Dr. M. Paul Renner

Paul graduated from the University of Queensland with a BDSc 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.

Biodentine™ in Bio-Bulk Fill procedure as a core material for indirect restoration

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.

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Summary

Introduction
Teeth with cracks that exhibit symptoms of moderate to severe pulpitis have historically been treated by pulpectomy, root canal treatment and then restoration with full-coverage indirect restoration. With the success of pulpotomies using calcium silicate cements, many of these teeth have been able to retain their vitality and arguably increase their longevity.

Methods
A full pulpotomy was performed on tooth 26 using Biodentine™ with the Bio-Bulk Fill technique, with a permanent dentin restoration and interim enamel restoration to allow time to assess the success of the vital pulp therapy. The Biodentine™ then acted as a core for the indirect restoration.

Discussion
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]

While there is little published data on the use of pulpotomy in cracked teeth, my own professional experience has shown this to be a viable treatment option for these symptomatic teeth.

Conclusion
Full pulpotomy and restoration with an indirect full-coverage restoration is a viable treatment option for cracked teeth with symptoms of moderate to severe pulpitis.

Introduction

Symptomatic teeth that are found to have cracks are one of the more difficult situations for which to plan treatment. Many articles have been published regarding these teeth and unfortunately, there has been no consensus on the best course of treatment. In my experience, it is best to treat these teeth conservatively as this allows for further treatment options if the conservative treatment fails.

Case report

Clinical signs and symptoms
In 2018, a 59-year-old patient presented with vague pain in the upper left region. He had difficulty locating which tooth was painful, but he reported that he thought it was one of the last two teeth (tooth 26 or 27).

No teeth were tender to percussion. Tooth 26 reacted strongly to cold testing while the other teeth reacted normally. Tooth 26 tested positive to biting on damp gauze but the sensation did not linger. Both tooth 27 and 25 were negative to the bite test. The composite resin restoration in tooth 26 was removed under rubber dam and crack lines could be seen under the restoration ***(Fig. 1)***, with the most obvious running from the lingual to the centre of the tooth, and another from the mesio-buccal to the centre. A number of other minor cracks were visible, including one that ran under the buccal cusps ***(Fig. 1)***.

Fig. 1 - Cracks in 2018.

These crack lines were discussed with the patient and he was given the option of either restoring the tooth with direct composite resin or with a full-coverage indirect restoration. The patient chose to have the tooth restored with a direct composite resin and so this was performed at this appointment. The patient returned annually for examination and reported the tooth was asymptomatic.

In 2024, the patient presented again with pain in tooth 26. He reported the tooth was very sensitive to cold, with the pain lasting several minutes. He also reported that the tooth had ached spontaneously at times. On examination, the tooth reacted very strongly to cold, which lasted for almost one minute. The tooth was also slightly tender to percussion. The composite resin restoration appeared sound ***(Fig. 2)***. A PA radiograph ***(Fig. 3)*** revealed no PARL, but the pulp chamber was reduced in size when compared to a previous bite-wing radiograph.

Diagnosis

Given the tooth's previous history of visible cracks running into the tooth and the current symptoms of moderate to severe pulpitis, a decision was made after discussion with the patient to enter the pulp chamber to assess the condition of the pulp and the depth of the cracks. The plan was to either perform a full pulpotomy or, if no viable pulp tissue was present, extirpate the pulp.

Procedure and treatment

Using local anaesthetic and rubber dam isolation, access was obtained through the composite resin restoration. While the cracks were visible, they appeared similar to the image from 2018 ***(Fig. 4)***. The roof of the pulp chamber was removed and vital tissue was found, which did not appear to be heavily inflamed ***(Fig. 5)***. A pulp stone was also present ***(Fig. 6)***. Removing this revealed bleeding pulp tissue at the opening of the root canals. A cotton pellet soaked in NaOCl was placed on the pulp tissue at the opening of the root canal and after five minutes the bleeding had ceased ***(Figs. 7 and 8)***.

As the plan was to restore the tooth with a full-coverage indirect restoration, the entire pulp cavity was filled with Biodentine™ with the Bio-Bulk Fill technique. ***(Fig. 9)***.

The patient returned after twelve weeks and reported that the tooth had been asymptomatic ***(Fig. 10)***. At this appointment, a preparation for a ¾ crown was performed ***(Fig. 11)***. The Biodentine™ was left in situ, cut back and used as a core for the restoration. A PVS impression was recorded, and a BIS-Acrylic temporary crown cemented with provisional cement ***(Fig. 12)***.

Three weeks later, a monolithic zirconia crown ***(Fig. 13)*** was bonded onto the tooth ***(Fig. 14)***. The tooth will be monitored and a review radiograph taken after six months.

Fig. 2 - Pre-op composite resin restoration, 2024.

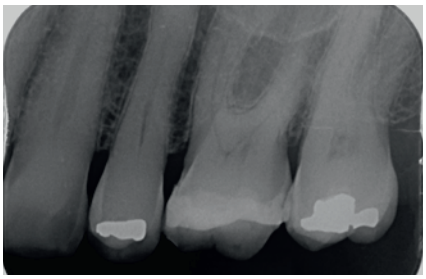

Fig. 3 - PA radiograph.

