**Prosthodontics**

**Removable partial dentures (RPD)**

**Sheet no. : 1**

**Refer to slide no. : 1 (1-40)**

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Let's start with the definition of the RBD ,it is a Prosthesis that replaces the missing teeth and associated supporting structures in a partially dentate arch, It can be removed from the mouth and replaced as well

It is removable because it can be taken out from the patient mouth and it is partial cuz it replaces some of the teeth, the patient is not completely edentulous so it replaces one teeth to let's say 27 teeth so even if the patient has only one remaining tooth he is called partially dentate or partially edentulous patient.

For example here in slide no. 4, several teeth are missing so this is partially edentulous patient))

and in slide (5)only the upper lateral incisor are missing in this case so this is called a partially edentulous patient.

-For any patient who is missing any part of the teeth we always have two options to replace teeth (two big categories):

1-fixed partial dentures (bridges).

2-removable partial dentures.

-Fixed partial dentures depend on how many remaining teeth , the condition of the remaining teeth, and the condition of the patient's health.

-If we go back to the first picture, on the right side of the patient there is a distal extension (the edentulous area is not bounded by teeth so we can't do fixed dentures whereas on the left side of the patient we can possibly do a fixed one .

However this situation doesn’t want to have anything removable, so what we can do for them ?

We can do implantation under the condition of having enough bone, patient health and other requirements for implantation.

Now, when we wanna do a classification for an edentulous patien,t we make simple classification so that the communication is easy between dentists all over the world plus dentists and technicians .

So when we have a case here or anywhere else in world there should be a common understanding between us ,for example this patient is class I or class ii or class iii patient ,,there should be an agree between us about what is the meaning of class I or ii or iii patient.

This classification also helps us to determine which method of treatment we gonna choose for the patient and if we will choose an RPD ,what kind of design is suitable for the patient and other things.

Removable partial dentures also can be classified into two types mainly: 1- acrylic RPD.

2- metallic RPD….. the base is a metal.

1)acrylic RPD ….the material that is made from is like that used for complete denture exactly ,same teeth and same material for the base but the only thing that we add is a flask from a wire that goes around the remaining teeth.

2-metal RPD….it's called (co-cr RPD/ cobalt-chromium RPD) all the base is metal and only where I'm gonna to replace teeth ,there will be the acrylic resin and the acrylic teeth.

-we talked about the acrylic dentures just to know that they are exist but we will not take about it anything this semester and all our speech will be about metallic RPD.

When we say RPD we always mean cobalt-chromium RPD ,,we consider the acrylic RPD as temporary or traditional but not a definitive treatment for the patient .

Now when do we use the RPD ?

As we talked that we have other options which is implants so there are an indications for RPD which are :

1- long edentulous span we can't use implant treatment.

2-free-end saddle we can't use implant.

3-the patient's oral hygiene must be satisfactory,, If it is not satisfactory we can't offer them RPD because when we look at the structure of the RPD we notice how much does it cover from the adjacent teeth and tissue ,if the patient is not meticulous about the oral hygiene and they make sure that they take off this RPD after each meal and clean it and get it back then the main purpose of all this prosthesis is to maintain the remaining tissues then replacement of the missing teeth but if the replacement will harm the remaining tissues then no need for it so the patients should be really good in oral hygiene in order to give them the RPD .

4- when there is need to restore both soft and hard tissues due to bone defect ,for example patient who has had surgery because of cancer or trauma ,he lost more than teeth he lost teeth and a lot of bone around it ,so in this case implants will be excluded and the only thing to offer the patient is RPD to depend on the acrylic resin to restore the missing bone and tissues.

5- of course if the patient is too young ,we will study about systemic syndromes that affect teeth at young ages, for example kids who are 6 year old and don't have any teeth or they have only some teeth so at these ages we can't give them implants so we depend on RPD until they became over the age of 18 year then we can give them implants.

6- patient desire and cost which is very important factor whether the patient can costs implants or not ,many of patient will go for a RPD for temporary period until they have sufficient finances to do implants.

:\*Now we will talk about the components of RPD

1- **Clasp “Direct Retainer**”: That part of ( Co-Cr )RPD to retain the prostheses in its place and it will be on the adjacent teeth.

2- **Rest**: That part of RPD, which placed on the abutment tooth to limit the movement of the denture in gingival direction "Support".

