateral triangle with 4 inch (10 cm) sides bounded by lines from the contact points of the lower central incisors to the condyle on either side and from one condyle to the other. It is the basis for Bonwill's theory of occlusion.



Frankfort Horizontal Plane

- It is established by the transverse horizontal axis of the mandible with a point on the inferior border of the right or left bony orbit.

C. Directions: ***(Fig. 10, Fig. 11)***

Anterior

- Toward the front.
- This is the position of anything that is toward the face in relation to another surface or structure.

Posterior

- Toward the back.
- This is the position of anything that is toward the back of the mouth or head.

Mesial

- Toward the midline of the face.
- This is the surface that is the closest to the midline of the face. Each tooth has a mesial surface.

Distal

- Away from the midline of the face.
- This is the surface that is distant to the midline of the face. Each tooth has a distal surface.

Occlusal

- The surface that comes into “occlusion” or contact with the opposing dentition, the “top” surface of the teeth. Generally applied to the posterior teeth.

Lingual

- The surface closest to the tongue.
- In teeth, the surface of the lower teeth closest to the tongue is termed lingual surface.

Palatal

- The surface closest to the palate.
- In teeth, the surface of the upper teeth closest to the palate is termed palatal surface.

Facial/Buccal

- The side of the tooth closest to the cheeks, the "outside" surface of the posterior teeth. Both of these terms can be used interchangeably.

Facial/Labial

- That side which is closest to the face or the lips. Generally used for the 'front' of anterior teeth. Both of these terms can be used interchangeably.

Lateral

- Meaning to the side.

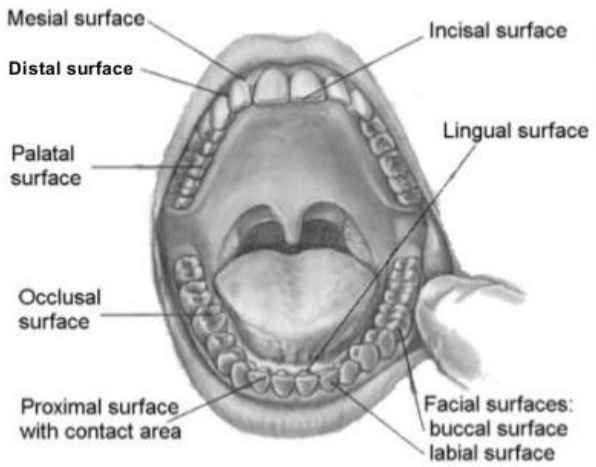


Fig. 11

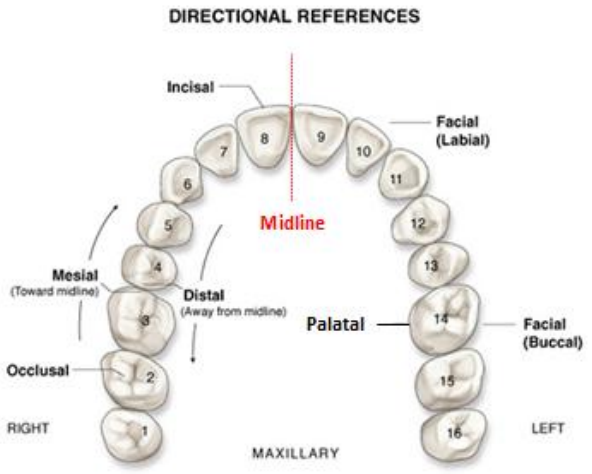


Fig. 10

Long Axis

- A line running the vertical length of the tooth. ***(Fig. 12)***

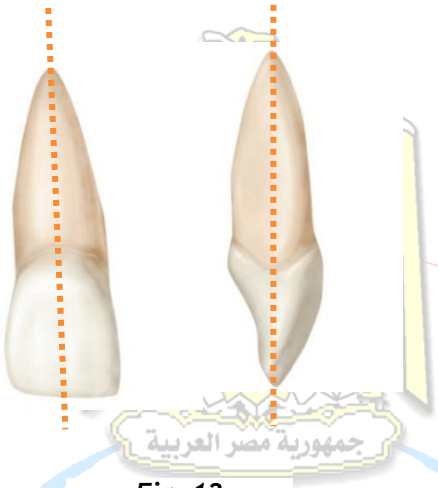


Fig. 12

Anterior Occlusal Determinants

- Are found on all anterior teeth.

Posterior Occlusal Determinants

- All of these posterior landmarks aid in mastication, and are present singly or in combination on all posterior teeth.

D. Structures: ***(Fig. 13)***

Maxilla

- The part of the skull, which supports the upper teeth and palate.

Mandible

- This is the lower member of the oral cavity, which is the portion that moves when chewing.

Palate

- Comprised of two parts: the soft and the hard palate. The palate is the "upper" part of the oral cavity, this is the part of the mouth which is opposite of the Mandible.

Temporomandibular Joint (TMJ)

- This is the joint where the maxilla and the mandible connect together. This is also the site where the condyle 'rotates' and 'translates' which are two primary movements.
- It is composed of:
  a. Mandibular fossa.
  b. Articular disc.

c. Condyle.

