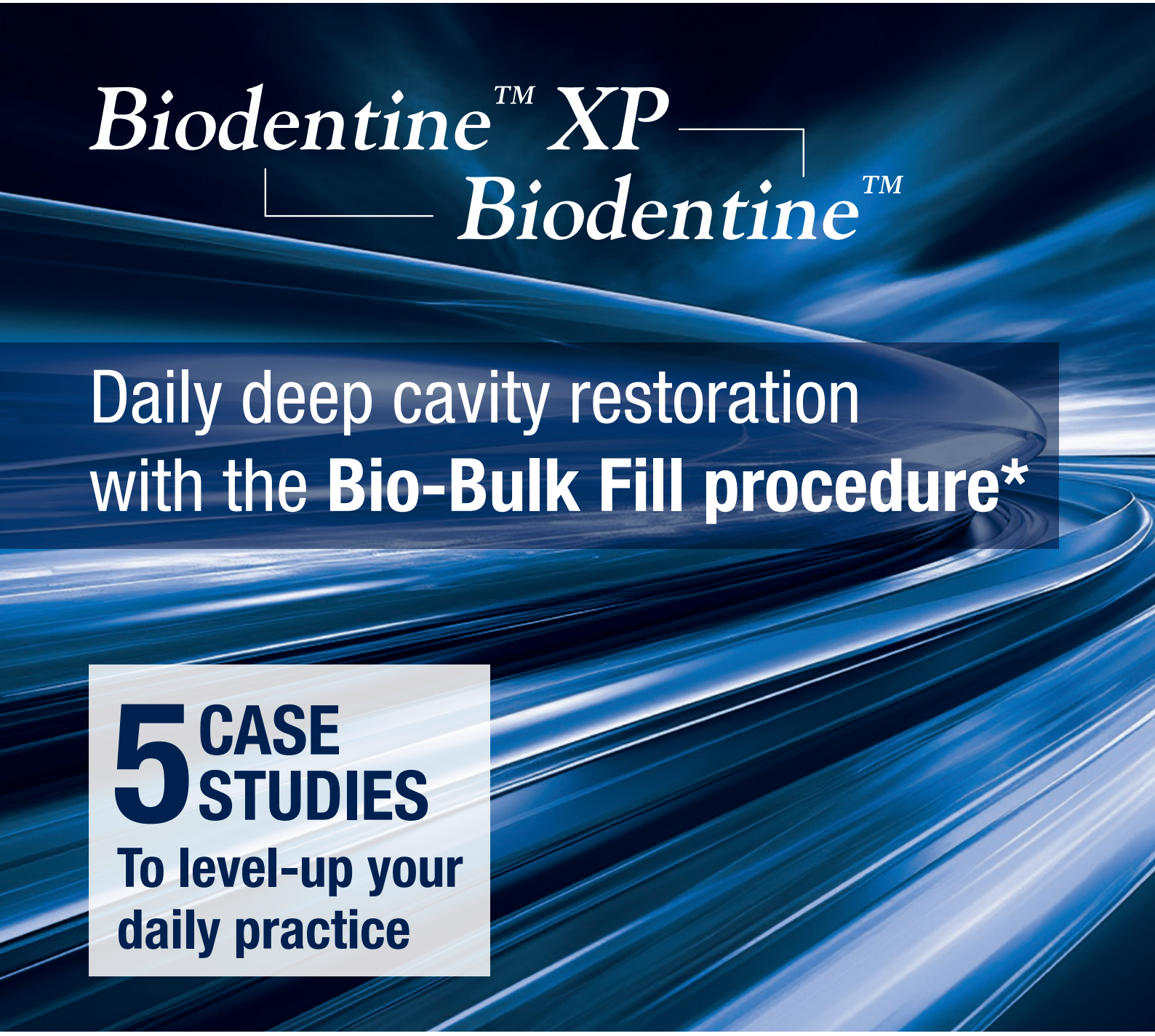
Septodont

Case Studies Collection

No. 27 - September 2024

Exclusive edition



*Apply Biodentine XP from the pulp to the tooth surface.
Internal Septodont's document provided from Biodentine Expert Board - 11th September 2023.

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Editorial

Septodont created the *"Septodont Case Studies Collection"* - a series of case reports - in 2012 to share with you their experience and the benefits of using these innovations in daily practice.
Over the past years, authors from more than 15 countries have generously contributed to the success of our magazine that is now distributed on the 5 continents.

The 27th issue features 5 cases for deep cavity restorations with Biodentine™ or Biodentine™ XP.

Biodentine™ XP is both a pulp therapeutic and a restorative material, in a single product.
It is a dentine substitute suited for restoring a deep cavity using the "Bio-Bulk Fill" procedure, from the pulp to the tooth surface, **thanks to its unique combination of both bioactivity & biocompatibility and physico-mechanical properties close to those of natural dentine.**

The cases are written by the practitioners, the products' application in every case is under the responsibility of the author. Septodont reminds that every product has an official indication, available in the product's information notice.

Content

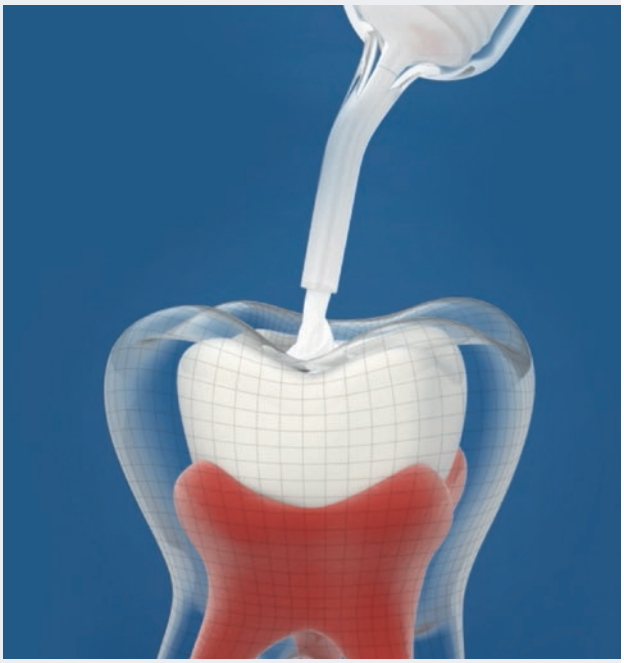
In this review focused on Biodentine™ and Biodentine™ XP in the Bio-Bulk Fill procedure you will find the clinical cases of:

Biodentine™ XP

Is THE unique material suited for

Bio-Bulk Fill procedure

Fill **the entire cavity** with only Biodentine™ XP
from the pulp to the tooth surface



Final enamel restoration to be performed

- in the same session
  or
- in the second session, which can be performed **between 2 weeks and 6 months later**.

- Internal Septodont's document provided from Biodentine Expert Board - 11th September 2023.
- Koubi et al. Clinical evaluation of the performance and safety of a new dentine substitute, Biodentine™, in the restoration of posterior teeth - a prospective study. Clin Oral Investig. 2013.

