313 RDS

Resin Modified Glass Ionomers and Compomers

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Resin Modified Glass Ionomer (RMGI)

- It is a glass ionomer cement in which the acid base setting reaction has been supplemented by a polymerization reaction of added resin

RMGI

- Conventional GI chemistry combined with resin technology » creation of RMGI
- They contain:
  - Ion-leachable fluoroaluminosilicate glass in the powder
  - Liquid: Monomers (HEMA), polymeric carboxylic acid, water
  - Photoinitiator, Chomphorquinone

RMGI

- There are two forms:
  1. Dual Cured: Contains a water-HEMA mixture
     - Slow acid-base setting reaction
     - Photoinitiated reaction occurs faster through homopolymerization and copolymerization of methacrylate groups grafted on the polyacrylic acid chain and methacrylate groups of HEMA
  2. Tri Cured: Contains modified polyacids with methacrylate side chains which can be light polymerized. Chemically initiated reaction occurs
     - No or little water is present

RMGI

Material	Manufacturer	Setting mechanism
Fuji II LC	GC	Visible light, Acid-base, Chemical
Geristore	Den-Mat	Acid-base, visible light
Ionosit	DMG	Acid-base, visible light
Photac-fil	ESPE	Acid-base, visible light
Vitremer, Vitrebond	3M	Visible light, Acid-base, Chemical

RMGI

GC Fuji II LC CAPSULE
RADIOPAQUE LIGHT CURED REINFORCED GLASS IONOMER RESTORATIVE IN CAPSULES
50 CAPSULES
POWDER 0.30g / LIQUID 0.10g (0.085mL) PER CAPSULE
A3
GC CORPORATION
TOKYO, JAPAN
LC
2
CAPSULE

RMGI

RMGI

3M ESPE
Vitrebond™
Light Cure Glass Ionomer Liner/Base
Lichthärtender Glas-Ionomer Liner
Base/fond de cavité, verre ionomère photopolymérisable
Sottofondo Vetro-Ionomerico Fotopolimerizzabile
Base Cavitaria de Ionómero de Vidrio Fotopolimerizable
Base de Ionómero de Vidro Fotopolimerizável
CONTENTS
9g
5.5ml
7510

RMGI-Advantages

Compared to Conventional Glass Ionomer	
Handling	**Easier** to handle
Working Time	**Longer** working time (Light polymerization)
Mechanical Properties	**Improved** compressive, tensile & flexural strengths Fatigue, wear resistance Fracture toughness Bond strengths to enamel & dentin Marginal adaptation, microleakage
Water Sensitivity	**Less sensitive** to water (Early development of strength & resistance against aqueous attack) Light polymerization
Fluoride Release	**Equal/higher** & **rechargeable**
Esthetics, Smoothness	**Improved** esthetics & smoothness

RMGI-Uses

- Clinically:
  - Luting agents
  - Cavity liner or base
  - Core build-up material
  - Direct restorative material
  - Pit and fissure sealant
  - Provisional restorative material
  - Retention of orthodontic brackets
  - Retrograde root filling material

RMGI- Direct Restorative Material

- Clinical handling:
  - Hand mixed (powder/liquid)
  - Mechanically triturated (Capsulated)

RMGI-Direct Restorative Material

- Etch the cavity preparation with polyacrylic acid for 10 seconds
- Rinse thoroughly for 10 seconds
- Keep the tooth hydrated
- Mix RMGI, inject into cavity, incremental technique
- Light cure for 20-30 seconds

RMGI- Direct Restorative Material

- Contoured & polished immediately after polymerization
  - Diamond, carbide finishing burs
  - No. 12 blade
  - Polishing with disks, impregnated rubber points or cups and polishing pastes
- Placement of unfilled resin after polishing (Protective coating)

RMGI- Class V

RMGI- Sandwich Technique

- It's replacing the lost dentin with CGI or RMGI and the enamel with a resin composite
- Combines the fluoride release of CGI or RMGI and excellent esthetics of composite resin
- Used in class V, class II or class III restorations

RMGI-Sandwich Technique

- Advantages:
  1. Lessen polymerization shrinkage of resin composite by lessening the bulk of the material
  2. Fluoride release reduces the chances of recurrent caries
  3. Better seal at dentin or cementum margins
  4. Improves physical and esthetic characteristics

