Laboratory Partial Denture Prosthodontics

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توصيف مقرر دراسی		
1- بيانات المقرر		
الفرقة /المستوى :الثانية Labo	اسم المقرر : pratory partial Dentures Prosthodontics	الرمز الكودى :
التخصص : عدد الوحدات الدراسية : نظرى عملى 12 3		
2- Overall Aim of Course: : عدف المقرر: 2 The course includes the preclinical procedures for partial denture construction and their interdependence procedures will be stressed. The candidate should learn the basic principles of clinical removable prosthodontics treatment for partially edentulous patients, and the different laboratory steps for partial denture construction.		
3- Intended learning outco	mes of the course (ILOs):	3 -المستهدف من تدريس المقرر
i. Knowledge and Understanding: ۱. المعلومات والمفاهيم :	By the end of this course, students should be able to: A1.Explain the anatomical landmarks of partially edentulous arch. a2-Describe the different types of articulators. a3-Define flasking , packing and curing.	
	 a4-Describe how to repair fractures a5-Identify the responsibilities of be dentist. a6- Identify the Trace new trends of 	d RPD oth technician and of RPD
ii. Intellectual Skills: ب- المهارات الذهنية :	 b1-Interpret technical factors that cause failure of RPD denture. b2- Evaluate the technical work. b3-Select suitable materials and technique to use. 	
III. Professional Skills: ج- المهارات المهنية الخاصة بالمقرر:	 By the end of this course, students should be able to: c 1-Apply the specified procedures for removable denture construction with professional applications c2-Choose the suitable material and technique. c3-Practice the arrangement of anterior teeth C4-practice the arrangement of the posterior teeth and occlusal adjustment. c5-Apply falsking ,packing and curing. C6-Pratice finishing and polishing of the dentures. 	
IV. General and Transferable Skills: د- المهارات العامة :	 Assess problems. Work efficiently with others. Practice independent learning technology tools. Evaluate information from vario improve professional skills. 	by using information ous standard sources to

4- Course content			
4- محتوى المقرر:	 Introduction & regulations of the course. 		
	 Anatomical landmarks of edentulous jaws. 		
	 Impression trays and materials. 		
	 Record blocks and Mounting. 		
	 Articulators. 		
	 Mounting. 		
	 Types of wrought wires 		
	 Arrangement of artificial teeth in different occlusal schemes occlusion. 		
	 Steps of partial denture processing. 		
	Lab Remount.		
	 other forms of acrylic partial dentures 		
5- Teacning and Learning Methods: 5- أساايب التعليم والتعلم	 Lectures. Group discussions Practical cessions 		
6- Teaching and learning methods for students with limited abilities 6- أساليب التعليم والتعلم للطلاب ذو ي القدر ات المحدودة			
7- Student Assessment:	7- تقويم الطلاب :		
a- Assessment methods:	a. Class work:		
ا- الاساليب المستخدمه	 Quizzes Midterm theoretical 		
	3. Practical exam		
	4. Assignments 5. Participation		
	b. Final exam: Written theoretical		
b- Assessment schedule:	a. Class work:		
ب- التوقيب	1. Quiz I (4 th week) 5 marks		
	2. Attendance 5 marks		
	3. Mildterm theoretical (7 week) 10 marks 4. Clinician 40 marks		
	b. Final exam		
	Practical exam (13 th week) 20 marks written theoretical exam (15 th week)120 marks		
C-Weight Of			
Assessments:	 Quizzes and class work (20%), 20 marks Practical (20%), 20 marks. 		
ج- لوريع الدرجات	 Final written theoretical exam (60%), 120 marks. Total percentage 100% 		

7- List of References:	نمة الكتب الدراسية والمراجع :
a- Course notes: أ- مذكرات	
	P
b- Essential books (text books) ب- کتب ملزمة	I. Stewart KL, Kuebker WA, Rudd KD: Clinical removable Prosthodontics. Third edition. Quintessence publishing Co, Chicago 2003. II. Carr AB, McGivney GB, BROWN DT. McCracken's removable partial Prosthodontics. Eleventh Edition, Elsevier Mosby, St. Louis, 2005.
 c- Recommended books ج- کتب مقترحة d- Periodicals, web sites, ,,,,, د- دوریات علمیة أو نشرات الخ 	 www.qualitysafety.bmj.com www.google.com www.pubmed.com www.biomed.net
Ministry	of Health & Population

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Course Description

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

The candidate should learn the basic principles of clinical removable prosthodontics treatment for partially edentulous patients, and the different laboratory steps for partial denture construction.

Core Knowledge

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

- List the anatomical landmarks of completely edentulous arch.
- Describe the different types of articulators.
- Describe how to repair fractured RPD
- **Define** flasking ,packing and curing.
- Outline the responsibilities of both technician and dentist.
- Trace new trends of complete denture.

Core Skills

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

- Apply the specified procedures for removable denture construction with professional applications
- Choose the suitable material and technique.
- Practice the arrangement of anterior teeth
- Practice the arrangement of the posterior teeth and occlusal adjustment.
- Apply flasking ,packing and curing.
- Practice finishing and polishing of the dentures.
- 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

		Methoo Numl	lsofTeac berofTot	hing/Tra alHours	uining wi sperTop	th ic
ID	Topics	Interactive Lecture	Field Work	Class Assignments	Research	Lab
1	Anatomical landmarks of edentulous jaws.	6				24
2	Impression trays and materials.	6				20
3	Record blocks and Mounting.	6		6		20
4	Articulators .	6				20
6	Types of wrought wire clasps	6				20
7	Steps of partial denture processing.	6		6		20
8	Other forms of partial dentures	3				20
TOTAL HOURS (195) 39 12 144			144			
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Introduction:

Acrylic removable partial dentures (RPD) consist of an acrylic resin denture base, artificial teeth, and wrought wire clasps or cast clasps.