Deep cavity restoration procedure[1] with Biodentine™ XP

Direct Pulp capping (vital tooth) First session

1. Assess the pulp status
2. Isolate the tooth with a rubber dam
3. Remove remaining caries
4. Adapt a matrix around the tooth if a wall is missing[2]
5. Achieve haemostasis by compression (1-6% NaOCl)
6. Activate the Biodentine™ XP cartridge, use Biodentine™ Mixer
7. Using Biodentine™ Gun, place the tip at the cavity base and slowly inject Biodentine™ XP while retracting the tip (Bio-Bulk Fill)[3]
8. Ensure marginal adaptation, minimal occlusal shaping/pressure on the setting Biodentine™ XP
9. Keep Biodentine™ XP out of occlusion

In case of indirect pulp capping, proceed to a minimally invasive selective caries removal by retaining caries-affected dentine over the pulp

If haemostasis cannot be achieved within 5 minutes, further pulp tissue should be removed (partial or full pulpotomy)

If the patient's follow up is not possible,
finalize the procedure in 1 session

1. Leave 2 mm space, wait for initial setting at least 12 min
2. Apply self etch adhesive system (selective etch or self-etch mode) over Biodentine™ XP and tooth structure
3. Place a resin composite
4. Patient recall according to current recommendations

Direct Pulp capping (vital tooth) Second session

minimum 2 weeks to 6 months after 1rst session

1. Assess the pulp vitality status
2. Cut Biodentine™ XP back sufficiently (average 2 mm)
3. Apply the adhesive system: total etch (etch&rinse) or self-etch over Biodentine™ XP and tooth structure
4. Place a resin composite
5. Patient recall according to current recommendations

(1) Procedure extracted from international dental practitionners experts board (Position statement. September 2023).

(2) Extensive Class II will require proximal wall build up (Mount GJ, Hume WR. A new cavity classification. Australian Dental Journal. 1998;43(3):153-9).

(3) Possible technique in the context of a coronal restoration.

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Deep caries management using Bio-Bulk Procedure

Prof. Joseph Sabbagh

How long have you been using Biodentine™ for?

I have been using Biodentine™ since it was launched in 2010, when it was presented to me during the ADF meeting in Paris. Since I am a specialist in endodontics and restorative dentistry, and given my academic positions, I wanted to try this new material and investigate its clinical application in different fields of dentistry. Throughout the several cases achieved, and given the success we had, it seemed a very promising material that could bring solutions for different cases in dentistry, mainly related to pulp vitality and root canals.

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

The concept of bulk filling has gained widespread popularity in dentistry in recent years. It can be approached in two ways: with inert bulk-fill materials, like the composites that are used in layers of 4 mm, or with bio-bulk fill materials based on tricalcium silicate or other molecules, which will interact with the pulp and induce repair and bridge formation, thus maintaining pulp vitality and avoiding root canal treatment.
The Bio-Bulk Fill procedure is mainly indicated in case of deep caries and large cavities. The main advantage of Biodentine™ is that we can use it to fill the entire cavity, and thus it will simultaneously act as both the bioactive pulp-capping material and the temporary cement.

When/in which cases do you use the Bio-Bulk Fill procedure?

Biodentine™ has several indications in restorative dentistry and endodontics, as well as in permanent and in deciduous teeth. It can be used for direct and indirect pulp capping, pulpotomy, internal and external resorptions, root perforations, apexification and retrograde endodontic surgery. The Bio-Bulk Fill procedure is used in a deep cavity with or without pulpal exposure. The most important factor is to evaluate the RDT (Remaining Dentine Thickness) after caries removal, clinically and radiographically. In most of the cases, when we have a minimum dentine thickness of 1 mm, composite restoration is placed without using a liner or a pulp protection. In other cases, when the pulp is seen by transparency, the best treatment is indirect pulp capping in one or two sessions, using a calcium trisilicate cement like Biodentine™ as a base, followed by a composite restoration on the top.

Summary

Introduction
The aim of this case study is to discuss two clinical situations treated with Biodentine™ and Biodentine™ XP with a 12-year follow-up, emphasising the evolution and improvement made to the Biodentine™ system.

Methods
The protocol of using Biodentine™ as a bio-bulk capping material in one or two sessions is explained, as well as the different clinical steps to follow.

Discussion
The concept of Bio-Bulk Fill is indicated in deep cavities, reducing the risks of pulpal damage and maintaining its vitality.

Conclusion
Biodentine™ XP, while keeping the same formulation and indications as Biodentine™, made the application technique and handling much easier for the dentist.

Introduction

Management of deep caries and preservation of pulp vitality represent daily challenges for the dentist and the patient concerned with avoiding root canal treatment. The American Academy of Pediatric Dentistry defines vital pulp therapy as “the placement of a protective barrier over exposed or unexposed pulp to induce the formation of a dentinal bridge and maintain its vitality and function.”[1]

The main techniques used to maintain pulp vitality in permanent teeth are direct and indirect pulp capping. Two groups of materials are used; the first is based on calcium hydroxide and the second is based on tricalcium silicate.[2] A recent meta-analysis compared the two types in deep cavities with exposed pulp, with better long-term outcomes achieved using the tricalcium silicate-based materials MTA and Biodentine™.[3]

Biodentine™ has been used for more than 12 years for different indications in deciduous and permanent teeth, showing high success rates at different recall times.[4-6] Biodentine™ XP was recently launched, offering the same composition in a pre-dosed, ready-to-mix capsule format. The system includes a mixer and a dispensing gun, ensuring a uniform consistency and easy delivery

directly into the cavity. According to the clinical indication and quantity needed, two capsule volumes are available: Biodentine™ XP 200 and Biodentine™ XP 500.

On the other hand, the bulk-filling approach has gained wide popularity in dentistry in recent years. It can be approached with inert bulk-fill materials, like the composites that are used in layers of 4 mm, or "bio-bulk fill" materials mainly based on tricalcium silicate. The Bio-Bulk Filling approach involves the application of a bioactive cement in the deep part of the cavity, which will interact with the pulp and induce repair and bridge formation, thus maintaining pulp vitality and avoiding root canal treatment. The application is completed with the placement of a 1.5-2 mm layer of conventional resin composite or a bulk-fill resin composite on the top, either during the first or the second session.

The aim of this clinical paper is to present the concept of "Bio-Bulk Fill" in cases of deep cavities using Biodentine™ XP, reducing the risk of pulpal damage and maintaining pulp vitality.

Case report 1

Clinical signs and symptoms

A 17-year-old male presented to our clinic in July 2011 with sensitivity in the lower left posterior region.

Diagnosis

Clinical examination showed several defective restorations and occlusal caries on the first and second left lower molars (#36 and #37) ***(Fig. 1)***.

Procedure and treatment

Local anaesthesia (Septanest,1:200.000, Septodont, Saint-Maur des Fossés, France) was given to the patient as needed to avoid discomfort during the restorative procedure. Cavities were prepared under copious irrigation and carious tissue was excavated using a carbide tungsten bur. The working field was isolated using a latex rubber dam fixed with a Softclamp (Kerr, Orange, USA) to avoid any gingival fluid contamination ***(Fig. 2)***.

The medium-sized occlusal cavity on tooth #36 was restored during the same session using direct composite restoration after applying an etch-and-rinse adhesive system (Optibond FL, Kerr-USA). The deep cavity on tooth #37 was completely restored in line with the Bio-Bulk Fill approach, using Biodentine™ as a pulp-capping material and a temporary cement ***(Fig. 3)***. After the initial setting time of 12-15 minutes, the

First session

Fig. 01 - Pre-op situation.

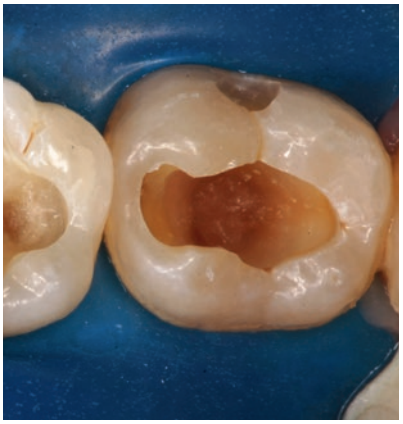


Fig. 02 - Deep carie after carie excavation.