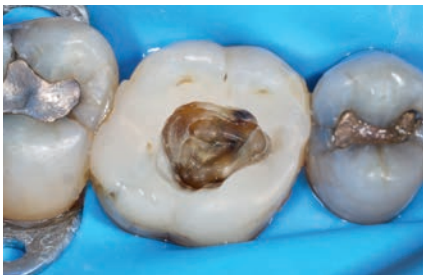

Fig. 4 - Initial access showing existing cracks.

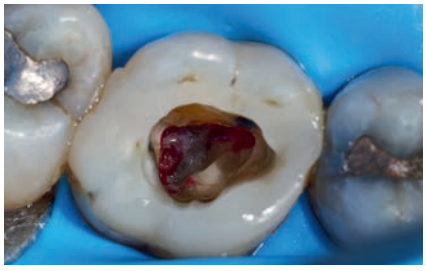

Fig. 5 - Initial exposure of the pulp chamber showing slight bleeding and pulp stone.

Fig. 6 - Pulp stone removed.

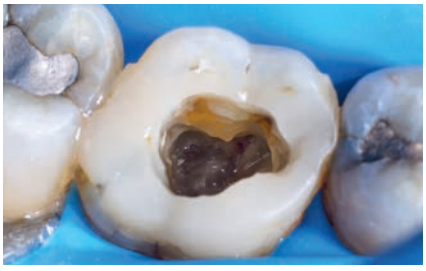

Fig. 7 - Buccal root openings with vital tissue after bleeding has stopped.

Fig. 8 - Palatal root opening with vital tissue after bleeding has stopped.

Fig. 9 - Cavity filled with Biodentine™.

Fig. 10 - Tooth at 12-week review.

Fig. 11 - 3/4 crown preparation.

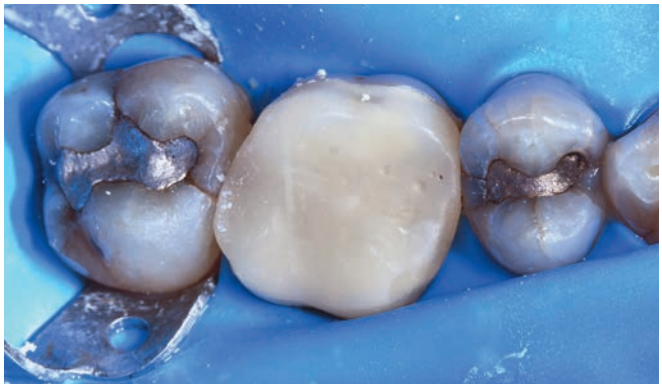

Fig. 12 - Acrylic provision crown prior to delivery of the final restoration.

Fig. 13 - Monolithic zirconia 3/4 crown.

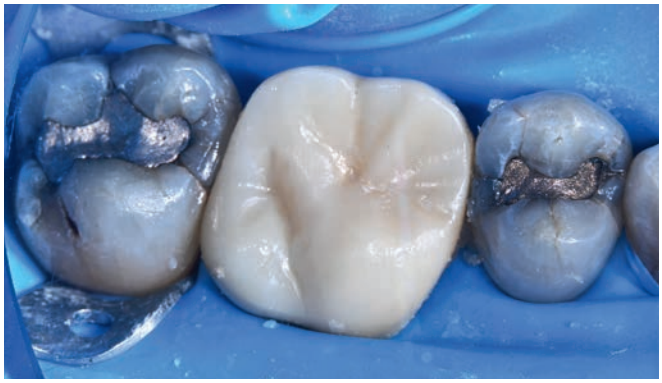

Fig. 14 - Zirconia 3/4 crown bonded.

Discussion

This case highlights a number of elements of pulpotomies in teeth with cracks. Firstly, many teeth with deep cracks have a long-standing mild pulpitis, to which the pulp has responded by producing reparative dentine that often appears in the form of a pulp calcification. The operator must be careful when performing vital pulp therapy on these teeth as it is often difficult to differentiate the pulp calcification from the floor of the pulp chamber. Any pulp calcifications must be removed before assessing the condition of the radicular pulp tissue.

Secondly, in teeth with pulp symptoms resulting from cracks, it is best to perform a coronal pulpotomy. This allows the floor of the pulp chamber to be examined for any extension of the crack across the floor, which would greatly reduce the prognosis for the tooth.

Conclusion

The ability to use Biodentine™ in the Bio-Bulk Fill technique has a number of advantages in cases like the above.

The initial vital pulp therapy appointment can be shortened by completely filling the cavity and using the Biodentine™ as a permanent dentin replacement and an interim enamel replacement. The fact that the material can be left for up to six months allows time to assess the success of the procedure before committing to the final indirect restoration. The strength of Biodentine™ means there is no requirement to place a separate core material.

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References

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