Indications of Acrylic Partial Dentures:

- 1-Young Patients for the following reasons:
- Expected bone growth in the young age.
- The pulp chambers are so large that a fixed prosthesis is not possible.
- 2- Elderly Patients whose health contraindicates lengthy and physically tiring procedures.

Health limitations are of course not limited to the geriatric patient but can be encountered in any age group.

3-Cost of acrylic partial dentures is considerably less than that for metallic partial dentures or fixed restorations.

4-Suitable with periodontally weak standing teeth.

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5-Acrylic RPD can be used as an Interim (Temporary) Prosthesis in the following conditions :

a- When denture is needed while healing is progressing after extraction or surgery.

b- Denture is needed while a prolonged treatment (periodontal or endodontic) is being accomplished.

c- Immediate denture.

d- The patient has no enough time at the moment for the lengthy definitive treatment.

6-Transitional Partial Denture: During the periodic shift from a partial denture to a complete denture.

7-Treatment Partial Denture: The treatment partial denture may be used in the following conditions :

a- As a vehicle to carry tissue treatment material to abused oral tissues.

b- To re-establish the vertical dimension of occlusion on a temporary basis, while the results of the increase can be observed.

c- As a splint following surgical corrections in the oral cavity.

d- As a night guard or mouth protective device to correct or control undesirable oral habits.

Advantages of Acrylic Partial Dentures:

1-Not expensive.

- 2-Light in weight.
- 3-Simple designs.

4-Easily constructed.

Ministry of 5-Easily added if a present natural tooth is extracted.

6-Easily relined after bone resorption.

7-Easily repaired if fractured.

8- Good appearance if extended labially or buccally because its color resembles that of the gingiva.

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9- Easily adjusted by grinding in the chairside.



Disadvantages of Acrylic Partial Dentures:

1-Less tolerated dentures than metallic



- 2- Poor thermal conductivity.
- 3 Lower strength, therefore it is :
 - a- Easily broken.
 - b- Must be constructed in thick sections.
 - c- The denture is somewhat bulky.
- 4- Not rigid enough for ideal connection.
- 4- Tendency for warpage if overheated during polishing or during recuring (for repairs or relining).

6- Design difficulties:

- a- Ideal tooth support is difficult.
- b- Ideal indirect retention is difficult.
- c- Unnecessary tissue coverage because of strength considerations
- d- Impossible to use more sophisticated components (e.g. precision attachments).

Advantages	Disadvantages
Cheap	Weak material
Relatively easy to construct	Non-rigid
Easy to modify (i.e. additions to denture)	Must be bulky for strength
	High potential for damage to soft tissues

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Chapter 2 Anatomical Landmarks

Extraoral landmarks of prosthetic importance:

A patient's face provides the dentist with a considerable amount of information. Prolonged edentulous periods result in apparent changes in the lower third of the face.

1- Nasolabial sulcus and angle:

This is the crease that extends laterally and downwards from the ala of the nose to the corners of the mouth. It becomes more prominent with aging. Figure 1





2- Vermillion border: Figure 2

It is the transitional epithelium between the mucous membrane of the lips and the skin, the amount of vermillion border shown on the lips depends on:

- a) The bulk of the orbicularis oris muscle.
- b) The amount of the labial alveolar bone.
- c) The alignment of teeth.



3- Philtrum (filtrum): Figure 3

This is a diamond shaped area at the center of the upper lip and base of the nose. With the loss of teeth and labial alveolar bone it becomes flattened. Improper tooth alignment may obliterate the filtrum. While a proper denture with appropriate arch form frequently restores a good contour to the filtrum within a short time.

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4- Mentolabial sulcus: Figure 4

This runs from side to side horizontally between the lower lip and chin. Its curvature frequently indicates the character of the maxillo mandibular relationship.





5- Angle of the mouth (commissure): Error! Reference source not found.

Dentures should support the mouth angle, because lack of proper support of the up- per lip may cause angular chielitis that is fissuring and inflammation of the angle of the mouth as a result of continuous wetting from saliva and a reduced vertical dimension.

Intraoral landmarks of prosthetic importance:

After extraction of teeth, the alveolar bone that supports the teeth begins to resorb and decrease in size.

The part of the alveolar process that remains is called the residual ridge.

Maxillary anatomical landmarks:

Figure 5





1- Alveolar ridge (residual ridge):

It is the portion of the alveolar process and its soft tissue covering that remains after the extraction of teeth. The residual ridge considered the primary stress bearing area in the upper jaw.

2- Maxillary tuberosity:

alth & Popul Distal to the maxillary third molar, the alveolar process ends in a prominence that is called the maxillary tuberosity. It is a rounded bulge behind and slightly above the distal end of the residual maxillary ridge.

3- Hamular or pterygo maxillary notch:

It is depression distal to the maxillary tuberosity used as a landmark for the correct extension of the upper denture.

4- Palatine vault

This is formed anteriorly by the hard palate and posteriorly by the soft palate.