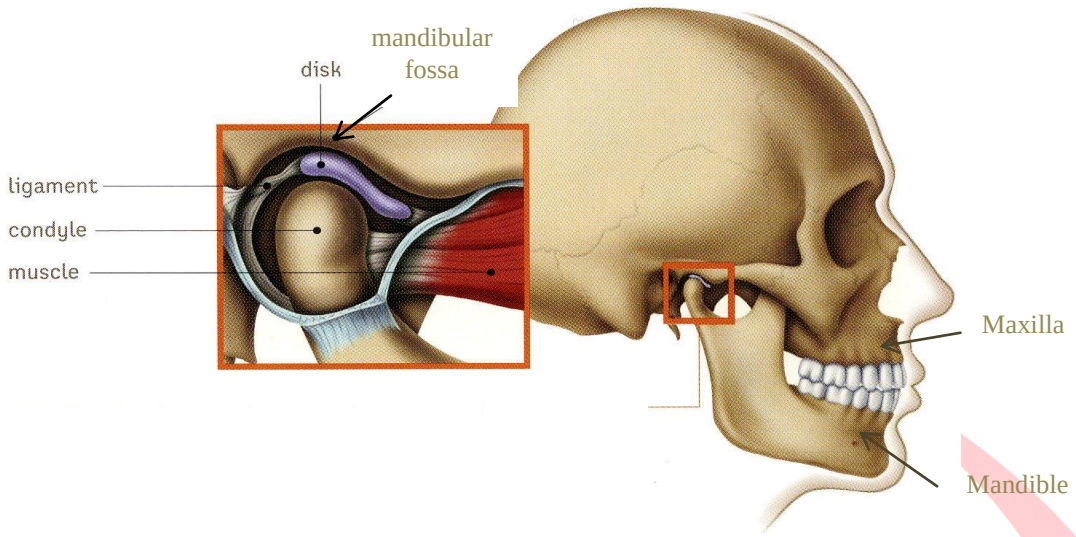


Fig. 13

Basic tooth structure

The tooth has two anatomical parts: *Fig. 14*

a. The crown: is that part of the tooth which is covered with enamel and this is the part usually visible in the mouth.
b. The root: is the part embedded in the jaw. It anchors the tooth in its bony socket and is normally not visible.

Structures around the tooth

a. Periodontal ligament: Made up of thousands of fibers which fasten the cementum to the bony socket. These fibers anchor the tooth to the jaw bone and act as shock absorbers for the tooth which is subjected to heavy forces during chewing.
b. Gingivae (gums): Soft tissue that immediately surrounds the teeth and bone. It protects the bone and the roots of the teeth.
c. Bone: Provides a socket to surround and support the roots of the teeth.
d. Nerves and blood supply: Each tooth and periodontal ligament has a nerve supply and the teeth are sensitive to a wide variety of stimuli. The blood supply is necessary to maintain the vitality of the tooth.

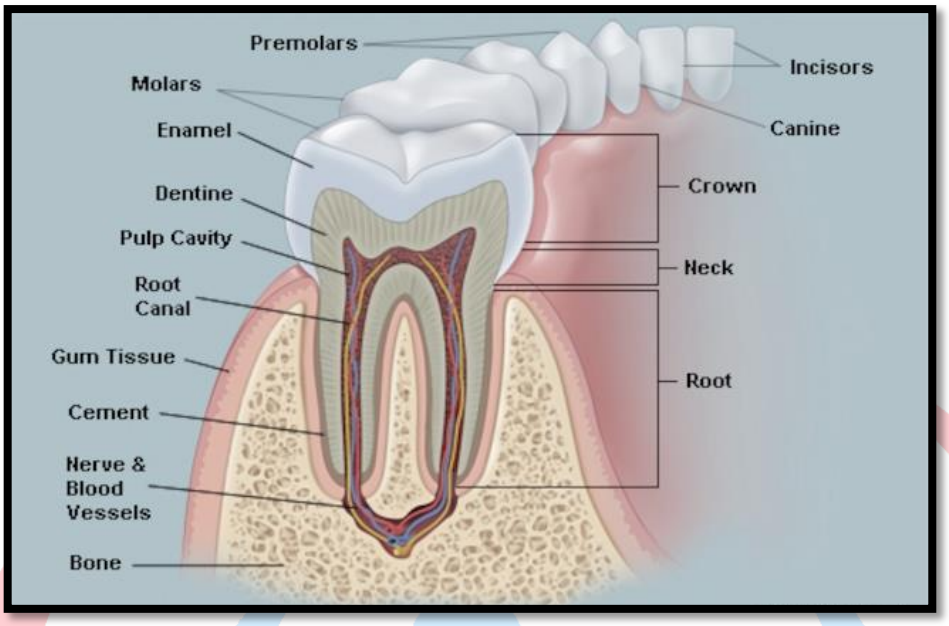


Fig. 14

Surfaces of the teeth

- When identifying teeth and referring to specific areas of a tooth, it is necessary to use name (***Fig. 15***)

