Prosthodontics ..

Sheet # 9

Refer to Slides # 6 +7

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Steps of frame work constriction :

\*all these step done in the lab .

 we will talk about how to prepare our master cast ,, how to duplicate it ,, then how to do wax pattern , spruing , investment , casting , finishing and fitting the master cast .

\*first , you have primary cast , we do our pre-design on it (we talked about that in last lecture) , we decide what type of pre-modification that we need ,then we do it inside pt mouth , after that we obtain final impression and pour it – you will get master cast .

last time We talked how to survey master cast and why we do survey and now, what to do next?

You should Prepare this master cast to be duplicated , because we want to make wax pattern , then we put it in investment material then we burn it out , and if we decide to make these step in master cast itself , we will lose the master cast (we'll lose the reference that we have ) .

Also the material that the master cast is made of which is dental stone is not suitable material to put into the investment material and oven… So we decide to duplicate our master cast >> then we will have the ((refractory cast )) >> this name according to the investment material that we use it >>after that we do wax pattern .

**# BLOCKIG OUT #**

-instrument that we are going to use:

1. Source of flame ( such as burner )
2. Different type of wax
3. Wax instrument ( such as wax knife )
4. Surveyor

Why do we do block out master cast ?

#The purpose of blocking out :

To eliminate any undercut areas on the master cast that would be crossed by rigid part of RPD framework.

Additional area to be block out wax or relief:

* The areas beneath the connectors in order to avoid soft tissue impingement
* The areas that we need to provide for future addition of acrylic resin denture base material mainly in the distal extension; underneath saddle
* Placement of ledges on which clasp arms are going to be placed

-For more explanation :

1. First we'll do blocking out for the undercuts found cervically beneath the guiding plane area to ensure that the metal framework will not stay locked in that area , so that we prepare 2-3 mm guiding plane on the tooth ,it should contact guiding plate of the metal framework so the area underneath this 2-3 mm is undercut, I don’t need any metal to enter inside it . so under survey line , we do blocking out using wax then u do trimming to remove excess wax using wax trimmer of the surveyor .
\*\* Always block out proximal area below survey line.
2. area Underneath minor connecter.

3-wax ledge under the clasp arm ( so we create the ledge where the clasp arm will rest onwhen we duplicate master cast whatever I have wax on Master cast , it will convert into model in refractory cast so ledge wax will be duplicated as shelf or ledge to help in putting wax pattern of clasp . If you don’t do it > then when you put your wax pattern of clasp it will not fit in its exact place )

NOW, we have to **relief** some areas, which is not under cut area. I need to create some relief between major connecter + saddle area, so we use wax its gage about 8 just under major connecter .

\*notice :

Every relief area have specific wax (( they differ in color and thickness ))

G.A . refer to Gage = thickness , so in saddle area we put gage wax of 22 to all the saddle area , why ?

To provide future space to acrylic resin Because we need about 1mm under the metal >> by doing relief using wax.

The only part of metal that touch the tissue directly is the tissue stop so no relief wax here.

1. Under the undercut of the I bar \_ we place some wax to act as a ridge .
2. The last type of blocking out is the "ARBITRARY blocking out" we call it arbitrary because generally we don’t follow a rule anywhere we find undercuts that must not interfere with our design, we need to block it out using(play dow)not wax ,we do it after finishing blocking out on master cast and the relief then any remaining undercut we cover it play dow! .

**The Less undercuts we have in our duplication the easier to get the duplicated cast out from the Agar – Agar.** For that reason we do our arbitrary blocking out, and this depends also on the case that we have.

**# BEADING #**

It's done specifically on the upper cast .

\*it means carving on the cast ( negative ) >> make addition area to be added with metal .

 Purpose of it :

\*to create additional space for metal to contact palate around major connecter to prevent any food entrapment .

We make it on the border of the major connector with SPOON excavator, it will have some additional metal in that area to make sure it contacts the palate very intimately.

It done just on upper , not to lower cast, why ? Different anatomy of palate helps in shrinkage.

How to fabricate the refectory cast ?