5- Median palatine raphe

The hard palate is formed by the pre- maxilla and two palatine processes of the maxillary bone. The suture that joins the two palatine processes at the midline is called the midpalatal suture. Its position in the palate is marked with a raised area of mucous membrane called the median palatine raphe, which may be hard or sensitive. It is generally relieved to prevent the upper denture from rocking.

6-. Incisive papilla

This is a pad of fibrous connective tissue overlying the orifice of the nasopalatine canal. It is located on the palatal side and between the necks of the central incisors.

7- Rugae

These are irregularly shaped ridges of connective tissues covered by mucous membrane in anterior third of the hard palate. The rugae are thought by some to play a part in speech, especially the letter "s".

8- Torus palatinus

There is usually a raised, bony ridge running down the center of the hard palate. If the size of the torus is too big or extended posteriorly to where the posterior palatal seal is placed, it should be surgically removed. If the torus is small, the denture base over this area must be relieved.

9- Fovea palatinae

These are small pits or indentations which are found at the midline just poste- rior to the junction of the hard and soft pal- ate. They are openings of ducts of minor salivary glands.

10- Frenum:

It is a fold of mucous membrane, which doesn't contain any significant muscle fibers. High frenum attachments will compromise the denture rentention and may require surgical removal.

Mandibular anatomical landmarks : Figure 6



1- Alveolar ridge (residual ridge):

Like in the maxilla it is the part of the alveolar process and its soft tissue covering that remains after extraction of teeth. The highest continuous surface of the ridge is the crest of the ridge.

2- Retromolar pad

It is a pear shaped area found on each side of the distal end of the residual mandibular ridge. The retromolar pad is used as a guide for locating the position of the occlusal plane of the mandibular denture. Which must not be higher than half its vertical height.

3- External oblique ridge

It is a ridge of dense bone extending from just above the mental foramen superiorly and distally, and then becomes continuous with the anterior border of the ramus of the mandible.

4- Buccal shelf area :

It is bounded externally by the external oblique ridge and internally by the slope of the residual ridge. The bone in this area is very dense and the trabiculation is arranged almost at right angle to the path of jaw closure.

5- Mental foramen

It is located on the buccal surface of the mandible in the premolar region between the roots of the first and second premolars. The mental nerves and vessels pass through it.

6- Torus mandibularis

It is a bony projection sometimes found on the inner surface of the mandible in the premolar region. It may be unilateral or bilateral. It is covered by a thin mucous membrane, where relief of the lower denture in this area will be necessary. When the torus mandibularis is large, and interfere with the seating of denture, it should be removed surgically.

7- Frenum:

It is a fold of mucous membrane, which doesn't contain any significant muscle fibers. High frenum attachments will compromise the denture rentention and may require surgical removal.

8- Mylohyoid Ridge Figure 7

Origin of mylohyoid muscle which influences length of lingual flange. Can be prominent, and/or sharp, requiring relief.



Figure 7

9- Genial Tubercles

Attachment for the genioglossus muscle. Tubercles may be higher than the ridge with severe resorption.

Border structures of the dentures:

a- Border structure of the maxillary dentures: Figure 8

- 1. The labial frenum
- 2. Labial vestibule (Labial mucous membrane reflection area)
- 3. Buccal frenum
- 4. Buccal vestibule (Buccal m.m. reflection area)

6. Vibrating line of the soft palate.

5. Hamular notch



Figure 8

b- Border structure of the mandibular dentures: Error! Reference source not found.

1. Labial frenum.

3. Buccal frenum.

- 2. Labial vestibule.

- 5. Retromolar pad.
- 7. Lingual vestibule.



Labial Vestibule

E: a

Chapter 3 Impression trays and materials

1- Terminology

Impression tray : Figure 9

Is a device used to carry, confine and control impression material while making an impression.





Impression : Figure 10

An impression is an imprint or negative reproduction of an object from which a pos- itive likeness or cast can be made.

In dental prosthetics, an impression is a negative registration of the entire denture bearing area.

An impression is made in order to reproduce a positive form of the oral tissue (cast).





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Preliminary impression :

It is an impression made in a stock tray for making a study cast on which a custom tray is constructed.

Final impression :

It is an impression made in custom tray and it is used for the purpose of making the master cast on which the denture is constructed.

Cast :

It is a positive reproduction of the form of the tissues of the upper or lower arch over which denture bases or other dental restorations may be fabricated. Figure 11



Figure 11

<u>Study (diagnostic) cast</u>

A cast formed from a primary impression for use in diagnosis or the construction of custom tray.

<u>Master (definitive) cast</u>

A cast formed from a final impression and used for fabrication of the prosthesis.

2- Impression trays:

An impression tray is a device used to carry, confine and control impression materials while making an impression. Impression trays are classified as:

REQUIREMENTS OF IMPRESSION TRAYS:

1. The tray should be rigid and strong, but not too thick. A uniform thickness of 2 mm should be adequate.

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2- The tray should simulate the finished denture in size and shape.

3- The border extension of the tray should be 2mm short of the vestibular depth with no interference with muscle or frenal attachments.

4- The entire borders of the tray should be smooth and rounded.

5- The tray should retain its shape throughout the impression procedure and pouring of the impression.

6- The handle of the tray should be angulated so that it aids in manipulation of the tray without distorting natural lip contours.

7- It should accept the desired modifications.