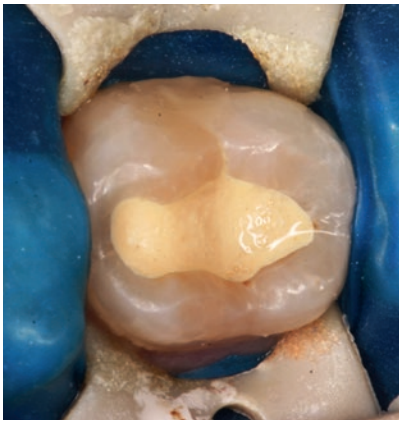


Fig. 03 - Bio-Bulk Fill procedure with Biodentine™.

rubber dam was removed and the occlusion was gently checked using articulating paper.

The patient did not report any signs of pain or discomfort, and was recalled four weeks later to complete the restoration of tooth #37 and placement of the final composite. After conducting a cold vitality test to confirm tooth vitality, 2 mm of Biodentine™ were removed using a diamond bur ***(Fig. 4).*** A rubber dam was placed and the same protocol applied previously was used to place the total etch adhesive system ***(Fig. 5-6)*** and the composite restoration ***(Fig. 7-8)***. The microhybrid composite filling was polymerised for 20 seconds using a LED light-curing device, then finished and polished using fine diamond burs and silicone points.

Follow-up

Figures 9 and 10 show digital radiography images at one-year and twelve-year recall after the bio-bulk restoration including Biodentine™ and composite restoration. The tooth is vital, and no periapical image is seen. No pulp retraction is observed, confirming the biocompatibility of Biodentine™.

Second session

Fig. 04 - Retrieve partially Biodentine™ (2mm).

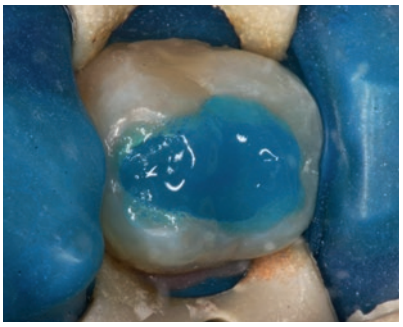


Fig. 05 - Cavity etching.

Fig. 06 - Adhesive placement.

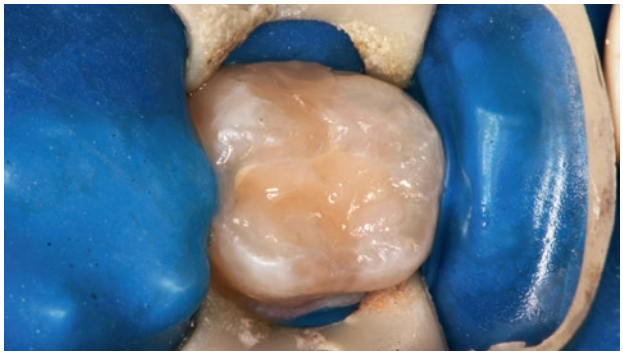


Fig. 07 - Composite placement.

Fig. 08 - Composite polishing.

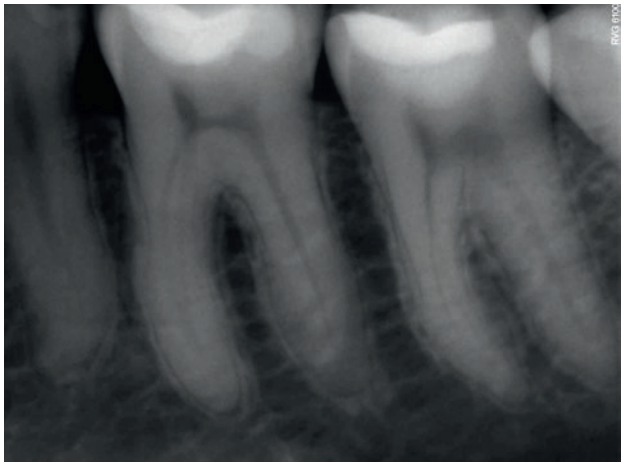


Fig. 09 - X-Ray at 1 year follow-up.

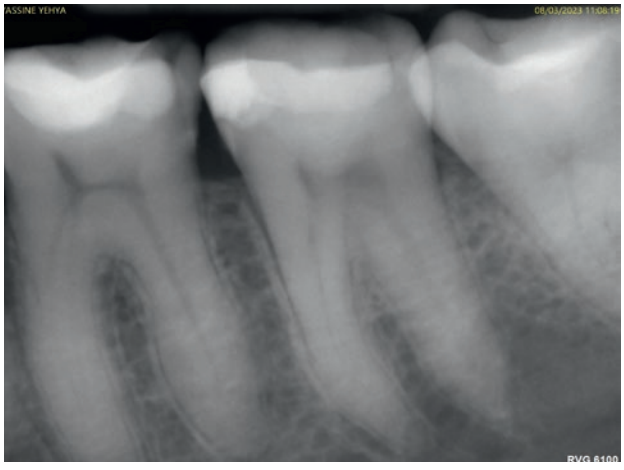


Fig. 10 - Biodentine™ recall at 12 yrs.

Case report 2

Clinical signs and symptoms and diagnosis

Case 2 shows a second lower molar with deep caries. No pain was reported by the patient, and the vitality of the tooth was confirmed before anaesthesia infiltration.

Procedure and treatment

A rubber dam was fixed on the tooth using a Softclamp (Kerr, USA) to ensure a clean field and prevent any saliva and bacterial contamination during caries excavation. A round carbide bur on a normal contra angle (1:1) was used with a low speed and pressure to avoid overheating the pulpal tissues. Figure 1 shows the prepared cavity after caries removal as well as the pulp that can be seen by transparency.

Using the Bio-Bulk Fill approach, a base of Biodentine™ XP 200 ***(Fig. 2)*** was applied in the cavity and allowed to set for 10 to 12 minutes ***(Fig. 3)***. A self-etch adhesive system was then placed, according to manufacturer instructions using a micro brush, on the cavity walls as well as the Biodentine™ XP ***(Fig. 4)***. The adhesive layer was then polymerised for 20 seconds using a LED curing device and the occlusal part of the cavity was restored using a thin layer of flowable light-cured composite, followed by a microhybrid composite Restofill A2 (Septodont, Saint-Maur-des-Fossés, France) ***(Fig. 5).*** After final polymerisation, the restoration was finished and polished using fine diamond burs and abrasive points.

Fig. 01 - Cavity preparation.

Fig. 02 - Biodentine™ XP placement.

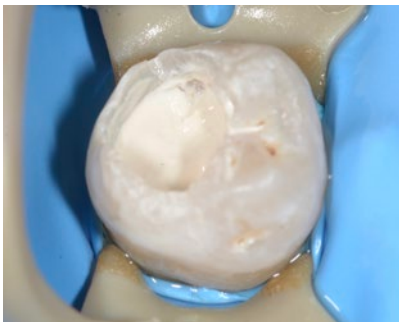


Fig. 03 - Initial setting time.

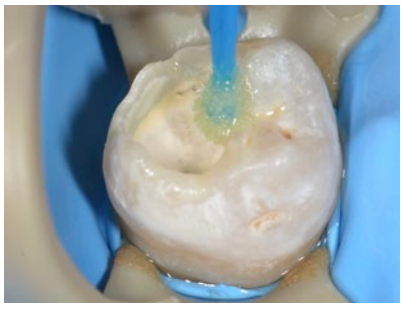


Fig. 04 - Adhesive (SE) placement.