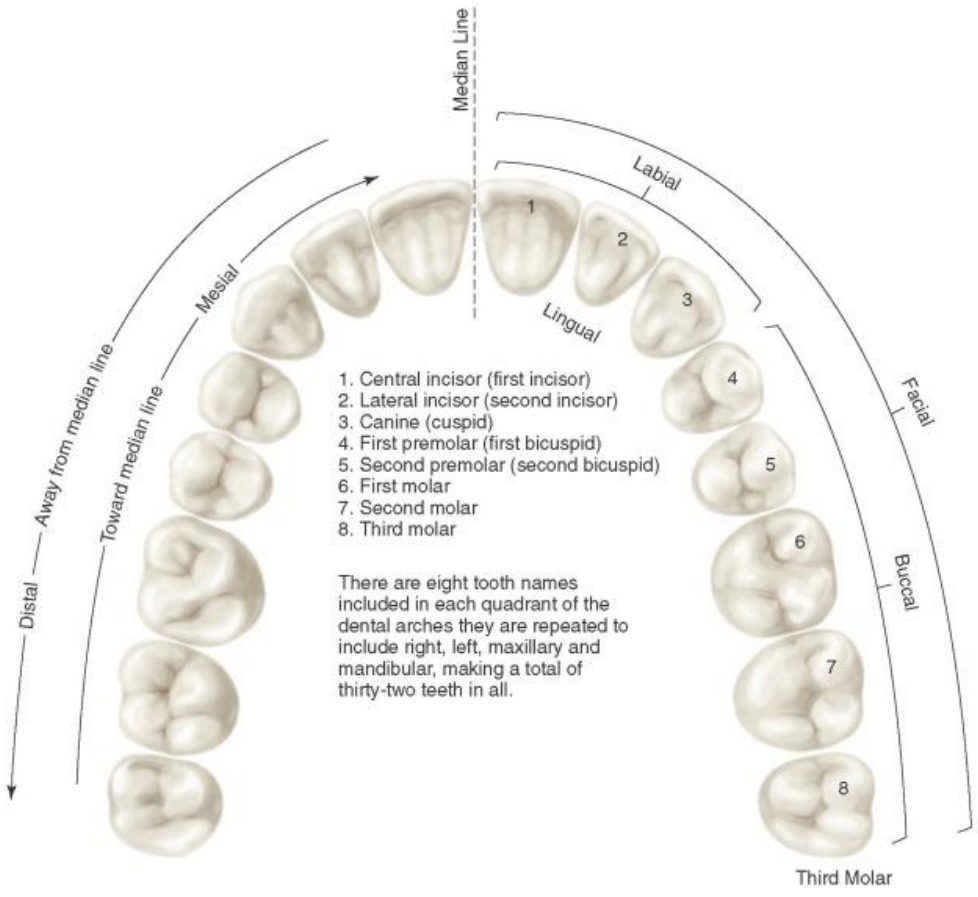


Fig. 15

Types of the teeth and their functions

There are 4 types of teeth in the oral cavity: ***(Fig. 16)***

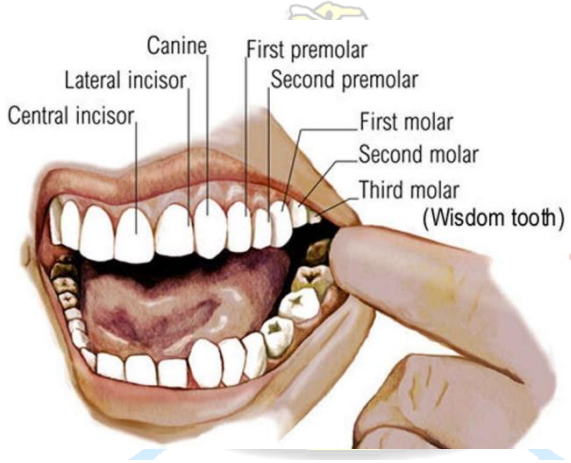


Fig. 16

a. **Incisors:**
- The four front teeth in both the upper and lower jaws are called incisors.
- Their primary function is to cut food.
- The two incisors on either side of the midline are known as central incisors. The two adjacent teeth to the central incisors are known as the lateral incisors.
- Incisors have a single root and a sharp incisal edge.

b. **Canines:**
- There are four canines in the oral cavity. Two in the maxillary arch and two in the mandibular area.
- They are behind and adjacent to the lateral incisors.
- Their main function is to tear food.
- They have a single, pointed cusp and a single root. They have the longest root of any tooth.
- They also serve to form the corners of the mouth.

c. **Premolars (Bicuspids):**
- These teeth are located behind and adjacent to the canines and are designed to crush food.
- There are eight premolars in the oral cavity. There are two in each quadrant of the mouth.

d. **Molars:**
- The most posterior teeth in the mouth are the molars.
- They have broader and flatter occlusal surfaces with 4-5 cusps. They are designed to grind food.
- There are 12 molars in the permanent dentition with three in each quadrant of the mouth. They are named starting with closest to the midline as first molars, second molars and third molars. Although, some people do not fully develop the third molars. Third molars are often referred to as wisdom teeth.

Chapter 2
Principles of Occlusion

Objectives

- List characteristics of normal occlusion.
- Describe dental arch form.
- Describe the overlap of the teeth.
- List the curvatures of occlusal planes.
- Describe the inclination and angulation of the roots of the teeth.
- Identify the functional form of the teeth at incisal and occlusal thirds.
- Discuss facial and lingual relations of each tooth in one arch to its antagonists in the opposing arch in centric occlusion.
- Highlight occlusal contacts and intercuspal relations between arches.

Characteristics of normal occlusion

Normal occlusion is desirable as it allows oral functions to operate properly, provides the best esthetics and is helpful in the prevention of disease. Anytime normal occlusion does not occur in the mouth, it is termed malocclusion. Malocclusion can have an effect on dental diseases, chewing, speech and esthetics (especially facial profile) and other functions of the oral cavity. Malocclusion can occur for a variety of reasons. These include, but are not limited to, heredity, trauma, diseases, and habits.

