

**Clinical case and text by**

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Cervical restorations - the retraction challenge

Every single time we face the restoration of a tooth a challenge arises to mind and probably the most disturbing one is dealing with colour. Fortunately, in cervical carious or non carious lesions, the colour is not a big issue. Choosing the right material, in particular the right opacity, can mean the aesthetic success of the restoration. In these few lines we propose some alternatives for material selection and a singular strategy for gingival retraction, efficient and delicate for soft tissues in these kind of lesions.

Cervical restorations always present a challenge, not only in the aesthetic area but also in the latero posterior region. The aesthetics in these kind of restorations are an achievable task, because most of the time, when the cavity is clean, the substrate below with the new composite blend optimally, leaving us the only task of choosing the composite opacity correctly.

Aesthetics not being a problem leaves us with the question of why cervical restorations fail. Debonding failures are more than common in class V restoration. The evidence shows us that among many factors tooth deflection restorations fail because of a bonding failure in the cervical margin, due to poor adaptation of the material. Those open margins will let filtration occur, the restorations will remain in place most likely because of the bonding in the enamel of the coronal part but short - medium term failures occur often.





1.

Initial situation, a cervical non carious lesion needs restorative treatment. So a strategy should be followed in order to be able to succeed in the immediate and long term. We are pursuing three things: perfect marginal sealing, strong bonding and optimal polishing of the composite material forming the restoration.

Analysing the clinical images, we note a very thin gum and, clinically, the adherent gingiva is only about 1 mm thick. Given this fact, the traditional methods for gingival retraction can be traumatic or inefficient. In cervical lesions such as this one, is difficult to obtain a margin. Generally the passage between the lesion and the root are flat and it is difficult to

determine the extent of the lesion and where to finish the restoration apically. Isolation with clamps and a rubber dam may offer retraction and perfect isolation but the risk of harming the tissue and the clamp having high stability are uncertain, so we can imply that a rubber dam offers uncertain retraction but excellent isolation.

On the contrary the use of retraction cords often offers an excellent means of retraction causing little harm to the tissue but on many occasions, poor isolation due to the cervical fluid, not to mention that when the cord is impregnated with primer and bonding, cause bonding to the gingival sulcus to fail, making the removal of the fibre very traumatic.



2.

The cavity is cleaned with pumice and a micro rotating brush.

Roots with cervical non-carious cervical lesions generally have sclerotic dentin. The surface must be cleaned in order to remove biological film formed in the surface of the dentin and make it more susceptible to the acid treatment (from the classical etch and rinse, to the etch and dry or to the selective etch technique).

Surface treatment of the dentin includes mechanical polishing, glycine powder abrasion, diamond burr roughening, sand blasting or nothing. There is a great deal of information in favour or against the many strategies in the literature. The authors suggest removing the mineral layer mechanically.



3.

After pre-treatment the cavity has to be completely clean.

Knowing that many of the mechanical actions applied to the surface will leave detritus, the surface must be cleaned perfectly with plenty of water. There must be no concerns with the etch and dry strategy because the smear layer will remain in place (except when sandbasting which we do not recommend) especially when roughening with the burr is performed.

Disinfection of the non carious cervical lesions is still an interesting strategy. It has been proven that bacteria present on the surface are still present after mechanical action inside the tubules and different micro defects. The presence of bacteria will lead to the release of metallic proteinase enzymes which have been identified as mainly responsible for mid and long term chemical bonding failure.

Several studies have proved that a 2 % aqueous chlorhexidine solution inhibits these enzymes and improve the bonding strength and longevity. After pre-treatment, decontamination and disinfection, the cavity is ready to receive the bonding agents and treatments.



4.
A mechanical strategy will be applied in order to retract the soft tissues in order to achieve adequate marginal sealing and contouring.

Poor visibility of the margin often means clinicians have to work blind at cervical level, promoting contraction of the material and a lack of precision. Many strategies are adopted to overcome this, such as the use of retraction cords, cervical clamps with a rubber dam, teflon tape as retraction material or no retraction at all.