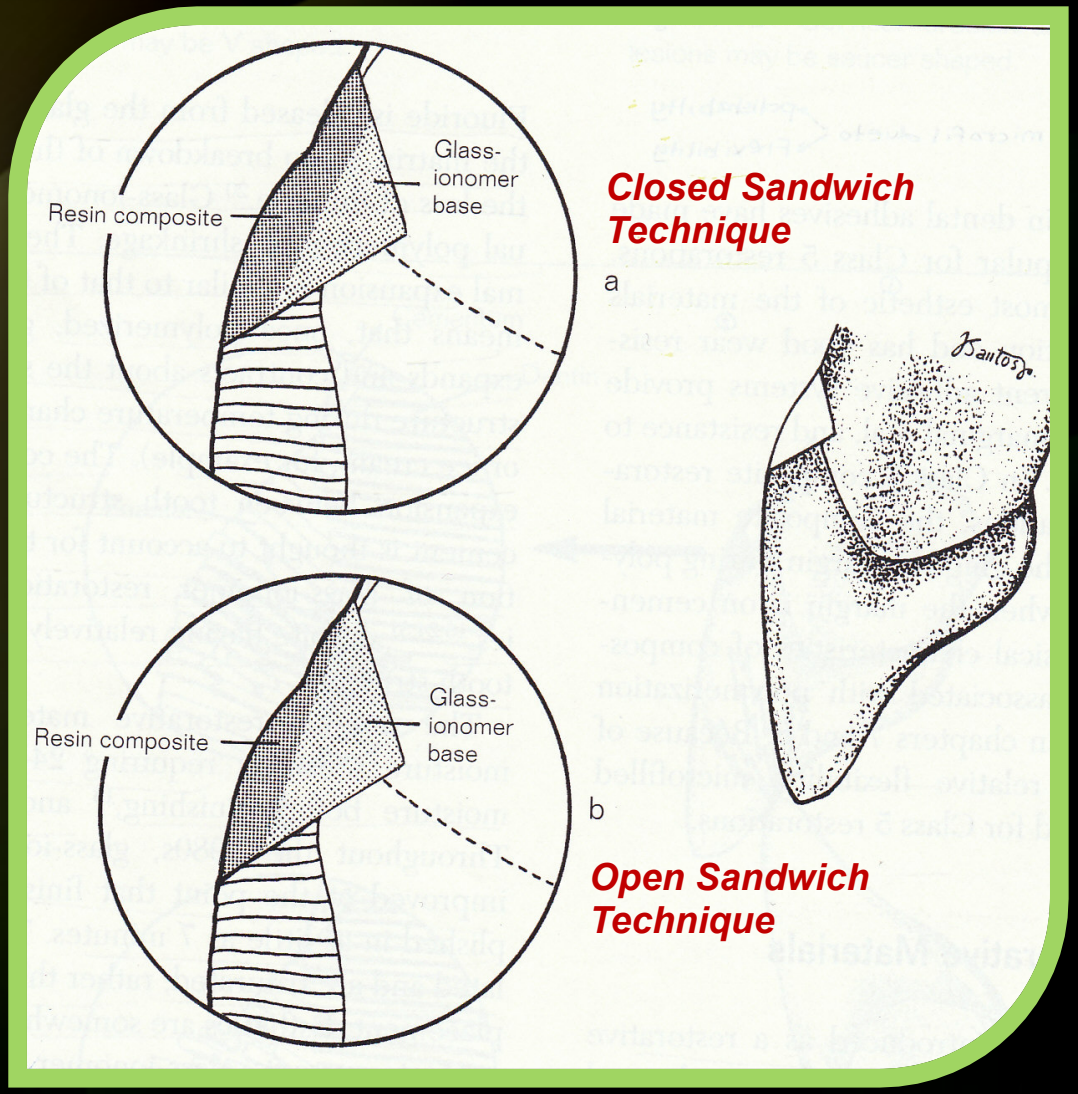
- Disadvantages:
  – Two-step procedure

RMGI-Sandwich Technique

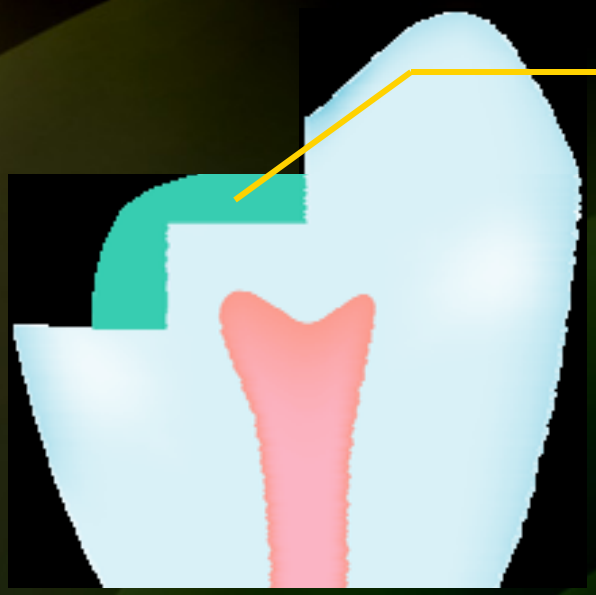
- Open Sandwich: The CGI or RMGI is carried to the gingival margin if it is on dentin or cementum. The enamel margins are etched and the restoration is completed with a dentin adhesive and composite