1. Block out
2. Duplication for blocked out master cast
3. Pour it in investment material

Steps of duplication (refer to page 8)

Now the duplication of mater cast is done by reversible hydrocolloids (AGAR – AGAR) Nowadays , they only use of it the in lab , also we can use silicon for duplication .

-(in the picture )we have the base that will contain the cast and on top of it there is an opening like a ring and finally the cover, so we assemble it all together then we start pouring the agar agar inside the assembled parts, in the beginning it will be in a solution state then after cooling it will be in a gel-like state, so after that we will take it out of the gel agar agar so if we didn’t make the blocking out state it will be difficult to take it out of the gel and it will distort, so this is the major reason why we make the blocking out for the master cast.

Now we have the negative impression (mold) of the cast and we pour it with refractory material in that impression of the cast to get the REFRACTORY CAST, so this cast is more heat stable and more porous.

**#**waxing up RPD framework on the refractory cast **#**

We have ready made wax for each component of RPD ( the mesh and lattice, modified type of lattice , rest seats, clasps and all the parts of the denture ).

\*after we finish wax up , we will do flasking ,here the importance of blocking out appears so to be sure that for example clasp arm to stay in it’s place , the ledge that we did it before will prevent its dislodgment.

\*We connect all component with each other .

Now , how to convert wax to metal (casting)?

sprue channel : is the opening leading from crucible= خزان (red part) to the cavity which the frame work is to be cast .

* it brings the metal in and the wax out of the cast .
* it has purpose of leading molten metal to the cavity so it should be large and have proper shape to accommodate the metal into cavity as quickly as possible and with the least amount of turbulence.

It is done by attaching the crucible and sprues to the refractory cast, the crucible will be a reservoir for the metal and the sprues will be the channels that transport the metal from the crucible to fill the spaces after burning out all the wax.

There are rules to attach the sprues not haphazardly, the sprues have to be in **certain width** and attached in a **certain angle.**

* Also it's functioning as a reservoir of molten metal ; preventing porosity caused by shrinkage after entering of the metal to the areas where there were wax , upon solidification it shrink so I need excess metal that exist on sprues it will go to in metal framework to compensate its shrinkage and fill these areas .

**We usually make 3-4 sprue channels (depending on the design) not one large sprue why ?**

1》 because metal will solidify too fast if it was one , moving from large reservoir to one small channel(small in comparistion to crucible) will cause early solidification.

 2》 because metal is get injected to this large sprue by huge force so high speed will lead to high turbulence it will cause large number of air bubbles in the metal (the Larger the sprue channel , the more turbulence)

* angles are nicely rounded no acute /sharp angles in order to make the flow of the metal easier .
* diameter is designed from the manufactory
* Less diameter--> metal will solidify earlier
* More diameter --> turbulence and air bubbles.

Conclusion: We put the refractory cast on the oven at high temperature the wax will evaporate . How it will evaporate despite that everything is closed? !

 1.. from the opening of the crucible

 2.. through the porosity of investment materials

 Investment materials expand upon setting so it compensate the shrinkage of the metal ,

 Each type of metal alloys has special type of investment material that its expansion match the metal shrinkage, Co-Cr has specific investment material which is the phosphate bonding investment material.

**# casting #**

Introducing the molted metal instead of the wax through crucible opening to sprue channels to the cast by huge centrifugation force

- Get the metal framework out by breaking down everything around it (refractory cast).

Metal framework will look blackish in colour because of the metal oxide so it has to be finished and polished , it should be shiny.

 NEXT STEP….(fitting the framework to the master cast)

 we want to make sure that this framework fit my master cast, Everything should be in intimate contact with the cast as the wax was doing.

NOW … GO TO SLIDES #7 " METAL FRAMEWORK TRY IN ... "

75% of RPD framework don't fit perfectly. WHY??!

1] it need a huge skills from the technician .

2] all the steps of RPD fabrication have defects .

 For ex: **1/** impression with alginate which is sensitive to the surrounding environment and if we didn't pour it immediately it'll not be accurate .

