



THE HYBRID LAYER

The Biomimetic Guide to Cracked Teeth.

How to find, classify, and treat cracks in dentin using evidence-based biomimetic protocols.

Based on lectures on The Hybrid Layer by:

Dr Andras Forster · Dr Masoud Hassan Zadeh · Drs David & Davey Alleman



Inside this guide

Six sections on the diagnosis and treatment of cracked teeth, drawn from four expert lectures on The Hybrid Layer.

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Why cracks are one of the most common restorative challenges

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The biobase protocol overview and your learning pathway inside The Hybrid Layer.

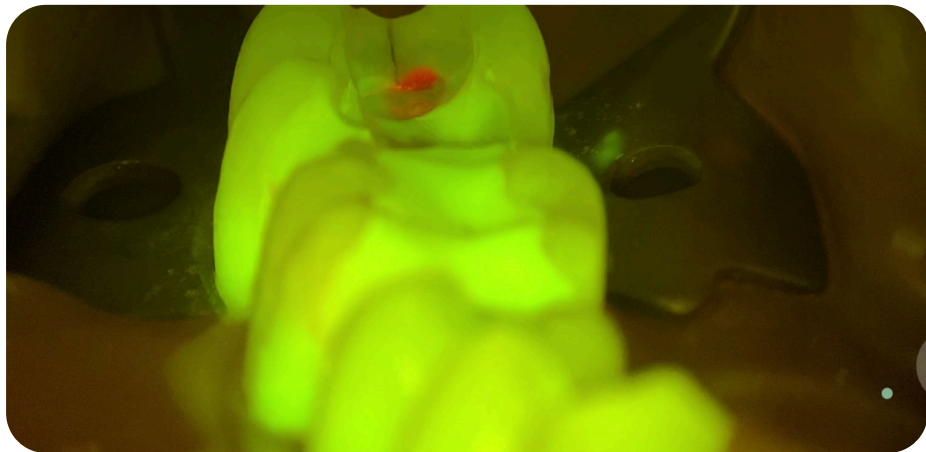


This guide includes links to video clips from our lectures. Look for the play icon for direct links to clinical footage and expert explanations.



SECTION 1

The Scale of the Problem



4.5% of patients present with cracked teeth, predominantly mandibular first and second molars in ages 45 to 54, according to a study by Ogundare et al. (2020). **Only 45% of cracked teeth are symptomatic**, Ozuna et al. (2021).

Previously restored teeth are **29 times** more likely to crack than virgin teeth (Ratcliff et al.). Cracks are a downstream consequence of the restorative cycle itself. A biomimetic approach and early intervention is therefore crucial.

Cracks do not often show on radiographs. Clinical diagnosis using magnification and a systematic protocol is the only reliable method.

“Cracks in dentin are the silent killers of dentistry.”

Dr Andras Forster





SECTION 2

Diagnosing Cracks

Six Diagnostic Methods

- 1 **Magnification.** Use minimum 5x loupes, or ideally a surgical microscope.
- 2 **Caries detecting dye.** Cracks may retain the dye, depending on the type of crack.
- 3 **Repeated drying.** Differences in optical properties can reveal information about the direction of the crack.
- 4 **Transillumination.** Use a curing light and orange filter.
- 5 **Sandblasting.** Aluminium oxide creates a uniform surface that reveals cracks.
- 6 **Adhesive primer.** Apply the primer and evaporate the solvent to help reveal the crack lines.