- Closed Sandwich: The dentin is covered with CGI or RMGI then entirely veneered with composite

RMGI-Sandwich Technique



Closed Sandwich Technique in class II restorations



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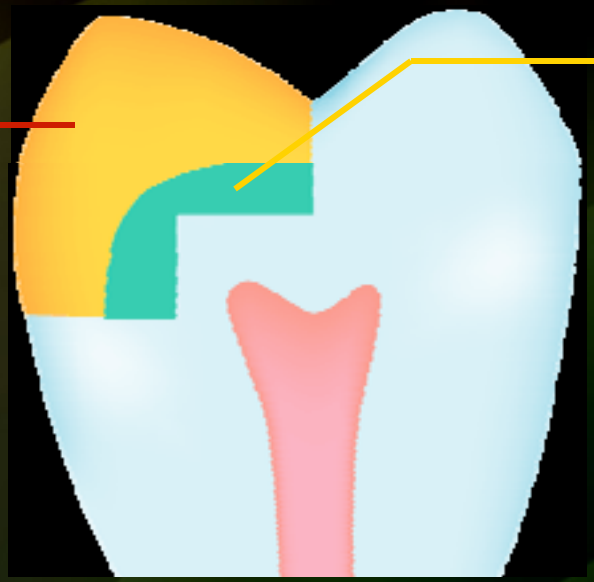

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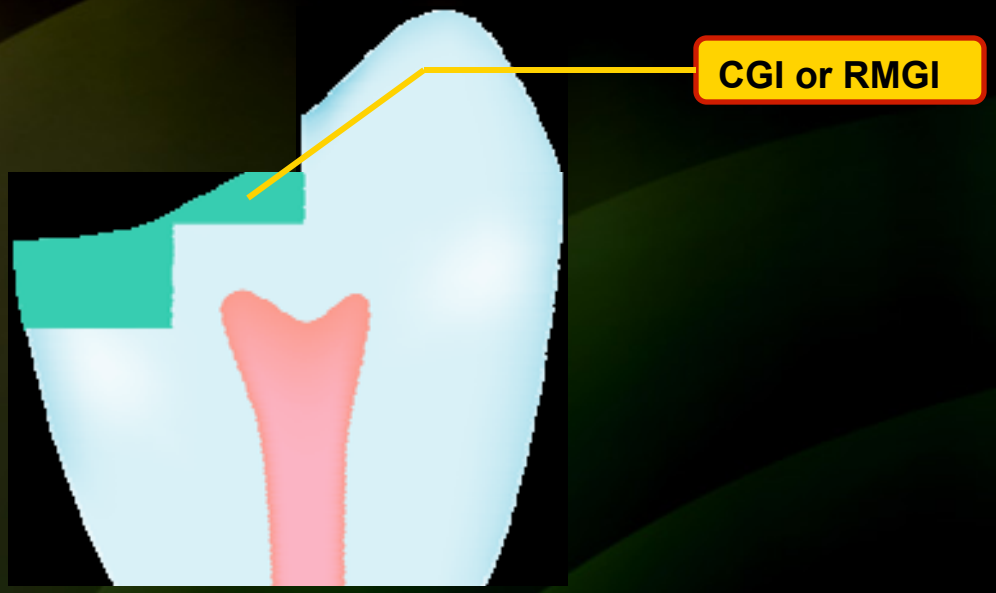

