Dental Material

Dental Abrasives

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Dhifaf Kamil Al-thahab

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الكورس الثاني

المرحلة الأولى

An abrasive material: is a material which is harder than the material which need to be abraded (restoration or appliance). The abrasive particles should possess sharp edges that cut rough surface of the abraded material.

Finishing And polishing materials

Dental restorations are finished before placement in the oral cavity to provide three benefits of dental care:

1. Oral health. 2. Function. 3. Aesthetics.

A well contoured and polished restoration promotes oral health by restricting the accumulation of food debris and pathogenic bacteria. With same dental materials, tarnish and corrosion activity can be reduced if the entire restoration is highly polished.

Function is enhanced because food glides more freely over occlusal surfaces and embrasure surfaces during mastication.

A single type of abrasive cannot be used effectively for all types of dental materials. Different abrasives are used for the three major classes of materials: ceramics, metals, and resin-based composites.

A. Cutting: it refers to the use of bladed instrument or the use of any instrument in blade like fashion. Ex: high speed tungsten carbide burs have numerous regularly arranged blades that remove small shavings of the substrate as the bur rotates. Examples of cutting would be milling, machining, or drilling. The process results in a somewhat smooth surface. In dentistry, cutting is done with metal burs and hand instruments to create cavity and crown preparations, which receive permanent restorations. When dental burs are used, the cutting process is affected by:

1. Design of the Bur
2. Sharpness of the Bur

B. Abrasion Abrasion is the wearing away of a surface. It may also be referred to as grinding. Irregular grooves or scratches are produced on a surface as the result of abrasion. It is the process of removing small particles of a substrate through the action of bonded or coated abrasive instrument. Grinding instruments contain many randomly arranged abrasive particles. Each particle may contain several sharp points that run along the substrate surface and remove particles of the material.

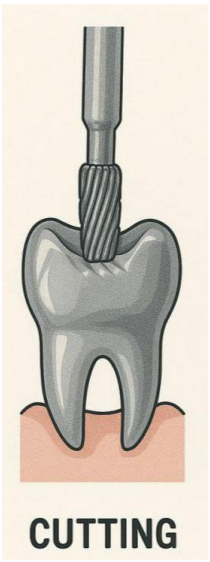
C. Finishing The process of producing the final shape and contour of a restoration is termed finishing. It is the process

transforms a material object from a rough form to a more refined form.

The instruments and armamentarium for finishing differ from those that are used for polishing. Examples used in finishing would be burs and stones.

Objectives of finishing:
1. Imperfections and surface irregularities are removed.
2. The material is shaped into the ideal form.
3. The outer most surface of the material is developed to the desired state.

D. Polishing: The most refined of the finishing process, produces the finest of particles; it acts on an extremely thin region of the substrate surface. Polishing produces scratches so fine that they are not visible unless greatly magnified. Ex: rubber abrasive points, fine particle disks and strips.



Wear: is a material removal process that can occur whenever surfaces slide against each other. The process of finishing a restoration involves abrasive wear through the use of hard particles. In dentistry, the outermost particles or surface material of an abrading instrument is referred to as the abrasive. The material being finished is called the substrate.

Erosive wear: is caused by hard particles impacting a substrate surface carried either by a stream of air or a steam of liquid.

Types of abrasives: Many types of abrasive materials are available such as:

1. Natural abrasives: includes Arkansas stone, chalk, corundum, diamond, emery, garnet, pumice, quartz, sand, Tripoli and zirconium silicate.
2. Remanents of living organisms: Cuttle.
3. Manufactured abrasives: which are synthetic materials that are generally preferred because of their more predictable physical properties such as: silicon carbide, aluminum oxide, synthetic diamond, rouge and tin oxide

Arkansas stone: is a semi translucent, light, gray, siliceous sedimentary rock mined in Arkansas. It contained microcrystalline quartz and is dense, hard, uniformly textured. Small pieces of this mineral are attached to metal shanks and turned to various shapes for fine grinding of tooth enamel and metal alloy.

Chalk:

It is used as a mild abrasive paste to polish tooth enamel, gold foil, amalgam and plastic material.

Corundum: Corundum is used primarily for grinding metal alloys. It is commonly used in instrument called white stone.

Diamond:

It is called super abrasive because of its ability to abrade any other substance. They are used on ceramic and resin based composite materials.

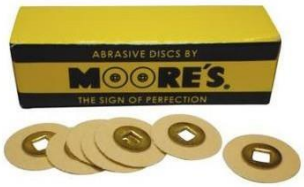
Emery:

It is used for finishing metal alloys or plastic materials.

Garnet: The term garnet includes a number of different minerals that possess similar physical properties and crystalline forms. These minerals are the silicates of aluminum, cobalt, iron, magnesium, and manganese. The garnet abrasive used in

dentistry is dark red. Garnet is extremely hard and when fractured during the grinding operation, forms sharp,

chisel shaped plates, making garnet a highly effective abrasive. It is used in grinding metal alloys and plastic materials.



Pumice: is used in polishing tooth enamel, gold foil, dental amalgam, and acrylic resins.

Quartz:

They are used mostly to finish metal alloys and may be used to grind dental enamel.

Sand: is a mixture of small mineral particles composed of silica. They are applied under air pressure to remove refractory investment materials from base metal alloy casting. They are coated onto paper disks for grinding of metal alloys and plastic materials.

Tripoli:

is used for polishing metal alloys and some plastic materials.

Zirconium silicate:

Cuttle: cuttle fish, cuttle bone are the common names for this abrasive. It is used for delicate abrasion operation such as polishing of metal margins and dental amalgam restorations.

Silicon carbide:

Particles are sharp and break to form new sharp particles. This result in highly efficient cutting of the materials

such as metal alloys, ceramics and plastic materials.

Aluminum oxide: White stones are made of sintered aluminum oxide and are popular for adjusting dental enamel and for finishing both metal alloys and ceramic materials.

Synthetic diamond abrasive:

used in polishing ceramic materials, resin based composite materials.

Rouge: Iron oxide is the fine, red abrasive component of rouge. It is used to polish high noble metal alloys.

Tin oxide: a polishing agent for polishing teeth and metallic restoration in the mouth. It is mixed with water, alcohol, or glycerin to form a mild abrasive paste.

Dentifrices: dentifrices are made in three forms: Tooth paste, gel and powders. They provide three important functions:

1. Their abrasive and detergent actions provide efficient removal of debris, plaque and stained pellicle compared with a tooth brush alone.

2. They polish teeth to provide increased light reflectance and superior esthetic appearance, since the highly polished surface enables teeth to resist the accumulation of microorganisms and stains better than rougher surfaces.

3. Act as vehicles for the delivery of therapeutic agents that provide known benefits such as fluoride, desensitizing agent.