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BISDENT GLOBE

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TheraCal LC®-

Over 5 million restorations later: Are you getting the most of it?

INSIDE THIS ISSUE

Introduction

After more than five years of extensive research and development, TheraCal LC was made available to clinicians in November 2011. It has been estimated that in the past three years, over five million restorations have been placed using TheraCal LC as a direct or indirect pulp capping material! The popularity and rapid growth of this product has certainly surprised BISCO, launching it to be one of their top selling products. The team responsible for developing TheraCal LC knew they had something special, something unique that would assist in maintaining vitality of the tooth while being easier to use than what was currently available. It appears that clinicians worldwide have also recognized how unique this product is by their clinical results.

Since TheraCal LC has been available, BISCO has monitored its progress and kept abreast of the thoughts and habits of the clinicians using the product. It is wildly popular for use as a direct pulp-cap, yet remains underutilized as an indirect pulp-cap. Perhaps this is because it requires a little more material in this procedure or perhaps it is due to a lack of understanding of how TheraCal LC can assist in facilitating the formation of reparative dentin[2,3], improving the prognosis of this procedure. Whatever the reason, it is the intent of this article to discuss indirect pulp-capping in more detail and demonstrate why you should be providing your patients with a TheraCal LC –based indirect pulp-cap under many of the restorations you provide daily.

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Direct Pulp-Capping

There are three types of pulp exposures: carious, mechanical, and traumatic. Both mechanical and traumatic pulp exposures can be easier to treat due to their higher success rate. However, the carious exposure remains difficult to treat based on the level of pulpal inflammation and infection. Due to the often unpredictability of the pulpal response to direct pulp-capping carious exposures, many clinicians opt for providing endodontic therapy every time the pulp is exposed. However, if the exposure is small and the pulpal status has been properly diagnosed, many clinicians are also finding success with direct pulp-capping by using TheraCal LC.

Rarely does a clinician diagnose the pulpal status of a tooth prior to providing routine restorative fillings. Either a clinical or radiographic exam reveals the need for a direct filling. It should be recognized that the level of infection is frequently deeper than what a radiograph can provide. In addition, it is usually not until after the pulp is exposed that a clinician diagnoses the tooth as being either symptomatic or asymptomatic reversible or irreversible pulpitis. Regardless, it is the best practice to avoid exposing the pulp entirely unless there are clear indicators for providing root canal therapy.

Indirect Pulp-Capping

Knowing when to stop removing carious dentin can be difficult, especially when the exact location of a pulp horn or chamber is not known. Most clinicians rely upon tactile sensation or the hardness of the dentin to determine when to stop excavating. When near the pulp, it is advised to stop excavating and leave a layer of affected dentin. This affected dentin may be demineralized and softer than sound dentin, but preserves the collagen structure, lacks contamination with bacteria, can extend up to 1mm, and is capable of remineralizing. In contrast, infected dentin is the softened dentin (demineralized and destroyed collagen), remains infected with bacteria, and should be removed.

The procedure by which incomplete excavation is provided, leaving a thin layer of affected or sound dentin when near the pulp, is called an indirect pulp cap. This procedure is usually more successful than a direct pulp cap and can provide the tooth the opportunity to repair itself and maintain vitality. However, it has fallen out of favor with the introduction of self-etching adhesives, the additional cost of the indirect pulp capping material, and the lack of insurance reimbursement. It should be noted that adhesives are acidic, do not disinfect the dentin, and do not provide the necessary chemicals for tooth remineralization. Providing an indirect pulp cap and/or liner with TheraCal LC has many benefits, that when combined with a well-sealed restoration, can allow the tooth many more years of service prior to endodontic treatment.