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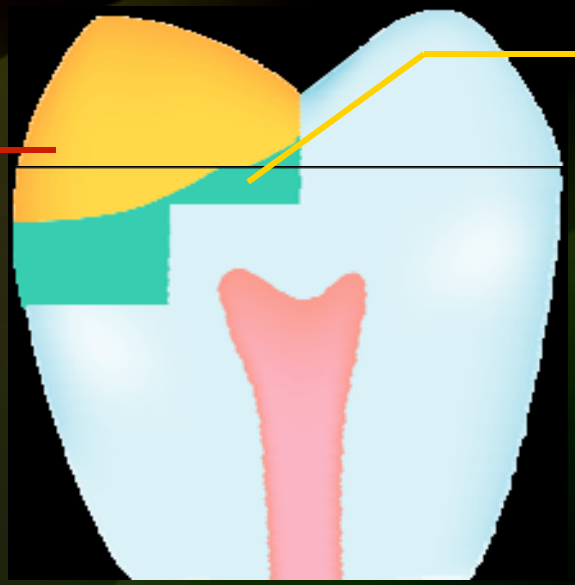


Open Sandwich Technique in class II restorations

Sandwich Technique

The depth of the premolar lesion has approached the cemento-enamel junction

Sandwich Technique

37 % Polyacrylic acid

RMGI is placed gingivally
After polymerization the entire cavity is etched with phosphoric acid

Sandwich Technique

Application of adhesive agent

First increment of composite

Sandwich Technique

Final occlusal increment

Excess composite along the axial margins is removed with finishing disks. The disks are inserted laterally into the proximal space and are used to cut back the excess marginal height

Sandwich Technique

The tip of an Enhance polishing point is used to reduce the marginal ridge

Completed RMGIC sandwich restoration on the premolar

Sandwich Technique

Completed restorations display the appropriate physiological contours

Postoperative view of the restorations 26 months later

RMGI- Base and Liner

- Examples:
  - Vitrebond
  - Fuji Lining LC
  - Fuji II LC

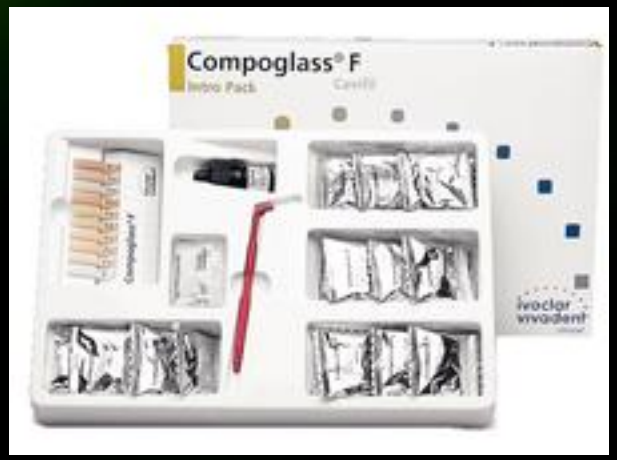
- Advantages:
  1. Quick setting
  2. Re-mineralization effect
  3. Low modulus of elasticity, works as a stress reliever compensating for the polymerization shrinkage of the composite resin.

RMGI-Liner and Base

Polyacids Modified Resin Composite (Compomer)

- Designed to combine the esthetics of resin composites and fluoride release and adhesion of GIC

- Examples:
  - Dyract, Dentsply
  - Compoglass, Vivadent



PAMRC (Compomers)-Setting Reaction

- Light initiated
- They contain:
  - Alumino-silicate glass
  - Bisglycidyl ether dimethacrylate (bisGMA), Urethane dimethacrylate (UDMA), Triethylene glycol dimethacrylate (TEGDMA)
  - Carboxyl groups attached to the resin backbone of the composite
  - Photoinitiator, Chomphorquinone

PAMRC (Compomers)-Setting Reaction

- Do not contain water
- Do not set in the dark
- Designed to absorb water to promote a secondary neutralization reaction (allow GI setting reaction to proceed, acid-base reaction)
- Packaged in airtight foil packs to prevent ingress of water vapor

PAMRC (Compomers)

- Considered to be hydrophobic
- Lack the ability to bond to the tooth structure, therefore it should be used with a bonding agent for proper adhesion.

PAMRC (Compomers)

- Advantages:
  - Single paste packaging
  - Ease of handling
  - Esthetic

- Disadvantages:
  - Less fluoride release
  - No fluoride uptake
  - Does not chemically bond to the tooth structure

PAMRC (Compomers)-Uses

- Clinically:
  - Class I
  - Class II
  - Class V
  - Fissure sealants
  - Retention of orthodontic brackets

PAMRC (Compomers)-Clinical Handling

- Same as conventional composite restorations:
  - Acid etching procedure
  - Adhesive bonding
  - Incremental placement
  - Light cured for 40 seconds
  - Finishing and polishing procedures

Thank You!

Any Questions?