FUNCTIONS OF IMPRESSION TRAYS

- 1- Support the impression material in contact with the oral tissues while making the impression.
- 2- Support the impression material while being removed from the mouth and while pouring the cast.
- A. Stock trays:

Stock trays are classified according to the following factors :

1- The presence of or absence of natural teeth.

a-Impression trays with flat or square floor :They are suitable for dentulous patient. Figure 12



Figure 12

b- Impression trays with round or oval floor :They are suitable for edentulous patients. Figure 13





2- The nature of impression material.

Impression trays may also be classified according to the nature of impression material used into the flowing types.

a- Plain trays. b- Perforated trays. c- Rim-lock trays. d- Water-cooled trays.

<u>3-Size of the dental arch</u>

Impression trays varies in size from small, medium to large in order to be suitable for different arch sizes.

- 4- Materials from which the stock trays are constructed
- a- Metalic
- Aluminum

• Stainless steel

- b- non metallic
- Plastic trays which can be sterilized.
- Disposable plastic trays

B. <u>Custom trays : (Special trays)</u>

They are designed to enable the dentist to make a more accurate and detailed impression than is possible with stock trays. Figure 14

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Figure 14

Advantages of custom trays:

1. It fits accurately the arches of the patient.

2. The bulk of the impression material is reduced and accordingly less dimensional changes will be expected.

- 3. Less impression material is used.
- 4. More comfortable to the patient.

Requirements:

- 1- The tray should be rigid and of uniform thickness (2mm).
- 2- The tray should simulate the finished denture in size and shape.
- 3- The border extension of the tray 2mm short of the vestibular depth.
- 4- The borders should be smooth and rounded.
- 5- The tray should retain its shape during the impression procedure and pouring of the impression.
- 6- It should be easily and rapidly constructed.
- 7- It should accept trimming.

Custom tray Materials :

- 1) Thermoplastic materials
- Shellac base plate. Modeling compound.
- Hydroplastic tray material.

- 2) Resins:
- Self cure. Heat cure. Light cure. Plastic sheets.

Self-curing acrylic resin:

Modified methyl methacrylates are the most widely used material for making custom trays.

Advantages:

- 1. Easily constructed.
- 2. More rigid than shellac base plate trays.
- 3. Can accept border-tracing material.

Construction of special tray:

- All apparent undercuts on the cast are blocked out with base plate wax.
- The exposed areas on the casts are coated with separating medium.
- The acrylic resin powder and liquid are mixed according to the manufacturer's instructions in a glass container. The consistency of the mix is checked periodically till it reaches the dough stage, wooden blade is used for mixing.
- The dough is placed within a form on a glass slab. It is patted out to form a wafer of uniform thickness, or two wet plastic sheets or glass plates are used to shape the dough into a wafer or sheet of suitable thickness.
- The wafer of the tray material is lifted from the slab and adapted to the cast with light finger pressure.
- A warm knife may be used to trim the soft material from around the borders of the cast, final trimming is done after curing.
- Excess material is formed into a handle of the desired shape. The handle must be placed so that it will not interfere with any movements of the patient's lips during impression procedures.

Spacer:

- Custom trays are sometimes provided with a spacer to ensure enough space between the tray and the tissues to allow an even thickness of impression material. The type of impression material used for the final impressions and impression technique determines whether a spacer is needed or not and the thickness of spacer to be used. Figure 15





Figure 15

- Advantage of the spacer :

- 1- It provides a space of even thickness in the custom tray for the impression material and thus any dimensional change in the material will be equal throughout the impression.
- 2- In case of plaster impression material, the suitable thickness provided will help the fractured areas to be accurately reassembled.

Pouring the impression and forming the cast

Materials used for casting

Plaster of Paris:

a white, powdery, slightly hydrated calcium sulfate made by calcination of gyp- sum, used for making casts and models when combined with water to form a quick setting paste.

Artificial stone:

It's a modified form of plaster of paris, which sets even more slowly and produces casts of improved hardness and strength.

a. Study Cast:

The study cast is produced from pouring the primary impression in either plaster or stone.

- The study or diagnostic cast is formed from a primary impression and used for diagnosis and construction of special tray.
- The materials used for making the primary impression are either compound or alginate irreversible hydrocolloid impression materials. The primary impression is poured in either plaster or stone gypsum martial.

B. Master Cast:

The master cast is poured either by inverting the impression on a putty of stone or by boxing the final impression. Materials used for making final impressions are zinc oxide, impression plaster, impression waxes and rubber base impression materials.

Boxing of an impression :

Boxing an impression produces a container into which stone can be poured.

Advantages of boxing :

1- It allows preservation of the borders of the impression.

2- It allows the use of a mounting plate which in turn permits the master cast to be repositioned accurately on the articulator after the denture has been cured (Laboratory remount).

3- It produces denser cast as it allows vibration to get rid of air bubbles.

4. Boxing produces a dense accurate master cast of a predetermined thickness.

REQUIREMENTS OF A DENTAL CAST:

1- The surface of cast should be hard, dense, clean and free of voids or nodules.

2- A cast should extend sufficiently to include all of the area available for denture support.

3- The peripheral roll should be complete and no deeper than 3.0 mm, and the edge of the cast extending out from this roll should be approximately 3.0 mm. wide

4- The side walls of a cast should be vertical.

5- The base of a cast should not be less than 10mm at the thinnest point.

6- The tongue space on a mandibular cast should be flat and smooth when trimmed, but the lingual peripheral roll should remain intact

7- The contour of the base of maxillary and mandibular casts :

The anterior border of the maxillary cast is pointed at the midline and the anterior border of the mandibular cast is curved from canine to canine.

8- A land area of 3.0 mm should be maintained around the entire cast.

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9- The base of the cast is trimmed so that the occlusal surface of the teeth or the plane of the edentulous ridge is parallel to the base.





Figure 16

Chapter 4

Record Blocks and Mounting

Outline:

- Methods for obtaining jaw relation records.
- Record blocks:
- a. Record Bases.
- b. Occlusion rims.
- Marking the occlusion rims. •

In partially edentulous situations there are different methods to record the jaw relation which depend on the number of the teeth present inside the patient's mouth.

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- Direct apposition of casts.
- Interocclusal records.
- Registration using record blocks.

Direct apposition of casts: Figure 17

- 8 Population (1) Sufficient opposing remaining natural teeth remain in contact.
- (2) Only few teeth are to be replaced.
- (3) No evidence of occlusal disharmonies are present.

Methods of Recording Jaw relations **Direct Apposition of Casts** (Hand Articulation)

Figure 17

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Interocclusal records: Figure 18

When sufficient natural teeth remain to support the removable partial denture (Kennedy Class III or IV) but the relation of opposing natural teeth does not permit the occluding of casts by hand.



Occlusal relationship using occlusion rims on record bases: Figure 19

- 1- When one or more distal extension areas are present.
- 2- When a tooth-supported edentulous space is large.
- 3- When opposing teeth do not meet.

I- if there is no sufficient number of tee

usal relations using occlusal record bases for framework fabrictaion)

Figure 19

32

FUNCTION OF THE RECORD BLOCKS

- 1- Jaw relations recording.
- 2- Selection of teeth:
- High and low lip lines help in determining the length of the anterior teeth.
- The distance between the two canine lines determines the width of the anterior teeth.

• The distance between the canine line and the posterior end of the occlusion rim determine the mesiodistal width of the posterior teeth.

3- Arrangement of teeth: Figure 20



RECORD BLOCKS

Are composed of record base and occlusion rim.

I. Record base :

Requirements :

It must be reasonably rigid to withstand handling under pressure in the patient's mouth.

It must fit the cast accurately in order to keep the same relationship of the occlusal rim to the cast. An accurate base plate will result in an accurate jaw relation record.

The borders should be developed in the same manner as the borders of the finished denture.

Record bases may be temporary or permanent:

A- Temporary base:

- 1- Shellac:
- 2- Self-curing acrylic resin bases:
- B- Permanent base :
- 1- Heat cured acrylic resin bases:
- 2- Cast bases : They are either gold or chrome cobalt.

II- Occlusion Rims :

Occlusion rims are horseshoe shaped blocks of wax, which are attached to the base plate. They are occluding surfaces constructed on temporary or permanent denture bases to be used in recording jaw V of Health & Popula relations and for arranging teeth.

Requirements :

- 1. The occlusion rim must be constructed from a material that is easy to manage.
- 2. It should be well attached to the underlying base.
- 3- It must be placed directly over the ridge.

4- It should follow the form of the arch.

5- It should have a smooth surface, and blend smoothly with the facial and lingual surfaces of the trial base.

6- The sides of the occlusion rim should make a 90o angle with the occlusal surface.

7. Its width must be considerable to permit occlusion of the upper and lower occlusion rims.

8. The posterior border of the upper rim should terminate at the anterior aspect of the maxillary tuberosity. While that of the lower rim should terminate anterior to the retromolar pad.

9. On average, the labial surface of the up- per rim should be 10mm anterior to the incisive papilla.

10. The average height of the upper occlusion block is about 20mm measured from the depth of the labial frenum to the incisal edge of the upper occlusion rim. Figure 21



Figure 21

MARKING THE OCCLUSION RIMS:

Marks or lines are marked on the record blocks during jaw relations recording which will aid in the selection and arrangement of artificial teeth, these lines are:

a-Central line or midline

This line is marked on the upper occlusion rim below the center of philtrum or at the bisection of the line from corner to corner of the mouth.

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b-Canine lines

These lines mark the corners of the mouth when the lips are relaxed.

c-High lip line

The greatest height to which the lip raised in normal function or during the act of smiling broadly.

d-Low lip line Figure 22

The lowest position of the inferior border of the upper lip when it is at rest, or, the lowest position of the superior border of the lower lip during smiling or voluntary retraction.



Chapter 5

Articulators

The information obtained from the cast, occlusal rims and bases may be termed static information, but, the mouth is a dynamic system, therefore, some means should be available in the laboratory for converting static information into a dynamic form. This is done by mounting the casts on an instrument called an articulator.

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TERMINOLOGY

Mounting :

A laboratory procedure of attaching the maxillary and or the mandibular cast to an articulator or similar instrument.

Articulator :

An articulator is a mechanical instrument that represents the tempro mandibular joints and jaws, to which maxillary and mandibular casts may be attached to simulate some or all mandibular movements.

Condylar guidance :

The mechanical device on an articulator intended to produce similar guidance in articulator movement as are produced by the paths of the condyles in the TMJ.

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Incisal guidance :

The part of the articulator that maintains the incisal guide angle.

FUNCTIONS

- 1. The primary function of the articulator is to act as a patient in the absence of the patient.
- 2. Articulators can simulate, but they cannot duplicate, all the possible mandibular movements.