Having been inspired by existing mechanical methods, the Styleitaliano group, together with the Finnish company LM-Instruments, developed an instrument called a multiholder in order to perfect the previous instrument depending on the clinical needs of these cervical challenges. The instrument and its tips were designed to fulfill many fundamental requirements of the clinical steps.



5.
Selective acid etching of the enamel

As scientific and clinical evidence shows, enamel etching is still the best surface treatment to achieve the highest bonding values on this surface. Although when speaking of dentin, opinions are more than divided. While some authors claim that etch and rinse is still the adhesive system that offers the highest bonding values in dentin, others claim that etch and dry are superior in dentin.

Despite that, many studies show that sclerotic dentin is resilient to both etch and dry or etch and rinse, whereas other authors claim that doubling or tripling the etching time is enough to overcome the difficulties of treating these kinds of surfaces. The authors suggest using the best of both worlds, etch and rinse for the enamel and etch and dry for the dentin, everything in a two step or three step strategy (depending on the product chosen).



6.
Self etching of the dentin with a 60 second scrubbing movement.

In this case a one bottle etch and dry system was used, applied after selective etching. The self etching adhesive will have very little (or no) etching effect on the enamel while the dentin has to be etched for 20 seconds. When applying it to sclerotic dentin, the action time must be doubled or tripled, in this case for 60 seconds.

Talking about one bottle systems, the strategy can be strongly enhanced by applying two layers of adhesive, the first of them used as the primer and completely removed and the second one used for bonding.



7.

Bonding applied and gently airflow is used to thin the adhesive layer.

As said before, when talking about etch and rinse or etch and dry or selective etching, the efforts of emulating a three step bonding system brings more reliability to the bonding process. The primer stage will be more effective, solvent will be perfectly evaporated and removed and, as shown in the picture, the bonding will have the chance to be blown delicately in order to control the film thickness.

In one bottle products, is advisable to blow air gently for 20 seconds. Primer included in the adhesive must ideally be evaporated completely. That way the material will have more stability over time.



8.

Polymerisation

Polymerisation of the bonding is commonly under estimated. Manufacturers in general suggest short polymerisation times and this trend is probably because in-vitro testing of polymerisation of the different products is done in a very controlled environment or, in other words, the distance from the bonding sample is minimal and the intensity of the lamps is high.

The Clinical reality does not allow polymerisation to be as precise as in industry which is why many authors suggest increasing the polymerisation time of the first and most important layer, the adhesive layer.



9.

A traumatic retraction of the gum

As mentioned before, soft tissues are as resistant and as delicate as we treat them and that means a single touch with the wrong force or in the wrong place can lead to bleeding or harming of the tissues. In this image we can see perfectly where the bonding interface was determined and where the restoration should be to close the margin.

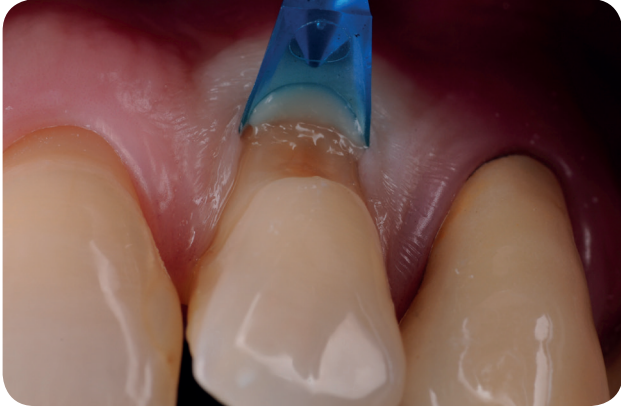
In this case, the small tip of the "Gengiva" instrument was used in order to retract the gum for the restoration procedure. The slight resilience of the plastic allows the tip to achieve more adaptation when more pressure is applied.

When uncommon anatomies are found, plastic tips have the advantage of being customised with a burr or an abrasive rubber in order to fit a furcation or a convex or concave root defect.