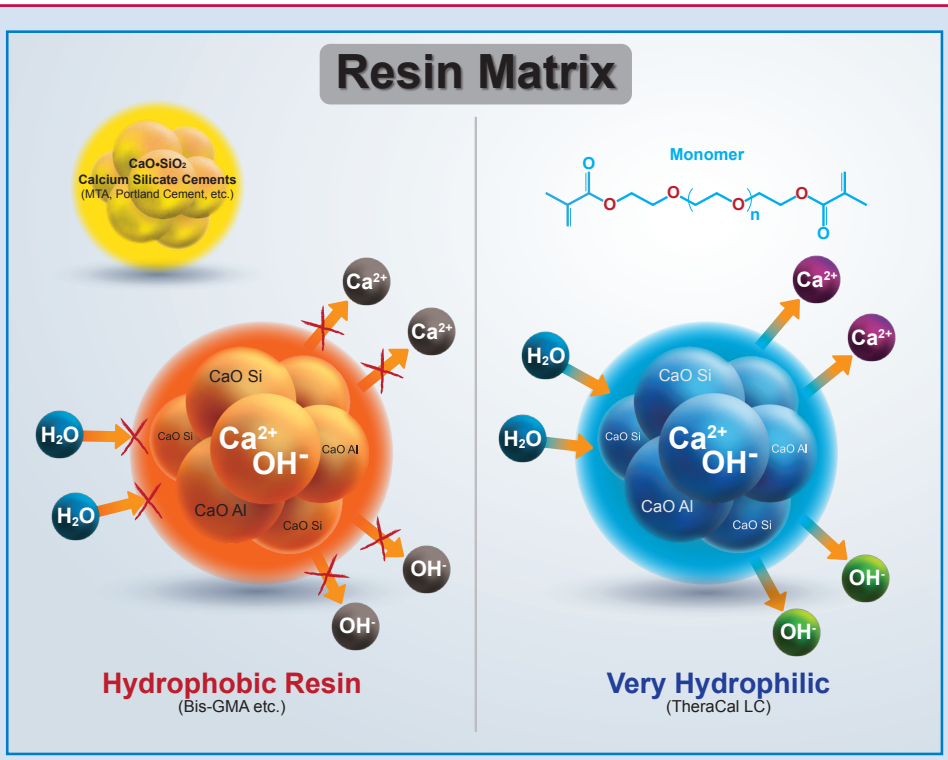

Figure 1: Calcium silicate cements have the capacity to release calcium and hydroxide ions in the presence of water, which aid in the restoration of tooth structure. However, if the resin matrix is hydrophobic, water is unable to penetrate it, leaving it incapable of dissolving the calcium silicates that generate the calcium and hydroxide ions necessary for assisting in apatite formation. TheraCal LC contains a special hydrophilic resin matrix, which allows water penetration and ion release, resulting in apatite formation and sealing of the tooth.

TheraCal LC

TheraCal LC is a light-cured, flowable resin-modified calcium silicate filled liner that can be used for direct and indirect pulp caps. TheraCal LC possesses many of the same beneficial properties similar to other commercially available self-curing MTA products. TheraCal LC's proprietary resin formula is unique, consisting of tri- and di-calcium silicate particles in a unique hydrophilic monomer that provides significant calcium[1] and hydroxide ion release (see Figure 1). These ions serve many roles in the ability to remineralize tooth structure via apatite formation[2,3] in an alkaline environment. Stable and durable as a liner, base, or pulp-capping material, it is permeable to dentinal fluid but resists dissolution[1].

TheraCal LC may act as a scaffold for reparative dentin formation. Dentinal fluids are absorbed within it, resulting in the release of calcium and hydroxide ions, and the tooth responds to form apatite and a bond, supporting the natural sealing ability of the product. This ability to assist in the formation of apatite[2,3] plays a critical role in pulpal protection.

Key Features and Benefits of **TheraCal LC**

- Significant calcium[1] release stimulates hydroxyapatite formation, secondary dentin bridge formation[2,3], and leads to a protective seal[5].
- The alkaline pH (hydroxide ions) promotes healing[2,4].
- Forms a protective barrier[5] that insulates the pulp (which may lead to less tooth sensitivity).
- Moisture tolerant with very low solubility[1].
- High radiopacity[1] making it easily identifiable on radiographs.
- Light-curable with immediate set and very easy to use.
- Strong physical properties[6] to withstand the forces of mastication under composites, amalgams, cements, and other base materials.
- Flowable yet stays where it is placed.