Dental Arch Form

The teeth are positioned on the maxilla and mandible in such a way as to produce a curved arch when viewed from the occlusal surface. This arch form is in large part determined by the shape of the underlying basal bone. Discrepancies in arch form between the maxillary and mandibular arches generally result in poor occlusal relationships. (Fig. 17,18)

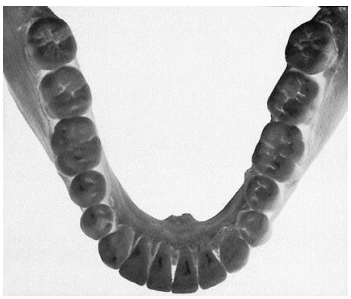


Fig. 17

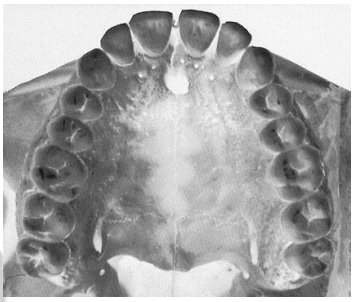


Fig. 18

Overlap of the teeth

The arch form of the maxilla tends to be larger than that of the mandible. As a result, the maxillary teeth "overhang" the mandibular teeth when the teeth are in centric occlusion (the position of maximal intercuspation). The lateral or anteroposterior aspect of this overhang is called **overjet**, while the vertical overhang is called **overbite**. (Fig. 19)

The significance of vertical and horizontal overlap has to be related to mastication, jaw movements, speech, type of diet, and esthetics.

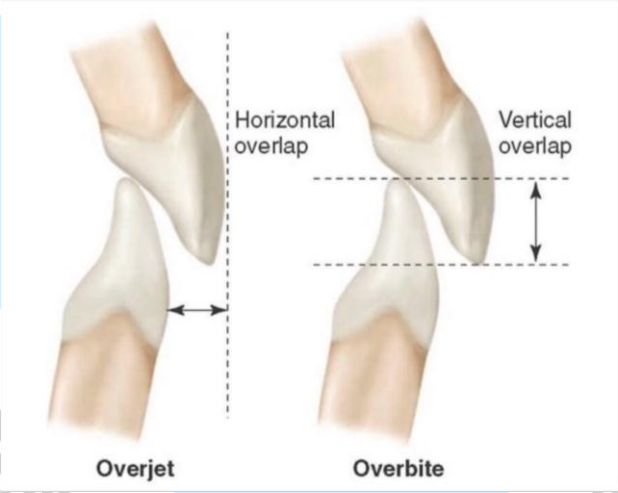


Fig. 19

Curvatures of occlusal plane

The occlusal surfaces of the dental arches do not generally conform to a flat plane (e.g., the mandibular arch has one or more curved planes conforming to the arrangement of the teeth in the dental arches). Perhaps the most well-known is the curve of **Spee**, who noted that the cusps and incisal ridges of the teeth tended to display a curved alignment when the arches were observed from a point opposite the first molars. (Fig. 20)

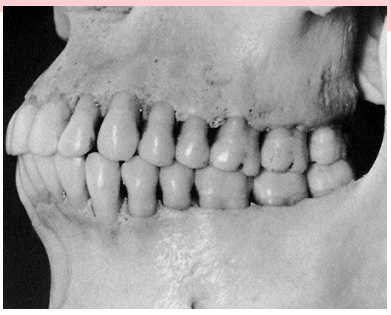


Fig. 20

Another one, is the curve of **Monson**, which represents a three dimensional spherical curvature involving both the right and left bicuspid and molar cusps and the right and left condyles.

Inclination and angulations of the roots of teeth

No absolute rules may be assumed when describing the axial relations of maxillary and mandibular teeth in centric occlusion. Each tooth must be placed at the angle that best withstands the lines of force brought against it during function. The angle at which it is placed depends on the function the tooth has to perform. (Fig. 21)

Fig. 21

Functional form of the teeth at incisal and occlusal thirds

The incisal and occlusal thirds of the tooth crowns present convex or concave surfaces at all contacting occlusal areas. When the teeth of one jaw come into occlusal contact with their antagonists in the opposite jaw during various mandibular movements, curved surfaces come into contact with curved surfaces.
The posterior teeth show depressions in the depth of sulci and developmental grooves; nevertheless, the enamel sides of the sulci are formed by convexities that point into the developmental grooves. Cusps that are rather pointed contact the rolls of hard enamel that make up marginal ridges on posterior teeth. (Fig. 22)

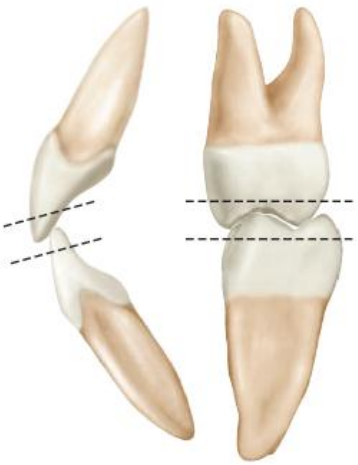


Fig. 22

Facial and lingual relations of each tooth in one arch to its antagonists in centric occlusion

In the intercuspal position, facial views of the normal dentition show each tooth of one arch in occlusal with portions of two others in the opposing arch with the exception of the mandibular central incisors and the maxillary third molars. Each of the exceptions named has one antagonist only in the opposing jaw. (Fig. 23)

Fig. 23

Occlusal contacts and intercuspal relations between arches

One should know for discussion purposes where a particular supporting cusp makes contact with a centric stop on the opposing tooth. For example, the lingual cusps of the maxillary posterior teeth and the buccal cusps of the posterior mandibular teeth are referred to as **supporting cusps**. The lingual cusps of the maxillary premolars do not necessarily make contact in the fossa of the mandibular teeth but occlude with the marginal ridges of the premolars, or premolars and first molars. (Fig. 24,25)

Fig. 24

Notice the contact of the blue points between upper and lower teeth, as well as the red dots of the upper and lower teeth.

