

Dental **PRODUCT  
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# Protecting the Pulp with Safety & Ease

*Pulpotomy treatment has changed for the better, thanks to the benefits of using a biocompatible, resin-modified calcium silicate.*



# Pulpotomies: Protecting the Pulpal Complex in Primary Teeth

*Vital pulp therapy can save a primary tooth, but it's important to know when it's appropriate, how the technique has changed, and which material to choose.*

When the pulpal complex of a primary tooth is affected by caries or trauma, a pulpotomy, under the right conditions, can keep it vital until it's time for the permanent tooth to erupt—which is critical to proper jaw development and tooth placement. A vital pulp therapy, pulpotomies involve removing the impacted pulp tissue at the pulpal chamber and then sealing it with the proper material, saving the primary tooth so it can maintain space for its permanent replacement. The procedure also relieves any inflammation and pain caused by caries or trauma, allowing for proper function.

"We remove the coronal portion of the pulp, and what's left can be treated," said Dr. Carla Cohn, a general dentist, author, and lecturer who operates Kids Sleep Dentistry Winnipeg, in Winnipeg, Canada. "We want to retain the tooth in an asymptomatic manner so the child can chew and have proper space maintenance."

But the approach to treatment and the materials used has changed in recent years. For decades, formocresol was the ma-

terial of choice for pulpotomies. It worked well, successfully mummifying residual pulpal tissue within the root canal after hemostasis, allowing the tooth to stick around long enough to be physiologically exfoliated rather than extracted.

This treatment was considered standard for decades, but that began to change when news came out that chronic exposure to high levels of formaldehyde, a component of formocresol, could cause cancer. Though studies showed formocresol didn't stay in the blood after pulpotomies and was deemed safe, the industry started to turn away from the material and look to other options.

"Around the same time, MTA and MTA-like materials were gaining popularity," Dr. Cohn explained. "We knew MTA was a good material to use for pulpotomies, but it had its



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Carla Cohn, DMD



challenges. It was very expensive, and pulpotomies aren't high-billing procedures. It also took a lot of work to mix up the material, and it took a long time to set. Over time, manufacturers started developing better materials that were easier to work with, such as TheraCal PT, a unique option that is dual cured, syringeable, and immediately curable."



*Vital pulp therapy is performed conservatively using TheraCal PT. Image courtesy of Dr. Carla Cohn.*

## Promoting Tooth Vitality

The technique clinicians have performed for decades is to excavate the caries, amputate the coronal pulp, achieve hemostasis, and treat with a medicament to seal the restoration. Dr. Cohn explained that the steps have changed a bit, starting with hemostasis. Instead of using hemostatic agents, hemostasis is now achieved by applying pressure with a saline-soaked cotton pellet after the coronal pulpal is amputated.

Once hemostasis is achieved, saline is used to irrigate, and a medicament is then applied, Dr. Cohn said.

As an alternative to formocresol, clinicians have used zinc oxide eugenol-based cements to cover the chamber, placing amalgam or a stainless-steel crown on top, BISCO's Manager of Clinical Marketing Dr. Rolando Nuñez said. Now, though, many are looking to bonding, which zinc oxide eugenol does not allow. Using a material like TheraCal PT, developed specifically for pulpotomies, enables a different approach that makes it possible to treat these cases more conservatively.

TheraCal PT is a resin-modified calcium silicate, which is similar to a mineral trioxide aggregate (MTA), but with enhanced properties. While the primary chemicals used in both materials are similar, TheraCal PT has a hydrophilic resin that facilitates calcium release. Both have an alkaline pH.



"We're now talking about calcium-containing materials that are more biocompatible and more forgiving."

Rolando Nuñez, DDS

"We're now talking about calcium-containing materials that are more biocompatible and more forgiving," Dr. Nuñez said. "The biggest change in this treatment is going from mummification to preserving the viability of the tooth to using biocompatible materials that promote the health of the remaining pulp tissue, seal the tooth, and are compatible with bonding."