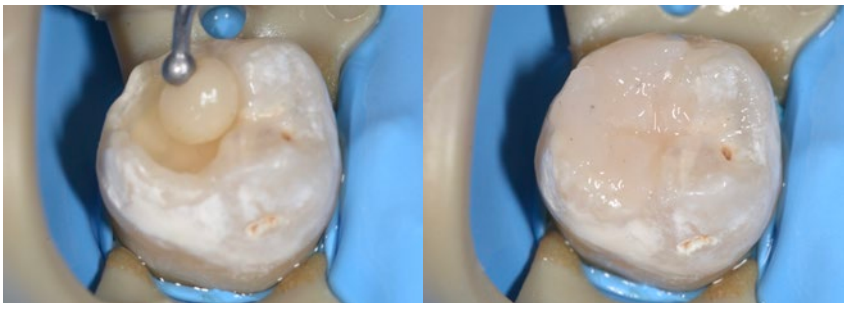


Fig. 05 - Flowable and Composite Restofill A2

Discussion

Biodentine™ has several indications in restorative dentistry and endodontics. The following clinical cases described the Bio-Bulk Fill procedure step by step. The Bio-Bulk Fill approach using calcium trisilicate is indicated in cases of deep posterior cavities for direct and indirect pulp capping in order to preserve pulp vitality. Careful case selection must be applied in order to check the absence of periapical lesions and ensure pulp vitality. Procedural decisions for the amount of pulp tissue retention or removal should be based on operator assessments, clinical judgement, and patient general health status.

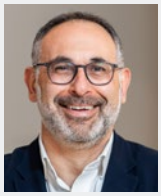
Conclusion

After placing Biodentine™ or Biodentine™ XP, the dentist has the options of completing the case in one session using a self-etch adhesive system, or in two sessions using a self- or total-etch adhesive system.

Biodentine™ XP, through its innovative pre-dosed capsules and mixing and delivery system, solved all the previous problems related to mixing uniformity and cavity application.

References

1. T. Komabayashi, Q. Zhu, R. Eberhart, Y. Imai. Current status of direct pulp-capping materials for permanent teeth. *Dental Materials Journal*. 2016;No35(1):1-12.
2. L. Bjørndal, S. Simon, P.L. Tomson, H.F. Duncan. Management of deep caries and the exposed pulp. *International Journal of Endodontics*. 2019;No52(7):949-973.
3. S. Cushley, H.F. Duncan, et al. Efficacy of direct pulp capping for management of cariously exposed pulps in permanent teeth: a systematic review and meta-analysis. *International Journal of Endodontics*. 2021;No54(4):556-571.
4. N. Parinyaprom, et al. Outcome of direct pulp capping by using ProRoot MTA or Biodentine in permanent teeth with carious pulp exposure in 6-18 years old patients: a randomized controlled trial. *Journal of Endodontics*. 2018;No44(3):341-348.
5. S. Kaul, et al. Comparative analysis of Biodentine™, Ca(OH)2, and 2% chlorhexidine with resin modified glass ionomer cement as indirect pulp capping materials in young permanent molars. *Journal of Contemporary Dental Practice*. 2021;No22(5):511-516.
6. N. Taha, S. AbdelKhader. Full pulpotomy with Biodentine™ in symptomatic young permanent teeth with carious exposure. *Journal of Endodontics*. 2018;No44(6):932-937.
7. J. Sabbagh, R.J. McConnell, M.C. McConnell. Posterior composites: Update on cavities and filling techniques. *Journal of Dentistry*. 2017;No57(2):86-90.



Author:

Joseph Sabbagh (DDS, MSc, PhD, FICD, HDR)

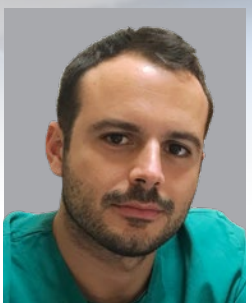
He graduated from Saint-Joseph university in Beirut. In 2004, he obtained his PhD in biomaterials from the catholic university of Louvain (UCL), Belgium. In 2000 he obtained a master in operative dentistry (restorative dentistry and endodontics) from the UCL. In parallel, he obtained two certificates of advanced studies in biomaterials and operative dentistry from the university of Paris-VII, France, in 1997 and 1998. In 2020 he obtained his HDR degree (Higher Degree of Research) from the Lebanese University, Beirut.

Currently, he is Professor, and former head of department and director of master program of restorative dentistry and Endodontics in the Lebanese university and the director of several research projects.

His private practice is limited to aesthetic dentistry and endodontics in Belgium and Beirut.

He has published more than 25 papers in international peer-reviewed dental journals and has lectured locally and internationally. He has edited and published a book by Springer entitled ¨Bulk Fill Resin composites in dentistry¨. He is a member of: the Academy of Operative Dentistry USA, the editorial board of Reality -Journal, USA, the International Association of Dental Research, and fellow of the International College of Dentists.

Indirect Pulp Capping: Bio-Bulk Fill Technique and Bulk&Go



Dr. Vincenzo Tosco

How long have you been using Biodentine™?

In my clinical practice, I have employed Biodentine™ for an extended period of six to seven years. With the introduction of Biodentine™ XP to the market, I switched to using this new product this year.

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

This technique enables clinicians to simplify direct posterior restorations, including both direct and indirect pulp capping, through the utilisation of a bioactive material such as Biodentine™ XP, as a dentine substitute. Indeed, the placement of a protective barrier over exposed or unexposed pulp induces the formation of a dentinal bridge and maintains its vitality and function. The combination of Biodentine™ XP and a resin-based composite for cavity filling ensures a safe outcome, preserving pulp vitality within a single visit.

When/in which cases do you use the Bio-Bulk Fill procedure?

I use it mainly in very deep cavities as a protective base, or for vital pulp therapy, both for indirect and direct pulp capping.

Summary

Introduction

This clinical case demonstrates the basic concepts of the Bio-Bulk Fill technique for indirect pulp protection, using Biodentine™ XP material as a dentine replacement, to perform the restoration of a deep caries lesion.

Federica, aged 37 years old, presented with mild sensitivity in her lower left molars. Clinical examination revealed a carious lesion on the first molar and an old filtered composite restoration without occlusal morphology. The tooth was positive on vitality testing and negative on percussion testing. Radiographic examination revealed no periodontal lesions.

Methods

The two cavities were prepared with high- and low-speed burs and a vanadium excavator. The indirect pulp capping was then performed on the second molar using Biodentine™ XP, filling the cavity up to 1.5mm from the occlusal margin. After allowing the material to harden for 15 minutes, the class II cavity was transformed into a class I cavity, and the adhesive procedures were performed. Next, a body shade composite was applied with the Essential Lines modelling technique to complete the direct restoration. Finally, the first molar restoration was performed using the Bulk&Go procedure combined with Essential Lines technique.

Discussion

Biodentine™ is a well-studied tricalcium silicate-based material that has demonstrated biocompatibility and bioactivity *in vitro* and *in vivo*. Pre-clinical investigations have revealed its mechanisms of interaction with dental hard tissues. Biodentine™ is shown to create a protective seal that prevents bacterial infiltration, thereby safeguarding the dental pulp. It achieves this through micro-mechanical retention by infiltrating dentinal tubules and by inducing tertiary dentine synthesis, which enhances pulp protection. Biodentine™ also reduces the expression and function of pain receptors, leading to the absence of postoperative pain and hypersensitivity. Additionally, when applied to odontoblastic cells, it decreases pro-inflammatory secretion, thereby reducing inflammation. These findings highlight the beneficial effects of Biodentine™ on dental hard and soft tissues, emphasising its potential for use in dental procedures.