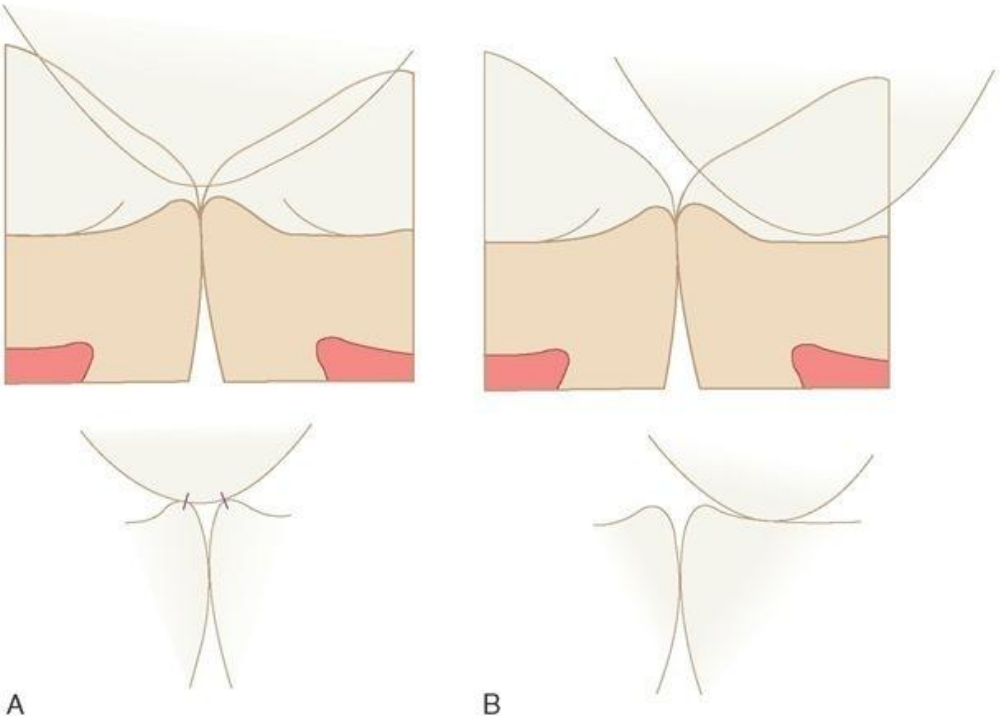


Fig. 25

A, Relationship of supporting cusps to marginal ridges. **B,** relationship of supporting cusps to fossae.

General characteristic signs in normal occlusion (Class I occlusion)

1. The maxillary first permanent molar is the key of occlusion as it is the first permanent tooth to erupt in the oral cavity.
2. The mesiobuccal cusp of the maxillary first permanent molar is in line with the central groove of the mandibular first permanent molar. (Fig. 26)
3. The upper anterior teeth overlap the lower anterior teeth.
4. The mesial surfaces of the upper & lower central incisors are in one line at the midline. (Fig. 26)
5. Each tooth in the dental arch occludes with 2 antagonist teeth in the opposing arch, except the mandibular central incisor and maxillary third molar. (Fig. 26)
6. Each maxillary tooth is in a more distal position to its antagonist in the mandibular arch; this is reflected in the molar relationship.
7. The buccal cusps of the maxillary posterior teeth overlap those of the mandibular ones. The palatal cusps of the maxillary posterior teeth occlude with the central grooves and marginal ridges of the mandibular teeth. (Fig. 27)
8. The lingual cusps of the mandibular teeth overlap those of the maxillary ones. The buccal cusps of the mandibular teeth occlude with the central grooves and marginal ridges of the maxillary ones. (Fig. 27)

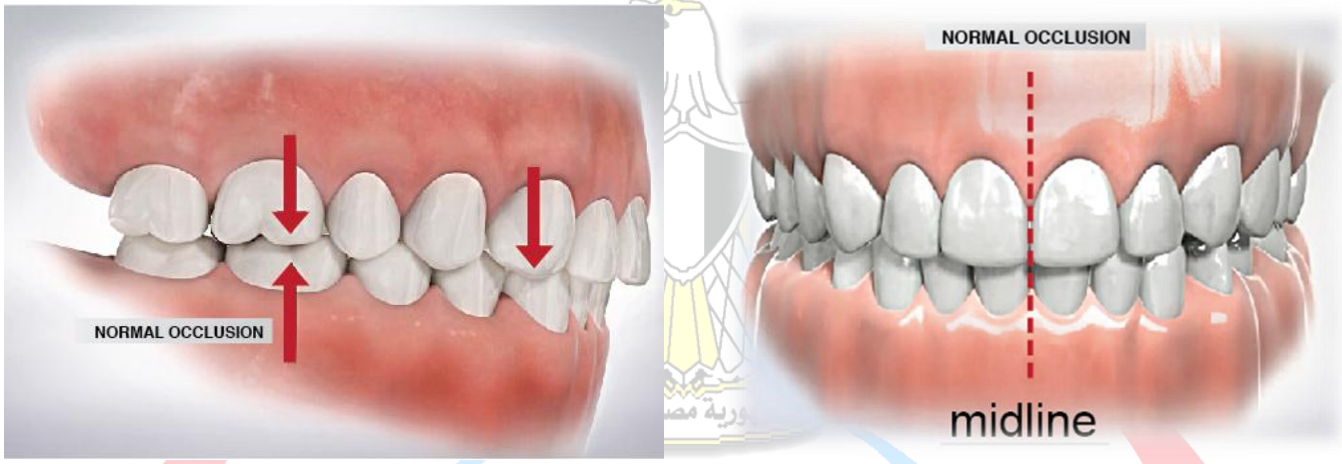

NORMAL OCCLUSION
NORMAL OCCLUSION
midline

Fig. 26


NORMAL OCCLUSION
midline

Fig. 27

Chapter 3
Basic mandibular movements

Objectives

- Describe the basic mandibular movements.
- Identify the significance studying mandibular movements

