AquaCare

Air Abrasion & Polishing Unit

CASE STUDIES

Bonding | Clean | Decontaminate | Desensitise | Endo | Fissures | Hygiene | Implants
Lab | MI | Ortho | Pediatric | Perio | Restorative | Veneers | Whitening

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REAL BIOCONSERVATIVE SOLUTION

by

Thomas Taha

UK

Find out more:
www.drth.co.uk

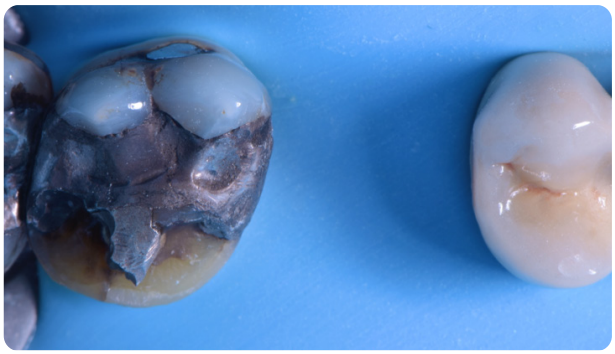
CASE 1:

This 54yr old patient wanted little to no tooth preparation done to cover up the developmental pits and discolorations.

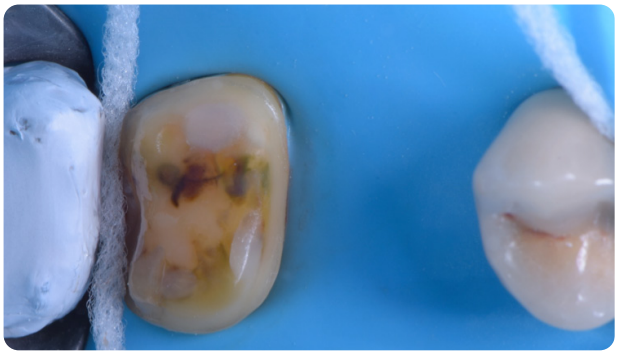
No drilling and with just the use of AquaCare 29µm Aluminium Oxide to remove staining and prepare surface for direct bonding.

Direct composite bonding used to restore and create natural and functional smile.

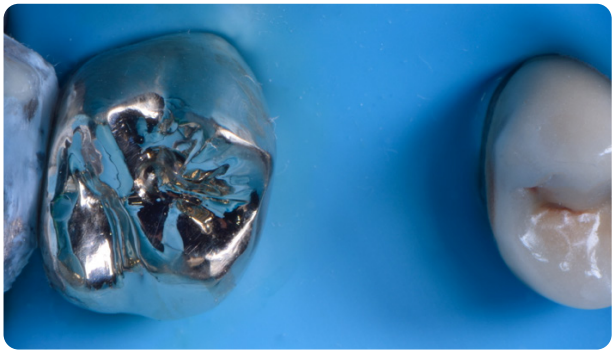
CASE 2:



Shows a large fractured amalgam restoration on a first molar.

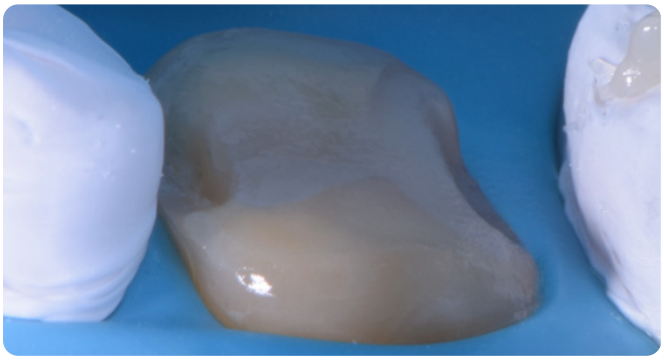


After tooth preparation with 29µm Aluminium Oxide and Sylc, and immediate dentine sealing.



Gold onlay placed to allow maximum long-term strength and function.

CASE 3:

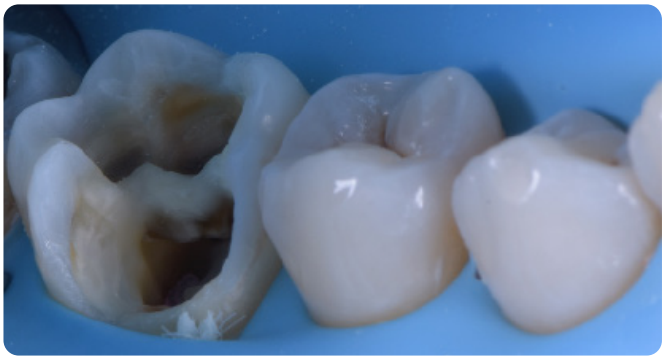


Onlay preparation on lower molar after deep margin elevation with 29µm Aluminum Oxide and Sylc.

Photograph after immediate cementation of lithium disilicate onlay.

Occlusal view showing biomimetic integration.

CASE 4:



Cavity preparation after abrasion with 53µm Aluminium Oxide on lower first molar, post root canal therapy.

Cavity restored provisionally with direct fiber reinforced composite.

CLEANING AND CONDITIONING

by

Jordi Manauta

Italy

Find out more:
styleitaliano.org

Cleaning and conditioning old composites

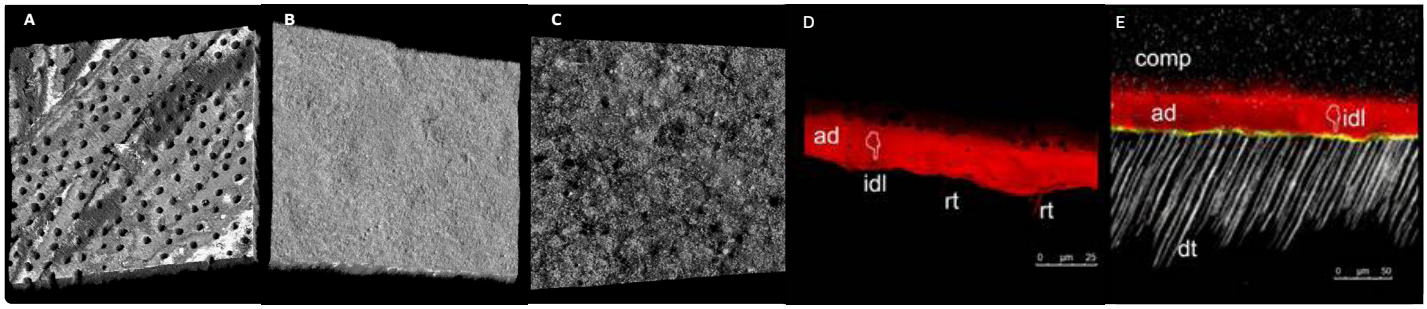
Cleaning and conditioning old composites with AquaCare 53µm Aluminium Oxide, and insertion of 2 UNICA matrices in the centrals. Matrices are held in this case by the contact point, but can be fixed either with wedges or with custom resin.

THERAPEUTIC EFFECTS

by

Salvatore Sauro

Spain



A: Dentine before air-abrasion. Note a smear layer-free surface with many patent dentinal tubules. (Confocal 3D topographic image)

B: Dentine treated using AquaCare and Sylc bioglass. Note the presence of a smear layer occluding the dentinal tubules and covering the entire dentine surface. (Confocal 3D topographic image)

C: Dentine treated using AquaCare with Sylc and conditioned with a universal adhesive in self-etching mode.

Note that smear layer partially covering the dentine surface; a Bioglass-rich smear layer is still available for conversion into apatite at the resin-dentine interface.

However, most of the dentinal tubules are totally occluded; the risk for post-operative sensitivity here is very low. (Confocal 3D topographic image)

D: Universal adhesive applied in self-etch mode onto a dentine surface treated with AquaCare and Sylc bioglass. Note the adhesive (ad) was able to form a sound interdiffusion layer (IDL: hybrid layer) but with very few resin tags (rt). In the confocal single-projection image (E) it is possible to observe a reflective material obliterating the dentinal tubules. It is most likely that the bioglass particles have penetrated the tubules several microns during the air-abrasion procedures.

CLEANING WITH SYLC

by

Griya Ridha Raharja

Indonesia

ORTHODONTIC RESIN REMOVAL WITH SYLC

by

Bhupinder Dawett

UK

ORTHODONTIC RESIN REMOVAL

'Air polishing with Sylc, a bioactive material, at low pressure setting to remove residual orthodontic resin as an alternative to using rotary instruments.'

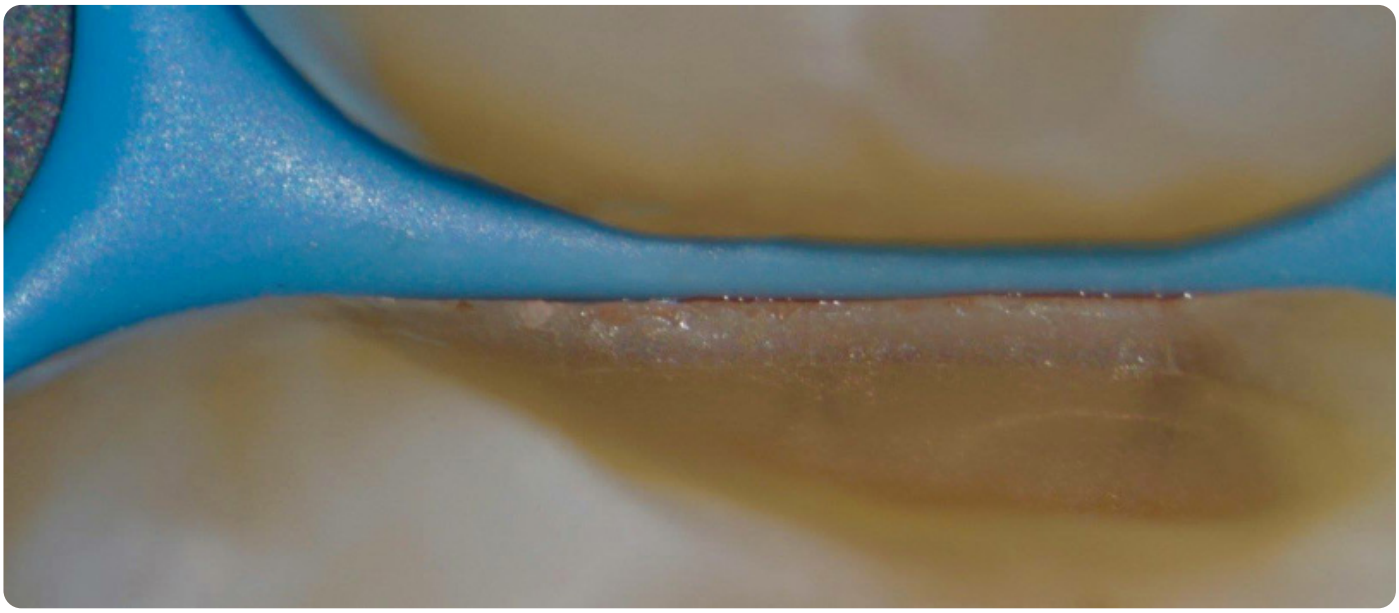
ALUMINIUM OXIDE AND SYLC

by

Thomas Taha

UK

Find out more:
www.drth.co.uk



"X 20 magnification of margin post 29µm Aluminium Oxide and Sylc."

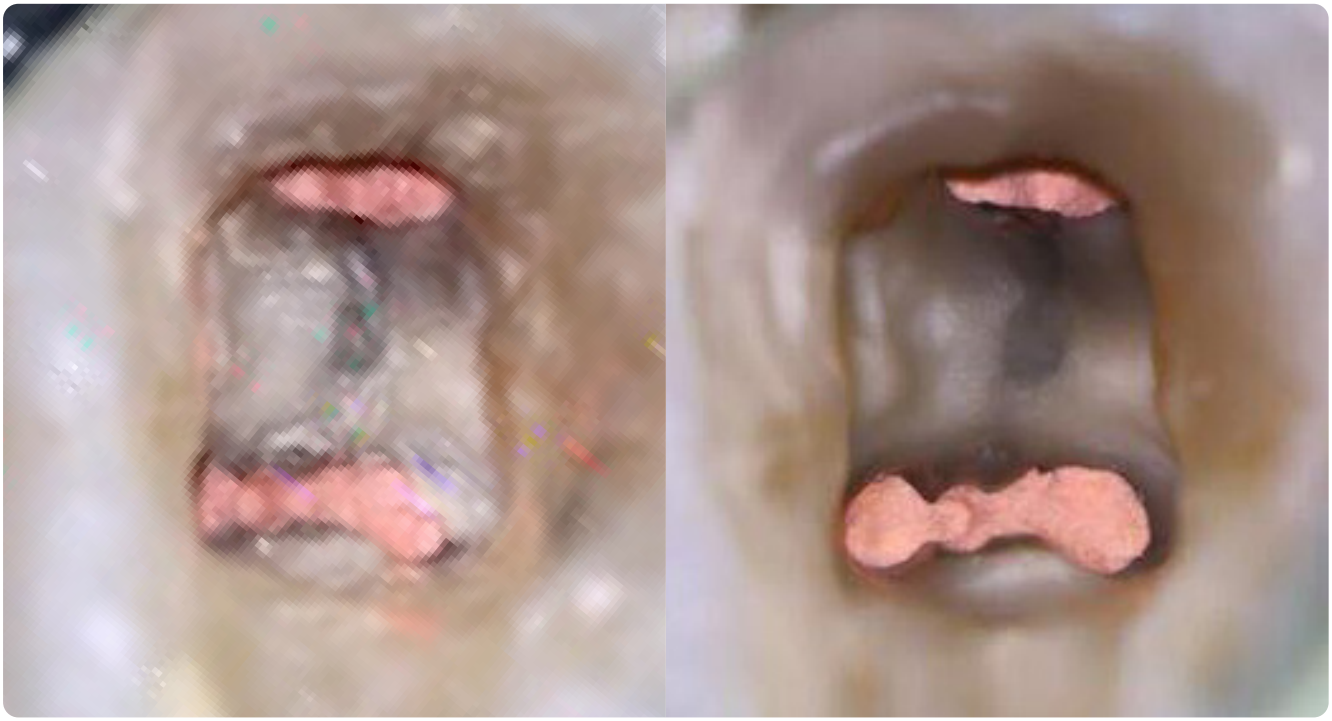
REMNANT REMOVAL

by

Freddy Belliard

Spain

ROOTS



REMNANT REMOVAL

`After the root canal therapy is completed, we end up having obturation cement all over the pulp chamber floor, isthmuses or other retentive areas.

Blasting it with sodium bicarbonate and a curtain of water allows me not only to remove all these remnants, but without creating a mess of powder all over my operatories.

This will allow for a cleaner environment in which adhesive dentistry can be carried out under ideal conditions.'