This strategy is also very compatible with the rubber dam. When it is in place it is possible to retract the gum and the rubber dam with the gengiva instrument rather than a clamp or dental floss.

Advantages

- The plastic tips allow a certain flexibility to obtain better adaptation
- The hardness of the plastic allows strong retraction
- Personalisation with burrs is possible
- Disposable
- Perfect contrast with soft tissues
- No bonding of the adhesive materials to the surface of the tips
- No significant interference with polymerisation



10.

Composite stratification at marginal level

If the instrument is well adapted to the cervical contour, the first increment of the material will copy exactly the shape and surface of the tip, which in most cases is ideal.

Cervical incrementation will be done with a small amount in order to avoid contraction of the material and marginal leakage.

The colour choice in most class V restorations is based on the correct choice of the composite opacity. In everyday practice, the chroma and hue are not of great importance as generally an A3 colour perfectly meets the aesthetic requirements. The opacity selected should be a high opacity body or a low opacity dentin. As demonstrated in previous publications, the nomenclature given to the different composites can be confusing and in some cases misleading.



11.

Polymerisation of small layers

As we already did a thorough polymerisation of the adhesive layer, we can continue with quick polymerisation for every increment (i.e. 10 seconds) in order to continue the stratification with small increments to avoid contraction and be able to adapt the material better.



12.

Complete insertion of hybrid composite

The result of one shade applied in many small increments is enough to fulfill the aesthetic requirements. At this stage, cervical retraction can be released until further procedures.



13.

Final polymerisation

The last layer is of utmost importance and thus its physical and mechanical properties must be as good as possible. All these features are improved with a final one minute polymerisation.



14. *Releasing retraction*

After the instrument has been removed, the gingival tissues are guided by the restoration and there is no visible trauma or bleeding.

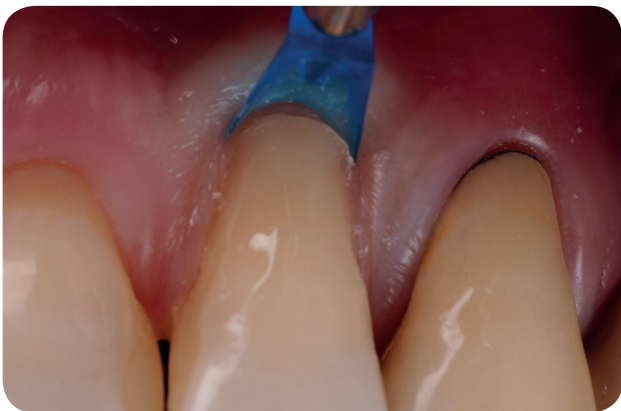
Notice how sometimes and especially when looking at the restoration under magnification, the surface has some imperfections, such as small pits on the surface or bubbles. The small defect will be sealed at this stage.



15. *Surface correction*

As mentioned before, the surface, even when worked with brushes and modelling liquid, sometimes appears to have small defects. If this is the case, we can cover those bubbles and defects with a high filled flowable composite.

These corrections are most likely to be removed during the finishing stage but if there is any chance of a bubble appearing in later stages, following this strategy will lower the odds of that happening.



16. *Retraction for protection*

Finishing procedures are generally delicate with composite and dental tissues but they are extremely aggressive to the gingiva. If soft tissues are harmed at this stage, not only will the patient have discomfort but future problems can be caused especially in thin biotypes and in those cases with little adherent tissue.

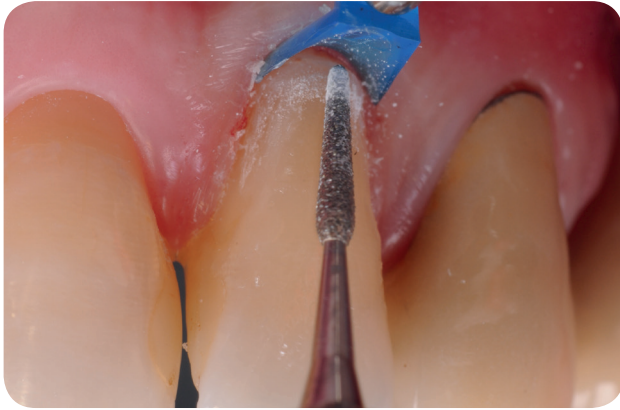
For the finishing stage is extremely useful to retract the soft tissues again in order to achieve two things. The first is not to harm the soft tissues with the burs and abrasive rubbers. The second is to let the instruments get to the area in question to achieve perfect polishing.