Basic mandibular movements:

- Mandibular movement occurs as a complex series of interrelated three dimensional *rotational* and *translational* activities. It is determined by the combined and simultaneous activities of both temporomandibular joints (TMJs).
- Mandibular movements are usually classified according to the main direction of movement. The starting point is the maximum intercuspation position. From this position, the mandible can open and close, move forwards (protrusive) and move sideways (lateral).
- *The basic mandibular movements*:

1. Opening and Closing.
2. Forward movement.
3. Backward movement.
4. Lateral movement.

1. <u>Opening and Closing</u>:

- This movement starts from the maximum intercuspation position to the maximum opening position.
- At the beginning, there is a rotation in the TMJ (***Fig. 28***). With further opening, a gliding movement occurs in the TMJ (***Fig. 29***).

Fig. 28

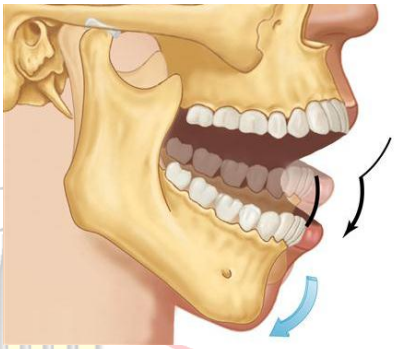


Fig. 29

- For the closing movement, the mandible moves from the maximum opening position with a reverse movement back to the intercuspal position.

2. Forward movement: (Protrusion of the mandible)

- Both condyles with their articular discs move as one unit downwards and forwards along the glenoid fossa and articular eminence. ***(Fig. 30Fig. 31)***

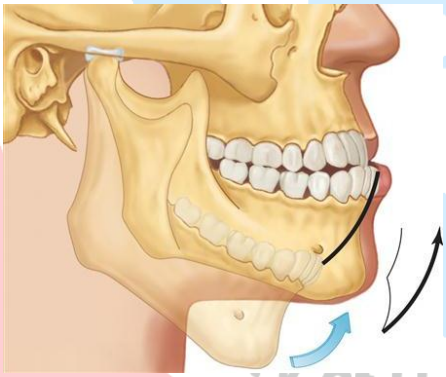


Fig. 30

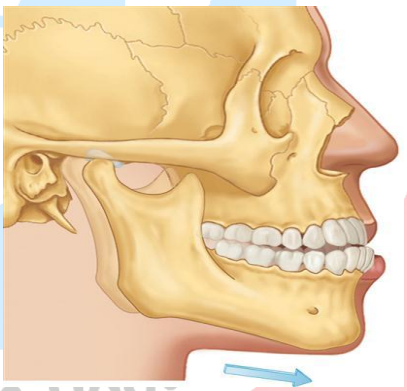


Fig. 31

- When the mandible moves forward to an edge to edge position, a separation occurs between the upper and lower posterior teeth. This phenomenon is called *Christensen's phenomenon.**(Fig. 32)***

Fig. 32

3. Backward movement: (Retrusion of the mandible)

- The retrusive movement of the mandible takes place by similar movements as the protrusive ones, but in the reverse directions (upwards and backwards).

4. Lateral movement:

- The side towards which the movement occurs is called the working side, the other side is called non- working or balancing side. (Fig. 33)

i.e. When the mandible moves towards the right side, the working side is the right side.

- *In the working side*, the occlusal contact in either a canine guided occlusion or in a group lateral occlusion. (Fig. 34)
- *In the non -working side*, the occlusal surfaces of the teeth may or may not contact. Teeth contacts are not necessary except in complete dentures.