## When To Treat with a Pulpotomy

Not every primary tooth is a candidate for vital pulp therapy. The tooth has to be healthy, with reversible pulpitis, along with normal soft tissue and radiographs. When irreversible pulpitis or necrotic pulp is present, nonvital pulp therapy is required, according to the "Pulp Therapy for Primary and Immature Permanent Teeth" guidelines from the American Academy of Pediatric Dentistry.

"We need a responsive pulp that will react normally to pulp stimuli and that isn't giving the child spontaneous pain," Dr. Cohn said. "The inflammation has to be capable of healing. The tooth also has to be restorable."

As part of the diagnostic process, Dr. Cohn talks with patients and their parents about the type of pain they're experiencing, giving her clues to whether the tooth can be treated with vital

## FOLLOW THE GUIDELINES

As with any dental procedure, it is critical for clinicians to follow the recommended guidelines. TheraCal PT is one component of vital pulp therapy; everything leading up to its placement must be completed properly for best results.

"It will work if everything else is done accordingly," Dr. Nuñez said. "If hemorrhage isn't controlled, for example, anything you put in to fill the pulp might not work as well as you would hope. You need to have faith in the materials you're using, but the clinical procedures are very important."

## THERACAL PT FEATURES

- Biocompatible, dual-cured, resin-modified calcium silicate designed for pulpotomy treatment
- Maintains tooth vitality by acting as a barrier and protectant of the dental pulpal complex
- Working time of a minimum of 45 seconds at 35°C
- Setting time of a maximum of 5 minutes at 35°C
- Hydrophilic matrix facilitates calcium release
- Alkaline pH at 7 days
- Radiopaque, making it easy to differentiate from recurrent decay and other restorative materials
- Easy syringe application
- No hand mixing required
- Dual cured
- Low water solubility

pulp therapy. If they only have pain after the tooth is exposed to a stimulus like hot or cold food or when eating something crunchy, the pulp is likely vital and can be saved. But if the child is waking up in the middle of the night with long-lasting, non-transient pain, you likely have a case where pulp therapy isn't an option and nonvital pulp therapy or extraction are indicated.

"Those symptoms indicate the pain has progressed from the coronal pulp to the pulp stumps," Dr. Cohn said. "So, the type of pain and how long it lasts gives us an indication of whether it's reversible or irreversible pulpitis. It can never be a definitive diagnosis without microscopic evaluation. You never really know if the bacteria has extended into the pulp stump, even if you've done all the right things."

It is also critical to look at furcation from the primary molars and root morphology, Dr. Cohn noted. You need to make sure you have enough root structure left. And if the child is going to exfoliate the tooth soon, it's not worth the time and cost to perform vital pulp therapy.

### Exploring the Options

When vital pulp therapy is the best option, there are three different types

to consider, Dr. Cohn said. The first is indirect pulp therapy. In this scenario, some of the decay is removed and the pulp treated with a medicament. With the second, direct pulp cap, the pulp is exposed and then treated with medi-

cament. Direct pulp caps don't have a high success rate and aren't performed that often, but that will likely change as materials continue to evolve.

The third and most popular option is, of course, a pulpotomy, with the fast-acting TheraCal PT becoming the filling material of choice for this procedure.

"TheraCal PT provides calcium release and serves as a stable base that does not affect the pulpal tissue," said Dr. David Martin, a restorative and cosmetic dentist in Totowa, NJ, who uses TheraCal PT for pulpotomies and deep restorations in his practice. "This allows for a quick, stable restoration that is kind to the surrounding tissue. In addition to the material's chemistry, the dual cure and the ability to complete the restoration in a timely fashion are the two biggest benefits I've experienced when using TheraCal PT."

## BEFORE RECOMMENDING PULPOTOMY TREATMENT:

- Obtain a comprehensive medical history.
- Perform a review of past and present dental history and treatment, including current symptoms and the patient's chief complaint.
- Complete a subjective evaluation of the area associated with the current symptoms/chief complaint by questioning the patient/parent on the location, intensity, duration, stimulus, relief and spontaneity of the pain.
- Complete an objective extraoral exam as well as examine the intraoral soft and hard tissues.
- Take radiographs to diagnose periapical or periradicular changes.
- Perform clinical tests such as palpation, percussion and mobility.

