

Dr. M. Paul Renner

Paul graduated from the University of Queensland with a BDS in 1981. He has worked in general practice since, first in government service and then in his private practice in Dalby, Queensland from 1991 onwards. For the last 15 years, Paul has been employed as a part-time clinical supervisor at the University of Queensland, supervising final year students. Additionally, he currently holds the title of Associate Lecturer at the university. Paul has been active in the Australian Dental Association Queensland, where he served as president for two terms and was awarded lifetime membership. Since starting to treat symptomatic carious teeth using vital pulp therapy eight years ago, it has become an increasingly important part of Paul's practice. Due to the inability of many patients to afford root canal therapy and restoration with an indirect restoration, Paul has been able to save many teeth from extraction using this approach. Apart from vital pulp therapy, his other areas of interest are the diagnosis and treatment of cracked teeth and dental photography.



70-year-old female partial pulpotomy using Bio-Bulk Fill technique

How long have you been using Biodentine™?

I switched from MTA to Biodentine™ five years ago.

Why do you use the Bio-Bulk Fill procedure with Biodentine™? What are the main advantages for you?

Firstly, if I have sufficient time at the appointment I can wait for the Biodentine™ to fully set (12 minutes) and then complete the permanent restoration without fear of damaging the Biodentine™. Secondly, in what is usually the case, if I have insufficient time to wait for the set and then complete the restoration, I can simply fill the cavity completely with Biodentine™, wait for the complete set (12 minutes), discharge the

patient, and then reappoint them at a later date to cut back the Biodentine™ and cover it with the final restoration. I often use this latter technique to allow time to assess Biodentine™'s effect on the pulp tissue, whether it be a pulpotomy, deep cavity or symptomatic crack, before committing to the final restoration, especially if an indirect restoration is planned.

In which cases do you use the Bio-Bulk Fill procedure?

I use Biodentine™ for all pulpotomy procedures (partial and full), for symptomatic teeth with deep caries where there is no pulpal exposure, and as a base under symptomatic teeth with deep cracks before restoring them.

Summary

Introduction

With the advent of MTA and other hydraulic calcium silicate cements such as Biodentine™ and a better understanding of the pulp's response to noxious stimuli, various techniques have been developed to preserve the vitality of tooth, even in teeth where the pulp shows symptoms of severe inflammation.

These techniques have been termed Vital Pulp Therapy (VPT) and include indirect pulp capping (selective caries removal), direct pulp capping, and partial and full pulpotomy.⁽¹⁾

Discussion

With good evidence from published papers, the high success rate for partial and full pulpotomies now allows us to conservatively treat many teeth with moderate to severe pulpitis, providing a cost saving to the patient and extending the life of the tooth.

Conclusion

Partial and full pulpotomy has been shown to be a very successful treatment option, even in teeth with symptoms which once were described as irreversible pulpitis. Biodentine™ has many years of proven, well-documented success. The material's dentine-like properties and its bond to dentine make it the preferred material for pulpotomies.

Introduction

Until recently, a tooth that showed symptoms of what has been termed irreversible pulpitis was doomed to either pulpectomy and root canal therapy or extraction. With the advent of MTA and other bio-ceramic materials and better understanding of the pulp's response to noxious stimuli, various techniques have been developed to preserve the vitality of the tooth, even in teeth where the pulp shows symptoms of severe inflammation.

These techniques have been termed Vital Pulp Therapy (VPT) and encompass indirect pulp capping (selective caries removal), direct pulp capping, and partial and full pulpotomy.⁽¹⁾ Numerous studies have demonstrated that the success rate of partial and full pulpotomies ranges from 75-100%.^(2,3) It has been advocated as the preferred option for treating teeth with symptoms once described as irreversible pulpitis.^(4,5)

Case report

Clinical signs and symptoms

A seventy-year-old female patient, who had been a regular patient of my practice but had moved interstate for a number of years, returned for an examination. She reported that she had been having some pain, sensitivity and, at times, an ache in the lower right posterior region. She reported the tooth reacted to cold drinks and when it ached, it was not for a long period and did not require analgesics.