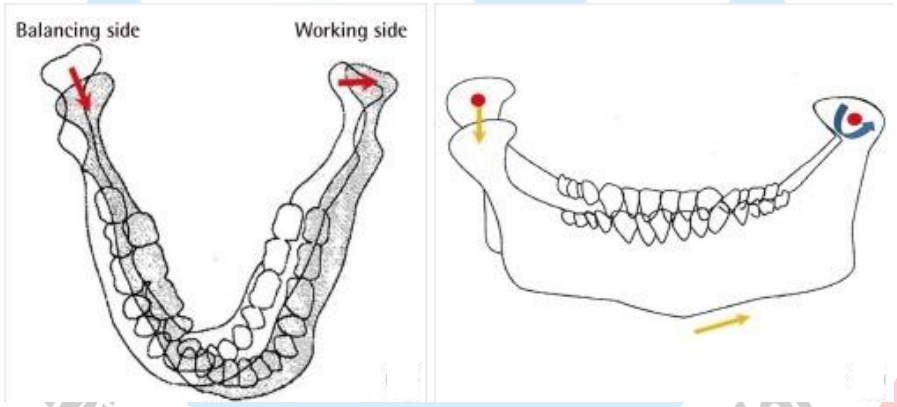


Fig. 33

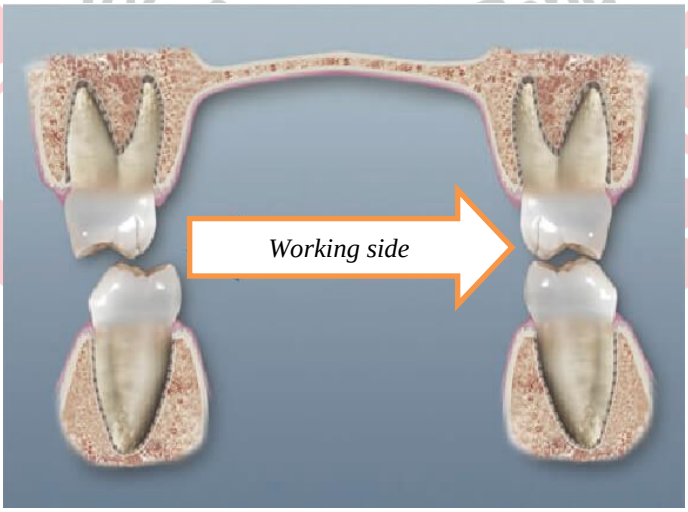


Fig. 34

Significance of studying mandibular movements

a. Adjustment and selection of articulators.
b. Developing tooth form for dental restorations.
c. Understanding the basic principles of occlusion.

Chapter 4

Natural Vs. Artificial Occlusion

Objectives

- Identify natural occlusion.
- Identify artificial occlusion.
- List differences between natural and artificial occlusion.

Natural Occlusion

➢ It is characterized by:

a. Teeth are supported by roots that are anchored in bone and surrounded by periodontal ligament. (Fig. 35)

b. When teeth move in one side during mastication, the other side is unaffected.

c. During protrusive movement, Christensen's phenomenon occurs. (Fig. 36)

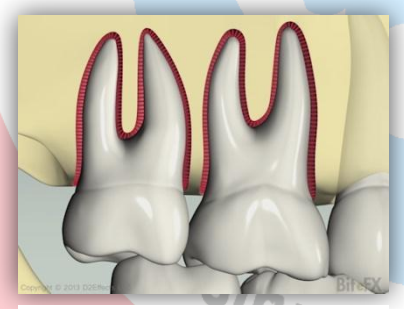


Fig. 35

Fig. 36

Artificial Occlusion

➢ Complete Denture Occlusion is characterized by:

a. Teeth are supported by denture base resting on residual ridge.

b. It moves as one unit.

c. When teeth move in one side during mastication, the other side is affected. (Fig. 37)

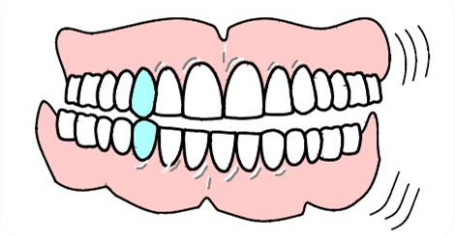


Fig. 37

Differences between Natural Occlusion and Complete Denture Occlusion

Natural Occlusion	*Complete Denture Occlusion*
Natural teeth function independently.	Artificial teeth move as one unit on a base.
Proprioception avoids occlusal prematurities.	No proprioception. Occlusal prematurities can shift the base.
Malocclusion may remain uneventful for years.	Malocclusion causes denture instability.
Incising does not affect posterior teeth.	Incising affect posterior teeth.
Bilateral balance is not necessary.	Bilateral balance is necessary.

Chapter 5

Laws of Articulation

Objectives

- Understand laws of articulation.

Hanau laws of articulation

Hanau proposed a set of laws which govern the bilateral balanced occlusion:

- The inclination of the condylar path.
- Incisal guidance angle chosen for the patient.
- Angle of the plane of occlusion.
- Compensating curves.
- Cuspal height and inclination of posterior teeth.

The inclination of the condylar path:

- It is defined as "the inclination of the pathway travelled by the condyle during a protrusive or a lateral movement.
- It can't be altered by the dentist.
- Components of condylar guidance:

1- Horizontal component. This guides the forward movement for the protrusive balanced occlusion.

2- Lateral component: The sideward or the lateral movement of the mandible. This guides the lateral movement of the lateral balanced occlusion.

Incisal guidance angle chosen for the patient

- Defined as "influence of contacting maxillary and mandibular anterior teeth on mandibular movements". (Fig. 38)
- It has two components:

  1- Horizontal component which is the overjet.

  2- Vertical component which is the overbite.

- Incisal guidance has more influence on posterior teeth than condylar guidance.
- It is determined by the dentist.
- It should be set according to the desired overjet and overbite of the patient.

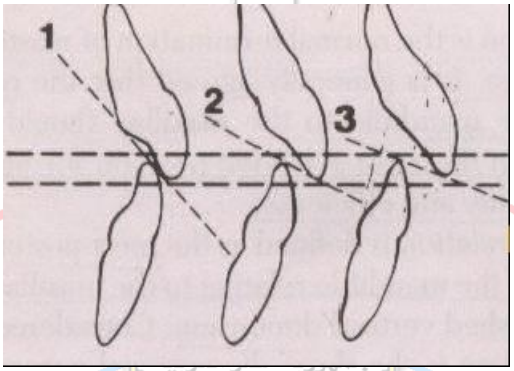


Fig. 38

Angle of the plane of occlusion

- 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 posterior teeth. It represents the mean curvature of the surface". (Fig. 39)
- It is defined anteriorly by the height of the lower canine, while it is defined posteriorly by the height of the retromolar pad. (Fig. 40)

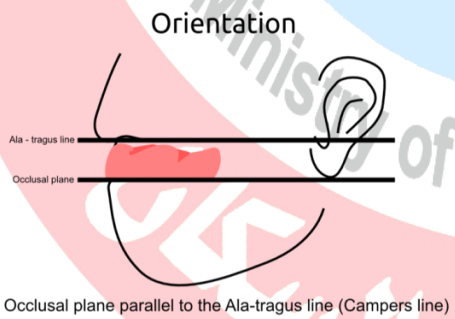


Fig. 39

Fig. 40

Compensating curves

- "The antero-posterior and lateral curvatures in the alignment of the occluding surfaces and incisal edges of artificial teeth which are used to develop balanced occlusion".

