

Replacement of Amalgams

Introduction

Modern composite materials are much easier to work with, especially because they provide much deeper depths of cure and shorter curing times. In this context, a material such as the latest composite, from Dentsply, QuiXfil™, enables us to fill deep posterior cavities as a whole as we will see in this clinical case. It is the ideal material for replacement of large old amalgams.

Dentsply materials shown in this film:

- QuiXfil™, Posterior restorative
- Nupro® Prophylaxis paste
- Xeno®III, Single Step Self Etching Adhesive
- Degulux® soft-start curing lamp
- Palodent® Sectional matrix System
- PoGo™ One Step Diamond Micro-Polisher

Original Clinical Situation

This patient exhibits active caries and had several fillings as well as a primary carious lesion on tooth 5 in the lower jaw. The old amalgam in tooth 6 is also defective and the composite in tooth 7 is unsatisfactory, therefore both will need replacement. We can see here an occlusal view of the different fillings with, in particular, the discolouration caused by the corrosion of the amalgam. The x-ray shows a large distal carious decay on the premolar: this means we will have to remove the decayed dental tissue with care. After having performed the anaesthesia, the rubber dam is put in place by setting a clamp on the last molar – tooth 7: it allows us to pull the rubber dam material correctly, and thus helps to create an acceptable free space for the restorative work.

Cavity Preparation:

1 Prophylaxis prior to treatment

Firstly, we clean all dental surfaces, using the Nupro® prophylaxis paste to eliminate any residue or deposit on the teeth, and we carefully wash it out afterwards.

The rotary instruments can be divided into 3 groups:

- Two 830-type burs (i.e. pear-shaped) used to shape the cavities, here in the front
- In the background, the ball burs mounted on blue ring contra-angle handpieces for excavating carious lesions
- Four red ring finishing instruments, designed for finishing composites.

2 Removal of amalgam, old composite filling and carious lesion

The first stage consists of removing the old amalgam. We proceed in small steps, using a lot of spray to avoid any over-heating. Here, you can see the amalgam is removed. In the same way, we remove the composite filling from tooth 7, taking care not to remove any healthy dental tissue. Here, we have an occlusal view after the composite was removed.

We are very cautious when we open the premolar as it has a very large carious lesion. We remove the marginal crest gradually, then access the carious lesion and then slowly open the cavity, taking care not to damage the mesial surface of the adjacent tooth.

3 Cleaning of cavities from carious lesions

Here is a view of the cavity that has, of course, not been cleaned yet. We start by removing the lesions with a small ball bur on the mandibular teeth 6 and 7, where the secondary caries are relatively limited. We work under spray to avoid over-heating. You can now see the cavity.

We select a round bur with a larger diameter to remove the caries from the premolar. We work very carefully due to the proximity of the pulp chamber (shown on x-ray). You see here the brown-discoloured secondary dentine of the cavity. We now smooth the edges of the cervical floor of the cavity. The cavity is quite a large one but we could preserve the natural cusps.

Placement of the Palodent® Sectional Matrix System

The cavity preparations are now fully completed and we insert a Palodent® Sectional Matrix for the proximal filling of the premolar. It is easily inserted using tweezers and kept in place with a finger. The wooden wedge is forced in to hold the matrix in place at the cervical margin.

The matrix is held with a finger to avoid its displacement when the wooden wedge is pushed in. The wedge must be placed with a certain amount of force to achieve good sealing. Here is now an occlusal view on this matrix. We will later add the rings to improve its adaptation.

Placement of the Xeno®III, Single Step Self Etching Adhesive

The adhesive Xeno®III is comprised of 2 bottles. We mix a drop of each product to a nice homogeneous mix and apply it only once. It is important to remember that the solvent used is a mixture of water and alcohol, which means that the material tolerates application on a slightly moist dentine. If the dentine is a little dehydrated, it is easily rehydrated by applying Xeno®III, since it contains water.



Applicator tips provided in the pack are designed for a homogeneous mixing and easy placement of the adhesive in the cavities. The three cavities are treated simultaneously. Please note that the adhesive must penetrate the dentine structure. It must be applied on the entire cavity surface as well as on both the enamel and dentine. These applicator tips are very useful indeed, because we can effectively dab the adhesive into the dentine.

With the pre-molar, make sure that you treat the entire dentine surface, especially under the enamel undercut.

The solvent is then spread using a gentle stream of air – hold far enough away, to avoid thinning the adhesive layer by excessive air-drying.

Each cavity is then light-cured - 10 seconds for each cavity is enough to polymerise the adhesive. Curing is important to achieve a good, deep polymerisation of the hybrid layer within the dentine.

Placement of the QuiXfil™, Posterior Restorative Material

1 QuiXfil™ in Bulk placement (tooth 7)

QuiXfil™, available in the practical Compules® Tips, provides a very low shrinkage rate. Its single Universal Shade simplifies the procedure and makes it suitable for most clinical situations.

It can be injected into the cavity in a relatively thick layer since it can polymerise perfectly within 10 seconds at 4mm thickness. We use a condenser, taking care not to compress the material and form a mass that gradually liquefies to become smooth. We work with pressure on the material but never stretching or spreading it, to avoid air bubbles.