STAIN REMOVAL

by

Peet Van der Vyver

South Africa

STAIN REMOVAL

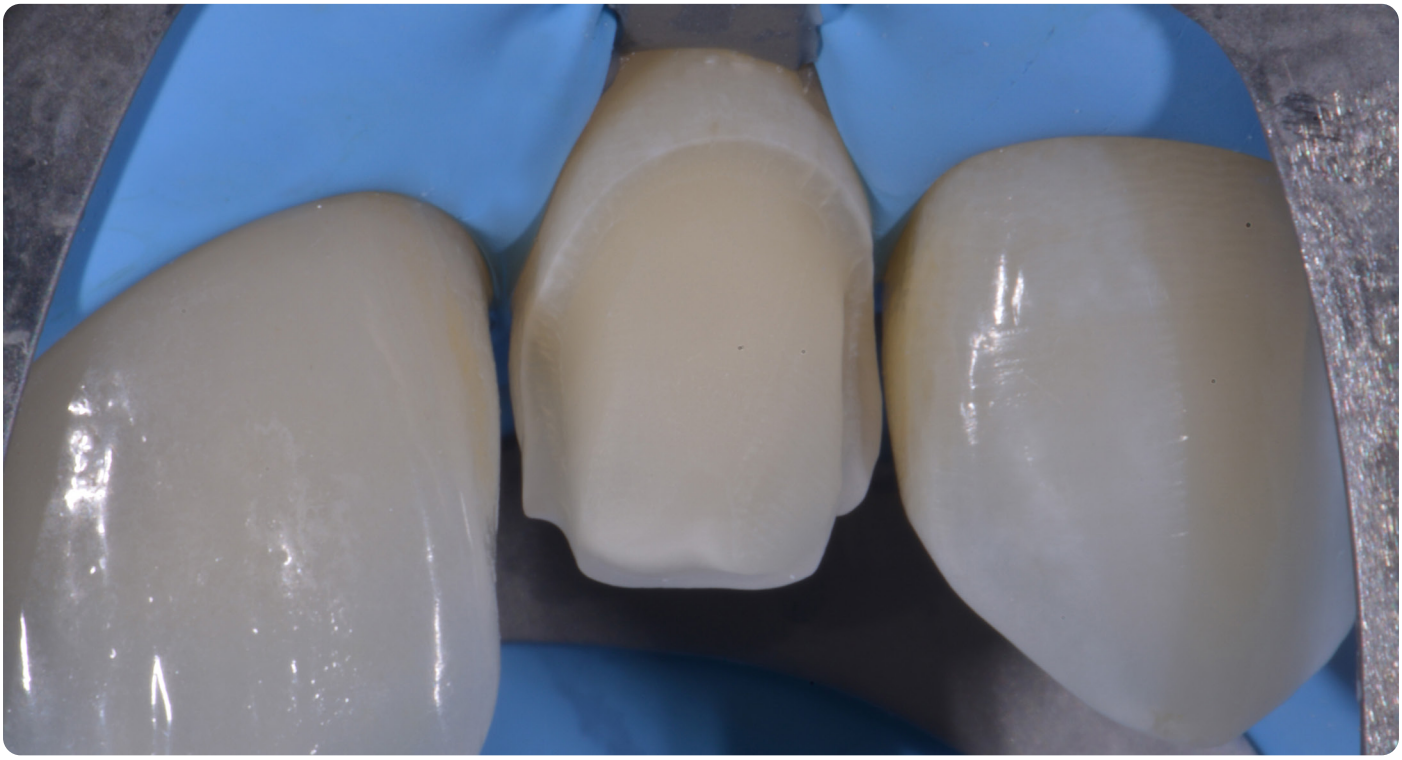
`Air polishing with a sodium bicarbonate to remove staining.

LITHIUM DISILICATE

by

Lorenzo Vanini

Italy



LITHIUM DISILICATE

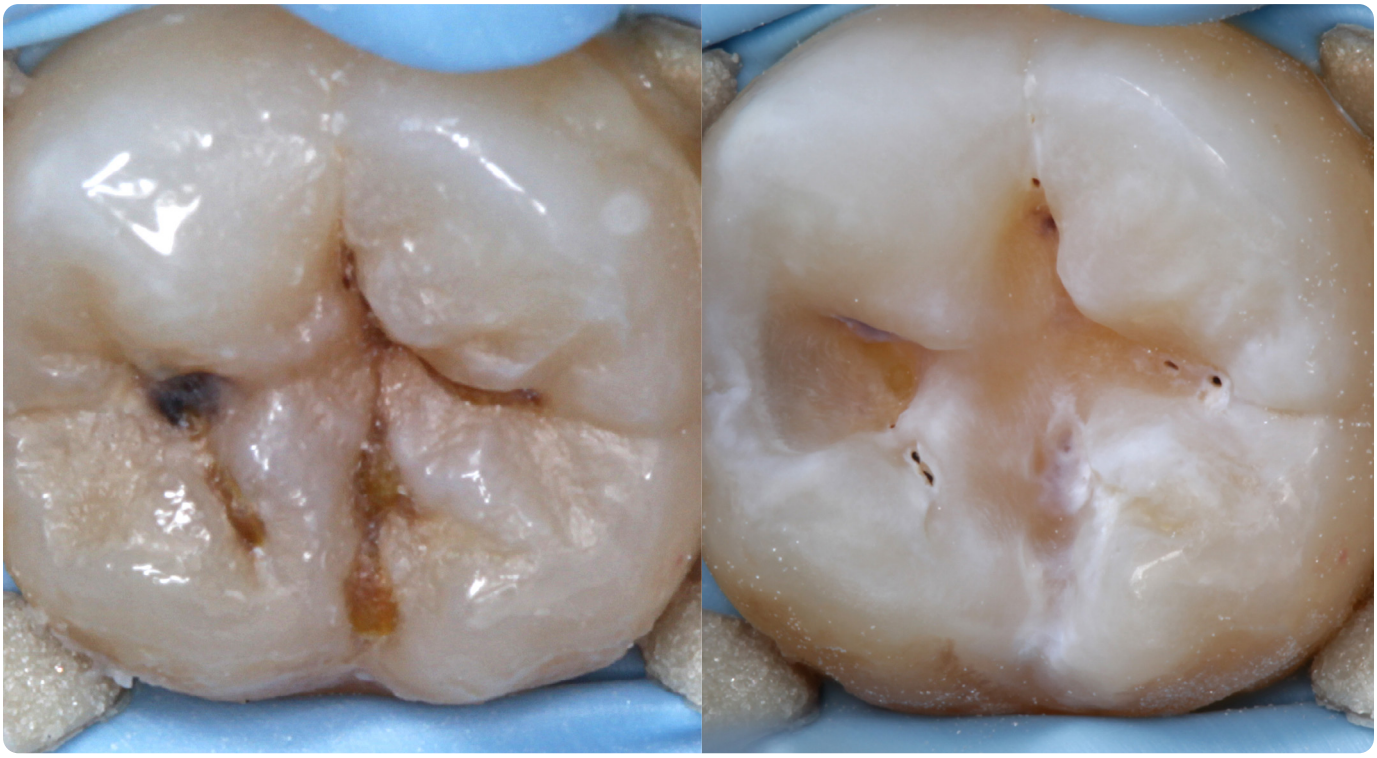
Particle abrasion with AquaCare 53µm micron Aluminium Oxide to remove bonding resin used for temporaries, to clean adhesive surfaces and improve bond strengths before cementing four disilicate veneers.

CARIOUS LESSION

by

Louis Mackenzie

UK



CARIOUS LESSION

Minimally invasive cavity preparation of a carious lesion on the occlusal surface a mandibular third molar using AquaCare 29µm Aluminium Oxide air abrasion powder.

ORTHODONTICS

by

Thomas Taha

UK

Find out more:
www.drth.co.uk

Bonded and glycerine cure.

RESTORATION
by

Lincoln Harris

Australia

Find out more:
restoringexcellence.com.au

The dentine margin needs to finish at 90 degrees. Enamel can have infinite finish lines with composite, but dentine cannot. It places too much stress on the bond and as the dentine deteriorates, you get staining up under the composite. If you have to finish on dentine, its better to have a margin.

Any demineralised enamel needs to be chased. Composite that finishes on demineralised enamel gets staining quickly. I did not remove the deepest part of the previous resin on the lateral.

Air abrasion from buccal and lingual to remove all debris. I use an AquaCare.

RESTORATION

by

Andres Roman

Argentina

THERAPEUTIC PRE-TREATMENT

by

Florin Cofar

Romania

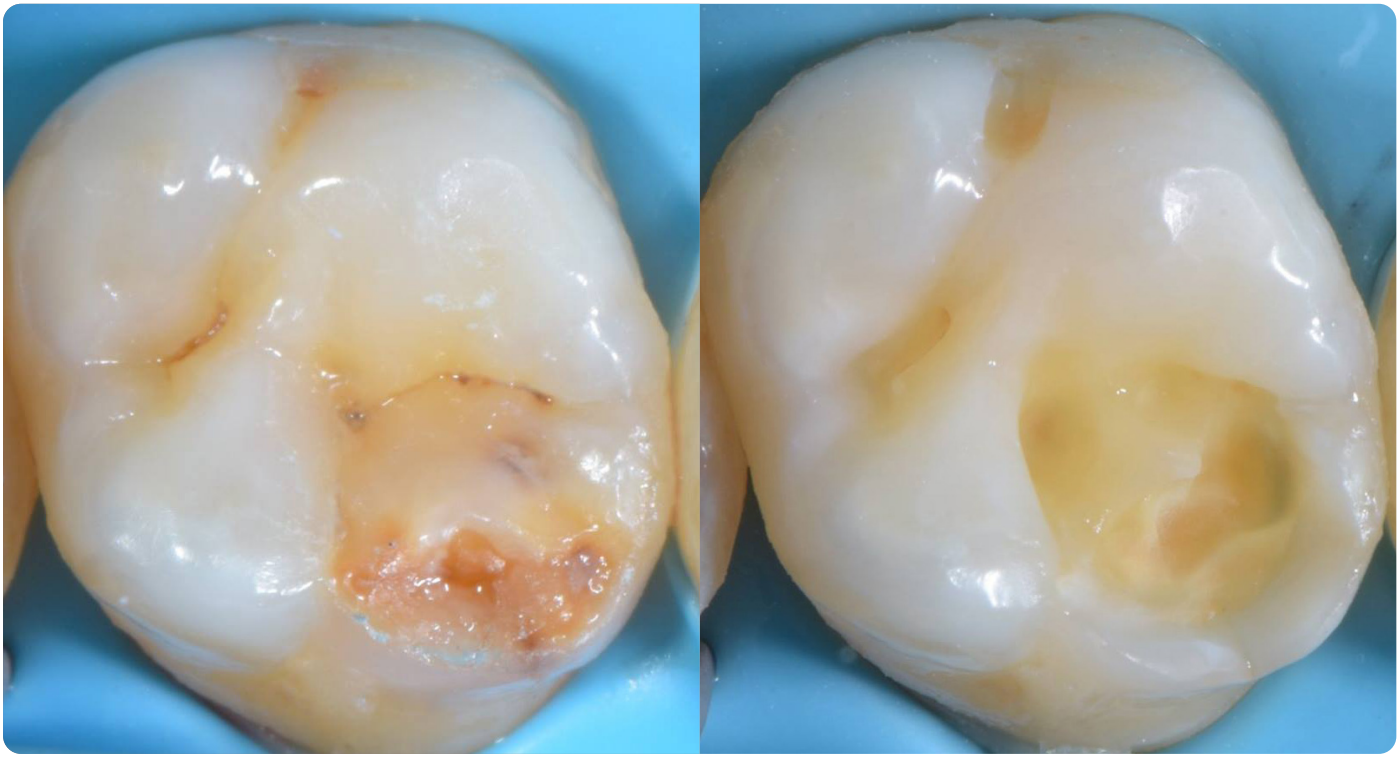
HYPO MINERALISED

by

Thomas Taha

UK

Find out more:
www.drth.co.uk



HYPO MINERALISED

'Used AquaCare 53µm micron Aluminium Oxide cutting powder to remove fractured and decayed hypo mineralised tooth tissue only without the need for drilling.'

SANDBLASTING
by

Pasquale Venuti

Italy

Find out more:
studiodentisticovenuti.it

Tomorrow Tooth

SANDBLASTING

‘Used 53µm Aluminium Oxide, then used electrosurgery and isolated by means of Ferrior Clamps and teflon. The image is after sandblasting and before etching.’

BONDING

by

Katherine Losada

Switzerland

1) Select your material (composite)
2) Isolate
3) Clean and prepare the surface to treat with AquaCare and 29µm Aluminium Oxide powder at 2-3 bar of pressure for 5 seconds.
4) Rinse with water or the AquaCare liquid (AquaSol)
5) Etch the enamel for 15 seconds only
6) Use your bonding system and the composite that you have selected
7) Polish
8) Remove isolation and check occlusion.

RESTORATION

by

Chad Perry

USA

CAVITY PREP

by

Thomas Taha

UK

Find out more:
www.drth.co.uk

"Always finish on 29µm Aluminium Oxide and Sylc"

DECONTAMINATION

by

Nazariy Mykhaylyuk

Ukraine

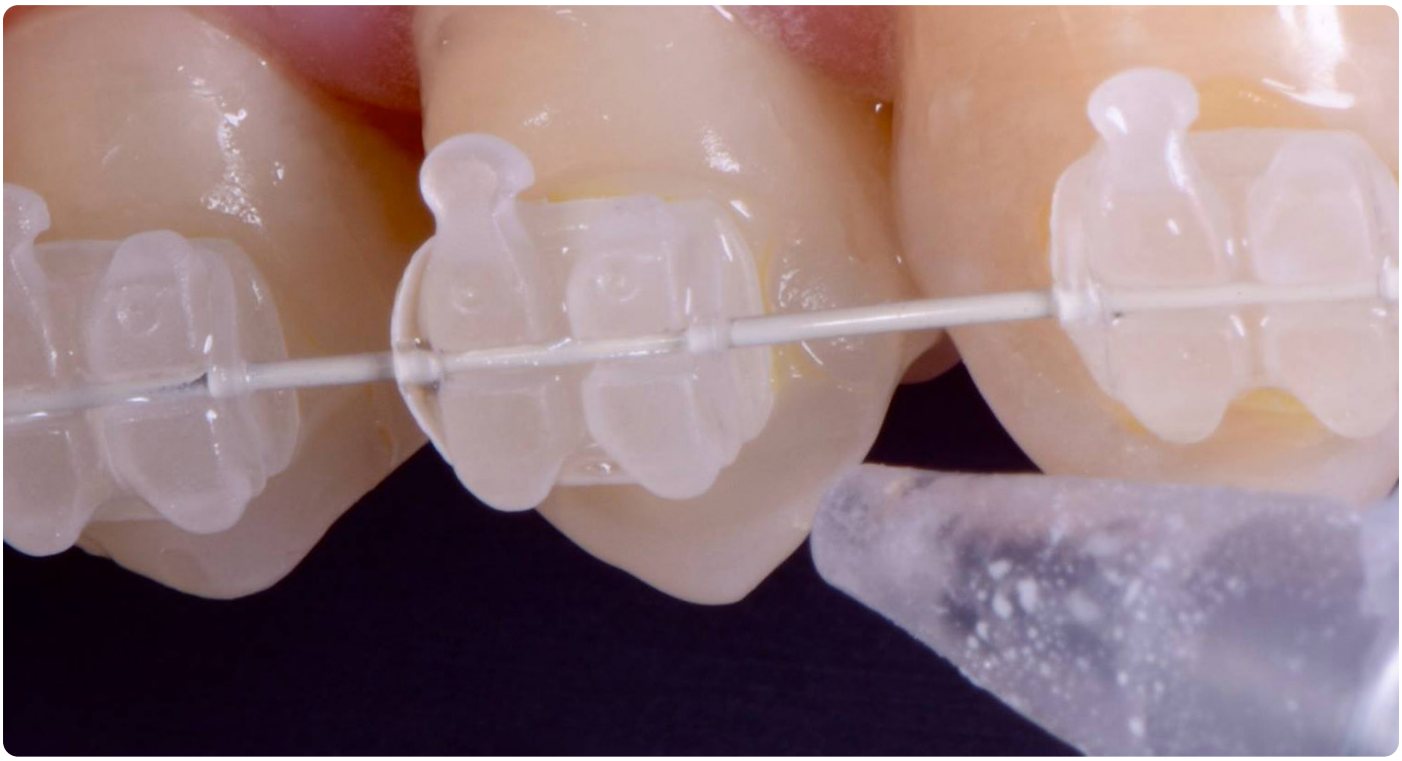
STAIN REMOVAL

by

Thomas Taha

UK

Find out more:
www.drth.co.uk



STAIN REMOVAL

'A bit of Sylc on low pressure cleans up staining nicely around brackets.'