Crack Classification & Structural Analysis

CLASSIFY BY	CATEGORIES
Direction	Oblique / Vertical / Horizontal
Tissue	Enamel vs Dentin
Age	Old (discoloured/darker) vs Young (white)
Vitality	Vital vs Non-Vital

STRUCTURAL COMPROMISE: THE RED FLAGS

- Cavity isthmus width greater than 2mm
- Cusp thickness less than 3mm
- Occlusal cavity depth greater than 4mm
- Proximal box depth greater than 4mm
- Any crack into dentin



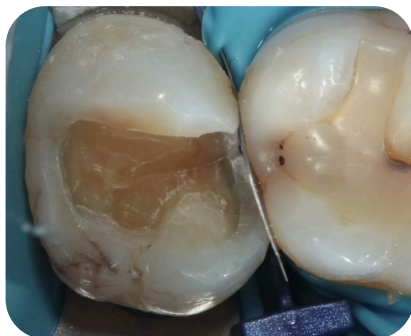
SECTION 3

Why Conventional Approaches Fall Short

Full crowns remove healthy tooth structure, including the BioRim, which is of utmost biomechanical importance and should be preserved where possible. If a traditional crown preparation is carried out, any remaining cracks can propagate further, even under the crown (Cohen et al.).

Cuspal coverage restorations (such as an overlay) improve survival rates (Opdam et al.), but any remaining cracks that have not been dissected can still serve as a bacterial pathway to the pulp, and can propagate.

Bonding over cracks treats the symptom, not the cause. The crack is still present and has the potential to propagate further beneath the restoration.



In 2019, Hybrid Layer lecturer Dr Andras Forster treated this cracked molar by attempting to bridge the crack without dissecting it. He bonded over the crack using EverX Posterior and a direct composite restoration.

Symptoms resolved initially, but three years later, the crack had propagated and the restoration failed.



Watch the clip

Dr Forster explains what happened in his 2019 case and what he does differently now. (2 minutes 12 seconds)

thehybridlayer.com/cracks-clip-1

An extract from our lecture "Cracked Teeth: Biomimetic Analysis, Diagnosis and Treatment" by Dr Andras Forster.



[WATCH THE FULL LECTURE](#)

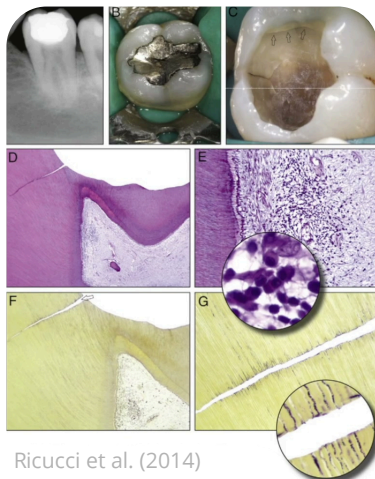


SECTION 4

The Case for Crack Dissection

Why are dentin cracks dangerous?

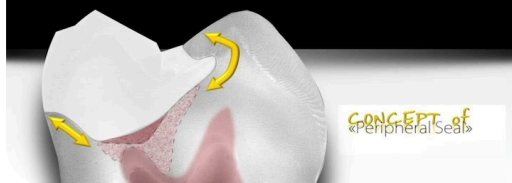
Bacterial colonisation. Cracks are highly prone to bacterial invasion as they act as an opening which, when connected to the oral environment, allows bacteria to penetrate. This can result in caries formation and can cause a pulpal reaction. Chen et al. (2023): "Cracks in dentin are invariably colonised by bacteria once exposed to oral fluids."



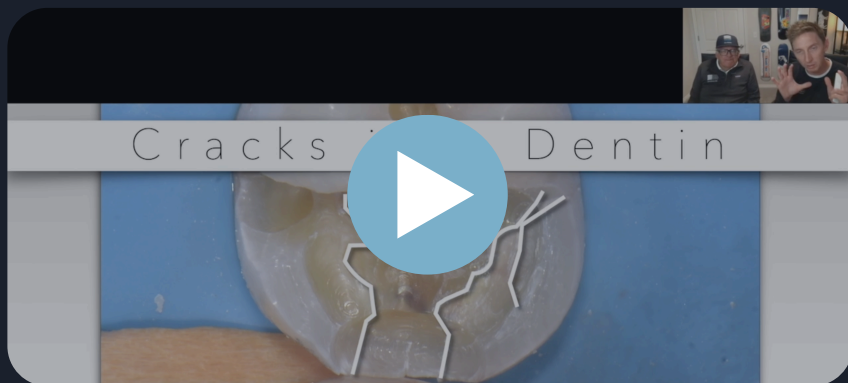
Ricucci et al. (2014)

Propagation. If a crack is not dissected fully, it has the potential to propagate further. If full crack dissection is not possible (e.g. if further dissection would result in pulp exposure) partial dissection will still reduce the lever arm of the crack, which means greater energy will be required for further propagation.