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- 3. Mounting dental casts for diagnosis and treatment planning.
- 4. Fabrication of occlusal surfaces for dental restoration.

5. Arrangement of artificial teeth for complete and removable partial dentures.

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 are 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.

<u>REQUIREMENTS :</u>

Minimal articulator requirements:

1. The articulator must accurately maintain the correct horizontal and vertical relationship of the patient's casts.

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2. The casts must be easily removed and attached to the articulator without losing their correct relationship.

3. The articulator should have an incisal guide pin with a positive stop to pre- serve 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, rig- id, 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.

CLASSIFICATION :

Articulators are classified 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.

<u>A- Plaster slab articulator : (Relator)</u>

It was formed by extending plaster index from the rear of the casts. The casts were keyed to each other by means of their indices.



B- Simple hinge articulator : (Plane line)

This articulator produces the simple opening and closing movements of the TMJ. It consists of two bows united by a hinge and a posterior screw adjustment that can raise or lower the distance between the bows



Class II :

Mean value articulators :

These articulators have two jaw members, joined by two joints representing the TMJ. These articulators are capable of eccentric movement, but the condylar path here is fixed at a certain angle, which is the average for many patients. It ranges from $30^\circ - 40^\circ$ from the horizontal. The incisal guidance may be fixed to an average or may be adjustable.

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.

Bonwill triangle makes an angle with the occlusal plane with an average of 15 degree called Bolkwill angle.

Class III :

Adjustable condylar path articulators

This class of articulators differs from the fixed condylar path articulators in that they can accept eccentric records that are used to adjust the condylar guidance of the articulator.

According to the eccentric records accepted by these types of articulators, they are classified into :

Semi and fully adjustable condylar path articulator.

A- Semi adjustable condylar path articulator :

This type of articulator can accept the following records :

- 1. Face bow record to mount the upper cast.
- 2. Centric relation record to mount the lower cast.

3. Protrusive record, to adjust the articulator's horizontal guidance, that correspond to the patient's horizontal candy- lar path inclination.

The 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.



B- Fully adjustable condylar path articulators : This type of articulators accept the following records :

- 1. Face bow record to mount the upper cast.
- 2. Centric relation record to mount the lower cast.

3. Protrusive record, to adjust the articulator's horizotnal condylar guidance which corresponds to the patient's horizontal condylar path inclination.

4. Right lateral record, to adjust the right lateral condylar guidance.

5. Left lateral record, to adjust the left lateral condylar guidance.



Chapter 6

Types of wrought wire clasps

Components of Acrylic Partial Dentures:

I. The Acrylic Denture Base:

The base acts as a saddle, and a connector, and has a reciprocal function for the retentive wrought wire clasp arm.

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For maxillary arches, the base may have a horseshoe configuration or a full palatal configuration. For mandibular arches, only the horseshoe configuration is used.

The extent of coverage is dictated by the rules of partial denture construction, lingually, the acrylic resin base should extend to cover the lingual surface of the standing teeth above the survey line with gingival margin relief. This extension in the maxilla or mandible provides :

- 1- Retention of the dentures by physical means.
- 2- Prevents food retention.
- & Populatio 3- The plate is less felt by the tongue than bar denture.
- 4- May provide indirect retention.
- 5- Increase the strength of the denture.

II. Wrought Wire Clasps:

Wrought stainless steel wire clasps (0.7 or 0.8 mm in cross sectional diameter), are used with acrylic dentures. They are attached to the acrylic denture base by embedding its non-retentive end in the denture base, this end must be looped or twisted to help anchor it in the acrylic resin of the denture base. The most commonly used clasps for acrylic partial dentures are:

Clasps are classified on the following basis:

<u>1- On the Base of Construction:</u>

<u>A) Cast Clasps:</u> The cast clasp is cast in gold or chrome- cobalt alloy, it is accurately fitting and easily varied in thickness, form and taper.

<u>B)Wrought wire clasps :</u>

The wrought wire clasp is usually made of stainless steel or gold alloy wire. The clasp is simply processed.

<u>C) Combination Clasps:</u> The combination clasp is a cast clasp in which wrought wire has been substituted for the usual cast retentive arm.

it is made by either of the two following methods:

- The wrought wire retentive arm is attached to the clasp with solder.
- The wrought wire can be embedded in the wax pattern of the clasp before casting.

Advantages of Combination Clasp:

1-It combines the resiliency of the wrought retentive arm plus the better stabilizing feature of the cast clasp.

2- It has a stress breaking action.

3- It can be used in the anterior part of the mouth as it is less showing and can be placed near the gingival margin.

Wrought wire Clasps :

1-Embrasure wrought wire clasp (Half Jackson):

It finds its application on molars and premolars when no edentulous space exists on either side of the tooth. It starts lingually and passes up to cross the occlusal plane on the embrassure between two neighboring teeth and then down to the buccal surface to engage the tooth undercut. This clasp can provide tooth support by resting on the embrassure, but its use is limited only wherever an interocclusal room exists for its occlusal portion.



2-Circumferential wrought wire Clasp :

It is used for the teeth adjacent to the edentulous ridge. It starts lingually and passes over the relieved ridge along the proximal surface of the clasped tooth to engage buccal undercuts. It should pass 3 to 4 mm away from the proximal surface of the clasped tooth, to allow for any needed grinding of acrylic during insertion.



a. Simple Circumferential Clasp b. Embrasure wrought wire clasp

III. Artificial Teeth:

These are attached to the acrylic base by a chemical bond. The acrylic teeth are easy to place, have acceptable esthetic appearance, have a decreased danger of fracture, and can be easily reshaped or adjusted by grinding in the chairside.