Conclusion

The scientific community, supported by in vitro and in vivo clinical studies/reports, demonstrates that Biodentine™ is biocompatible, has strong mechanical properties, and can be safely applied in restorative dentistry. In addition, Biodentine™ requires no surface conditioning treatment and can be cut and reshaped like natural dentine. Because of its characteristics, it can be used as a bulk substitute for permanent dentine to replace the entire damaged or lost dentine, thus as indirect pulpal protection and not just as a direct pulp capping material. The surface of Biodentine™ can be bonded like natural dentine with various adhesives before the final application of composite resins.

Introduction

Nowadays, bulk-fill composites (BFCs) are among the resin-based materials most widely used for the restoration of posterior teeth. They can be placed and cured in increments of up to 4–5mm in thickness, eliminating the need for layering, shortening the clinical procedure, and simplifying handling. Furthermore, the introduction of bioceramic materials with high-performance properties as a replacement for dentine makes their application possible for the bulk-filling of deep cavities. This clinical case presents two direct restorations in the posterior

sector, one based on the Bulk&Go technique proposed by Style Italiano, and a second based on the Bio-Bulk Fill technique.

The Bulk&Go technique takes full advantage of the favourable chemical–physical characteristics of the high-viscosity BFCs to allow for a one-step procedure. Therefore, providing the cavity that does not exceed a depth of 4mm, its restoration can be performed in a single mass application.

The Bio-Bulk Fill technique is a two-step procedure based on the positioning of a first layer of bioceramic material, which acts as a dentine substitute, instead of BFC. The second cover layer consists of an enamel-like composite, like a Body Shade composite, with low translucency.

Fig. 01 - Initial situation.

Fig. 02 - Isolation.

Fig. 03 - Cavites preparation.

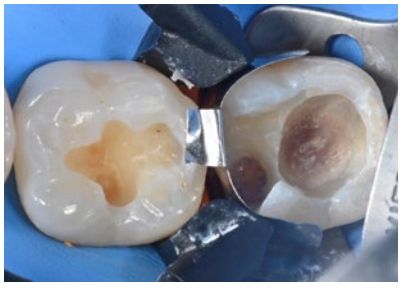


Fig. 04 - Matrix, wedge and ring placement on the second molar.

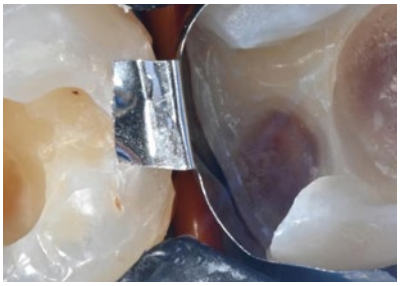


Fig. 05 - Verification of a proper contact point.

Case report

Clinical signs and symptoms

The young patient reported mild sensitivity in her left lower molars. Clinical examination revealed a carious lesion on the first molar and an old filtered composite restoration without occlusal morphology. The tooth was positive on vitality testing and negative on percussion testing. Radiographic examination revealed no periodontal lesions.

Diagnosis

Dental caries was present in both molars, with a carious lesion on the first molar and secondary lesions on the second molar.

Procedure and treatement

A rubber dam was placed to isolate the two molars to be treated ***(Fig. 02)***. With the cavities open, the carious lesions were first cleaned with the aid of high-speed burs, and then with manual instruments such as vanadium excavators. When all the infected dentine had been removed, a class I on first molar and a class II on the second one were obtained ***(Fig. 03)***. For the second molar, a sectional metal matrix was placed with wedge and ring to transform class II in class I ***(Fig. 04)***.

The closure of the matrix on the preparation margin of the cavity was checked and a proper contact point verified ***(Fig. 05)***.

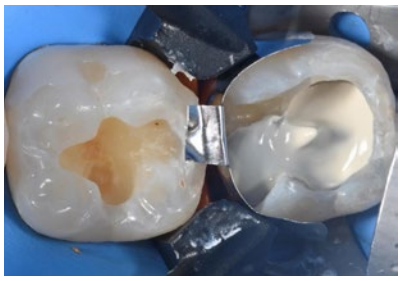


Fig. 06 - Biodentine™ XP placement.

Fig. 07 - Enamel margin of the cavity preparation.

Fig. 08 - Selective-etch on enamel.

Fig. 09 - Restoring the mesial wall of the second molar.

Fig. 10 - Essential lines technique.

Fig. 11 - Drawing the lines on the first and the second molars.

After that, the Biodentine™ XP biomaterial was applied inside the cavity in a single mass up to 1.5 mm from the occlusal surface, thus leaving space for the final layer of composite enamel.

Once applied, the material was left to harden for 15 minutes before proceeding with the adhesion procedure *(Fig. 06)*. The enamel margin of the cavity preparation was kept free in order to build the mesial wall with the composite, transforming class II into class I *(Fig. 07)*. Subsequently, the enamel was selectively etched for 20 seconds *(Fig. 08)*. The mesial wall of second molar was built, making it possible to restore the two class I cavities *(Fig. 09)*.

The Bulk&Go technique was used in the first molar, while in the second molar, the last layer of enamel shade composite was placed using a Body Shade composite to complete the restoration. The Essential Lines technique was applied for modelling *(Fig. 10)*. After filling the cavity and condensing the composite, the essential lines were drawn to reproduce the occlusal anatomy of each posterior tooth *(Fig. 11)*. The two restorations were then finished and polished *(Fig. 12)*.

Fig. 12 - Final situation.

The control x-ray shows the different radiopacities of the BFC and Biodentine™ XP. Furthermore, the entire cavity was filled and sealed without the presence of gaps or voids within the restorations.

Follow up

At nine months, no radiographic signs of periodontal lesions were evident, and no symptoms were reported by the patient *(Fig. 13)*.

Fig. 13 - 9 months follow-up.

Fig. 14 - Before and after.

Discussion

Biodentine™ has been applied as a bulk restorative material in deep dentine cavities to replace dentine. Biodentine™ is easy to handle, showing good marginal adaptation. When covered with resin-based composite, it is a well-tolerated permanent dentine substitute. Additionally, Biodentine™ can be cut and shaped like the natural dentine. Furthermore, in this case, the patient reported absence of post-operative pain and post-operative sensitivity.

This may be due to at least two factors:

1) The infiltration of Biodentine™ into the dentine tubules. The precipitation of crystals within the tubules decreases dentine tubule permeability and fluid movement, which may decrease post-operative sensitivity.

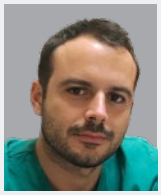
2) The reduction of odontoblast pain receptor expression and function and the reduction of the secretion of pro-inflammatory cytokines.

Conclusion

Biodentine™ has multiple applications. Considered a dentine substitute due to its similar physical mechanical characteristics, it can be used to fill the cavity up to 1.5mm from the occlusal surface in bulk mode, following the Bio-Bulk Fill technique. The combination of Biodentine™ for filling the cavity and the Essential Lines technique for modelling the occlusal surface simplifies and saves time in direct posterior restoration.