- They are three types:

1- Curve of Spee:

Anatomic curvature of the occlusal alignment of teeth beginning at the tip of the lower canine and following the buccal cusps of the premolars and molars continuing to the anterior border of the ramus. (Fig. 41, 43)

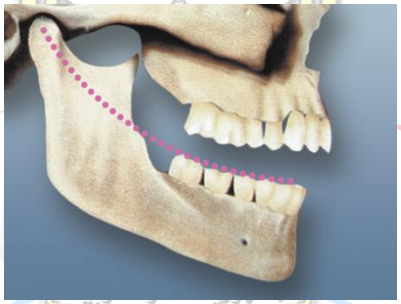


Fig. 41

2- Curve of Wilson:

The **curve**, viewed from the front that contacts the buccal and lingual cusps of the molars, being lower in the middle due to the lingual inclination of the long axes of the mandibular molars. (Fig. 42, 43)

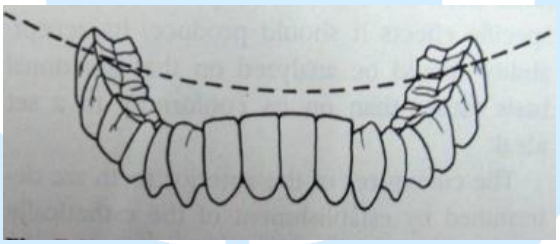


Fig. 42

3- Curve of Monson:

- The curve of occlusion in which each cusp and incisal edge touches to a segment of a sphere of 8 inches in diameter with its center located at the glabella.
- It is a three dimensional curve. (Fig. 43)
- It runs across the palatal and buccal cusps of maxillary molars.

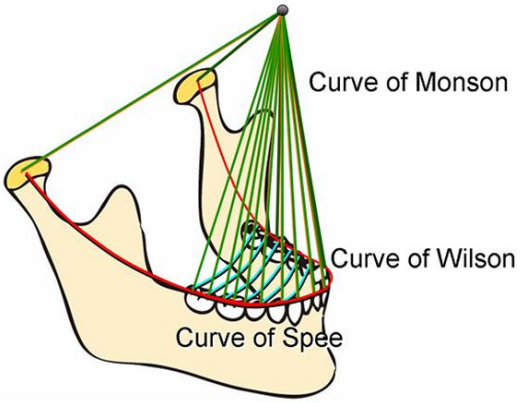


Fig. 43

Chapter 6

Balanced Occlusion

Objectives

- Define balanced occlusion.
- List the types of occlusal balance.
- Highlight advantages of balanced occlusion.
- Recognize disadvantages of balanced occlusion.

Balanced occlusion

Definition:

It is defined as the bilateral, simultaneous, anterior, and posterior occlusal contact of teeth in centric and eccentric positions.

Balanced occlusion is needed only in complete denture occlusion.

It can be achieved with anatomic teeth or with non-anatomic teeth.

Types of occlusal balance:

a. *Unilateral Occlusal Balance:*

This is present when the occlusal surfaces of the teeth on one side articulate simultaneously as a group with smooth uninterrupted glide. (Fig. 44)

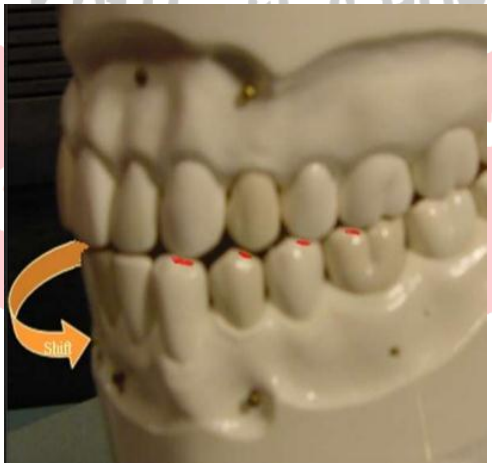


Fig. 44

b. *Bilateral Occlusal Balance:*

This is present when there is equilibrium on both sides of the denture due to simultaneous contact of the teeth in centric and eccentric occlusion. (Fig. 45, 46)

Fig. 45

Fig. 46

c. *Protrusive Occlusal Balance:*

This is present when the mandible moves forward and the occlusal contacts are smooth and simultaneous in the posterior both on right and left sides and on the anterior teeth.
It requires a minimum of three contacts *(one on each side and one anterior). (Fig. 47)*

Fig. 47

Advantages of Balanced Occlusion

- Distribution of load: in both centric and eccentric positions, maximum number of teeth are in contact so the masticatory load is distributed over the supporting tissues and not concentrated in an area.
- Stability: as maximum number of teeth are in contact, no tilting or movement of the denture will occur.
- Reduced trauma: as there is no movement of the denture as well as distribution of load as evenly as possible.
- Comfort.

Disadvantages of Balanced Occlusion

1. It requires an adjustable articulator.
2. It requires protrusive as well as protrusive records.
3. It may tend to encourage lateral and protrusive grinding.

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