Clinically Proven Technique for **TheraCal LC**

1. *Isolate the tooth to be treated with a rubber dam. Research still indicates that this is the best technique to use.*
2. *Excavate all infected dentin and leave a thin layer of affected dentin when near the pulp. Use maximum caution to avoid exposing the pulp.*
3. *Clean the cavity with 2% chlorhexidine (Cavity Cleanser). Use a moist cotton pellet for at least 20 seconds.*
4. *If a pulpal exposure occurs, control hemorrhage with sterile saline, chlorhexidine, or sodium hypochlorite.*
5. *Apply TheraCal LC to the pulpal floor of the prepared cavity up to 1mm. This will assist in reducing post-operative sensitivity via insulation. Make sure to apply to TheraCal LC to MOIST dentin as this will improve its initial bond and stability.*
6. *Light-cure TheraCal LC for 20 seconds. TheraCal LC is very opaque and requires a full cure.*
7. *Selective etch the enamel (Select HV Etch) or total-etch the entire preparation.*
8. *Apply adhesive (All-Bond Universal)*
9. *Fill preparation with restorative material of choice (composite, amalgam, core-buildup, etc.)*
10. *Shape, finish, and polish restoration.*
11. *Seal tooth-restorative margins with BisCover LV.*

Distal-occlusal caries present on an asymptomatic mandibular first premolar.

Incomplete excavation of caries leaving affected dentin without exposing the pulp.

Direct placement of TheraCal LC as an indirect pulp cap on entire pulpal floor.

Thin layer of TheraCal LC after light-cure of 20 seconds.

- Dentistry courtesy of Dr. Ross Nash.

The Building Block for the Perfect Core

BISCO has long prided itself on its ability to bring science to the art of dentistry through its wide range of versatile products that are revolutionizing dental offices around the world. BISCO is proud to introduce CORE-FLO™ DC Lite, a dual-cured, radiopaque, fluoride-containing core material. CORE-FLO DC Lite is a brand extension of BISCO's tried and true stackable core material CORE-FLO DC.

CORE-FLO DC Lite is a self-leveling low viscosity material, perfect for cases where a band may be required, lower viscosity is desired, or initial subgingival margins are present and not visible (e.g. fractured cusp). CORE-FLO DC Lite's compressive and flexural strength offers the clinician reliability and durability when fabricating direct restorations. CORE-FLO DC Lite is indicated for core build-up, post cementation and as a dentin replacement material.

The Major Benefits of the Core-Flo DC Lite

Core-Flo DC Lite's optimal self-leveling viscosity allows for excellent adaptation resulting in gap-free margins when replacing natural dentition with a direct core build-up. Its high strength and water sorption provides a strong foundation for both crowns and direct restoratives. The material is easy to prepare and cuts like dentin. Core-Flo DC Lite's void-free flow makes it an ideal material to use for post cementation.

5 Standout Features

- **Self-leveling Handling**
  Ideal for cases where a band may be required, lower viscosity is desired, or initial subgingival margins are present and not visible (e.g. fractured cusp)
- **Multiple Indications**
  CORE-FLO DC Lite is indicated for core build-up, post cementation, and as a dentin replacement material
- **Physical Properties**
  High compressive and flexural strengths offer the clinician reliability and durability when fabricating direct restorations
- **Popular Shades**
  Fluoride-containing CORE-FLO DC Lite is available in an 8g auto-mix dual-syringe in two esthetic shades: Natural/A1 & Opaque White
- **Kit Convenience**
  The CORE-FLO DC Lite is available with UNIVERSAL PRIMER™, a low-film thickness, dual-cured adhesive/primer designed for the dentist who prefers not to light cure the adhesive layer under indirect restorations

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2. ADA definitions for direct and indirect pulp capping at http://www.ada.org/en/publications/cdt/glossary-of-dental-clinical-and-administrative-ter
   - direct pulp cap as a "procedure in which the exposed vital pulp is treated with a therapeutic material, followed with a base and restoration, to promote healing and maintain pulp vitality."
   - indirect pulp cap as a "procedure in which the nearly exposed pulp is covered with a protective dressing to protect the pulp from additional injury and to promote healing and repair via formation of secondary dentin.
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