Remove Cracks Completely in the PSZ with Round Diamond



In structural engineering, cracks are physically removed from pipes, fuselages, and load-bearing structures to stop propagation and prevent re-initiation (Alleman). We can apply the same principles to teeth.



Watch the clip

Drs David & Davey Alleman explain the engineering rationale behind crack removal and the relevance of the peripheral seal zone.
(2 minutes 31 seconds)

thehybridlayer.com/cracks-clip-2

An extract from our lecture "The Six Lessons Approach to Biomimetic Restorative Dentistry" by Drs David & Davey Alleman.



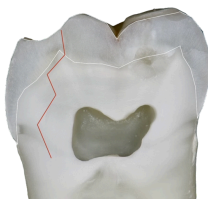
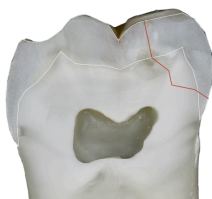
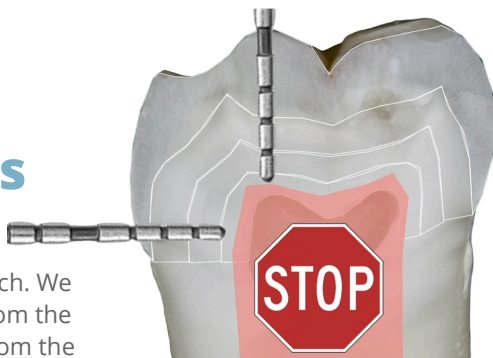
WATCH THE FULL LECTURE



SECTION 5

Three Scenarios, Three Approaches

The direction, depth, and proximity to the pulp determine the dissection approach. We generally dissect cracks **5mm** vertically from the occlusal surface, and **3mm** horizontally from the adjacent marginal ridge. We aim to remove cracks fully in the Peripheral Seal Zone, while halting dissection at the Central Stop Zone to preserve pulp vitality.



HORIZONTAL

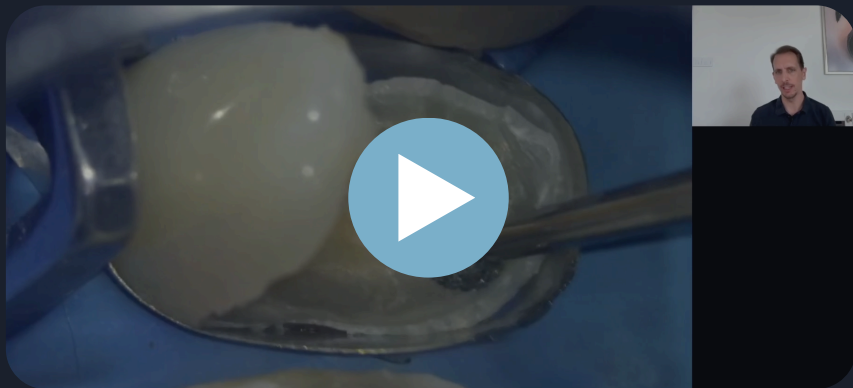
Horizontal cracks are generally more straightforward to treat than vertical cracks, as they tend to propagate in a way that is more favourable. The part of the tooth above the horizontal crack is no longer bonded to the tooth. It can move freely and will either break off or the crack will propagate. We aim to remove the portion of unbonded tooth above the crack while preserving pulp vitality.

VERTICAL

When dissecting vertical cracks, it is essential to make use of magnification and good lighting. You should consider using a surgical length diamond bur to dissect the crack. This allows improved access and the ability to measure as you work. It is important to be very familiar with the Central Stop Zone measurements in order to minimise the risk of pulpal exposure. Consider leaving a lip of enamel to make deep margin elevation more feasible.

VERTICAL (INTO PULP)

Vertical cracks into the pulp are the most difficult cracks to treat. These cracks have the poorest prognosis. We aim to dissect as much of the crack as possible, however we stop dissection at the point where further removal would result in exposure of the pulp. This requires intricate knowledge of Central Stop Zone measurements. By decreasing the length of the crack, we reduce the lever arm. This means part of the crack still remains, but greater force would be required to cause the crack to propagate. Bridge the remaining crack with Ribbond and short fibre composite.



Watch the clip

Dr Forster dissects a horizontal crack under the microscope, explaining each step as he works.
(3 minutes 7 seconds)

thehybridlayer.com/cracks-clip-3

An extract from our lecture "Cracked Teeth: Biomimetic Analysis, Diagnosis and Treatment" by Dr Andras Forster.



[WATCH THE FULL LECTURE](#)



SECTION 6

The Rebuild

Biobase Protocol Overview:

1. Immediate Dentin Sealing

Clearfil SE Protect on freshly cut dentin.

2. Resin Coating

Clearfil Majesty Flow, 0.5mm layer.

3. Ribbond fibre

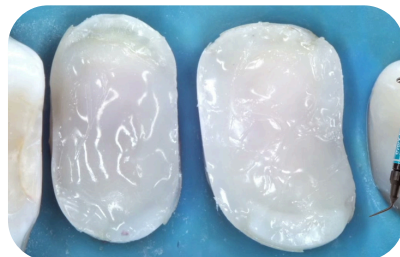
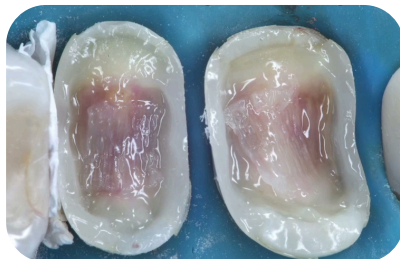
Pre-wetted polyethylene fibre. Improves fracture toughness and mitigates polymerisation stress.

4. EverX Flow

Short fibre reinforced composite. Fracture toughness similar to natural dentin.

5. Final restoration

Lithium disilicate overlay, full cusp coverage.



Learn more about advanced adhesive protocols and biobase formation:

1 HOUR 25 MINUTES

POST-ENDODONTIC RESTORATIONS
WITH MODERN
FIBRE-REINFORCED TECHNIQUES.

DR ANDRAS FORSTER

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2 HOURS 4 MINUTES

**ADHESIVE PROTOCOLS
FOR
POSTERIOR
RESTORATIONS.**

DR JORGE ARAVENA DIAZ

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Your cracked teeth learning pathway

Watch the full lecture series, including theory, case discussions, and clinical video demonstrations on The Hybrid Layer.

RECOMMENDED ORDER

-  **The Six Lessons Approach to Biomimetic Restorative Dentistry**
Dr David Alleman & Dr Davey Alleman
-  **Cracked Teeth: Biomimetic Analysis, Diagnosis and Treatment**
Dr Andras Forster
-  **Crack Dynamics in Dental Hard Tissues**
Dr Masoud Hassan Zadeh
-  **Cracks: Treatment Options and Prevalence**
Dr Masoud Hassan Zadeh

Plus 50+ hours of lectures from 34 world-renowned expert speakers. Learn predictable adhesive protocols, isolation techniques, fibre-reinforcement, general restorative techniques, anterior aesthetics, and more.

JOIN THE HYBRID LAYER

£345 GBP/year for full, on-demand access to **every** lecture.

The price for new members is increasing to £395 on 1st August 2026. Join now to lock in the lower rate. Your discounted rate will be honoured on all future renewals.



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10/1/2025 to 9/30/2027.
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