SANDBLASTING
by

Jordi Manauta

Spain

Find out more:
styleitaliano.org

Style Italiano

SANDBLASTING

'Two partial bonded restorations just prepared for bonding. AquaCare allows me to finally sandblast or prophylaxis inside and outside the mouth, with or without water, with the exact amount of media I want to deliver. I'm in full control now of those important procedures.'

ISOLATION PARTICLE ABRASION

by

Jason Smithson

UK

Find out more:
jasonsmithson.com

ISOLATION - PARTICLE ABRASION

‘Particle abrasion with 29µm Aluminium Oxide to remove aprismatic enamel and improve bond strengths prior to no prep direct bonding to close black triangles which were secondary to periodontal disease.’

USING AQUACARE

by

Jordi Manauta

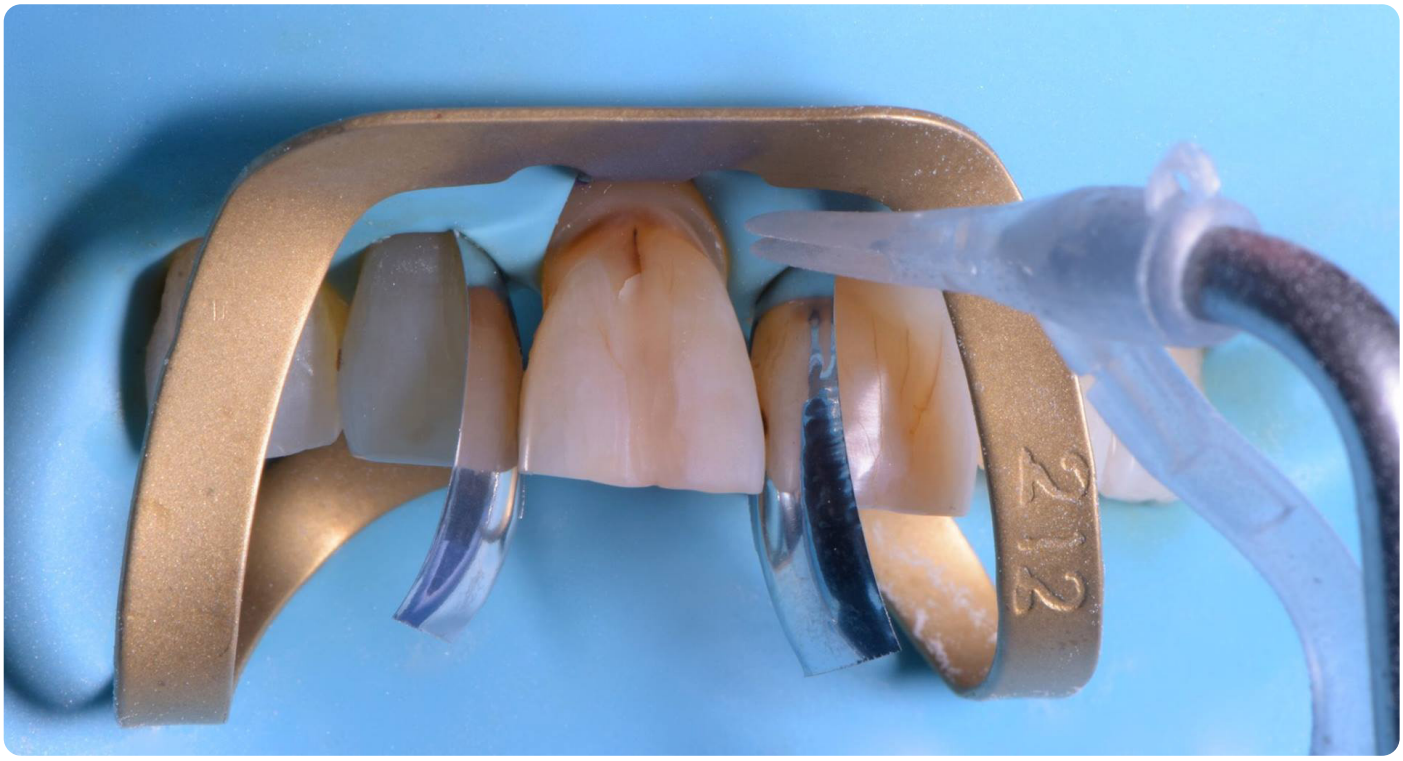
Italy

iTIP
by

Thomas Taha

UK

Find out more:
www.drth.co.uk



iTIP | **A stable 212 rubber dam clamp with iTip cleaning**

SANDBLASTING
by

Walter Devoto

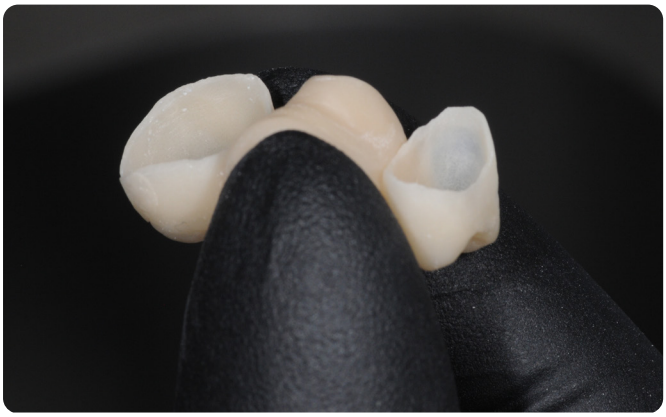
Italy

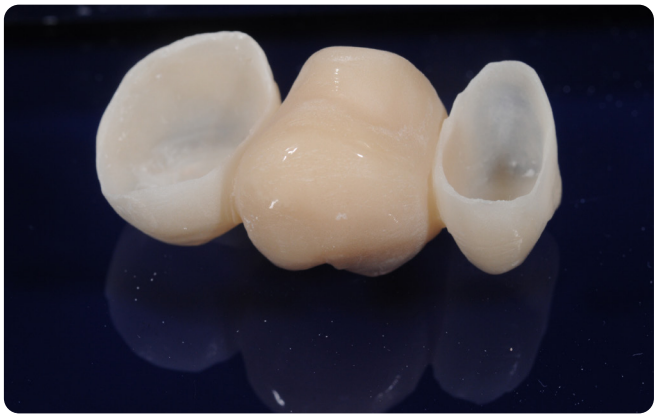
Find out more:
styleitaliano.org

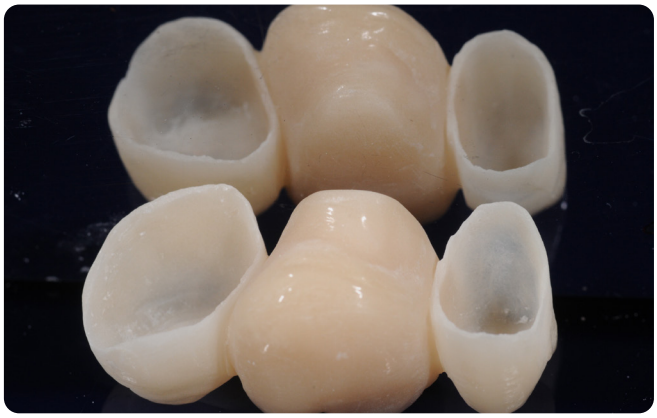
Style Italiano

SANDBLASTING

'Activation temporary before relining.'







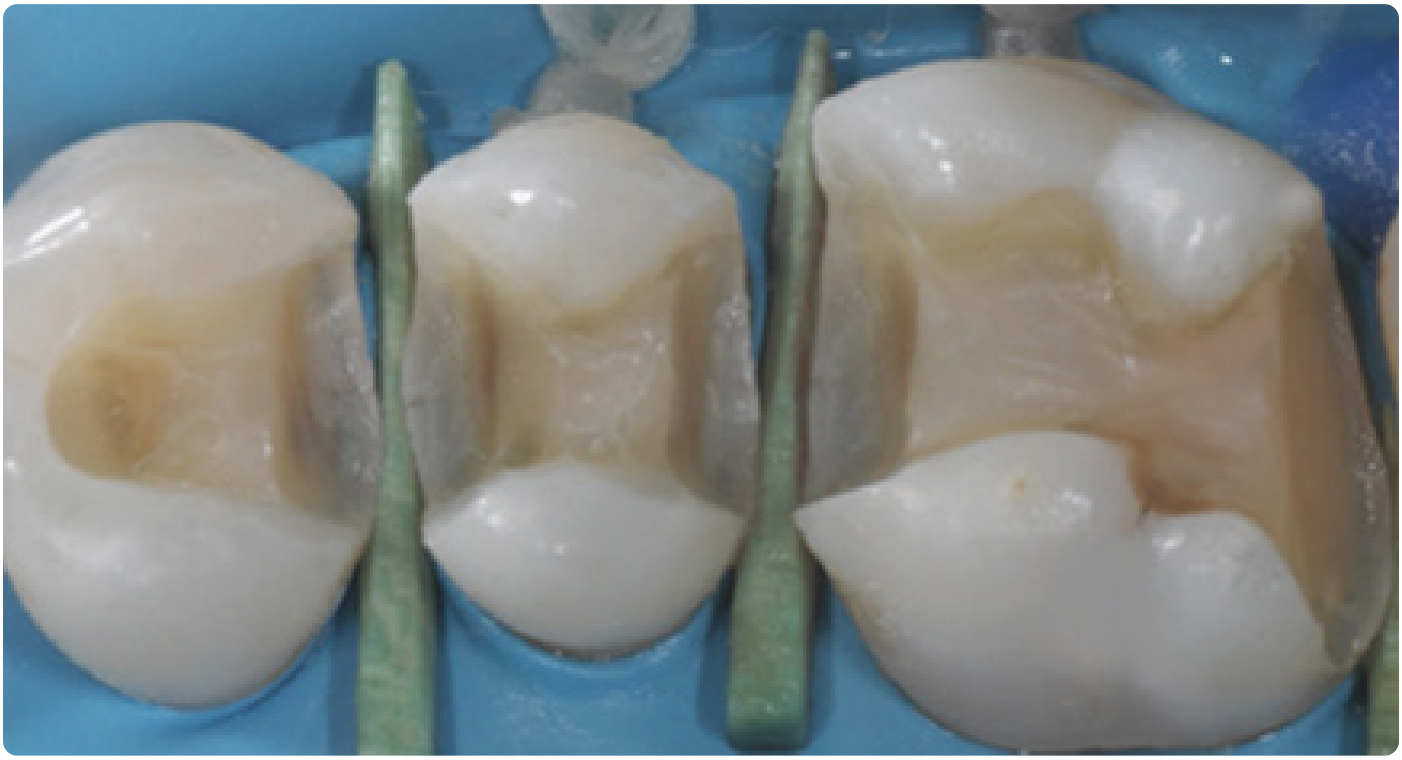
PREPARATION FOR ADHESIVE CEMENTATION

by

Prof. Dr. Francesco Mangani

Italy

Find out more:
odontoiatriamanganiroma.com



PREPARATION FOR ADHESIVE CEMENTATION

'Composite build-ups have been selectively cleaned and sandblasted using 53µm Aluminium Oxide with HIGHER PRESSURE.'

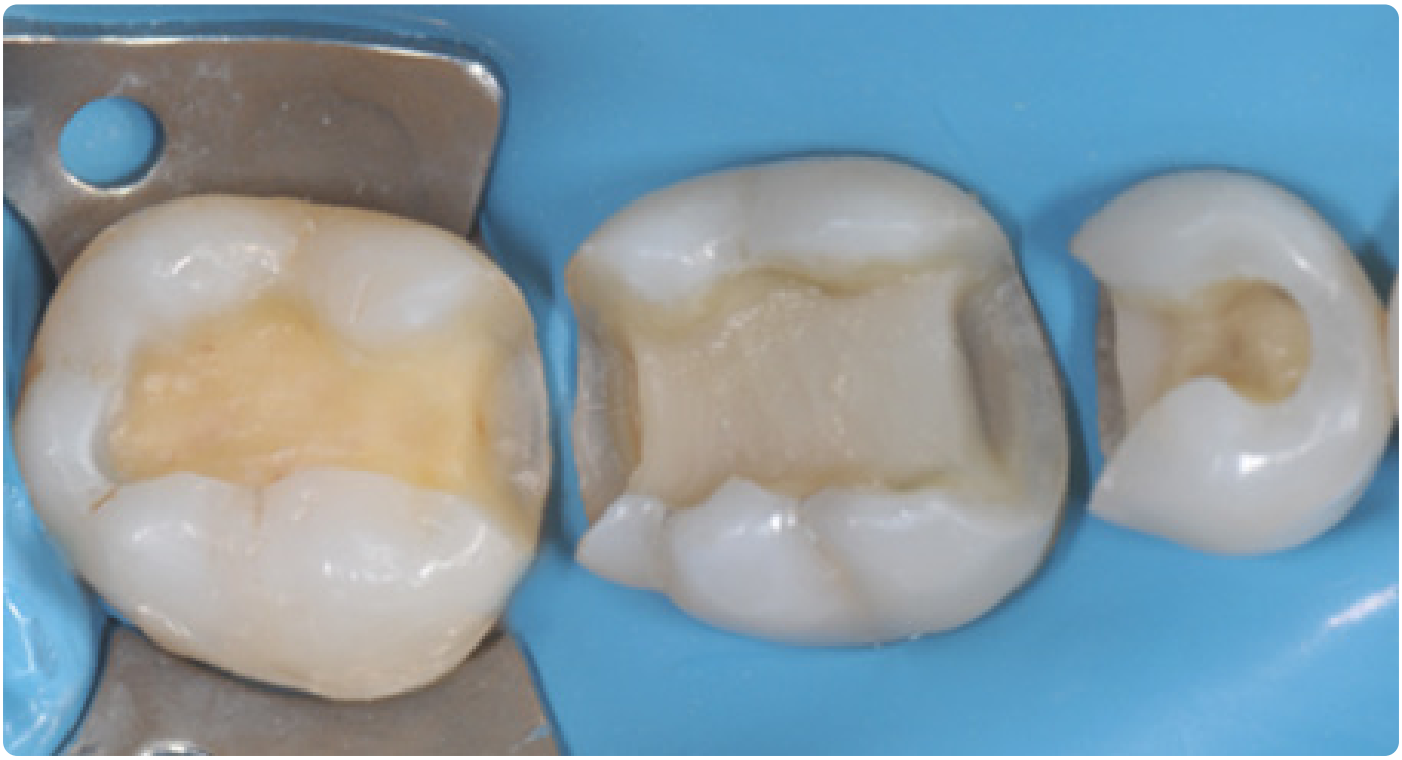
PREPARATION FOR ADHESIVE CEMENTATION

by

Prof. Dr. Francesco Mangani

Italy

Find out more:
odontoiatriamanganiroma.com



PREPARATION FOR ADHESIVE CEMENTATION

'Preparations after composite resin build-ups treated for adhesive cementation. Cleaning has been made using AquaCare Device. Powder 29µm Aluminium Oxide with LOW PRESSURE.'

