**Dental Wax**

\*-Referring to the slide #2:

There were different forms of wax with different uses.

-definition of waxes (as in the slide)

Thermoplastic: affected by heat.

\*Slide#3

Types of waxes:

1-**Base plate wax**: as the name indicates it is used to make base, we get it in the form of sheets and it is used in complete denture.

2-**Bite wax**: as the name indicates as well it is used for biting.

3-**Boxing wax** : something that’s going to form a box, when we use a tray and take an impression for a patient we get this boxing wax and put it around the tray and pour it, in order to get a nice impression without anything messing.

5-**Inlay wax** : this one is used in crowns, in previous lectures the Doctor showed us a cast with prepared teeth and told us that, the place of the preparation build up using wax to show a model just like the original teeth .so Type of wax to used as a transitional stage to make a crown is the **inlay wax**.

\*Anything that has types means that we have different uses for them.

6-**Sticky Wax**: also as the name indicates it is used to stick things together. (*adhesive* )

\*Slide #4 : shows pictures:

The first one is a base plate wax: it is used as base for the complete denture.

The second is a bite wax: shows indentation of the teeth.

The central one is a boxing wax, looks like a box around the impression and then we pour.

Slide #5\*

-Inlay wax’s color is dark blue, teeth below it are prepared and then we return their normal shape using wax. And this wax is placed inside and around it we pour an investment material (gypsum for example) and then we heat the trapped wax " lost wax technique. ", but inside we have the shape of the wax preserved because the material after it has been set the investment becomes rigid, we take out the wax and replace it by metal like( in partial denture or crowns)or acrylic in denture, this is the principle of investment.

Slide#6\*

General composition:

-All the previously mentioned waxes have differences between them that is related to the percentages of these compositions, but generally all the compositions are present in all of them.

1-Base Wax: same as the slide

since WAX has a lot of bad properties i need a modifier

2-Modifier Waxes : same as the slide

3-Colorant : different colors

4-Fillers:same as the slide

Slide#7\*

we have two main types if wax ,either natural or synthetic.

Natural Waxes : same as the slide

-All these hydrocarbons are present in the wax and all form the base wax which is the first and main compisiton.

-Very few types of waxes contain **alcohols or acids**.

Slide#8\*

-no need to know all these kinds of waxes you have to know that :

-we have two types: natural & synthetic

 **Natural:** has three origins-> a-mineral

 b-plants

 c-insects and animals

-some things are mutual between them .

Slide#9 \*

**Common Modifier Waxes:**

**-Gum Dammer:** inceasres smoothness ,increases resistance to flaking and toughness.(when we talked about base wax we said that it is rough so what's used to improve the smoothness is the gum dammer)

-**Ceresin**: also improves the hardness and water resistance of wax. improves carving properties.(we carve inlay waxes to get the shape of the tooth )

-**Carnuba:** increases hardness and water resistance ,increase the melting range(melting range and not point due to the presence of a mixture),gives glossiness and decreases flow at mouth temprature(this feature is very important because for example when using a bite wax i don't want the wax to flow and not be able to tolerate the temparature of the mouth).

Direct technique :waxing up inside the patient's mouth for example bite wax.

Indirect technique: waxing up outside the patients mouth for example inlay wax.

-**Beeswax:** improves the stickiness and flow properties at mouth temperature .

-**Rosin:** increases the brittleness.

-**Microcrystalline waxes:** decreases the stress release on cooling**. (** the stress caused due to change in temperature like a thermal shock or change) and use such materials provide dimensional stability .

Slide #11\*

Range--> because its a mixture

since i have a range i have two lines, one line below it the wax would be solid lets assume 40 degrees this line is called **the solidus line** ,40 is when the melting starts ,when its complete liquid its called **the liquidous line.**

refer to the graph in slide#12 for furthur understanding.

-usually the melting range is **wide** about 40-80 degrees which gives me time for manipulation this feature is a very essential one.

-**NEVER** do excessive heating which is above **the liquidous line,** because that would affect the wax and do decomposition and gives us residues.

