Dental Composite
Dental Composite

TOPICS

- History
- Ideal Properties Of Composite
- Composite Structure
- Curing Of Composite
- Application Of Composite
Dental Composite

- Acrylic resins were introduced to dentistry in the 1940's to construct denture bases

- It is this same acrylic resin that was first used for indirect/direct filling of individual teeth
Dental Composite

- These were supplied as a powder-liquid system
Dental Composite

- In the 1950's self curing unfilled acrylic resins (denture base acrylic) was used moderately for the filling of individual teeth

- They were easy to use, polish, and had good initial aesthetics
The main problems encountered were high shrinkage upon polymerization, large thermal dimensional change, eventual discolouration and a high wear rate.
Dental Composite

- During the 1960’s fillers were added to the acrylic resins to form what are now known as Resin Composite, Dental Composite or Composite.
IDEAL PROPERTIES OF COMPOSITE
Ideal Properties

Important properties of composites include:

- Low polymerization shrinkage
- Low water sorption
- Coefficient of thermal expansion similar to tooth structure
- High fracture resistance
- High wear resistance
Ideal Properties

- High radiopacity
- High bond strength to enamel and dentin
- Good colour match to tooth structure
- Ease of manipulation
- Ease of finishing and polishing
COMPOSITE STRUCTURE
Composite Structure

There are three structural components in dental resin-based composites:

1) **Matrix** - A plastic resin material that forms a continuous phase and binds the filler particles
Composite Structure

2) **Filler** - Reinforcing particles and/or fibres that are dispersed in the matrix

3) **Coupling Agent** - Bonding agent that promotes adhesion between filler and the resin matrix
Composite Structure

- Composite restorative materials contain a number of components in addition to the resin matrix, filler particles and a coupling agent.

- An *activator-initiator* system is required to convert the resin paste from a soft, mouldable filling material to a hard, durable restoration.
Composite Structure

- Other components are included to enhance the performance, appearance and durability of the material.
- Pigments help to match the colour of the tooth structure.
Composite Structure

- Ultraviolet (UV) absorbers and other additives improve colour stability, and polymerization inhibitors extend storage life and provide increased working time for chemically active resins.
CURING OF COMPOSITE
Curing Of Composite

The activator-initiator systems used allow for:

- Self-curing
- Light-curing
- Dual-curing
SELF-CURING

Chemically activated polymerization is initiated by mixing two pastes just before use.
Curing Of Composite

**SELF-CURING**

- During mixing it is almost impossible to avoid incorporating air into the mix, thereby forming pores that weaken the structure and trap oxygen, which inhibits polymerization during curing.
Curing Of Composite

**SELF-CURING**

- Working time is also limited and out of the control of the operator so contouring must be completed quickly.
Curing Of Composite

LIGHT-CURING

- Light-curable dental composites are supplied as single paste contained in a light proof syringe.
Curing Of Composite

LIGHT-CURING

- These materials allow the operator to complete insertion and contouring before curing is initiated.

Click below to show video

Makonnen Lion
Root Canal Procedure

Chicago Zoological Society
Brookfield Zoo
May 2006
Curing Of Composite

LIGHT-CURING

- The advantage of using a paste and light curing system is that small amounts of material can be added (layered) and cured
Curing Of Composite

LIGHT CURING

- The disadvantage of composite material is that when laid in large amounts the light may not penetrate and activate the curing process at the deeper levels
Curing Of Composite

DUAL-CURING

- Dual-curing dental composites consist of two light curable pastes that contain chemical accelerators and light activators so that polymerization can be initiated by light and then continued by the self-cure mechanism.
Curing Of Composite

DUAL-CURING
Curing Of Composite

COMPOSITE INITIATING & PROCESSING SYSTEMS

- Composite restorations produced in the laboratory may be processed using various combinations of light, heat, pressure and vacuum this increases the degree of polymerization, density, mechanical properties and wear resistance
Curing Of Composite

COMPOSITE INITIATING & PROCESSING SYSTEMS
APPLICATION OF COMPOSITE
Application Of Composite

As a modern dental technician you may be required to fabricate indirect composite restorations such as:

- Veneers
- Inlays
- Onlays
Application Of Composite

- Temporary/Permanent Crowns
- Temporary/Permanent Bridges
Application Of Composite

- One of the main advantages of indirect composite restorations is that the dental technician has better access to the margins and the interproximal space as we have the advantage of working on a die or a model.
Summary

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