ZEROIN ON

by

Arthur Volker

USA

Find out more:
dentcaredentaloffice.com

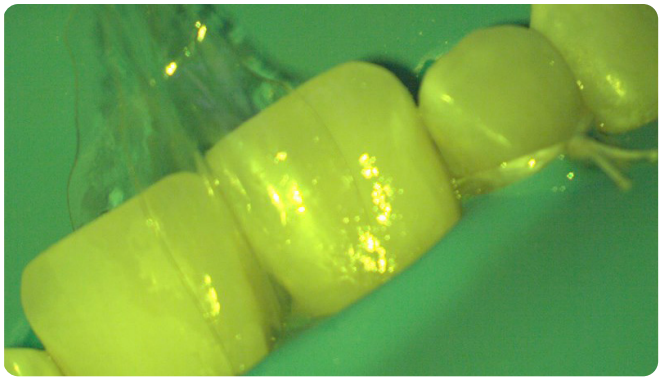
1. Initial frontal view. Patient was unhappy with the black triangle between #8 and 9 (11 and 12)

2. Taking shade

3. Retracted view.

4. Rubber dam view after air abrasion. The matrices will help to retract the dam further at the operative site

5. Scope photo. Note the unusual position of the matrices, due to the overlapping of the teeth.



6. Scope pic with filter.

7. Immediate result following gingivectomy of #8 (11). Needs some refinement, which will be addressed after discussion with the periodontist.

8. Post-operative radiograph. Note the resultant contours from the matrices, as well as the palatal volume at #8 due to the unusual positioning of the teeth.

PERI-IMPLANT MUCOSITIS

by

Andrew Thorpe

Australia

Find out more:
beyondacceptable.com

Peri-implant mucosotis

Peri-implant mucositis / early peri-implantitis on 21 is present.

This implant is 6 years old. There is bleeding and suppuration.

Minor bone loss present that occurred in a year.

The issues come and go for the last year or so. Periodontist has been managing this and the perio but a sudden flare up has come on the 21. This is a new tip that was sent by Veloplex to try on their machine for inter proximal cleaning, and I realised it would fit in this pocket.

Used with sodium bicarbonate to flush out the area. This was then flushed with Chlorhexidine, flushed again with sodium, and one last CHX intrasulcular.

Implant Dent. 2012 Oct;21(5):390-3.

Effectiveness of implant surface decontamination using a high-pressure sodium bicarbonate protocol: an in vitro study.

Nemer Vieira LF[1], Lopes de Chaves e Mello Dias EC, Cardoso ES, Machado SJ, Pereira da Silva C, Vidigal GM Jr.

Author information

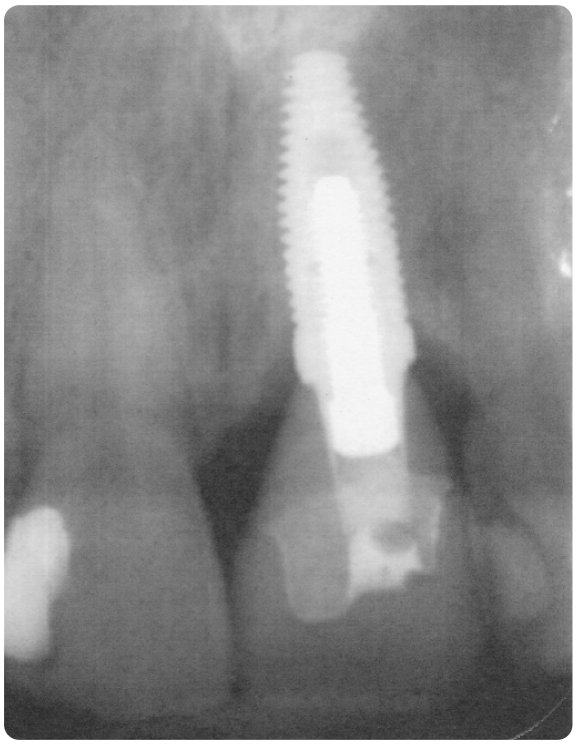
Abstract

OBJECTIVES: To evaluate the effectiveness of a high-pressure sodium bicarbonate spray protocol to decontaminate implant surfaces intentionally inoculated with bacteria.

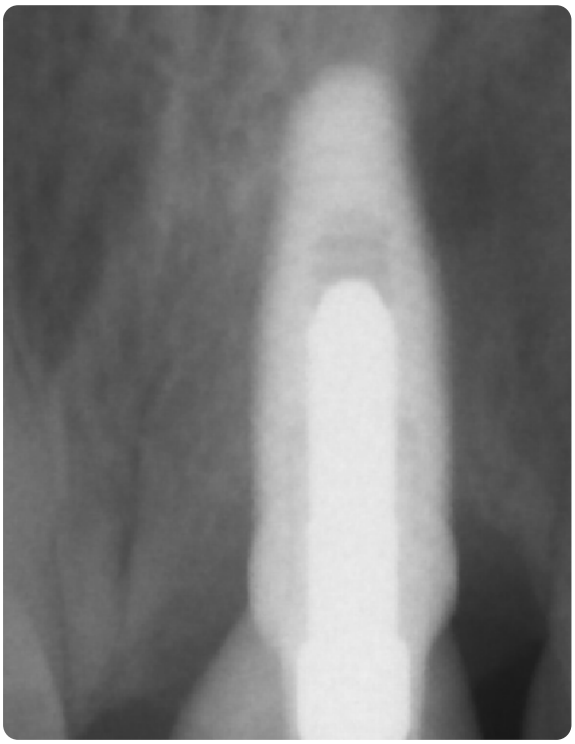
MATERIALS AND METHODS: Twenty commercially pure titanium implants, 10 with machined surfaces and 10 with rough surfaces, were inoculated with Streptococcus sanguis and then submitted to a decontamination protocol using a high-pressure sodium bicarbonate spray device for 1 minute under aseptic conditions.

RESULTS: After the application of the decontamination protocol, all bacterial cells were removed from the tested implants, regardless of surface roughness.

CONCLUSION: The results suggest that regardless of the implant surface roughness, the protocol using high-pressure sodium bicarbonate spray for 1 minute, under aseptic conditions, was effective in removing all the viable bacterial cells.



Radiograph from around 2015.



This is 20/4/2017.

Loss is evident on the distal.

Radiograph orientation is a bit off but tells the point. There is one from 2016 but I don't have a digital copy. Stable since first DX in 2016 radiographically.

INCISAL SAUSAGE

by

Lincoln Harris

Australia

Find out more:
restoringexcellence.com.au









Incisal Sausage - Lincoln Harris

AQUACARE EXPERIENCE AS A USER

by

Michael Thomas

UK

Minimally invasive dentistry (MID) advocates the maximum preservation of intact and repairable dental hard tissues through minimising the unnecessary alteration of healthy tooth structure. As an enthusiastic advocate of the application of the principles of MI dentistry in everyday dental care, the AquaCare has been a revelation in helping me to achieve improved outcomes for patients under my care.

The unit allows ease of use for polishing and abrasion techniques with a change in function at the turn of a switch. For polishing, surface stains are removed efficiently and selectively without damaging the underlying sound tooth structure. There is no heat generation or damage to soft tissues and the result is immediately pleasing to both clinician and patient. For air abrasion, the particles are emitted at high velocity within a fluid stream from an easy to use nozzle and are hence easily controlled and directed ensuring comfort for the patient as well as ease of vision for the operator. The air abrasion particles remove adherent extrinsic surface stains and debris without vibration or heat generation, minimising the risk of pulpal damage. The lack of vibration also improves comfort for the patient.

Bioactive powders have the potential for remineralisation and will selectively remove damaged tooth structures with much greater precision than conventional mechanical techniques. Bonding to the cleaned tooth surface is also enhanced making this technique ideally suited to modern adhesive dentistry, particularly with regards to the repair and refurbishment of existing restorations, which is now such a key component of MID.

From being brought up in the age of the high-speed handpiece, the Aquacut Quattro is now my go-to unit for cavity preparation and tooth repair. This is one of those pieces of kit that I can find further uses for every day and that the patients under my care much prefer compared to the conventional rotary handpiece.

1. Pre-operative

2. After wet air-abrasion

3. Final restoration (GC Essentia resin composite)

RESTORATION

by

Richard Field

UK

RICHARD FIELD

Find out more:
www.DrField.co.uk

"Working with the AquaCare as part of my daily routine gives me the confidence that my bonding is the best it can be. Often excess hand piece oil can contaminate your cavity during preparation and if not removed can seriously compromise bond strength. Prior to bonding, decontaminating the cavity with 27µm Aluminium Oxide will help to ensure that the cavity with be clean and oil free."
Richard Field

Patient presented with food trapping medsial and distal to the Upper left 5. This was stemming from a poor medial and distal contact point from the adjacent defective restorations

Isolation was achieved with Unodent non latex rubber dam.

The old restorations and caries was removed from the upper right 4 6 and 7 reviewing a carious pulp exposure on the upper right 6.

Cavities were cleaned with 27µm Aluminium Oxide using the AquaCare unit to ensure bonding surfaces are clear of contaminants

An MTA plug was placed as a means of direct pulp capping over the exposure on the upper right 6

Direct composite was used to restore the Upper right 4 and 7 with a GIC core placed as a long term provisional on the upper right 6 in order to monitor pulp vitality prior to an indirect restorations

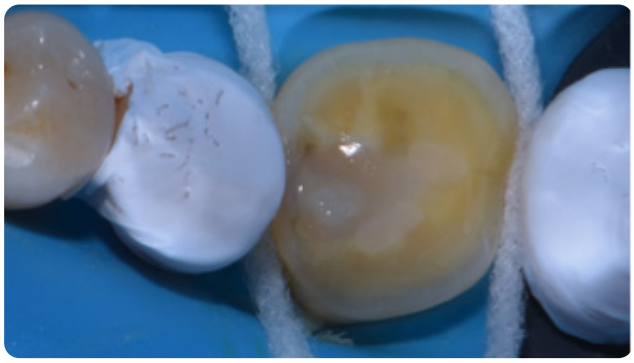
LEGO PREP

by

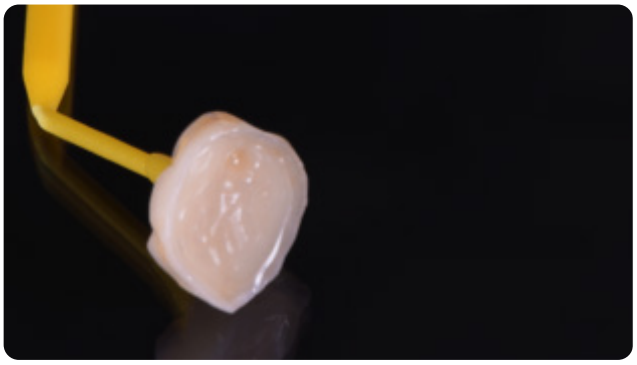
Thomas Taha

UK

Find out more:
www.drth.co.uk



1. The preparation ready for cementation with composite bump to aid location.



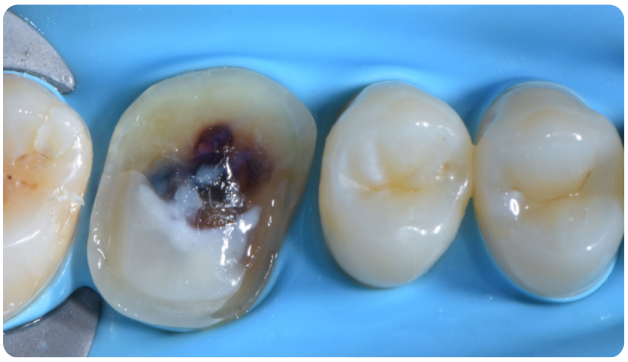
2. Lithium disilicate emax onlay surface being prepared for bonding.

3. Immediate buccal view post cementation.

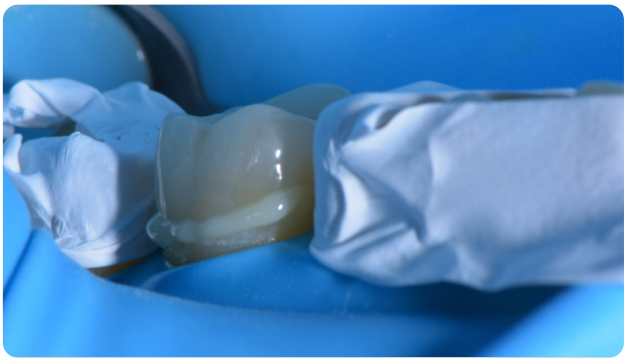
4. Occlusal view showing fantastic bio mimetic integration.

5. Post operative X-ray shows clean join lines. A raised margin allows for easier cement clean up and less excess remaining.

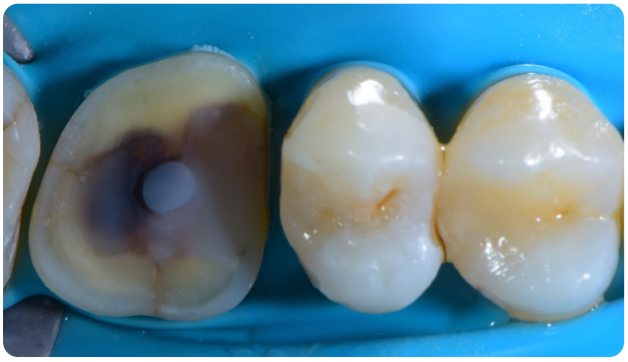
6. An incongruous defective amalgam filling.



7. Preparation after IDS and being prepared for cementation.

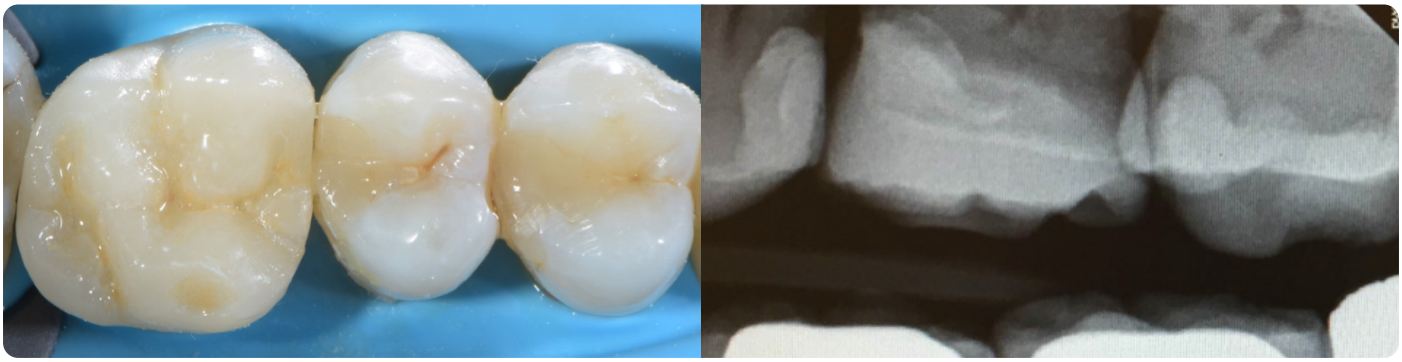


8. Supra gingival margin allowing for simplified excess cement removal.



9. Occlusal view immediate post operative shows very natural result well integrated, occlusal bump (Lego onlay prep) after cleaning with AquaCare.