3- **Major Connector (Rigid,a piece pf metal )**: It is that part of RPD that connect the components of the RPD on one side of the dental arch to opposite side,,there is no partial denture on one side,there is very important concept called **cross arch stabilization** , if you are using a removable prosthesis you are always connecting the two sides together to make sure that the prosthesis is stable even if you are restoring a single teeth.

 4- **Minor Connector**: Also rigid which connect the major connector or the denture base and other components of the RPD such as rest and clasp.

5- **Saddle area**: A gap or space in the dental arch due to loss of natural teeth, so it will be in the edentulous area ,it will be like a perforation with many designs for it, the purpose of this is to retain the acrylic teeth.

6- Guiding plans: The proximal surfaces of the tooth that guide the RPD towards the final position in the mouth,,

-the tooth that is adjacent to the edentulous area is called an abutment , an abutment whether was a tooth, crown, implant or whatever you have beside an edentulous area is an abutment,, so we have one abutment and other abutment and between them we have a saddle area ,the proximal surface of these teeth (abutments) are called guiding planes cuz they guide the RPD into its position in the mouth.

\*Acrylic RPD as we said is not considered as a definitive treatment, it's just used in some cases for:

 1- Esthetics

2- Space maintainer: in order to make teeth stable and not moving while growing up.

3- To reestablish occlusal relationships

4- Interim restoration during treatment.

5- To condition the patient for wearing a denture.

For example : some patients the only remaining teeth they have are the lower four incisors so let's assume that they are in a bad condition and the patient is gonna do an extraction ,many patients are not able to go into a complete denture right away so we do for them a traditional phase by giving them an acrylic partial denture (there will be clasps around these central or lateral incisors ). It's just to accommodate the patient for the idea of wearing something removable and then after that they can go for extraction and transition into a complete denture, so this is what we mean by condition the patient for wearing a denture.

\*We said that we should have a classification for partially dentures and there are several classifications for them but we are gonna focus on two of them and we will talk in details about the main one.

**So we have 2 methods in classification:**

classification according to support: that is to say what is it that giving the support for my RPD, is it only teeth, is it only tissues or is it teeth and tissues.

***a) Teeth borne RPD* :** we said that adjacent teeth to the edentulous area are called abutments and the part of the RPD that placed on them is called rest ,,so if we are using RPD in a design that is the edentulous span is bounded by an abutment on distal and an abutment on mesial; then this tooth is called tooth borne because all forces that come on the partial denture is borne by the teeth and there is no force that gets transmitted to the tissues.

**b)tissue borne RPD :** when I press on this denture it will cause some pressure on the mucosa so all the force doesn’t go to the teeth, it will go to mucosa (there is no rest on the teeth).

**c)teeth and tissue borne RPD :** it's a combination, there is rest on teeth so some of the force will go the tooth, however, it is a distal extension case (there no distal abutment) so some of this force will go to the mucosa) look at the picture in slide 16.)

\*now, mucosa borne has a disadvantage because we don’t want the forces to go through the mucosa direct to the bone cuz a resorption of the bone will happen, and this is the main reason why do we have a resorption in edentulous cases and no resorption when there are remaining teeth,( In edentulous cases all the force will go to the mucosa).

However, that classification is not enough because there are a lot of possibilities of each case (one tooth missing, two, three are missing or if there is a distal extension or not).

*Requirements of an Acceptable Method of Classification:*

1- It should permit immediate visualization of the type of partially edentulous arch that is being considered

2- It should permit immediate differentiation between the tooth -supported and the tooth- and tissue-supported removable partial denture.

3- It should be universally acceptable.

The most popular classification is called kennedyis classification ( in 1925) according to Edward kennedy .

It attempts to classify the partially edentulous arch in a manner that suggests certain principles of design for a given situation.

note : it depends on the location of the missing tooth (if there is distal extension so that there is no distal abutment, if it is bilateral surrounded by abutments, it is anterior or posterior).

there are 4 classifications that we are gonna go through ,the purpose of them for example if I said that this is class I patient then I must differentiate it from other classes and take many things in consideration.

\*Now, let's define each class :

**Class I**

Bilateral edentulous areas located posterior to the natural standing teeth "Bilateral free-end saddle".

**Class II**

A unilateral edentulous areas located posterior to the natural standing teeth "unilateral free-end saddle".