References

1. About I. Biodentine: from biochemical and bioactive properties to clinical applications. Giornale Italiano di Endodonzia, 2016, Volume 30, Issue 2, Pages 81-88, https://doi.org/10.1016/j.gien.2016.09.002.
2. Falakaloğlu S, Yeniçeri Özata M, Plotino G. Microshear bond strength of different calcium silicate materials to bulk-fill composite. PeerJ. 2023 Mar 29;11:e15183. doi: 10.7717/peerj.15183. PMID:37013141; PMCID: PMC10066686.
3. Tosco V, Vitiello F, Furlani M, Gatto ML, Monterubbianesi R, Giuliani A, Orsini G, Putignano A. Microleakage Analysis of Different Bulk-Filling Techniques for Class II Restorations: μ-CT, SEM and EDS Evaluations. Materials (Basel). 2020 Dec 23;14(1):31. doi: 10.3390/ma14010031. PMID: 33374708; PMCID: PMC7793523.
4. Chiodera G, Orsini G, Tosco V, Monterubbianesi R, Manauta J, Devoto W, Putignano A. Essential Lines: a simplified filling and modeling technique for direct posterior composite restorations. Int J Esthet Dent. 2021 May. 10;16(2):168-184. PMID: 33969973.



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Graduated in Dentistry at the Universidad Alfonso X el Sabio, Madrid, Spain. PhD in Biomedical Sciences at the Università Politecnica delle Marche, Ancona, Italy. Currently, research fellow at the same University under the supervision of Professors Angelo Putignano and Giovanna Orsini.

My main activities concern Endodontics, Restorative Dentistry, and Aesthetics. After graduating, I had the opportunity to build on current scientific research with the goal of creating new procedures specifically designed to improve health outcomes. This translational research allowed me to apply simplified techniques and learn about the characteristics of the different materials. During lectures and workshops, I'm pleased to show the results of research work to provide predictable, repeatable, and quality results to improve all possible therapies for our patients.

Biodentine™ XP

The unique

Pulp therapeutic & Restorative material

- One-step cavity filling [1]
- Adapted to your practice, in 1 or 2 sessions [1]
- Final enamel restoration to be performed within 6 months [2]

1. Internal Septodont's document provided from Biodentine Expert Board - 11th September 2023.
2. Koubi et al. Clinical evaluation of the performance and safety of a new dentine substitute, Biodentine™, in the restoration of posterior teeth - a prospective study. Clin Oral Investig. 2013.

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The Biodentine™ Bio-Bulk Fill technique for moderate pulpitis after restoration

Dr. Sascha Herbst

Dr Sascha Herbst, Dr Chantal Sophie Herbst

How long have you been using Biodentine™?

I have been using hydraulic calcium silicate cements (HCSC) on a daily basis since 2016 to manage endodontic complications and obturate open apices. In 2017, as I focused on dental traumatology, I became aware of the risk of discolouration associated with conventional HCSC, particularly in anterior teeth undergoing pulpotomy. This prompted my introduction to Biodentine™, specifically for use on traumatically exposed pulps.

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

Over time, I discovered that the properties of Biodentine™ increasingly aligned with my clinical needs: faster setting time, less discolouration, and predictable consistency due to standardised mixing procedures. Consequently, I have replaced my previous HCSC with Biodentine™ for all indications.

When/in which cases do you use the Bio-Bulk Fill procedure?

Before Biodentine™ XP, I limited the use of the Bio-Bulk Fill procedure to emergency cases. Since the introduction of Biodentine™ XP, the Bio-Bulk Fill procedure has become the standard in my practice. Now, with Biodentine™ XP and its convenient cartridge and orientable nozzle, the Bio-Bulk Fill procedure has become more time-efficient, making it my standard approach for vital pulp therapies (indirect pulp capping and pulpotomy) and large perforation repairs. For the obturation of open apices, I prefer the application of Biodentine™ XP in one session.

Summary

Introduction
Unscheduled cases of pain with pulp involvement can complicate time management in the dental practice.

Methods
The application of Biodentine™ in the Bio-Bulk Fill technique after pulpotomy in a recently restored tooth is shown.

Discussion
The use of Biodentine™ in the Bio-Bulk Fill technique with an interval of two weeks between appointments can increase the adhesive bond strength to the composite due to the increased degree of crystallization.

Conclusion
The Bio-Bulk Fill procedure can be a time-saving method of maintaining vitality in pain patients who have not been scheduled.

Introduction

The treatment of acute pain symptoms is a frequent challenge in everyday practice. Adequate time management is essential here, especially for unplanned visits.

For severely symptomatic pulpitis, vital extirpation with intracanal dressing and temporary restoration is a proven and time-efficient treatment method in daily practice.[1] The disadvantages here are that a complete root canal treatment must be carried out in the second session, and the long-term prognosis for tooth preservation is reduced due to the loss of vitality.[2]

A possible alternative to conventional root canal treatment in teeth with symptomatic pulpitis is the preservation of the pulp by pulpotomy if indicated.[3] However, this procedure can also be time-consuming, as setting times of the capping material must be taken into account and a definitive direct restoration is then recommended.[3]

Due to the continuous development of hydraulic calcium silicate cements, it is possible to use them simultaneously as a therapeutic capping material and as a temporary filling.[4] However, Biodentine™ is currently the only hydraulic calcium silicate cement that is approved for use as a temporary filling for enamel replacement for up to six months.[4] The use of Biodentine™ in this form is referred to as the Bio-Bulk Fill technique.

Bio-Bulk Fill can help to permanently cap teeth after a pulpotomy as well as temporarily seal them in a time-saving manner; a planned definitive restoration can then be carried out in a second step.

Case report

Clinical findings

A 71-year-old female patient with a generally unremarkable medical history had a full crown placed on tooth 17 in July 2021. A few months later, she presented to the Department of Oral Diagnostics, Digital Dentistry and Health Services Research at Charité Centre 03 with pulpal complaints. The patient stated that the tooth had been reacting more strongly to cold stimuli since the crown had been inserted and that the pain had recently begun to occur independently of stimuli. Clinically, the tooth showed increased sensitivity in the cold test and slight percussion sensitivity. The radiograph showed a sufficient crown margin closure and a continuous, physiological periodontal gap; the apical conditions were also unremarkable ***(Fig. 1)***.

Diagnosis

After evaluation of the clinical and radiological findings, a suspected diagnosis of moderate pulpitis was made.

Clinical procedure

The patient was informed about the possibility of a complete pulpotomy as an alternative to conventional root canal treatment. For personal reasons, the patient only appeared six months later in May 2022 as an acute case without an appointment and decided in favour of an attempt to preserve vitality through complete pulpotomy. Under local infiltration anaesthesia (Ultracain DS 1/200,000, Septodont, Saint-Maur-des-Fossés, France) and dental dam, a complete pulpotomy was performed with a sterile diamond ***(Fig. 2)***. After five minutes of haemostasis with a sterile foam pellet and 3% NaOCl ***(Fig. 3a, b)***, the entire access cavity was temporarily restored with Biodentine™ using the Bio Bulk-Fill technique ***(Fig. 4)***. The final coronal filling was performed two weeks later and the patient was symptom-free ***(Fig. 5)***. Approximately 4 mm of the Biodentine™ filling was removed under dental dam (2-3 mm residual thickness of the Biodentine™ should be ensured) ***(Fig. 6)*** and the tooth was then permanently restored with Scotchbond Universal Plus and Filtek Supreme (both 3M, Saint Paul, USA) in A3.5 ***(Fig. 7)***. Finally, a radiological control was carried out ***(Fig. 8)***.

Follow up

One year later, in May 2023, the patient continued to present for follow-up without any symptoms. The follow-up radiograph showed no pathologic signs. ***(Fig. 9)***.