10. Immediate after onlay cementation.



11. X-ray showing deep margin elevation and onlay placed over to protect tooth.

12. Comparison prior to emax onlay replacing stained old composite restoration.

Lego prep - Thomas Taha

TOOTH RESTORATION

by

Chad Perry

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ISOLATION PARTICLE ABRASION

by

Find out more:
jasonsmithson.com

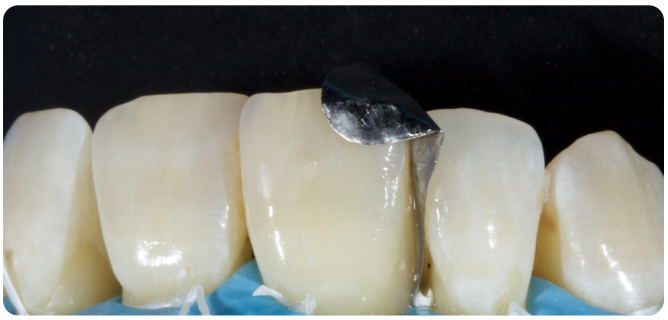
Jason Smithson

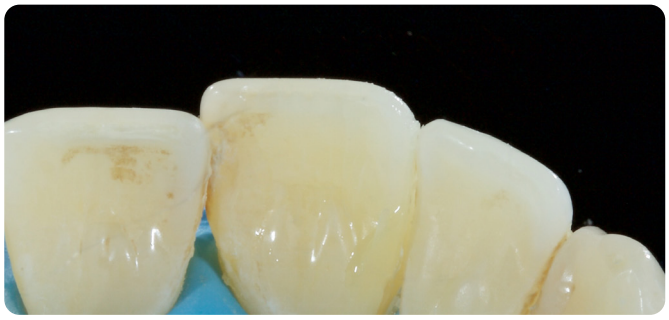
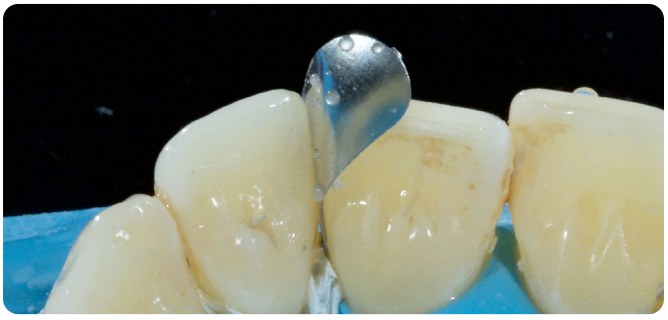
UK

ISOLATION - PARTICLE ABRASION

'Particle abrasion with 29µm Aluminium Oxide to remove aprismatic enamel and improve bond strengths prior to no prep direct bonding to close black triangles which were secondary to periodontal disease.'





Isolation Particle Abrasion - Jason Smithson

FRACTURED LOWER MOLAR AND LARGE DEFECTIVE RESTORATION

by

Alejandro Pineda

Uruguay

Find out more:
lhasa.uy

"At Lhasa we always innovate, using the latest techniques in biomimetic dentistry, respecting the tooth structure to the maximum, wearing the minimum and respecting the dental biology to the maximum, restoring health, resistance and naturalness to damaged teeth."

1. Digital restoration milled in Ceramic (Lithium Disilicate - Rosetta by @hassbio)

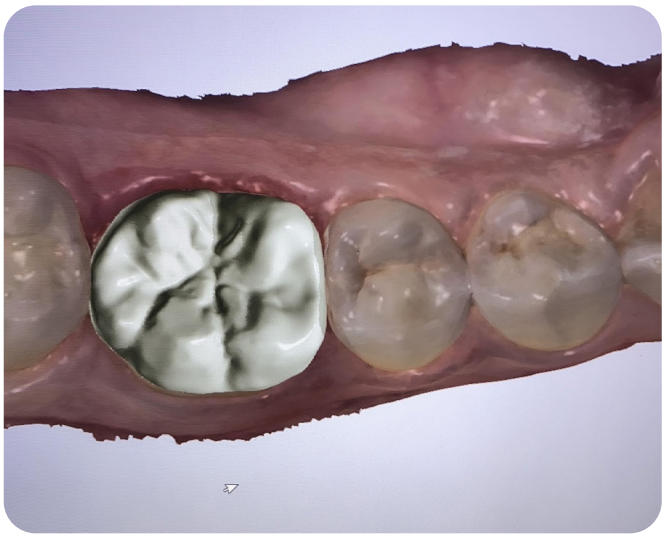
2. Appearance after removal of the restoration and fractured area (disto lingual cusp)

3. Cleaning the cavity with @aquacare_

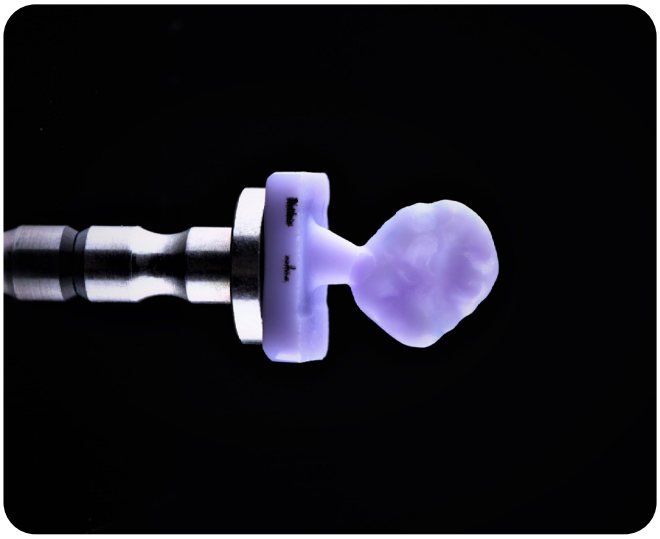
4. Biobase (phase 1) cusp)

5. Biobase (phase 2)

6. Scan



7. Digital design (natural anatomy)



8. Milling of the design, from a block of Lithium Disilicate / Rosetta by @hassbio

9. Cemented using AquaCare to prepare surface for bonding, heated resin (RTM) and absolute isolation

10. Prior to removal of isolation, polishing and occlusal control

ADHESION TO TEETH WITH RESTORATIONS

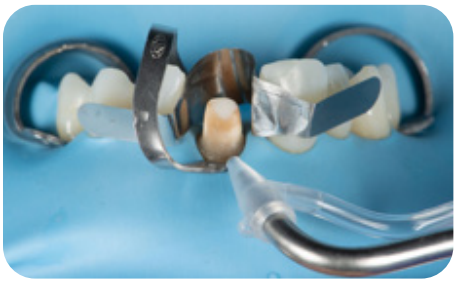
by

Dr. Marco Gresnigt
Netherlands

When only adhering to dental tissue, the instructions of the various adhesive materials can be used. However, when dealing with different substrates, such as dental tissue, but also old or new composite and / or IDS [Immediate Dentin Sealing], it can be difficult to take which step first. Often people ask in courses and / or on social media [Instagram and Facebook] what the sequence is of the different steps that must be taken for optimal adhesion. In this description I give the step-by-step plan that we use in our research to obtain optimal adhesion to dental tissue with existing composites and / or an IDS layer.

CoSil 30µm

Firstly, dental material must be roughened using a drill and / or sandblasting. If you want to restore minimally invasive and no preparation is required, it is wise to first sandblast the dental material to be adhered to with Aluminium Oxide 29µm - 53µm. This improves the adhesion as the hard surface layer is then more accessible to the phosphoric acid.



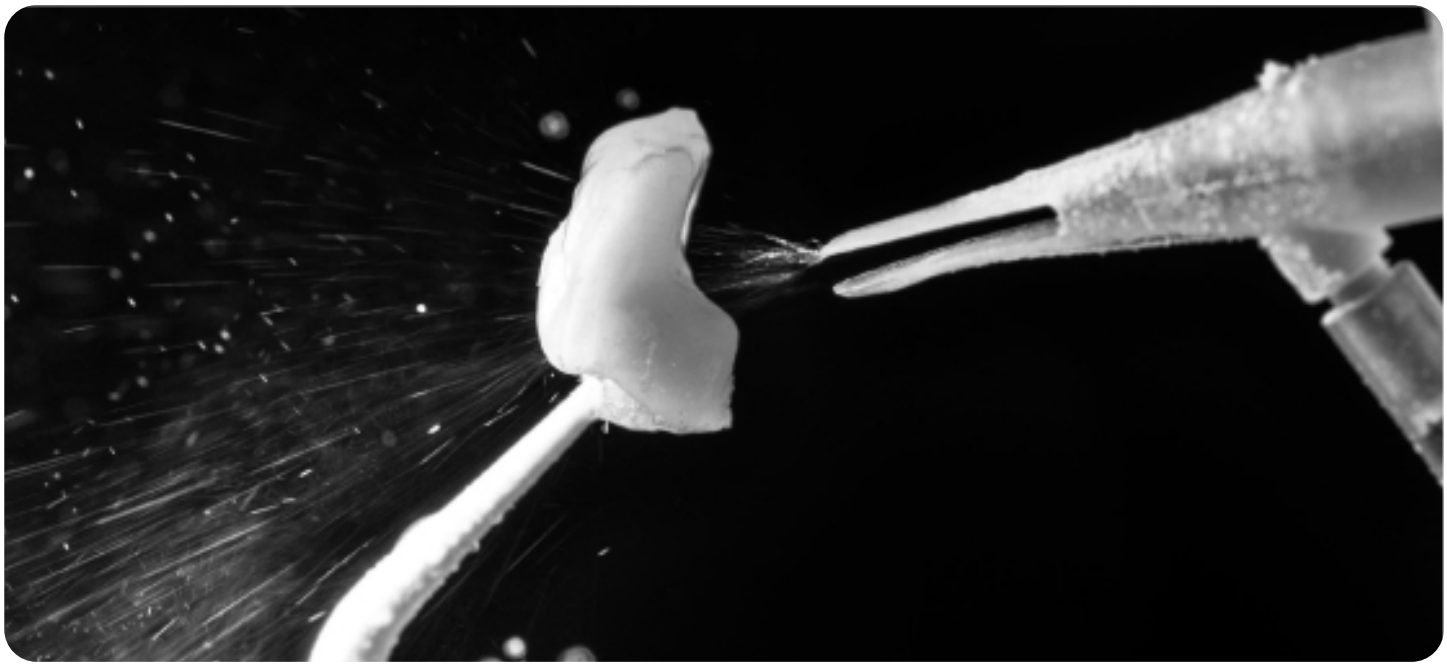
If restorations or an IDS layer is present, it must first be silicatised with CoSil 30µm, preferably with AquaSol. Since the loose particles are then rinsed from the surface with the AquaSol. Subsequently, the enamel will have to be etched [also with a two-step adhesive] with a 35-38% phosphoric acid.

Then the primer can be applied to the dentin and the silane to the silicated composite. These should be applied as described in the enclosed instructions. For silane it is important that only 1 thin layer is applied and not several and that it can dry well afterwards.

As a final step, the adhesive is applied, after which the restoration can be manufactured and / or the indirect restoration can be placed.

Below the steps again quickly:

1. Sandblasting with Aluminium Oxide of the unprepared tooth structures
2. Sandblasting of IDS [max 1-2 seconds] and composites [5 sec] with CoSil 30µm at an angle of 45 degrees, 1 cm distance and at least 2 bar pressure.
3. Etching of the enamel and / or dentin [depending on the adhesive system]
4. Prime dentin if necessary [depending on whether the dentin has been exposed]
5. Silanize the silicated IDS layer or composite, 1 layer, allow to dry thoroughly
6. Adhesive to all structures.



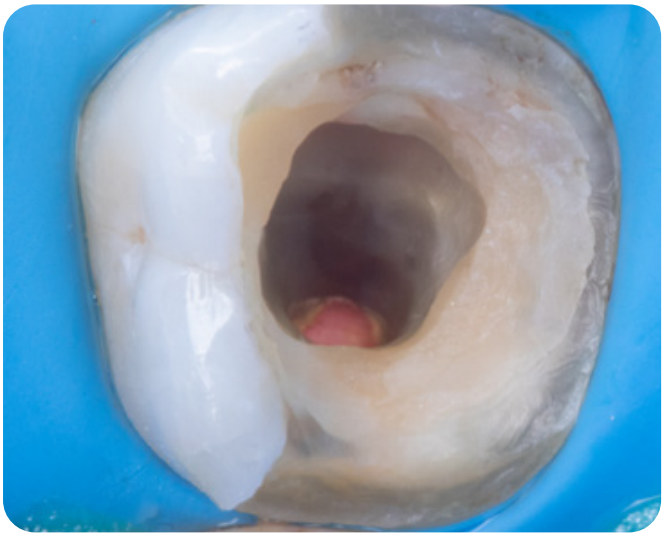
EXTENSIVE RESTORATIVE FRACTURE IN ENDODONTICALLY TREATED TOOTH

by

Patricio Gutiérrez Pino
Chile

Find out more:
@dentalastorres

"Biomimetic restorative dentistry is part of my area of expertise to restore extensively compromised teeth, with the main objectives of maximizing the adhesive force and mitigating the effects of stress on the polymerization contraction of the tooth-restoration complex."



1. Initial situation. After removal of the restoration, a large defect is observed in the lingual walls of an endodontically treated tooth.

2. Biobase construction: Adhesive interface and margin elevation.

3. Biobase finished and sandblasted with alox 53 microns of Aquacare.

4. Indirect lithium disilicate restoration cementation, with previously heated resin and under absolute isolation.

5. Removal of excesses and polishing of the cervical margins to finalize the cementation.

6. Final post-cementation view and occlusion check.

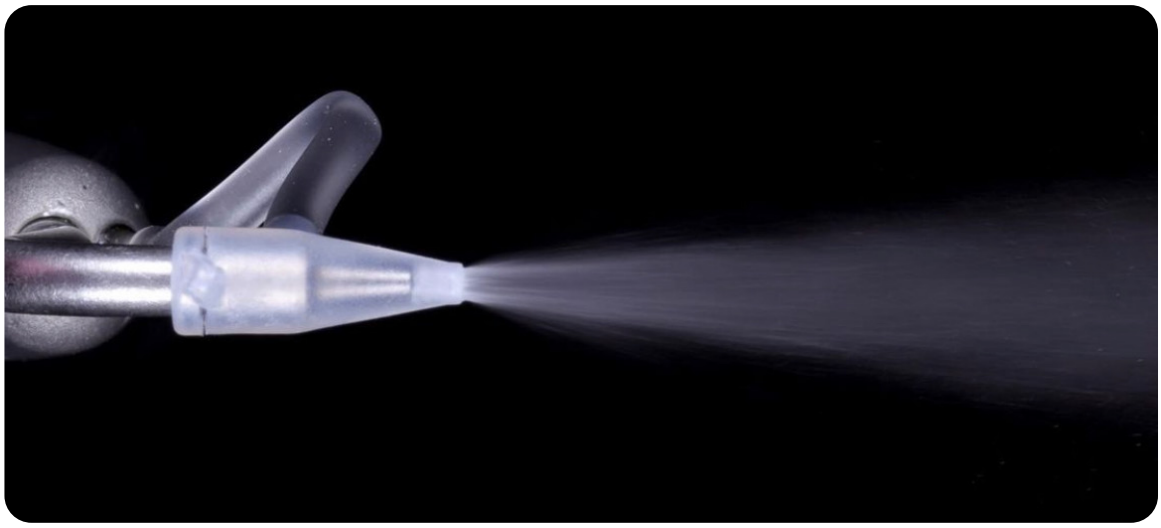
CONDITIONING THE INTAGLIO SURFACE OF COMPOSITE ONLAYS

by

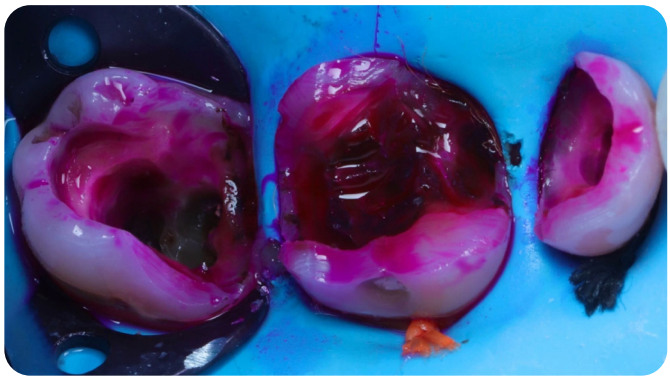
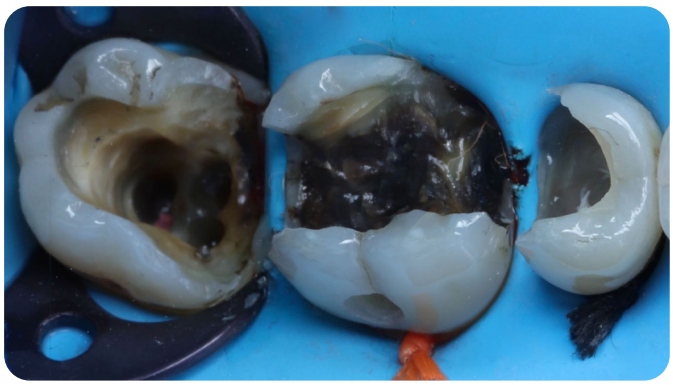
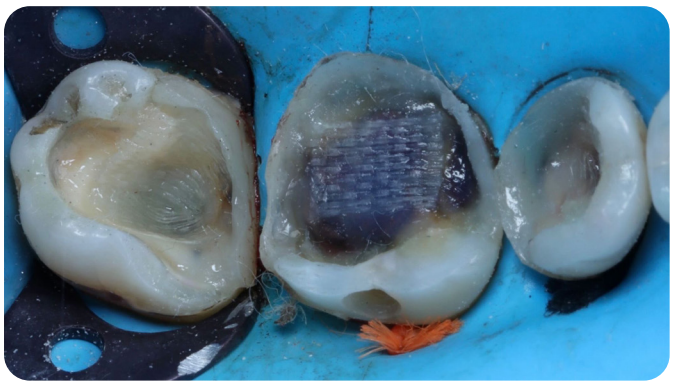
Claire O'Connor
Ireland

Find out more:
bantrydental.ie

"Air abrading the intaglio surface of the onlays with 53µm Al_2O_3. This reactivates the composite on the intaglio surface of the onlay which makes it more suitable for chemical bonding to the tooth with heated composite. It also creates a micro etching pattern which helps with micro mechanical retention."





ESTHETICS OF A CLASS IV DIRECT COMPOSITE RESTORATION

by

Find out more:
www.speareducation.com

Jason Smithson

UK

In part one of this series, we discussed how clear understanding of the Class IV direct restoration is the gateway to all knowledge of direct bonding in the anterior dentition. We also discussed the case of a female patient in her early twenties with esthetic complaints and a diagnosis of altered passive eruption (APE) and tooth surface loss (TSL).

In this article, we will discuss the ideal preparation stages of the tooth prior to bonding. To illustrate, we will discuss the case of a 21-year-old male who presented with TSL related to nocturnal bruxism. His complaints were mainly esthetic regarding the lateral incisors and canines (Fig 1).

Figure 1: The patient's esthetic complaints regarded the lateral incisors and canines.

Due to the patient's age, a decision was made to treat him with a purely additive approach with direct composite resin of the upper and lower anterior sextants alongside an occlusal equilibration.

Figure 2: The teeth were isolated with a rubber dam and floss ties.

Figure 3: The missing tooth structure was replaced with direct composite resin in layers using the Natural Layering Approach (Dietschi)

Figure 4: The immediate post-operative appearance after polishing.

The figures below highlight the new occlusal scheme in protrusive (Fig. 5) from canine guidance to crossover (Fig. 6 and 7).

Figure 5: The new occlusal scheme in protrusive.

Figure 6: The new occlusal scheme from canine guidance.

Figure 7: The new occlusal scheme from canine guidance to crossover.

Small Class IV restorations like the case illustrated above cause practitioners the most issues with repeated debonds. In this article, we will consider a protocol for predictable bonding to tooth structure (both enamel and dentin) prior to layering the Class IV restoration. This protocol is common to all bonding and can be employed for any anterior direct procedure.

Particle abrasion

Particle abrasion – sometimes known as air abrasion – in dentistry was first developed in the 1940s by Dr. Robert Black. This was further improved and combined with adhesive technology by Dr. J. Tim Rainey in the United States. Dr. Rainey could be considered the father of modern microdentistry.

Particle abrasion is defined as, "the process of tooth substrate removal utilizing the kinetic energy from particles entered in a high velocity stream of gas +/- fluid."1 The gas is usually compressed air from the delivery cart and is sometimes augmented with water or water/alcohol mix.

I prefer the addition of an alcohol/water mix – also called hydro-abrasion – since fewer particles are required for the abrasion. Importantly, the process is also cleaner with less dust contamination of surrounding air.

Reduced dust is healthier for the operator and less damaging to surrounding equipment such as handpieces, microscopes and camera gear. Examples of available hydro-abrasion units include Velopex Aquacare and PrepStart H2O.

The particles commonly employed for restorative dentistry are aluminum oxide, glycine and SYLC. Aluminum oxide is most used since it offers sharp, irregular particles of the required hardness at a low cost.

Remember -

Kinetic energy = ½ MV2

M = mass, V = velocity.

It therefore follows that increased cutting efficiency will be gained by:

Greater particle mass
Increased velocity of the particles resulting from either higher air pressure, narrower bore of delivery tip or the tip being closer to the tooth structure1
I use 27-micron alumina at a pressure of around 2-3 bar. When using the unit, the tip is held close to the tooth, but is continually in motion – dwelling in one area increases the degree of cutting. The motion used is a crisscross, checkerboard shaped movement.

Particle abrasion improves bond strengths and restoration longevity as a result of:

1.Removal of biofilm such as plaque, calculus and staining<
2. Removal of old composite bonding
3. Removal of the aprismatic layer of enamel

What is the aprismatic layer?

All enamel surface layers are comprised of amorphous, highly fluoridated, remineralised enamel around 10-30 microns in thickness – this is the aprismatic layer.

When we eat sugars, our oral biofilm creates acids. This acid attacks the tooth surface: the so-called "carious challenge." This results in the loss of hydroxyapatite from the surface of our enamel (demineralization). Fortunately, most of us have fluoride in our diet or in toothpastes, mouthwashes and floss. The fluoride demineralizes the enamel, creating the aprismatic layer. The aprismatic layer lacks prism structure and is therefore more resistant to future acid attack.

As restorative dentists we aim to etch teeth with 35 – 37 percent phosphoric acid to bond to them – but the aprismatic layer makes this less effective. Additionally, the aprismatic layer is only loosely adherent to the underlying main body of enamel. This means that when we bond to aprismatic enamel, we can achieve weak bonds.

However, heat is generated when we begin to polish the restoration because of friction between the polishing rubber/disc and the tooth/restoration surfaces. Each of the components of the tooth-restoration interface – including enamel, dentin, bonding agent and composite resin – have a different coefficient of thermal expansion (CTE). This means they expand and contract at different rates when heated.

As a result of the CTE mismatch, the weakest link in the system often breaks down during the polishing process. This is commonly the link between the aprismatic enamel and the underlying enamel. On a clinical level, this is why a white line may appear during the polishing process that was not present prior to polishing. Particle abrasion reduces this risk.

Sharp cavosurface angles create stress risers. A stress riser is an area of high stress concentration which may result in adhesive bond breakdown. Particle abrasion creates rounded cavosurface angles.

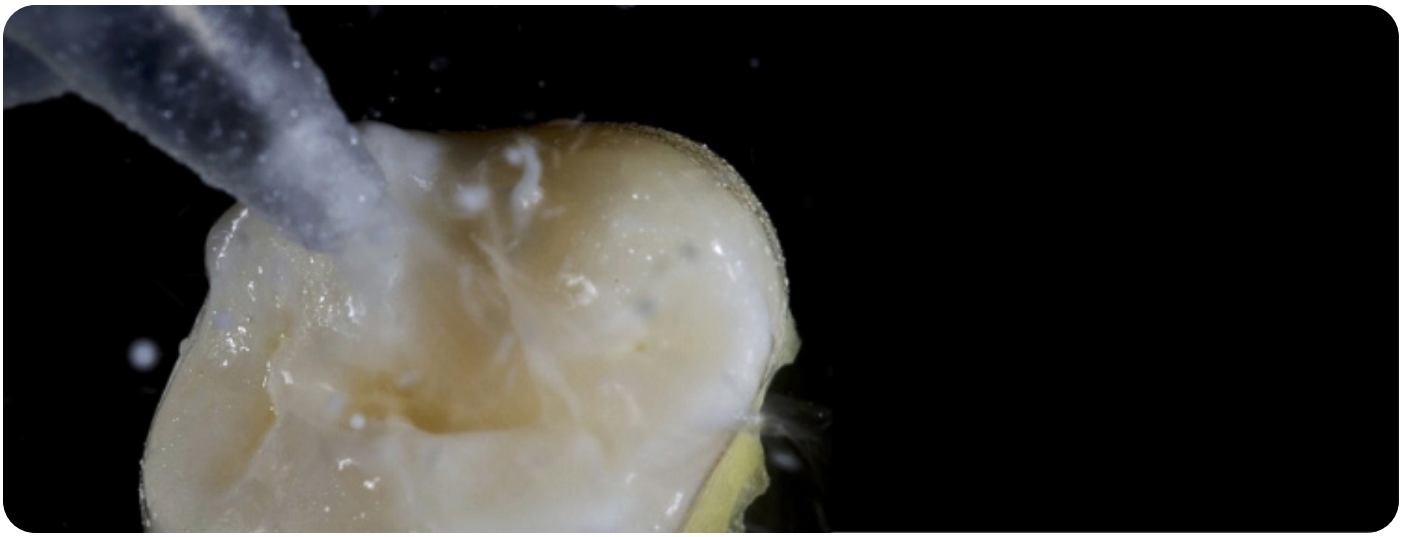


Figure 8: "Fanning" of adhesive particles as they exist the orifice of the instrument tip.

Rounding of the margins is caused by "fanning" of the adhesive particles as the exit the orifice of the instrument tip (Fig. 8). However, abrasion provided by the peripheral portion of the stream is less efficient due to the lower velocity and concentration of alumina particles. This results in the rounding of all internal line angles.

This effect is minimized when the tip is sited less than 1.0mm from the tooth where fanning is negligible. Therefore, for any preparation requiring a rounded cavosurface margin, the instrument tip should be placed 2.0mm from the tooth surface. If a butt joint is required, a distance of 0.5mm should be employed.2

There is a wealth of research both in vitro and in vivo which demonstrates an increase in bond strengths to enamel after particle abrasion.3 4 5 6 However, the effects on dentin bonding are more controversial. Particle abrasion reduces smear layer thickness in comparison to burr prepared dentin. Since they contain weaker acids and are less able to penetrate the smear layer, the performance of self-etching bonding agents may be improved.7 This effect is not seen in etch and rinse dentin bonding agents.

In contrast, particle abrasion may result in splitting of the collagen fibers on the dentin surface, reducing the quality of the hybrid layer.8 Anecdotally, I have used lower mass particles at low pressures for 15 years with no discernible adverse effects.

Figure 9: Tofflemire bands without the matrix bands interproximal.

It is prudent to protect the adjacent teeth when carrying out particle abrasion and bonding procedures to avoid iatrogenic damage and linking the teeth together. I tend to employ Tofflemire bands without the matrix bands interproximal (Fig. 9). Note the matte appearance of the enamel surface following hydro-abrasion.

Tooth preparation with burrs

Following particle abrasion, the tooth is prepared on the facial and interproximal surfaces.

Figure 10: A coarse or medium diamond flame shaped burr (863) is used to create a 2.0mm long bevel extending from the enamel-dentin junction superiorly to a knife edge within the enamel inferiorly.

Figure 11: The inferior and superior borders of the bevel.

Facial -

A coarse or medium diamond flame shaped burr (863) is used to create a 2.0mm long bevel extending from the enamel-dentin junction superiorly to a knife edge within the enamel inferiorly (Fig. 10). The bevel has an inferior and superior border (Fig. 11) – this is discussed in more detail in the final article in this series.

Key advantages of the bevel:

1. The bevel provides an increased surface area for bonding improving retention.
2. From an esthetic standpoint, when layering over the bevel there is a greater capacity to create an invisible margin in comparison to a butt joint.

A coarse/medium diamond has the advantage of efficiency when creating the bevel. However, the large particles on the burr tend to cause microfractures of the enamel at the cavosurface.

Remember that composite resin contracts as it polymerizes (polymerization shrinkage) and sets up stresses. These stresses may cause breakdown of the weakest link – often between the fractured enamel prisms and the main body of the enamel. Consequently, fractured enamel prisms pull away with the contracting composite. This is called the "enamel peel concept" and is a cause of white lines at the restoration margin.

Restorative dentists can avoid this problem by finishing the bevel at extremely low speed (3000 RPM) and water spray with a flame carbide finishing burr – this will reduce the number of fractured prisms. Practitioners should avoid polishing with a silicone point because silicone debris may remain – this results in decreased bond strengths.

Interproximal -

The mesial and distal interproximal surfaces are finished with a metal finishing strip. These are available from Brassler, GC and Cosmedent, amongst others. This will remove staining, old composite resin, biofilm and the aprismatic layer. This step will mean the restoration is less likely to stain interproximal in the mid-term. The transition from incisal edge to interproximal is rounded off with a medium disc (e.g. Soflex, 3M) to remove sharp line angles and reduce stress.

Palatal -

Figure 12: Correctly finished MID and MI preparations.

The palatal margin is finished as a simple butt joint. Correctly finished MID and MI preparations are seen clinically in Figure 12. Explore bonding and layering the Class IV Restoration in the next and final article in this series.

Jason Smithson, BDS (Lond), DipRestDentRCS (Eng), is a member of Spear Resident Faculty.

INFILTRATION OF ENAMEL DEFECTS

by

Erik Jan Muts

Karma Dentistry, Netherlands

Find out more:
www.karma-dentistry.com

Laura (38) was referred to my clinic for the removal of the enamel discolouration on tooth 11 and 21 and a small composite restoration on tooth 12. Treatment of the enamel defects was performed by; (1) rubberdam isolation, (2) cleaning and removal of the surface enamel layer with air-abrasion (AquaCare, Velopex), (3) enamel acid-etching with 15% hydrochloric acid (Icon Etch, DMG), (4) enamel infiltration with a TEGDMA-based resin (Icon Infiltrant, DMG), (5) a little cosmetic bonding with composite (Asteria Estelite, Tokuyama) and (6) some final finishing (Green Stone, Shofu) and polishing (Diacomp Twist, EVE).

Although there was both yellow and white discolouration present within the enamel, infiltration seemed to be successful without visual remnants of the yellow discoloration. The air-abrasion is very useful in these cases to clean, remove the surface enamel layer and to remove hypomineralized enamel if necessary; hypomineralized enamel is softer and therefore easily removed with air-abrasion without harming the neighbouring enamel too much.

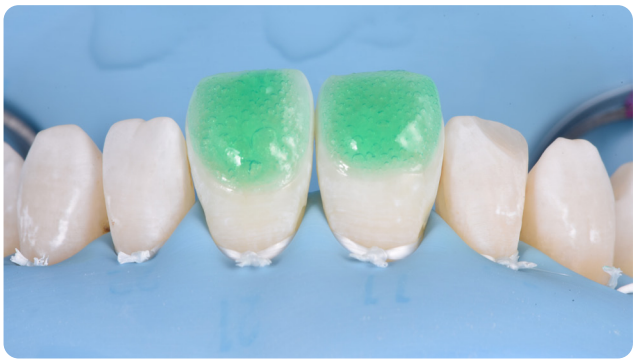
1. Initial situation.

2. Both yellow and white discolouration is visible.

3. Cross-polarized picture to be able to analyse the hypomineralisation even better.

4. Full rubber dam isolation is mandatory when performing infiltration treatment due to the harmful effects to the soft-tissue of the materials used.

5. Cleaning and air-abrading the teeth for a better etching effect, which will facilitate an easy infiltration process (AquaCare, Velopex).



6. Acid-etching for two minutes with 15% hydrochloric acid (Icon Etch, DMG) to create access to the porosity.

7. After infiltration of the porosity with a TEGDMA based resin (Icon Infiltrant, DMG) and some minor cosmetic bonding (Asteria Estelite, Tokuyama).

8. Final result after check-up.

9. Cross-polarized picture to check differences in colour.

10. Happy Laura.

DEBONDING

by

Lincoln Harris

Australia

Find out more:
restoringexcellence.com.au

DEBONDING

Calculus removed with Sodium Bicarbonate using AquaCare. Then moved to Aluminium Oxide to remove remaining composite from previous retainer.

ICON PROXIMAL WORKFLOW

by

Ahmed Tadfi
United Kingdom

Find out more:
styleitaliano.org

Early enamel lesions in the occlusal plane are often seen and treated. One of the most common treatment interventions in early lesions whereby the caries has not yet attacked the dentine (remaining only in enamel) is to fissure seal these lesions which tends to slow down or stop the progression of decay within a tooth. Interproximal (IP) caries, are small cavities that form in the spaces between teeth. These spaces can be difficult to clean with a toothbrush and are therefore more prone to developing caries.
Icon is a minimally invasive procedure that is used to treat small IP caries in their early stages (E1 and E2 being the most predictable to treat whereas D1-D3 may require mechanical caries removal – see image 1 and 2) and can be applied for lesions with an intact surface layer and without any cavitation. The procedure involves applying a special resin to the affected area, which infiltrates the enamel and seals the lesion, preventing further damage.

Fig.1
Diagrammatic stages of interproximal caries.
E1: outer half of enamel
E2: inner half of enamel

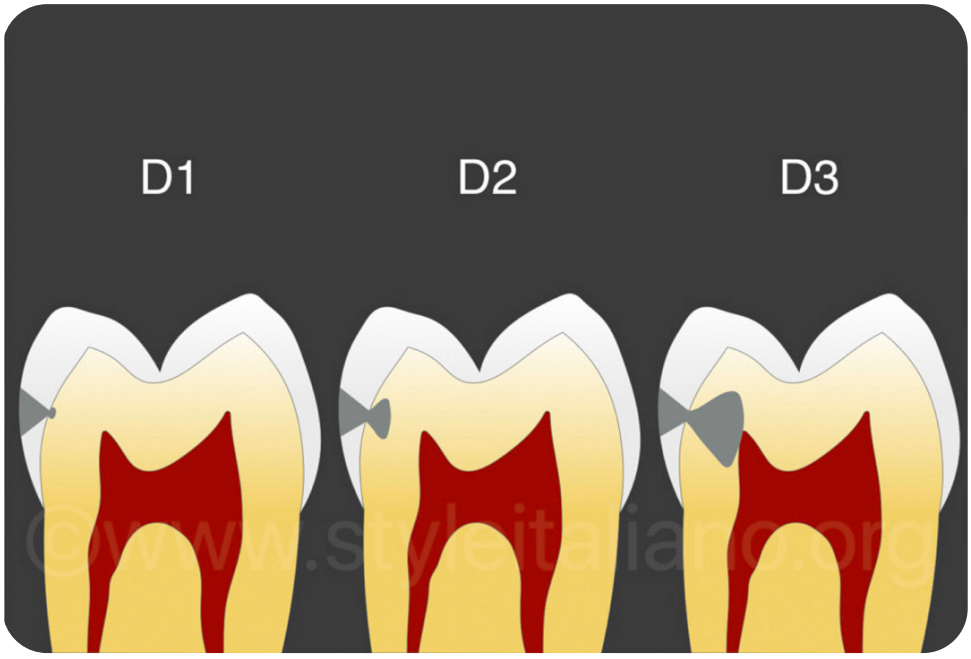


Fig.2
Diagrammatic stages of interproximal caries.
D1: Outer third of dentine
D2: Second third of dentine
D3: deeper third of dentine

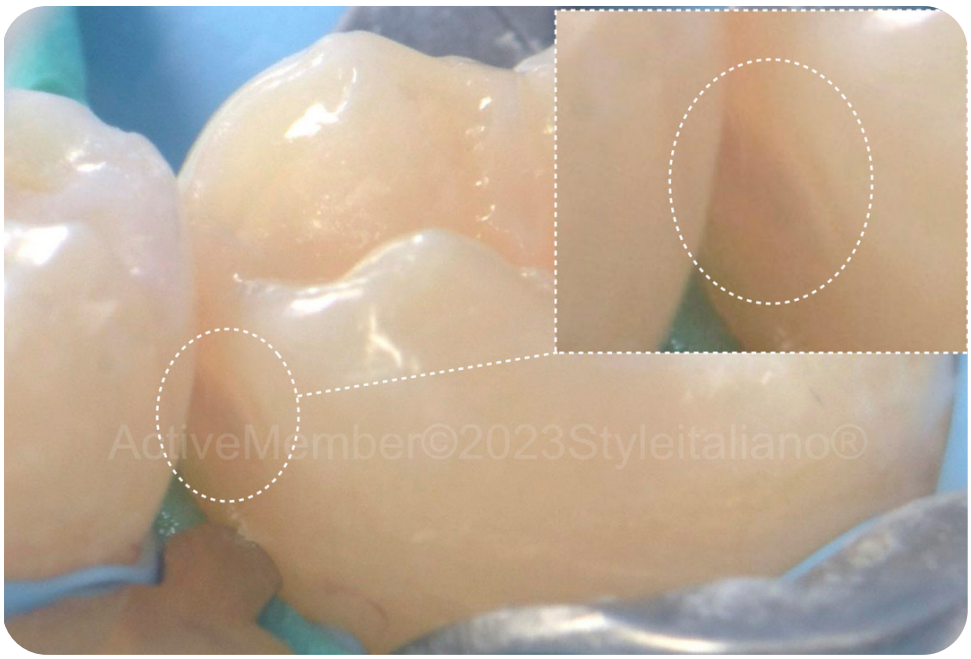


Fig.3
When considering whether to use resin infiltration (Icon) or a direct composite restoration to treat caries, a few factors should be taken into account. In addition to the extent and progression of the carious process, it is important to consider whether the caries is cavitated or not. In cases of cavitated lesions, resin infiltration is not recommended, and a conventional composite restoration should be performed instead. In practice, however, it can be difficult to make a definite treatment decision due to the limitations in the diagnostic techniques.

Fig.3 (continued)

While bitewing X-rays can provide valuable information about the depth of the lesion, they do not reveal whether a lesion is cavitated or not. Only direct visual examination can determine this. This image (Fig 3) shows an example of how a lesion on a tooth can be diagnosed through direct examination. A small E1 lesion can be seen interproximally (circled).

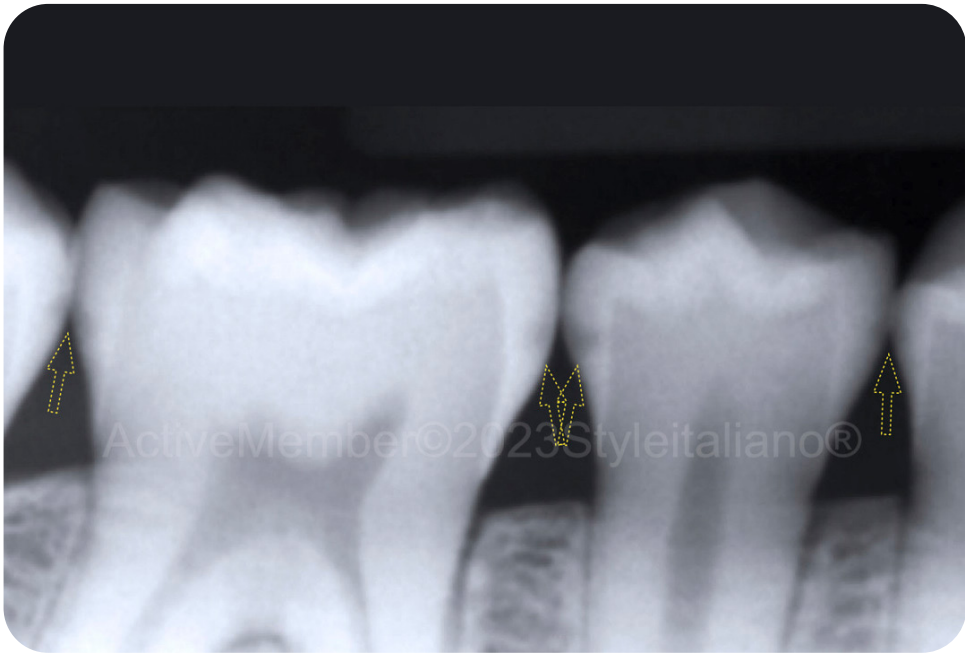


Fig.4

Below is a workflow summary of Icon proximal:
Step 1. Diagnosis of interproximal caries: radiographic E1 and E2 lesions (arrows).

Fig.5

Step 2. Separation of the teeth can be carried out using a number of methods:
I. Orthodontic rubber bands: where possible, it is recommended to place the rubber bands 1 to 5 days before treatment to allow separation to occur.

Fig.6
II. Using the Icon wedges supplied in the Icon proximal package.

Fig.7
III. The use of an Ivory separator. This is placed between the teeth and the screw turned to slowly separate the teeth in question.

Fig.8

Step 3. The affected areas are cleaned using Aquacare by Velopex or equivalent to remove any visible plaque or tartar.

Fig.9

Step 4. With the teeth clean and separated we can start the Icon treatment.

Fig.10

Step 5. Icon Etch, a 15% hydrochloric acid gel, is applied using the proximal tip. The etching process takes 120 seconds, after which the gel is thoroughly rinsed off for 30-60 seconds.

Fig.11

Step 6. Once the gel is rinsed off, carefully dry the area. Icon Dry, a solution of ethanol, can then be used to thoroughly dehydrate the treated area. Simply apply Icon Dry using the application tip provided for 30 seconds and then allow the area to air dry. The lesion should be desiccated.

Step 7. Steps 5 and 6 may need to be repeated up to three times until the lesion has desiccated and appears to disappear when the dry (ethanol) agent is applied. This will provide the best results and penetration of the resin.

Fig.12

Step 8. Apply the resin infiltrant using a new proximal tip. Leave this on the tooth for 3 minutes. Slightly moving the applicator will enhance resin penetration.

Fig.13

Step 9. Once the time has passed, air dry, and use floss to remove any excess and light cure for 40 seconds on each side.

Fig.14

Step 10. Repeat steps 8 and 9, attach a new proximal tip to the resin infiltrant syringe and apply it to the desired site. Allow the material to penetrate for one minute, then remove the application tip from the site. Use dental floss to remove any excess material and cure for another 40 seconds per side.

Fig.15

Step 11. As a last step, use a composite finishing strip to remove any excess and smooth the areas over. Figure showing the completed Icon treatment of the lower right premolars. Steps 1-11 should be repeated for all the necessary lesions as per treatment plan. We can see that the teeth have closed back following the removal of the wedge.

Fig.15 (continued)

The patient should be advised to continue to brush and floss regularly to prevent future caries from forming. It is also recommended that the patient return for periodic check-ups to monitor the treated area with bite wing radiographs and clinical examination. □

Conclusion

Icon is a fantastic conservative treatment modality. In most cases where Icon is used there is no need for anesthetic, drilling, or tooth damage. It is important to follow the instructions and utilise the icon-dry solution to preview the results before placing the resin infiltrant. In most cases Icon can be used as an alternative to cavity preparation, prolonging the time before a more invasive treatment is needed, or eliminating the need of such intervention.

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CONSERVATIVE MANAGEMENT OF OPEN CONTACT BETWEEN OLD COMPOSITE RESTORATION AND OLD INDIRECT COMPOSITE OVERLAY

by

Dr Abdelrahman Mohammed Elgamal

Egypt

Open contact following back-to-back restorative treatments is a common challenge in daily restorative dentistry—a nightmare for patients and a test of skill for dentists. Achieving proper contact anatomy and tightness is the key to overcoming this issue effectively.

The aim of this article is to present a conservative approach for managing open contact between an existing composite restoration and an old indirect composite overlay.

Fig.1

A female patient presented to the dental clinic with complaints of pain, discomfort, and food impaction caused by an open contact space between the lower right second premolar and first molar. The pre-operative image reveals an open contact between the old composite restoration on the premolar and the old indirect composite overlay on the molar. This highlights the importance of creating a broad and strong contact point to minimize the risk of food impaction and subsequent infiltration.

Fig.2

Close-up view of the initial situation reveals a diagnosis of gingivitis due to open contact and food impaction. Despite the localized inflammation, the tooth responded normally to the vitality test (Endo Ice cold test), confirming its viability.

Fig.3
Following multiple rubber dam isolations, the premolar with the old composite restoration exhibited irregular margins. In contrast, the old indirect composite overlay on the molar displayed regular and smooth margins after initial finishing and polishing using discs from Kerr.