**Class III**

A unilateral edentulous area with natural teeth standing anterior and posterior to it.

**Class IV**

Single, but bilateral “Crossing the middle line” edentulous area located anterior to the remaining natural teeth,,,it means that the two central incisors must be missing and all the posterior teeth must be present that is no edentulous area posterior to it.

after they put the classification they found that it is not enough and they had to apply some extra rules in order to be able to apply the classification on all cases so we have something called: Applegate's rules for applying The Kennedy classification.

 The Kennedy classification would be difficult to apply in every situation without certain rules for application. Applegate provided eight rules that govern application of the Kennedy method.

**Applegate's Rules :**

 *: Rule 1*

Classification should follow rather than precede any extractions of teeth that might alter the original classification. (for example if a patient came to the clinic and all his teeth are present but his upper left five and six are of a very big prognosis and scheduled for extraction so I don't do the classification before the extraction).

*Rule 2:*

If a third molar is missing and is not to be replaced, it is not considered in the classification.

*Rule 3*

If a third molar is present and is to be used as an abutment, it is considered in the classification.

*Rule 4*

If a second molar is missing and is not to be replaced, it is not considered in the classification (e.g., if the opposing second molar is likewise missing and is not to be replaced).

*Rule 5*

The most posterior edentulous area (or areas) always determines

the classification.

*Rule 6*

Edentulous areas other than those that determine the classification are referred to as *modifications* and are designated by their number.

*Rule 7*

The extent of the modification is not considered, only the number of additional edentulous areas not the number of missing teeth.

*Rule 8*

No modification areas can be included in Class IV arches. (Other edentulous areas that lie posterior to the single bilateral areas crossing the midline would instead determine the classification; see Rule 5).

SLIDE 27: plz refer to the pictures ☺

A) class IV

B) class II modification 2

C) class I modification 1

D) class III modification 3

E) class III modification 1

F) class I modification 2

G) class IV

H) class II

I) class III modification 5

\*\*Now we move to the next step which is taking an impression for a study cast ( Diagnostic cast ).

Usually taken by alginate for both upper and lower arches and it helps in:

1- They are useful in patient's education.

Permanent dental record for the patient before treatment to avoid any conflict during treatment stages or later on.

I show the cast to the patient to show him which tooth is going to be extracted ,which tooth is already missing ,which tooth need a filling or if there is a bridge, so that make them him appreciated for it and easy on him to understand the class when he know what present in his mouth.

2- For initial surveying.

3- It helps to determine the treatment plan.

4- It helps in work authorization order to dental technician,, when I write a paper with the cast it will be easy for the technicians to understand what he will do exactly.

5- To construct special tray.In( edentulous patient we made primary impression ,we poured it into a model then we made a custom tray (special tray),same goes for a partially edentulous patients).

6- you keep it as a record for your patient. By law you should keep the diagnostic cast of your patient for minimum of 10 years before u discard it and all that for medico legal reasons.

\*\*We divide trays into upper and lower trays (slide 29)

- The upper two trays are for edentulous patient while the lower two trays are for partially edentulous patient.

- the tray used for partially edentulous has a box shape and has different angle not rounded and its flanges are longer than the edentulous areas in order to accommodate tooth with sulcus.

we make an alginate impression ,then we pour it in a stone and we get our model and this model we will use it for things which are:

1- showing it to the patient.

2- tell them the treatment plan.

3- making special tray.

4-surveying.

Now what is the meaning of surveying?

First we will define the surveyor \*\*

Dental Surveyor: It is a mechanical device used to determine the relative parallelism of the teeth surfaces and the undercuts areas in relation to the common path of insertion and removal of the denture.

Now we will talk about the components of the surveyor :

 1-base

 2- horizontal arm

3- vertical arm

4- mandrel: connected to the horizontal arm by a string so we can bring it up and down by the string.

 5- adjustment table :not fixed on the base ,it can be removed and get back ,, the purpose of it is to put the cast on it in a certain way.

 6- accessories.

 the surveyor is a mechanical device , we put the cast On the table and through using different types of accessories we make specific steps for the cast that is on the base to help us in the design of the partial denture.

-there are objects that are sticking out from the surveyor they are like a small halls each one of them has an instrument ,these instruments are called accessories.