-refering to the graph you can notice that as we go further in the x axis the Carnuba percentage increases,as it increases the melting range increases.

slide#13\*

when paraffin is present alone we have a very limited melting range (50-57) leading to a limited manipulation time. However Carnuba increases the liquidus line from 62 -82 so we have a wide range. solidus line is not affected much by the carnuba additions .

Slide#14\*

Methods: 1-using the instrument the most alternative method ,you heat the instrument and then just touch the wax.

 2- warmth of the hand is questionable.

 3-Dry heat as wax pot: used in labs, wax is in a pot with an electrical cable, the wax here is all the time melted when you take the wax out of the pot it starts hardening and you use it whenever you feel it is suitable.

 4-water bath : warm water softens the wax. **NOT** for inlay wax because we don't want water to be imbedded in the wax and forms voids ,because the inlay is VERY critical, we wouldn't care if it was for the base.

Flow: same as slides

-I want the material to be moldable in the patients mouth but not flowy.

Slide#15\*

Creep: pressing on the solid to get deformation.

same as slide

Slide#16\*

Thermal conductivity should be very low.

-wax should be heated evenly in order not to get a flowy part versus a very hard part ,and this even heating leads to less stress release.

-the method described in the slide is the best way to heat wax.

-if you want the material to be moldable you have to soften it into thin sheets and then roll it.

Slide#17\*

lost wax technique ,is the idea mentioned previously about melting the wax and keeping its shape in an investment.

-it is used in cast metal technique. (porcelain is build up in layers like composite)

slide#18\*

anything heated become more sticky

Slide#19\*

the two pictures shows a wax heated and then left to cool down ,notice the change in shape .this indicates that the dimensional stability for the wax is low so we need to improve it.

Invest the pattern IMMEDIATELY after removal from the die to decrease the stress release.

this is called plastic deformation it goes back to its initial shape on its own.

Slide#20\*

same as slide

Slide#21\*

Waxes have a very wide coefficient of thermal expansion so it's expected to have a distortion once you change the temperature this is why we have to be strict to what we mentioned previously to try to reduce the residual stress.

Carnuba has the lowest thermal coefficient so whenever it increases its an advantage because it reduces the distortion when changing temparature.

refer to Slide#22 for better understanding.

Slide#23\*

I want the wetting to be good, to be able to accept water on its surface.

Wax has a high surface tension ,so rebulging occurs when there is anything on the surface so i have to improve this in order to have a very precise image taken by the investment this is why we have certain components poured on the surface to improve the wetting of the wax ,because surface tension is high and we need to make it low.

Slide#24\*

same as slide

Slide#25\*

General Classes:

-Pattern: anything that has to do with shaping.

-Impression :used to take impressions.

-processing :anything used to stick things together for ex.

Same as the slides but add to it:

**Pattern waxes:**

**-Inlay wax:** used for shaping ,we used it to shape teeth.

**-Casting Wax:** comes in mesh shapes ,or ladder shapes, clasp shaped. We stick them together to get a partial denture.

**-Base Plate**

**Impression:**

**-impression wax also called correction wax. ( no one uses the impression wax because it has a high thermal coeffecient)**

-**bite plate wax**

**processing:**

**-boxing wax:** because i used it to process something (utility).

-**utility wax:** used to correct the tray border

-**sticky wax:** sticks things together

\*when you think about the function of the wax you can determine which classification it belongs to.

**Inlay wax has 3 types: type A (hard): expected to be used in the direct technique because i want its flow to be low.**

  **Type B (med) and type C could be used outside the patient's mouth ,indirect technique**.

**Also ,Base Plate wax has three types according to climate : in cool climates type 1 is used ,warmer climates use type 2 and 3.**

-We usually use medium types.

\*Slide#28

first picture shows a casting wax,2&4 shows pattern wax and the 3rd picture shows a base plate wax. all of these are pattern waxes.

\*Slide#29

inlay wax comes in different forms and colors

same as slide.

\*Slide#30,--,42.

undercuts require utility wax, but overlapping occurs according to what available.

**NOTE: this sheet is only complementary to what in the slides please refer to the slides and study them.**

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