 **2/**expansion of gypsum products

 **3/**duplication

 **4/**refractory material

 **5/**waxing up

 **6**/metal

 All these steps have tiny errors ,adding them all togather will result in significant error that will make the RPD not perfect .

 So we will discuss how to adjust any imperfection in metal framework .

\*If it doesn't fit perfectly the dentist might be aggressive and force the metal framework to the pt mouth ,here the components will be actively engaging teeth causing orthodontic movement this is opposite to what we already know that the RPD must be passive except the retentive tip of the clasp arm which is actively engaging the tooth ONLY under function

\*Adjust soon after fabrication, without denture base(before the teeth setting and taking jaw relation).

 \*First we take the primary cast and the master cast and check the design

we have to check the fit on the master cast (if it doesnt fit the master cast it won't fit intraorally), look at the picture the stone look abraded (because we force the base to sit and the stone is brittle) , but inside the patient mouth , the cobalt chromium is not harder than enamel , so binding of the metal will occur.

\*so always check the teeth on the master cast NOT to be abraded , and the rests are fully seated , we have to chek that there is 1 mm space for the acrylic in the minor connecter .

\*also check the taper of the clasp should be alright because the taper of the reciprocal arm is different than the taper of the retentive arm , for example on lower posterior we put the retentive arm on the lingual and the reciprocal on the buccal , but if the technician doesn't have the enough knowledge to do this , he will may make the opposite ,so you have to check it.

also the frame work should be polished and shiny , you have to inspect it visually and with your hand to make sure there are no sharp areas.

the polishing of the framework start in certain sequence(from the most rough toward the most soft )

* + - * Heatless stones
			* Diamond burs
			* E-Cutter burs.
			* Coarse stones
			* Shofu coral stones
			* Carborundum disks

\*Shofu coral stones maded by the same company that made the shofu discs for composite finishing .

\*they have 2 colors brown (more rough ) green (smoother )

- they are like rubber ; if we use it on high speed it may make shuttering every where and lead to excessive generation of heat , so always it should be used on slow speed not high !

-For clinical adjustment use:

* an indicating medium( like the pressure indicating paste in the complete denture )
* Aerosol Sprays (Occlude)
* Disclosing Wax
* Silicone

-we put green spray and at the place that will make binding with the tissue there will be exposure to the metal ( the spray will disappear) so we make adjustment for that part with a diamond bur .

-second example is Disclosing Wax( flowy wax on the room temp ) when we put it in the patient mouth it will set , if there is showing of the metal we make adujstment

-third type silicone (base and catalyst) called fit checker , if there is any showing for the metal we make adjustment.

\* note : don't worry about the slides that we will talk about , because it will be repeated with us on 4th year ( more clinical steps) and about any of these details ,we only have to know about the names.

Intial assessment of framework :

‘How does the framework feel?’

- No pulling or wedging (Active engagement of abutment teeth)

- Overall comfort of the framework

- Determine if casting fits similarly on the cast and intraorally.

 -If it is not fitting then the final impression is inaccurate and a new impression should be made !

-Most common interferences that prevent complete seating (So if we have interferences we have to think on that sequence )

1. Rigid portions of direct retainers (all the components of the clasp except the retentive tip ) most commonly make binding
2. Interproximal portions of lingual plates (which get inside the embrasure between the teeth )
3. Interproximal minor connectors
4. Shoulder areas of embrasure clasps

As we mentioned before , After adjustment is completed, a thin even layer of indicating medium is applied results in greyish hue from underlying metal. Complete seating with gliding sensation and no grating or snapping .

The final thing is the Occlusal Adjustments :we have to make sure that the rest seat doesn’t make premature contact with the opposing tissue , so we bring articulating paper and ask the patient to bite down , if the rest seat have excessive color from the articulating paper we have to make adjustment, but this depend on its thickness ( the rest seat should be at least 1.5 mm )

-If it was more than 1.5 and there is interferences we make trimming , but if it was less than 1.5 and there was interferences , we can't make trimming because it will be weak (prone to fracture) , this mean that the metal frame is not well done , or when we made preparation in the tooth for the rest seat the thickness wasn't enough ,so we have to repeat every thing .