A radiograph (*Fig. 1*) revealed recurrent caries under the composite resin restoration tooth 46.

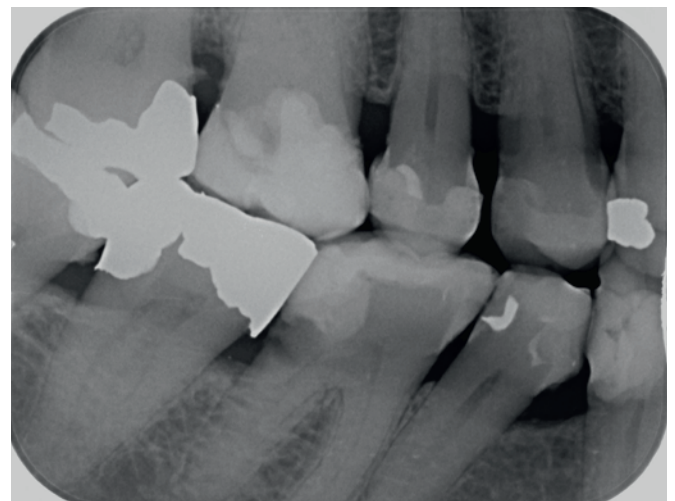


Fig. 1 - Pre-operative radiograph.

This lesion was very sensitive to an air blast and the pain lingered for more than one minute. The tooth reacted strongly to cold testing (endo frost on a small cotton roll) but was not tender to percussion.

Due to the radiographic appearance and the proximity of the caries to the distal portion of the pulp, the patient was advised that it may be necessary to perform vital pulp therapy or root canal therapy. However, this could not be determined until the caries had been accessed and removed. The patient consented to proceed with treatment.

Diagnosis

Recurrent caries causing moderate pulpitis.

Procedure and treatment

The tooth was anaesthetised using 3% mepivacaine HCL as an inferior dental block. The area was isolated with dental dam and the isolated teeth disinfected with 4% NaOCl.

After removing the distal section of the existing composite resin restoration and accessing the caries, the cavity was disinfected again and the margins of the cavity caries freed. As the inferior margin of the cavity extended subgingivally, it was impossible to maintain a moisture-free field with the dental dam alone. A sectional matrix was therefore placed, which extended past the inferior border of the cavity to seal the field.

Once the field was well-sealed, the cavity was disinfected again and sterile round burs were used to complete the caries removal.

When the remaining caries was removed, a small bleeding pulpal exposure was noted (*Fig. 2*). The cavity was disinfected again, and the exposure enlarged with a sterile round high-speed bur using copious amounts of water spray. A small margin of dentine was removed from around the exposure and approximately 1.5mm of pulp tissue amputated.

A cotton pellet soaked in 4% NaOCl was placed onto the exposure and held against the pulp for three minutes. After removing the pellet, the bleeding had stopped and the exposed pulp tissue appeared healthy (*Fig. 3*).

Due to time constraints, the entire cavity was filled with Biodentine™ using the Bio-Bulk Fill technique. The patient was appointed to return to have the remaining composite resin removed, the Biodentine™ cut back and the tooth restored with composite resin (*Fig. 4*).

12 weeks after the initial procedure, the patient returned for the final restoration. The patient reported that the tooth had been pain-free since the initial procedure. The tooth did not respond to a cold test, and neither did tooth 45.

After discussion, the patient elected to proceed with the final restoration. Again, using local anaesthetic and rubber dam isolation, the entire composite resin restoration was removed and the Biodentine™ cut back. Where the Biodentine™ extended subgingivally on the disto-lingual aspect, it was decided to leave this section of Biodentine™ exposed (*Fig. 5*). The cavity was restored with composite resin (*Fig. 6*). A post-operative radiograph (*Fig. 7*) revealed no peri-apical changes and the Biodentine™ appeared well-adapted to the distal margin of the cavity. At the 12-month review, the tooth is vital (positive to cold test) and has been asymptomatic (*Fig. 8*).