Fig.4
Marginal ridge finishing and polishing were achieved flawlessly, thanks to the 4-step OptiDisc system from Kerr.

Fig.5
Caries detector dye application is one of the most effective and objective methods to guide the caries removal process.

Fig.6
Sandblasting was performed using AquaCare (Velopex International, London, UK) to achieve optimal surface preparation.

Fig.7
The cavity is now clean and fully prepared for the adhesive procedure.

Fig.8
The selection of the matrix height and size is a crucial step. Ensuring proper adaptation of the matrix is essential to achieve a well-defined contact point and optimal interproximal contour. After confirming the matrix's fit, a wedge and ring were applied to secure it in place. Selective enamel etching was performed for 20 seconds using OptiBond Gel Etchant from Kerr. Subsequently, two layers of 3M Scotchbond Universal Plus adhesive (Solventum, St. Paul, MN, USA) were applied, with each layer thoroughly rubbed onto the bonding surface. The adhesive was followed by proper air-blowing to ensure uniform distribution before light curing. Finally, the snowplow technique was employed to enhance adaptation and minimize voids at the gingival margin.

Fig.9

Transformation into a Class I restoration began with restoring the proximal wall and sealing the entire dentin surface using a flowable composite. This step ensured proper adaptation and protection of the dentin. A precise contact point was created, along with an anatomically correct marginal ridge inclination. The LM Posterior Misura instrument (LM-Dental, Parainen, Finland) was instrumental in achieving these results, ensuring both functional and aesthetic accuracy.

Fig.10

The composite was carefully placed to restore the final anatomy using the Espresso Posterior technique (FMT as described by Hardan and Akhundov). This approach allowed for efficient and precise replication of the tooth's natural contours. The Fissura LM instrument (LM-Dental, Parainen, Finland) was utilized to craft a simple yet functional anatomy by following the essential lines. Stains were then applied to enhance the aesthetic integration and mimic natural occlusal characteristics.

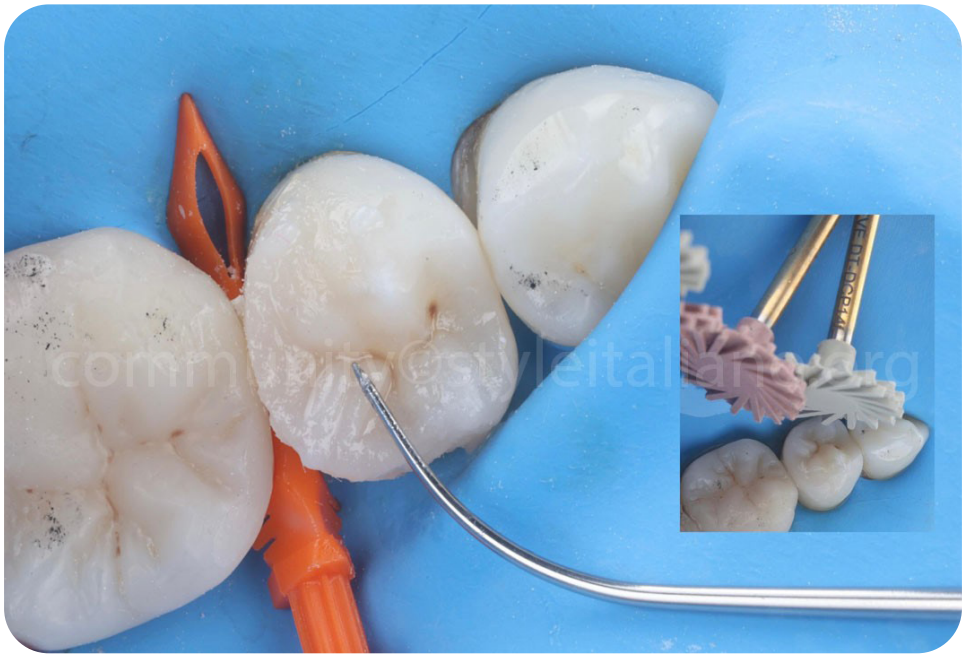

Fig.11

The finishing and polishing protocol was carried out using OptiDisc (Kerr, Orange, CA, USA), Eve Twist (EVE, Keltern, Germany), and OptiShine (Kerr, Orange, CA, USA) at low speed with water. This crucial step ensures the durability of composite restorations, improving both aesthetics and longevity. Polishing enhances the surface, making it smoother and more resistant to wear, contributing to the restoration's prolonged performance and appearance.

Fig.12

The post-operative picture displays the highly polished composite restoration, showcasing a smooth and well-maintained surface. The restoration demonstrates an ideal contact point, ensuring optimal fit and function. The smooth finish reflects the success of the finishing and polishing process, contributing to both aesthetics and the longevity of the restoration.

Conclusions

Incorporating new materials and proper techniques is essential for avoiding open contacts. Key factors include selecting the appropriate matrix height and size, using a separation ring to compensate for matrix thickness, and pre-wedging for gingival retraction and tooth separation. Furthermore, the snowplow technique ensures better adaptation to the gingival wall, minimizing the risk of secondary caries.

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INOVATIVE RESTORATIVE PROCEDURES

by

Snezana Banković

Serbia

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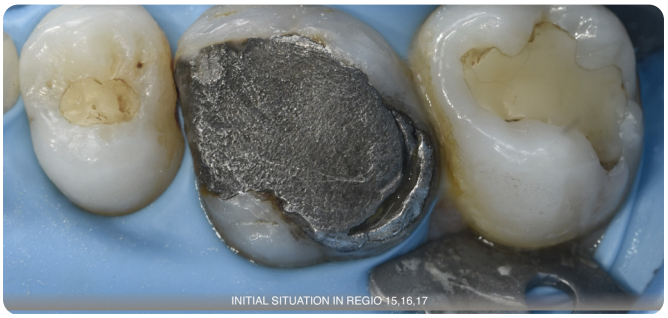
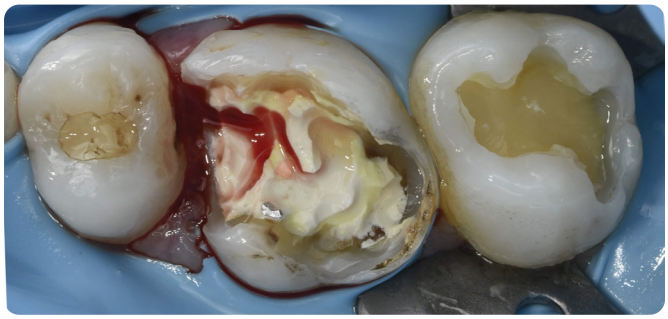
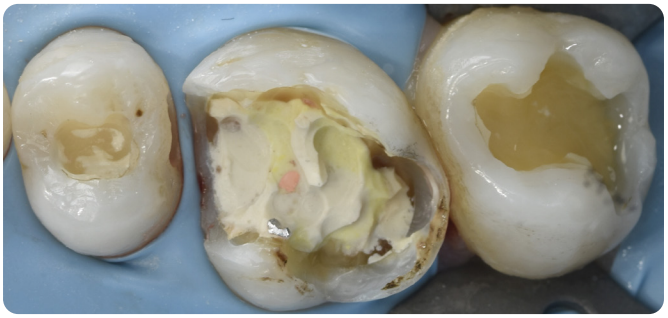
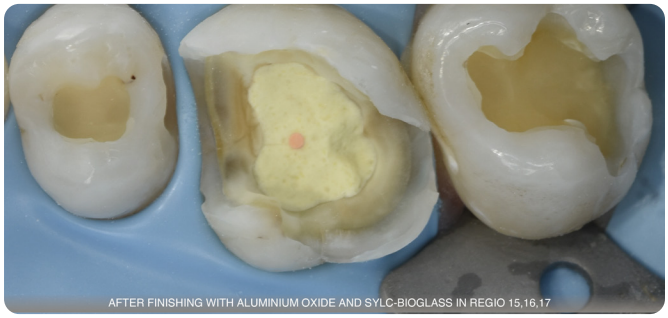
Inovative restorative procedures of direct composite restorations using AquaCare and G-premio bond, EverX Flow and G-eanial universal Injectable composite.









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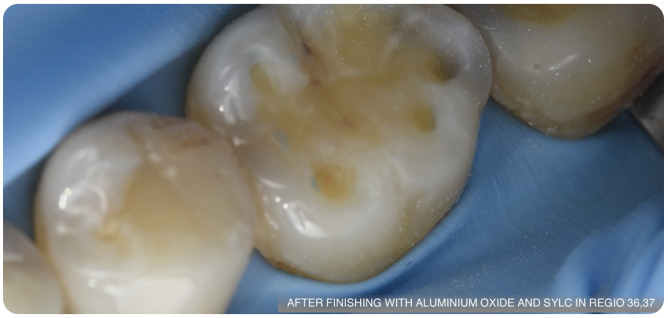

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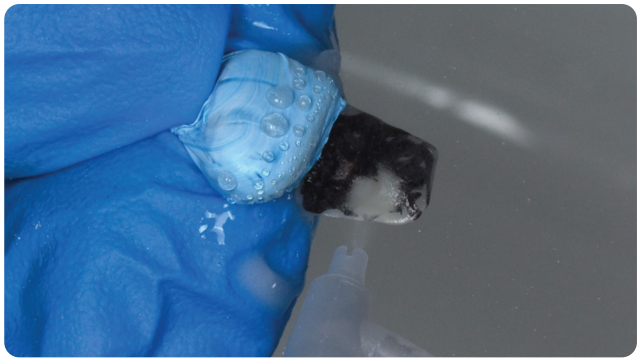

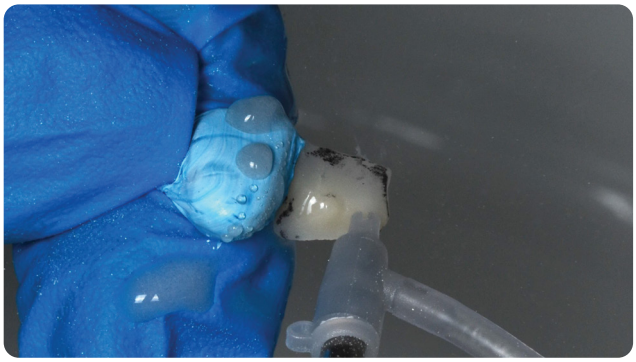

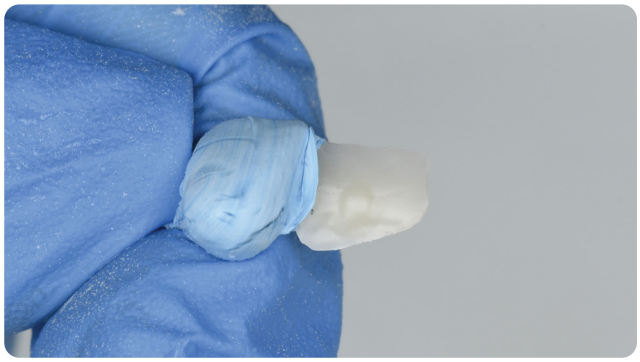

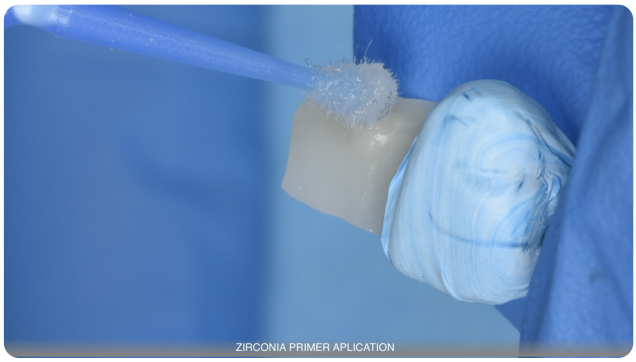
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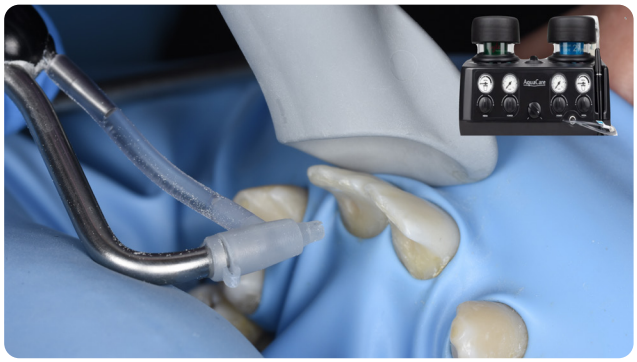
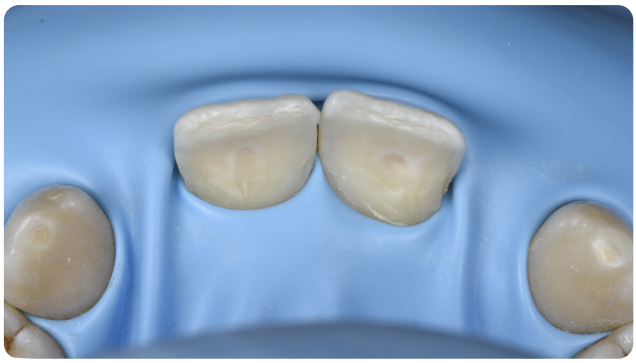
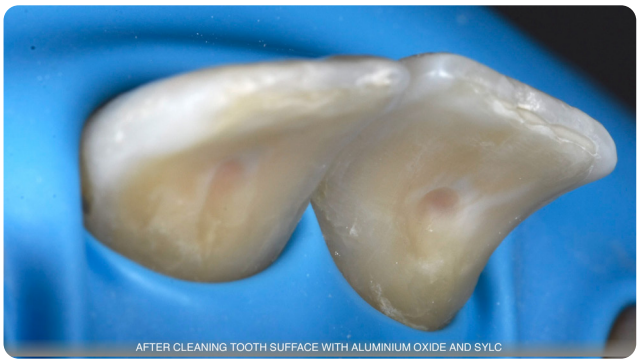


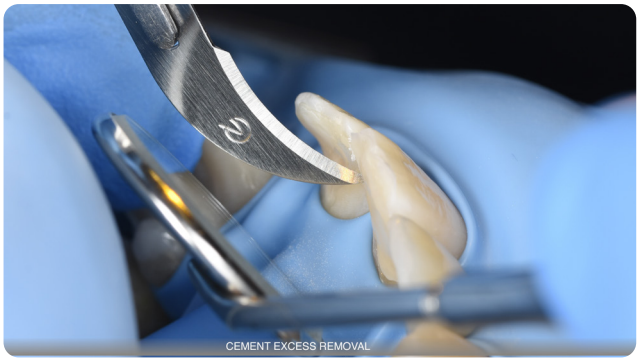
TOOTH SURFACE CLEANING PRIOR TO BONDING WITH ALUMINIUM OXIDE

FINISHING WITH SILC




AFTER CLEANING TOOTH SUFFACE WITH ALUMINIUM OXIDE AND SYLC


CEMENTATION OF A SINGLE-WINGED ZIRCONIA RESIN BONDED FIXED DENTAL PROSTHESES (RBFDP)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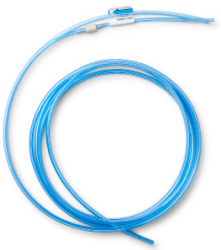

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