Fig. 01

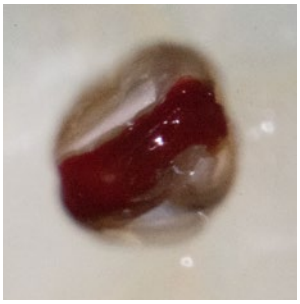

Fig. 02

Fig. 3a

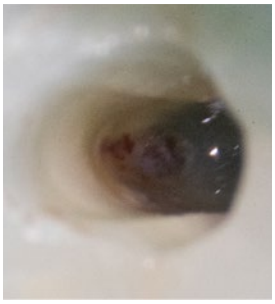

Fig. 3b

Fig. 4

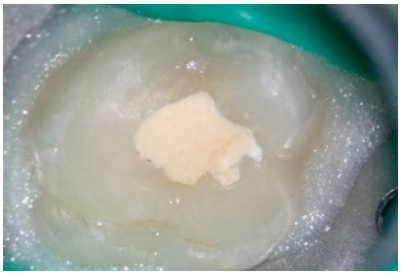

Fig. 5

Fig. 6

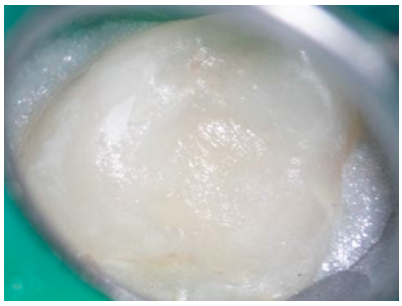

Fig. 7

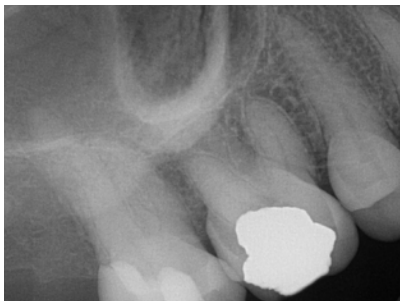

Fig. 8

Fig. 9

Discussion

Full pulpotomy for moderate pulpitis in combination with a deep restoration, which was performed seven months after crown placement, proved to be successful in the present case. The patient was symptom-free both a few hours after treatment and one year later, and the periapical conditions showed no radiological abnormalities.

The use of Biodentine™ in the Bio-Bulk Fill technique enabled a time-efficient initial treatment, which could be continued as planned in a second session.

Based on laboratory studies, it can be concluded that the use of Biodentine™ as a temporary filling for several days (up to weeks) does not impair the adhesive bond to the subsequent direct composite restoration.[5] There are also indications that the adhesive bond between composite and Biodentine™ is increased if fourteen days are left between the application of Biodentine™ and the direct restoration with composite.[6,7] One possible reason for this is the almost-complete crystallization of the calcium silicate hydrate gel over two weeks, which improves the biophysical properties of the material.

Conclusion

The present case has shown that preserving the vitality of teeth with Biodentine™ using the Bio-Bulk Fill technique in symptomatic pulpitis can be a time-efficient - and at the same time patient-orientated - solution in practice, even in acute situations.

References

1. Alhilou AM, Al-Moraissi EA, Bakhsh A, Christidis N, Näsman P. Pain after emergency treatments of symptomatic irreversible pulpitis and symptomatic apical periodontitis in the permanent dentition: a systematic review of randomised clinical trials. Front Oral Health. 2023;4:1147884.
2. Caplan DJ, Cai J, Yin G, White BA. Root Canal Filled Versus Non-Root Canal Filled Teeth: A Retrospective Comparison of Survival Times. Journal of Public Health Dentistry. 2005;65(2):90-6.
3. By ES of E (ESE) developed, Duncan HF, Galler KM, Tomson PL, Simon S, El-Karim I, et al. European Society of Endodontology position statement: Management of deep caries and the exposed pulp. International Endodontic Journal. 2019;52(7):923-34.
4. Koubi G, Colon P, Franquin JC, Hartmann A, Richard G, Faure MO, et al. Clinical evaluation of the performance and safety of a new dentine substitute, Biodentine, in the restoration of posterior teeth - a prospective study. Clin Oral Investig. 2013 Jan;17(1):243-9.
5. Arandi NZ, Thabet M. Minimal Intervention in Dentistry: A Literature Review on Biodentine as a Bioactive Pulp Capping Material. Biomed Res Int. 2021;2021:5569313.
6. Mustafa RM, Al-Nasrawi SJ, Aljdaimi AI. The Effect of Biodentine Maturation Time on Resin Bond Strength When Aged in Artificial Saliva. Scribante A, editor. International Journal of Dentistry. 2020 Oct 22;2020:1-7.
7. Hashem D, Mannocci F, Patel S, Manoharan A, Brown JE, Watson TF, et al. Clinical and radiographic assessment of the efficacy of calcium silicate indirect pulp capping: a randomised controlled clinical trial. J Dent Res. 2015 Apr;94(4):562-8.

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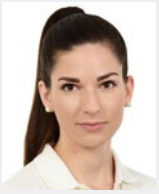

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2019 - 2023: Dentist in private practice

The Biodentine™ Bio-Bulk Fill technique for deep caries and moderate pulpitis

Dr. Sascha Herbst

Dr Sascha Herbst, Dr Chantal Sophie Herbst

How long have you been using Biodentine™?

In my clinical practice, I have employed Biodentine™ for an extended period of six to seven years. With the introduction of Biodentine™ XP to the market, I switched to using this new product this year.

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

This technique enables clinicians to simplify direct posterior restorations, including both direct and indirect pulp capping, through the utilisation of a bioactive material such as Biodentine™ XP, as a dentine substitute. Indeed, the placement of a protective barrier over exposed or unexposed pulp induces the formation of a dentinal bridge and maintains its vitality and function. The combination of Biodentine™ XP and a resin-based composite for cavity filling ensures a safe outcome, preserving pulp vitality within a single visit.

When/in which cases do you use the Bio-Bulk Fill procedure?

I use it mainly in very deep cavities as a protective base, or for vital pulp therapy, both for indirect and direct pulp capping.

Summary

Introduction
Treating deep carious lesions in a time-effective and sufficient manner can be challenging in everyday practice, especially in symptomatic pulpitis.

Methods
In the present case, a pulpotomy was performed in two stages due to an extensive cervical defect on tooth 47.

Discussion
The use of Biodentine™ in the Bio-Bulk Fill technique, combined with a two-step restoration, made it possible to meet the patient's need for shorter treatment sessions.

Conclusion
Bio-Bulk Fill can help to preserve the vitality of teeth and save time.

Introduction

The treatment of deep carious lesions is often complex and time-consuming in practice, especially in the case of acute complaints. Reconstructing cervical marginal areas at the subgingival to epicrestal level, with adequate dental dam placement, presents a challenge even for experienced practitioners.(1) It can help to divide the treatment over two appointments, especially if pulp involvement is expected.

Pulpotomy and indirect capping are methods of preserving vitality in order to avoid root canal treatment.(2) Subsequently, the teeth are typically restored with time-consuming composite restorations in the same session, resulting in extended treatment times.

The Biodentine™ Bio-Bulk Fill technique can initially seal cavities after pulpotomy or indirect pulp capping in a bacteria-proof and time-saving manner so that a planned, definitive restoration can be carried out in a second step.(3)

Case report

Clinical findings
A 23-year-old female patient presented to the Department of Oral Diagnostics, Digital Dentistry and Restorative Research at Charité Centre 03 for the first time in August 2021 with acute, throbbing pain in tooth 47. Clinically, the tooth exhibited an inadequate composite restoration along with a localised enamel fracture ***(Fig. 1)***, as well as increased sensitivity to cold. The preoperative radiograph showed a secondary caries that had extended into the pulp ***(Fig. 2)***.

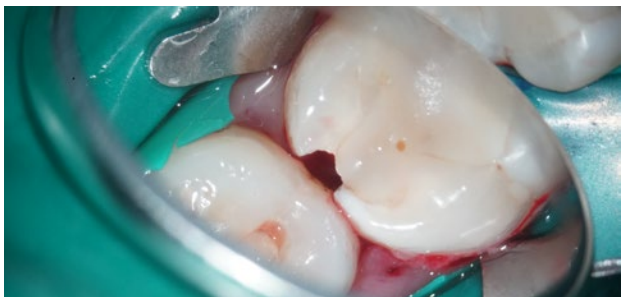

Fig. 1

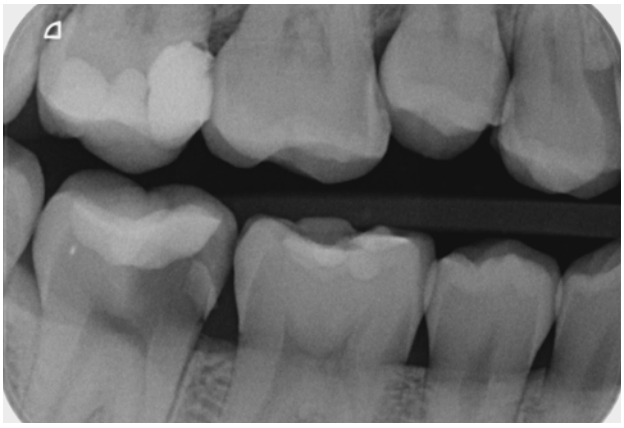

Fig. 2

Diagnosis

The clinical and radiological findings suggested moderate pulpitis.

Clinical procedure

Due to the extension of the carious lesion, a non-selective caries excavation with pulpotomy was planned. The old filling was removed under local anaesthesia and dental dam. After excavation, an epicrestal cavity floor was revealed ***(Fig. 3)***. At this point, the patient already showed limited compliance with regard to sufficient mouth opening time, which is why the treatment steps had to be prioritized. The goals for the first treatment session were defined intraoperatively:

1) Restoration of the epicrestal cavity margin.
2) Removal of the caries-exposed pulp and capping of the healthy pulp tissue.

The final restoration with composite was planned for the second session.

In the first step of the first session, the caries at the mesial cavity margin was removed non-selectively and a sectional matrix was adapted with Teflon. The mesial cavity margin was then elevated with composite (Filtek Supreme, 3M, Saint Paul, USA). Non-selective caries removal was then performed in the area of the pulp with opening of the pulp chamber. A complete pulpotomy was performed using sterile diamond and haemostasis was achieved within five minutes using a foam pellet and 3% NaOCl ***(Fig. 4)***. In the final step, the pulp tissue was capped with Biodentine™ (Septodont, Saint-Maur-des-Fossés, France) using the Bio Bulk-Fill technique ***(Fig. 5)***.

In the second session two weeks later, the patient appeared recovered and symptom-free for the final composite restoration. The Biodentine™ was partially removed under rubber dam so that a remaining layer of 2-3 mm could be ensured ***(Fig. 7)***. The restoration was then restored with Scotchbond Universal SE and Filtek Supreme A2 ***(both 3M; Fig. 8)*** and a radiological control was carried out ***(Fig. 9)***.

Follow up

In April 2023, the patient appeared for a follow-up check of the pulpotomy at tooth 47 after 20 months. The patient was symptom-free and radiographic examination revealed physiological apical conditions ***(Fig. 10)***.

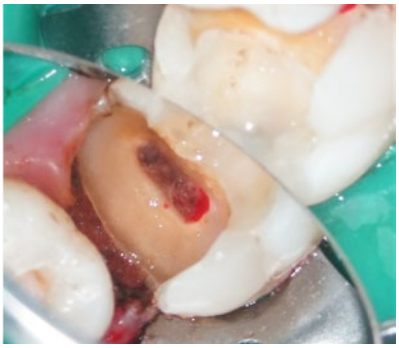

Fig. 3

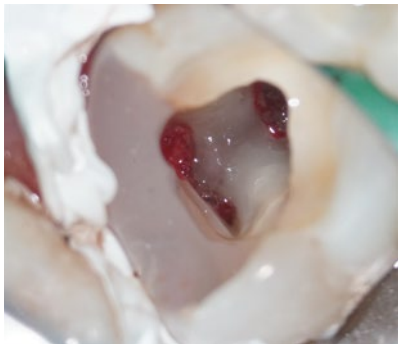

Fig. 4

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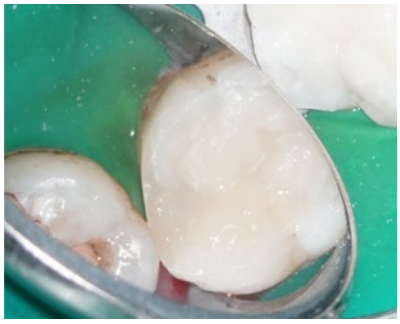

Fig. 8

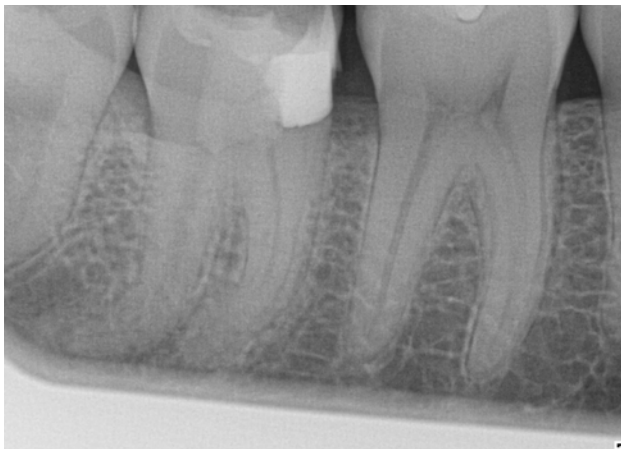

Fig. 9

Fig. 10

Discussion

Utilising Biodentine™ in the Bio-Bulk Fill technique eliminates the setting time and the necessity for the permanent restoration in a single session. This approach supports the effective implementation of vital pulp therapy in even sophisticated treatments. Such measures, once frequently relegated to root canal treatments, can now be efficiently managed.

In the area of pain treatment, the number of treatment steps that can be carried out may be limited by the patient's co-operation. The opportunity to streamline the treatment phase of pulp capping has enabled the intricate reconstruction of the cervical area to be conducted during the initial session. In this case, this led to an increase in patient comfort, as the treatment could be spread over two sessions and the pulp could be preserved.

Utilising Biodentine™ within the Bio-Bulk Fill technique, coupled with a two-step restoration process, facilitates an optimal alignment with the patient's pain management needs. This approach ensures that treatment quality remains uncompromised, even within time-constrained scenarios.

Conclusion

Pulpotomy and capping with Bio-Bulk Fill and subsequent restoration in a two-step procedure can be a good clinical solution for deep defects. This can lead to increased patient comfort.

References

1. Eggmann F, Ayub JM, Conejo J, Blatz MB. Deep margin elevation-Present status and future directions. J Esthet Restor Dent. 2023 Jan;35(1):26-47.
2. By ES of E (ESE) developed, Duncan HF, Galler KM, Tomson PL, Simon S, El-Karim I, et al. European Society of Endodontology position statement: Management of deep caries and the exposed pulp. International Endodontic Journal. 2019;52(7):923-34.
3. Koubi G, Colon P, Franquin JC, Hartmann A, Richard G, Faure MO, et al. Clinical evaluation of the performance and safety of a new dentine substitute, Biodentine, in the restoration of posterior teeth - a prospective study. Clin Oral Investig. 2013 Jan;17(1):243-9.

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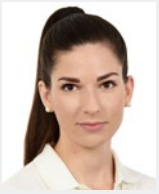

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