So the surveying is: The procedure of analyzing and delineating the contours of the abutment teeth (Hard tissues) and associated structures (soft tissues) before designing a RPD.

\*\*we knew that we use the RPD for replacing hard tissues (teeth) and soft tissues, so this surveyor will help me in determining the best way of replacing those hard and soft tissues so I have to know how the denture will be placed and removed from the patient's mouth with the best available design.

The surveyor will help us in the analysis of this adjustment of teeth ,or tell me if i need to do any modifications for them or for the tissue.

Accessories:

1- carbon marker :different colors ,we put it at the mandrel then we bring it in a way parallel (at right angle to the occlusal plane)the end of it is bevel ,when I we buy it ,it will be flat but we make beveling for the end by a sand paper cuz we want the end of it to be touching the soft tissue and the side of it to be touching the tooth.

\*I will move this carbon marker around tooth so it will draw a line on the tooth , this line is the height of contour of the tooth,,

- we know that the tooth is pulpal not flat ,there is an area of maximum contour ,so by common sense when I put something parallel or at a right angle of the tooth then the area that will be touched and being drown around is the maximum bulge of the tooth or the height of contour of the tooth.

\*\*now ,why we need to know this information?!

The area under the survey line is called under cut ,in the lab we used alginate not compound material or other material of nonelastic materials cuz we have teeth that have undercuts ,if we used a nonelastic materials it will get lost and there is absolutely no way to take it out from the patient's mouth,, for that reason we use elastic elastic material or elastomers when we do impression for dentate patients.

- this also help us in the design ,when I put the denture ,its imp to know where the undercut area and where the non undercut area.

\*\*we talked about the components of the partial denture (clasps ,rest, major connector , minor connector ,and others), now by common sense the component that I should know where the survey line to use it is the clasp.

- the thing that will retain the denture in the patient's mouth will be removable which is the clasp arms,, they are also the only thing used for retention.

- the clasp should be placed in the undercut area ,if I didn’t make a surveying and I send it to the technician and I told him to put a clasp on this tooth, he doesn’t know where the survey line so he could put the clasp arm on a non undercut cut area so it doesn’t surve the purpose , and when the patient bites on the partial denture ,any type of food will be sticky and displacement will happen, so as soon as the patient bite on the denture it will come out in the first bite they have,so I need to know where is my surveying line to know exactly where to put the tip of the clasps arm that will make retention and this is only one purpose of the surveying line.

- There are many purposes of surveying line but the main thing we need to know about it is to determine the height of contour of the teeth.

Another type of accessories we use it before carbon marker which is analyzing rod,, as its name implies it makes analysis which means that we put it on the mandrel and go down the surface of the tooth to make an initial assessment of the area of undercut

There may be zero undercuts or the tooth may have a huge number of undercuts so I have to change the design of the denture ,mainly this is what we want to know about analyzing rod.

Undercuts: That part of a tooth, which lies between the survey line and the gingival margin.

 "1- Hard tissue undercut “teeth

2-Soft tissue undercut

 3- True and false undercuts

Also, why do we use the surveyor and make an analysis for the areas of teeth around the denture?... there is something called common path of insertion.

**Common Path of Insertion**: All possible paths along where the RPD can be inserted and removed from the mouth.

(plz look at the pic in slide 37)

In the right one there is much more parts of the adjacent teeth making contact with the sides of the RPD and no guiding plane on the adjacent teeth so it move in 2 ways.

while in the left one: less contact and there is an undercut area so we can't put a rigid component and what will happen is a lot of food infarction which is uncomfortable for the patient, that’s why we do a preparation on the sides of teeth to create what we called guiding planes and those guiding planes are the ones that make the guidance for the denture.

also there are no 2 possible ways for the denture to going inside the patient's mouth ,there is only one way to move which is straight way (up and down).

Now ,how did I prepare these guiding planes on the adjacent teeth ??

Through using the surveyor,, so we use the surveyor for two things;

 determining the guiding plane and determining the survey line.

\*\* we don’t want the common path of displacement to be the same as that of insertion, if we made them the same then there is no benefit of it ,for example if the insertion way was straight and displacement is the same then when the patient bite on it ,if it was sticky from food then it will come out , so I need to find a way of displacement not at the same angle of the way of placement and we determine all these paths through using the surveyor.

GOOD LUCK ☺