Keep in mind, teeth exhibiting provoked pain in short bursts that's relieved with over-the-counter analgesics, by brushing, or after the stimulus goes away likely have reversible pulpitis and are candidates for vital pulp therapy.

Teeth with unprovoked pain, a sinus tract, soft-tissue inflammation not from gingivitis or periodontitis, excessive mobility not associated with trauma or exfoliation, furcation/apical radiolucency, or have evidence of internal/external resorption likely have irreversible pulpitis or necrosis and are not candidates for vital pulp therapy.

Source: Pulp Therapy for Primary and Immature Permanent Teeth, American Academy of Pediatric Dentistry

# Why TheraCal PT for Pulpotomy Treatment?

*The calcium-releasing material was designed specifically for pulpotomies, protecting the tooth rather than embalming it as was done in the past.*

In the years following BISCO's release of TheraCal LC in 2011, many clinicians inquired about whether the resin-modified, calcium silicate-filled liner could be used in pulpotomies. But it could only be placed in layers of less than 1 mm, and because materials used for pulpotomies need to be 2 to 3 mm thick to fill the chamber, the answer was no. Realizing there was a need, the team at BISCO developed a product specifically for pulpotomies: the dual-cured TheraCal PT.

TheraCal PT has much in common with TheraCal LC. Both use BISCO's THERA technology, which facilitates calcium release and offers a unique array of benefits. Both are radiopaque and moisture tolerant. But TheraCal PT is primarily indicated for pulpotomies, maintaining tooth vitality by serving as a barrier and protectant of the dental pulpal complex.

"It will cure on its own chemically," Dr. Nuñez said. "So, you don't have to worry about having it properly polymerized by the light."

Dr. Cohn, who has used TheraCal PT since it was released, likes the fact this resin-modified calcium silicate material comes with a double barrel syringe, making it easy to extrude into the pulp

chamber so it makes contact with the pulp stump. Instead of embalming the tooth, TheraCal PT, which doesn't require mixing, creates a hydrophilic matrix that facilitates calcium release, protecting the tooth. It also has an alkaline pH that promotes pulp vitality.<sup>1</sup>

Because the material is radiopaque, Dr. Cohn said it's easy to see on radiographs and to monitor at recall visits. The product also helps to avoid waste, as clinicians can extrude what they need for the case and save the rest for later, which is especially beneficial for dentists who don't perform pulpotomies often.

Dr. Martin also appreciates the fact TheraCal PT takes less time to set. He can place and set material in seconds, which is critical when working with children who are nervous about the procedure and find it difficult to sit still. Being able to perform pulpotomies faster makes the experience more positive for his patients, making them more likely to accept other needed treatment down the road.

"TheraCal PT is unique because it's dual cured, syringable, and immediately curable," Dr. Cohn said. "You don't need to mix it, and because it's dual cured, you can hit a light on it and proceed with the procedure. If you're covering a tooth with a crown, it's not as important to have a material that becomes hard immediately after light cure, but when you're putting a composite on top of a glass ionomer, it's critical to move quickly."

The calcium-releasing, biocompatible TheraCal PT protects the dental pulpal



complex and promotes the health of the remaining pulp tissue, making it a more attractive option for pulpotomies than methods of the past. It has become the go-to filling material, setting a new standard for vital pulp therapy treatment.

### Reference

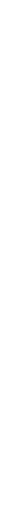
- 1 T. Okabe, M. Sakamoto, H. Takeuchi, K. Matsu-shima. Effects of pH on Mineralization Ability of Human Dental Pulp Cells. *Journal of Endodontics*. Volume 32, Number 3, March 2006.

## THE PROCEDURE

- Achieve hemostasis after removing the coronal pulp
- Place TheraCal PT
- Light cure for 10 seconds
- Place adhesive, base and/or restoration following the manufacturer's directions



# Additional Resources



## How To Reach BISCO



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