The selection and adjustment of these artificial teeth are governed by: 1-The mesio-distal and occlusogingival space available.

- 2-Teeth on the other side of the arch.
- 3-The occluding opposing teeth in the opposite jaw.

4-Other than the above items, the rules of complete dentures will be applied.

Chapter 7

Acrylic partial Denture Processing

DESIGN PRINCIPLES FOR A GOOD ACRYLIC PARTIAL DENTURE :

In a similar manner to an RPD design for a cobalt-chromium denture, the casts should be surveyed and, where appropriate, articulated to assist in the design. The design of acrylic dentures will follow the same principles involved with a cobalt chrome denture3 and should consider the following:

- -Saddles
- -Support
- -Retention
- -Bracing and reciprocation
- -Connector
- -Indirect retention
- -Review of completed design.

Saddles are designed to fill the edentulous space to be replaced. However, the saddle must be fully extended in the distal extension edentulous area.

When designing the denture the clinician should look to increase the tooth borne *support* of the denture and not rely exclusively on mucosal support. This may be obtained by finishing the denture above the survey line in those places where the acrylic components contact the tooth .

It is possible to avoid contact with the gingiva and obtain relief by blocking out the dentogingival junction, although this is controversial. It has been found that deterioration in gingival health will occur whether relief is present or not.

Retention will generally be a wrought clasp, which will be attached to the acrylic and will require reciprocation.

Connection will usually be acrylic or, where strength and reduction in bulk is indicated, then a cast cobalt chrome framework is designed. In order to obtain indirect retention, the clasp must always be placed between the saddle and the indirect retainer. Finally, the completed design is reviewed against a checklist of the design principles.

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Steps of RPD Construction:

-Acrylic Special Tray:

On the study cast resulting from the primary impression a special tray is prepared which may be either shellac or acrylic resin. Shellac tray is indicated with severe undercuts on the ridge. It must be thick to be strong, perforations are prepared using hot pointed instrument, the value of these perforations is to retain the impression material in the tray.

Acrylic special tray is the most commonly used one as it is rigid, perforations are prepared in the tray by using a bur.

Spacer is needed between the teeth and the tray to provide adequate thickness of the impression material (2 mm space is required for rubber impressions, and 5 mm for alginate impressions), i.e. the use

of acrylic special tray with spacer is a must. The self-cure acrylic tray is constructed on the study cast as follows:

1-Outline of the tray is drawn by indelible pencil, taking care to avoid muscle attachments, freni, and movable tissue, the outline of the spacer is shorter than the outline of the tray.



2- Two thicknesses of base plate wax are adapted over the outline to act as a spacer, to provide 2 mm space in the tray.



3-polymer and monomer is mixed in a cup until a dough is formed.

4-The acrylic mix is adapted to the wax spacer by light finger pressure.

5-While the material is still workable, the excess is trimmed. A small piece of the trimmed material is used to make a handle.

6- After polymerization, the tray is trimmed by acrylic stones. Perforations are then made in the tray with a No. 8 bur, to ensure retention of the impression material to the tray.

Record Blocks:

1-Record base:

Shellac bases are used for the construction of record base.

The base plate is softened and adapted to all the remaining teeth and palate in upper RPD cases so it can be placed on the cast and on the mouth in the same position according to the outline the drawn on the cast. nist

2- Wax Rims:

a- Wax rims should be placed directly on the cast over the edentulous alveolar ridges and centered over the crests of the ridges to take the shape of the arch and then attached to the base.

b- The height of the wax rims should be even with the cusps of the adjacent abutment teeth.

c- For mandibular distal extension bases, the posterior height of the wax rim should be at the level of 2/3 the height of retromolar pad. No landmark determines the height of the maxillary free-end wax rim.





Recording Jaw relations :





- Mounting of Record blocks on an articulator:



-Arrangement of teeth



-Try-in of the denture in the patient's mouth جمهورية مصر العر

-The denture is processed in the usual manner.

Preparation of the Master Cast:

This step is carried out before denture processing.

a-Undesirable proximal undercuts that would interfere with insertion of the partial denture should be blocked with plaster they may be blocked with wax if the base is going to be constructed of self- cure acrylic resin.

b-The posterior border should be slightly beaded to provide a posterior seal .

c-The gingival margin should be relieved to avoid gingival irritation.

d-The retentive clasp arm is attached to the tooth surface with cement applied on the buccal surface of the tooth. This step is made to prevent a clasp loss or movement during the wax elimination stage.

-Finishing and polishing of the denture to be ready for insertion.

Chapter 8 Other Forms of RPD

- Swing-lock RPDs
- Single complete denture opposing Kennedy class I RPD
- Sectional dentures
- Snap-on Smile
- Partial Overdentures
- Attachment-retained partial dentures
- Implant-supported partial dentures
- Temporary RPDs

Swing-lock RPDs

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They are a form of RPDs in which all or several of the remaining teeth are used for retention and stability of the prosthesis against vertical displacement.

• It consists of a hinged buccal or labial bar attached to a conventional major connector.

• It is designed with small vertical projection arms that contact the labial or buccal surfaces of the teeth gingival to the height of contour. They look like I or T-bars and provide both retention and stabilization for the prosthesis.