Follow-up

The tooth will continue to be monitored at the patient's annual exam. If signs of apical periodontitis occur, a traditional root canal therapy will be performed on the tooth. If the tooth remains asymptomatic and there are no radiographic apical changes, the tooth will be restored with a full-coverage indirect restoration.



Fig. 2 - Initial exposure.

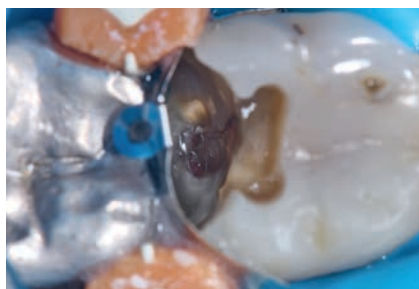


Fig. 3 - Exposure after enlarging and applying pressure with cotton pellet and 4% NaOCl.



Fig. 4 - Cavity filled with Biodentine™.



Fig. 5 - Second visit -- composite resin restoration removed, Biodentine™ cut back and matrix placed.



Fig. 6 - Final interim composite resin restoration.



Fig. 7 - Post-operative radiograph.

Discussion

While a post-operative reaction to a cold test gives a greater confidence that the vital pulp therapy has been successful, an absence of symptoms or radiographic periapical changes can be used as a measure of success. This is especially the case where the tooth has previously been heavily restored and, as in this case, tooth 45 does not respond to cold testing.

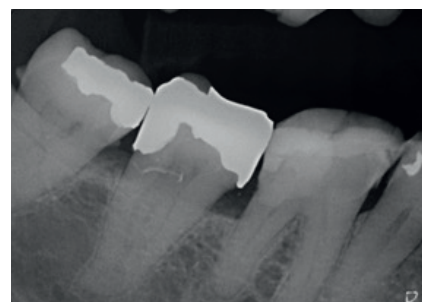


Fig. 8 - 12-month review radiograph.

Conclusion

Partial and full pulpotomy has shown to be a very successful treatment option even in teeth with symptoms which once were described as irreversible pulpitis. Biodentine™ has many years of proven, well-documented success. The material's dentine-like properties and its bond to dentine make it the preferred material for pulpotomies.

The relatively short initial setting time of Biodentine™ and the physical properties of the set material provide another advantage over other hydraulic calcium silicate cements, in that Biodentine™ can be used as an interim enamel replacement where time is limited (for up to six months) and to allow time to assess the success of the procedure.

Acknowledgements

I would like to thank my dental assistants, Ms Ellen Gordon and Ms Julie Schefe, for their assistance with the procedures and photography.

References

1. Wei Shang ,1 Zeliang Zhang,1 Xicong Zhao,1 Qingquan Dong,2 Gerhard Schmalz ,3 and Shaonan Hu 2 The Understanding of Vital Pulp Therapy in Permanent Teeth: A New Perspective. *BioMed Research International*, 2022, 1–11. <https://doi.org/10.1155/2022/8788358>.
2. McHugh, H.;Wright, P.P.; Peters, C.I.; Peters, O.A. Diagnostic and Prognostic Predictors for the Success of Pulpotomy in Permanent Mature Posterior Teeth with Moderate to Severe Pulpitis: A Scoping Review. *Oral* 2023, 3, 545–571. <https://doi.org/10.3390/oral3040045>.
3. Al-Ali M. and Camilleri J. (2022) The scientific management of deep carious lesions in vital teeth using contemporary materials—A narrative review. *Front. Dent. Med* 3:1048137. doi: 10.3389/fdmed.2022.1048137.
4. https://www.aae.org/wp-content/uploads/2021/05/VitalPulpTherapyPositionStatement_v2.pdf.
5. European Society of Endodontology (ESE) developed by: Duncan HF, Galler KM, Tomson PL, Simon S, ElKarim I, Kundzina R, Krastl G, Dammaschke T, Fransson H, Markvart M, Zehnder M., Bjørndal L. European Society of Endodontology position statement: Management of deep caries and the exposed pulp. *International Endodontic Journal*, 52, 923–934, 2019.

Septodont

58 rue du Pont de Créteil - 94100 Saint-Maur-des-Fossés - France

www.septodont.com

Follow us on social media channels:

