Dental materials 2

Sheet #12

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The dr started saying he will tell us about the testing for composite material and that happens by testing it stickiness, if it was sticky then it’s bad and the spread of the material.

Then the dr moved on to talk about the CAD CAM, in this machine you put the material on the machine and it will make for you the bridge and so on.

The following is from wiki for further understanding

“CAD/CAM dentistry is a field of dentistry and prosthodontics using CAD/CAM (computer-aided design and computer-aided manufacturing) to improve the design and creation of dental restorations, especially dental prostheses, including crowns, crown lays, veneers, inlays and onlays, fixed bridges, dental implant restorations, dentures (removable or fixed), and orthodontic appliances. CAD/CAM complements earlier technologies used for these purposes by any combination of increasing the speed of design and creation; increasing the convenience or simplicity of the design, creation, and insertion processes; and making possible restorations and appliances that otherwise would have been infeasible. Other goals include reducing unit cost and making affordable restorations and appliances that otherwise would have been prohibitively expensive. However, to date, chairside CAD/CAM often involves extra time on the part of the dentist, and the fee is often at least two times higher than for conventional restorative treatments using lab services.CAD/CAM is one of the highly competent dental lab technology.”

For have a good lasting machine the machine have to be do maintenance for your machine because if u don’t it won’t give you accurate crowns.



In the past they used to make the core material of the crown Composite and they put it on the milling machine (جهازخرط) and then they put the input and it will give you the crown with zirconium or titanium.

Then they started using scanning where you take impression of the teeth and then pour it then you scan the impression and it will give you a picture on the computer and you decide the design you want on the computer then you send it to the milling machine.

In the past the milling machine only existed on specific places so they used to send it via network and after it’s done they send it back to you via DHL or Aramex so it was hard and expensive. but now you have the scanner and the milling machine, also there is something called Chair Side where you move the scanner intraorally on the prep tooth and send the input to the milling machine and place the crown in the same visit but it has some limitation that it only can do crown 1 unit or 2 units and another limitation that it can’t cut all types of zirconium it only cut semi sintered type because it’s soft enough.

The milling machine should always have spray of water because zirconium easily cracked.

Now as I said there is 2 types of zirconium: 1- sintered 2- semi sintered (non sintered)

They differ on their softness.

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Types of composites
Macrofilled , hyprid , microfilled, nanocomposite( it’s the latest type of composite)

Nanocomposite means that it contains nano-sized fillers ( 7 to 10 nanometers)

Manufactures change the shape of the composite particles from round to more irregular shape and that’s increase it’s strength and polishability .

When you want to introduce a new material , there are many thing’s you have to test like :

Biocompatibility , relative cell growth ( it means that after putting the material with living cells in tube they measure the growth of these cells by measuring succinate dehydrogenase enzyme if it increases the cell growth decreases so the material is more cytotoxic .

What they do is that ,they make a comparison between the product’s in the markets ,ex: ivoclar , 3m , densplay which have intermediate quality and Moneta which has the highest quality (when you make a class 5 composite filling and polish it with disk or rubber you can’t differentiate it from the tooth structure unless you use light cure ( the density of the tooth is more than the composite).

Another criteria’s to be tested are technical criteria’s like :

1-Compressive strength .

2- yield strength.

3-flexural modulus ( it should be near the value of dentin flexural modulus otherwise there will be debonding after thermal shock ).

4- Shrinkage ( after shrinkage there will be stress inside the particle and this stress upon any force make the particles more prone to shear and crack .

5- Elastic modulus

 it should be near the elastic modulus of dentin

“They think that Fiber post is able to bend with the tooth structure “,

Note : Fiber post , titanium post , carbon post and bioglass are new developments ,the benefit of fiber post is that when we have anterior tooth that has discoloration we can clean and bleach it then we put titanium post or carbon post or any other dark post it will make shadow on the thinnest area which is tooth neck and if the gingive is thin or the patient have gingival recession it will appear as grayish discoloration which is not the case in fiber post .

5- Abrasion

Sometimes you will see class 1 composite with hole or abraded class 4 .

How to measure abrasion?

It’s done by using multiple brush working on machine then they measure the amount of powder and the lost amount of material or you can use acid .

6- Leakage

They bring extracted teeth and make a class 2 restoration on these teeth ; for example if we take 40 teeth and prepare them , then take randomly 10 teeth of the 40 and restore them with certain type of composite etc .. we will end with 4 groups with 4 different type of composite , after that we immerse them on die ,and we do fixation on block (like methy methacrylate block)then sectioning to observe the amount of die penetration on the joints of the restorations (the more the penetration the worse the material ).

7-Incremental

 If you didn’t make 100% isolation , and have contamination between the incremental layers ,the composite layers will not bond effectively to each other .

8-Marginal integrity

The material should be adapt on the tooth structure without any chipping after load.

\*\*one of the new development of composite is that ,they make it of 3 layers dentin , enamel ,and translucent layer.

 9-Polishability

One of the important criteria of the material

10-Stickiness

 which is measured by machine that have a rod that touch composite before curing it on a cavity and after that they measure how much of this composite stick to the rod .

So the material we use shouldn’t have high stickiness or we can use gold plated instrument which actually has lower stickness than stainless steel or we can use ceramic tips of instrument like a condenser with metallic handle and zirconia tip but the best thing is that the composite itself not being sticky.

Note : it’s not recommended to use bonding agent between the composite layer since it make separating layer between the composite .

11- Working time

It is of importance to you as a dentist that the material you use shouldn’t set on the normal room light .

Note : you mustn’t put composite in your table while the light still on ,since it will enhance the setting of the composite.

So the working time of composite in normal room temperature with ambient light should be enough ( at least 5 minutes) .

Ambient light is the room light .

Note : nanocomposite has extended working time and good biocompatibility .