17. *Bonding excess removal*

The first stage for finishing is to pass a curette in order to remove the small film of bonding agent that went under the restoration limits.

The instrument used is called a LM-Arte Eccesso, an instrument specially designed for removing excess composite, which has a thick cross-section in order to be resistant enough so that the instrument does not bend during this procedure but at the same time it must be very thin so that it can perform the task.



18. *Rough finishing*

The first step of finishing is with a low-speed diamond burr (Komet finishing style) that works gently with the composite due to the low speed and the balance diamond that caresses the composite and smooths the surface very efficiently.

The goal is to have a completely flat surface that will be ideal for the following polishing appliances.



19. *Fine finishing*

The same movements are done with a low speed multiblade burr. This time the multiblade will act as a polishing device which will make the surface of the composite shine slightly.

After this burr has completed its work, the brushes and pastes will be used in order to give the restoration a high gloss polish over the already smooth surface developed with the previous burrs.



20. *Image: Instruments for finishing - diamond burr and multiblade burr (finishing style)*

21. & 22. *Images: LM-Gengiva for retraction and LM-Arte Eccesso for cleaning excess manually*

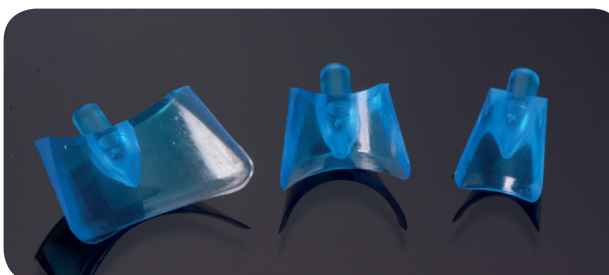
Not only are the interface layering and margin accuracy fundamental to the outcome of the restoration, as is logical, once the composite has been completely modelled and adapted to the new situation, finishing and polishing are fundamental.

After LM-Gengiva has been used as an efficient retraction method for bonding and layering, we will use it as a physical barrier to protect the delicate gum from the finishing procedures, as in the case of the LM-Arte Eccesso curette to eliminate excess bonding agent, the diamond burr for rough finishing and multiblade burr for fine finishing.

The delicate handling of gingival tissues is essential for the immediate and future health of the gingiva. An adequate retraction is fundamental for the correct sealing of the restorations, especially for those carious or non-carious lesions that are located near the cervical area.

Clamps and retraction cords can sometimes be traumatic and create transitory or permanent lesions to the gums. The rational use of "gengiva" will help the clinician to achieve tissue retraction in most cases, with or without the rubber dam without harming the soft tissues.

23. *Image: Tips for retraction*





24.

Final aspect of the restoration

The main goal was achieved, aesthetics were fulfilled and the soft tissues were not harmed at all. This strategy is very useful in everyday practice and specially when other retraction methods can harm a very delicate soft tissue complex.

Conclusions

While working in the cervical area all kinds of solutions must be possible. The importance of not harming the tissue and sealing the restoration perfectly is of utmost importance. The use of the gingiva instrument is useful not only for conservative dentistry but as well for prosthodontic work and as a perfect appliance to use together with the rubber dam as well.

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Styleitaliano, founded by Walter Devoto and Angelo Putignano, is a group of passionate clinicians and researchers, who are constantly developing materials and techniques for aesthetic and conservative dentistry.



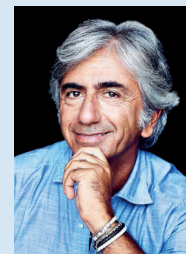
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