INDICATIONS:

- . Too few remaining natural teeth which require splinting.
- . Periodontally –involved teeth because it provides support.
- . Position of remaining teeth not favorable for conventional design.
- . Retention and stabilization for maxillofacial prosthesis.

. Retention of a prostheses for patients who have lost large segments of teeth and alveolar ridge as a result of traumatic injury.

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SINGLE COMPLETE DENTURE OPPOSING

KENNEDY CLASS I RPD

Most common situation is single maxillary complete denture opposing some remaining lower natural teeth.

PROBLEMS:

The remaining natural teeth are often tipped, supra-erupted or malposed. This results in:

- 1. Uneven occlusal plan.
- 2. Poor stability of the denture.
- 3. Difficulty in obtaining harmonious occlusion.
- 4. Tissue injury and ridge resorption
- 5. Supra-erupted teeth reduces the space available which makes teeth setting a difficult laboratory procedures.

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6. Heavy occlusal forces, due to the existence of opposing natural teeth. 7. The fixed position of the anterior teeth causes problems with esthetics, as there will be less flexibility in setting teeth.

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This excessive force leads to several problems including:

Bone resorption. .Occlusal wear. .Combination Syndrome (Kelly's Syndrome).

1. Bone loss from anterior part of maxillary ridge which is replaced by fibrous hyperplastic sues.





2. Hypertrophy of the maxillary tuberosity (fibrous tissues)



This results in: • reduced space to place the artificial posterior teeth • reduce space for the tongue in the posterior region

3. Papillary hyperplasia on the hard palate:



4.Extrusion of the mandibular anterior teeth:

It is caused by lack of sufficient stimulation required by the periodontium of the anterior mandibular teeth. The contact between the teeth and a complete denture supported by an edentulous ridge is not sufficient and may lead to extrusion of the mandibular anterior teeth



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Additional manifestations

- . loss of occlusal vertical dimension
- . occlusal plane discrepancy
- . poor adaptation of the prosthesis(fracture)
- . epulis fissuratum
- . periodontal changes

Management :

- Symptomatic treatment:
- 1. Treatment of papillary hyperplasia by a combination of tissue conditioners and antifungals.
- 2- Surgical removal of denture fissuratum and grossly fibrous tissue.
- 3- Reducing enlarged tuberosities to allow the lower RPD to extend over the retromolar area.
- 4- Maxillary complete denture should have maximum extension and border seal to ensure retention
- 5- The design should be rigid and provide maximum stability and retention.
- 6.Anterior teeth should be used for cosmetic and phonetic purpose only.
- 7- Posterior teeth should be in balancing occlusion.

SECTIONAL DENTURES

Sectional dentures are constructed in separate parts which join together intra-orally to create a single prosthesis.

• They are used to exploit undercuts around teeth, hard and soft tissues which require more than one path of insertion, and are usually of split pin or locking bolts design.

sectional metal partial denture is designed to use mesial and distal undercuts for its retention instead of buccal and lingual undercuts.



This system has the following advantages:

- . No special tooth preparation is required, and clinical time is reduced to a minimum.
- . Spaces that would trap food are eliminated by the extension of denture base into undercuts which would be unusable with one- piece partial dentures.
- . Retention is obtained without the use of unsightly buccal retainers, thus the appearance of the restoration is improved.
- . Unilateral removable partial dentures can be constructed with reliable retention.
- . Buccolingual splinting can be achieved.
- . Lingual and palatal connectors can be avoided even for those patients in whom labial and buccal undercuts are severe.
- . Retention is sufficiently positive for dentures to be worn by epileptics with confidence.

SNAP ON DESIGN

- It is a multi-purpose restorative appliance.
- It is a removable appliance made of tooth-colored acetyl resin and is intended to be worn over the existing teeth.
- It can be designed as a full-arch or unilateral device and may be used to replace missing teeth.

Indications:

- . As a removable partial denture
- . Establishing vertical dimension before starting full-mouth reconstruction
- . As a provisional for implant restorations
- . For cosmetic enhancement of color or alignment
- . Requires no preparation of tooth structure
- . Non-invasive
- . Completely reversible.
- . Can be made as thin as 0.5 mm
- . Available in 19 shades.



REMOVABLE PARTIAL OVERDENTURE

Definition:

• It is a removable prosthesis that is constructed over existing tooth, root or implant for providing additional support, stability and retention Other names:

- Overlay denture
- Overlay prosthesis
- Superimposed prosthesis

INDICATIONS:

- 1- free end saddle cases (class I ,II)
- 2- cases with long span anterior edentulous spaces
- 3- additional support for weak abutment teeth
- 4- support when few teeth remains

CONTRAINDICATION OF RPO:

Mentally or physically handicapped patient who can't perform and maintain good oral hygiene measures inadequate interarch space teeth with grade III mobility teeth with insufficient attached gingiva .

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IMPLANT SUPPORTED PARTIAL OVERDENTURE

*The principle of osseointegrated implants has been used for more than 20 years, and its application can be extended to solve existing problems in prosthetic dentistry.

*There are many implant systems available, some may vary while others are interchangeable.

*Advantages:

- 1-Higher rate of success.
- 2-Improved masticatory efficiency and performance.
- 3-Superior patient satisfaction.
 - 4- Prevent alveolar bone resorption beneath the denture base
 - 5- Provide additional retention for the RPD
 - 6- **Reduce** stress on the natural abutment teeth
 - 7- Reduce the number of needed clasps for the RPD







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