Small additional increments for reproductions of anatomic details (tooth 7)

We now adapt the filling, as it cannot be perfect at this stage. Here, we have to restore all the occlusal cusps, bulbs and fissures. We see the buccal part first. We cure and then we do the same for the lingual part: shaping and creating fissures. A final increment corrects a small imperfection.

See how easy it is to work with this material, as it does not tear off and, above all, does not stick to metal instruments. This final layer is polymerised.

Bulk filling (first molar)

We now start filling the first molar. This tooth has a very large cavity however, we can fill it all with one mass of material. The condenser helps make the material slightly more "fluid." We obtain a homogeneous mass of composite on which we directly pre-shape the all-important anatomical structures of the occlusal surface.

Small additional increments for anatomic details (first molar)

We cure and with the same procedure as before, we add several small increments to reproduce details of the various anatomical structures. Here, a slightly more pointed instrument makes it easier to reproduce thin details of the tooth: As our patient is young, all fissures are therefore deep and clearly marked.

We cure again and see that we must still add a bit of material in some parts: for example at the distal part of the disto-buccal cusp and cure. Please note again that QuiXfil™ does not stick at all to instruments.

Filling of the premolar: Palodent®

We place a Palodent® separation ring to improve the quality of the contact points as it will create space needed for a better proximal contact between the premolar and the first molar. The matrix is adapted with a burnisher. It gives the matrix the desired shape and the cavity is now ready to be filled.

Filling of the premolar: bulk filling with QuiXfil™

We place at once a large amount of QuiXfil™. The condenser makes this bulk filling smooth and you can see how we can easily form the distal marginal crest without ever touching it: This was done by modelling the homogeneous mass of composite material.

On this view, we see the distal marginal crest that is pre-shaped and we now have to rebuild the cusps. We can do the work in one layer, using the same Peter Thomas Number 3 hand instrument as before. We carve and model our increment to the final desired morphology without the risk of running out of time, as QuiXfil™ exhibits a sufficiently long working time. We then cure.

Finally, we remove the matrix system, starting with the ring, then with the wooden wedge. We remove the matrix by pulling it sideways with tweezers. Here, we see that it might even tear, which demonstrates that we have created an excellent interproximal contact. Although QuiXfil™ does not belong to the "packable" composite materials, you see that one can still achieve excellent contact points. We will check this contact point later, using silk floss.

Finishing steps with burs

We now enter the finishing stages. We use red ring finishing burs - mounted on a red ring contra-angled handpiece, rather than on a turbine, and so can better control the pressure on the instrument.

We will use them, to pre-shape and finish the cuspids both lingually and vestibularly. It is also possible, with this type of instrument to:

- accentuate fissures,
- eliminate a certain amount of excess material,
- Create a good transition between convexities and concavities on the occlusal surface.

We always work at a moderate speed to control the movement during these finishing stages, since only very small quantities are being removed.

We finish here by creating the mesio-proximal pit. You can see here on the occlusal view, the anatomy obtained under these conditions. We do the same for the pre-molar, where we are careful to preserve the convexity of the marginal crest.

You can see, in this occlusal view, the difference in shade due to the translucency of the material. This, in effect, permits a deep photo-polymerisation. However, when replacing amalgam, as you can see in tooth 6, discolouration caused by the amalgam is shining through to the surface, although the cosmetic result is infinitely better than anything achieved previously.

We do have some excessive adhesive on the premolar: Excess from the inter-proximal space can be easily removed with a periodontal curette.

Polishing with PoGo™

The finishing stage is completed very quickly using only one instrument – we use the point form from the PoGo™ system. It gives a very nice shine on the occlusal surface, having beforehand used the red ring finishing bur. We can work, as is the case here, without a spray on a lightly moist tooth. We work at low speed to avoid the risk of overheating. It is possible to use it at low speed on a dry composite too. We have, ourselves, done some tests using a water spray and also obtained excellent results.

We want to make sure all dental surfaces are polished and proceed with care. I want to stress again that the quality of the result you can see on the screen is obtained with only one single instrument.



Contact points

We check the interproximal contact point using silk dental floss and you can see that, here, we have obtained an excellent proximal contact.

The articulation is adjusted, after having removed the rubber dam. Clearly two high spots of the filling are removed, with the same bur as that used for the finishing.

A second check is carried out and you can see how the creation of the normal occlusal anatomy enabled us to obtain easily a tripod, as described in the dental literature. Under these conditions, we can easily position all contact points with the opposing teeth.

Final View and Conclusion

Here is a general view of the filling on the post-operative x-ray. You can see:

- the excellent cervical adaptation of the proximal filling on the premolar,
- the good radio-opacity of the QuiXfil™ filling product.

We have shown how valuable is this new generation of composite QuiXfil™. The material is easy to use, does not stick to instruments and allow a fast bulk placement.. We can now, in ONE SESSION, treat 3 posterior teeth with large cavities and get excellent final results. The combination of Xeno®III + QuiXfil™ save quite some time for the whole procedure without compromising with the quality of the results.