

DENTAVANTGART

labline

VOLUME III ISSUE 04 WINTER 2013



INTERVIEW

THE
BOUNDLESS
**MICHEL
MAGNE**

MDT. BENJAMIN VOTTELER &
DR. ANDREA KLINK

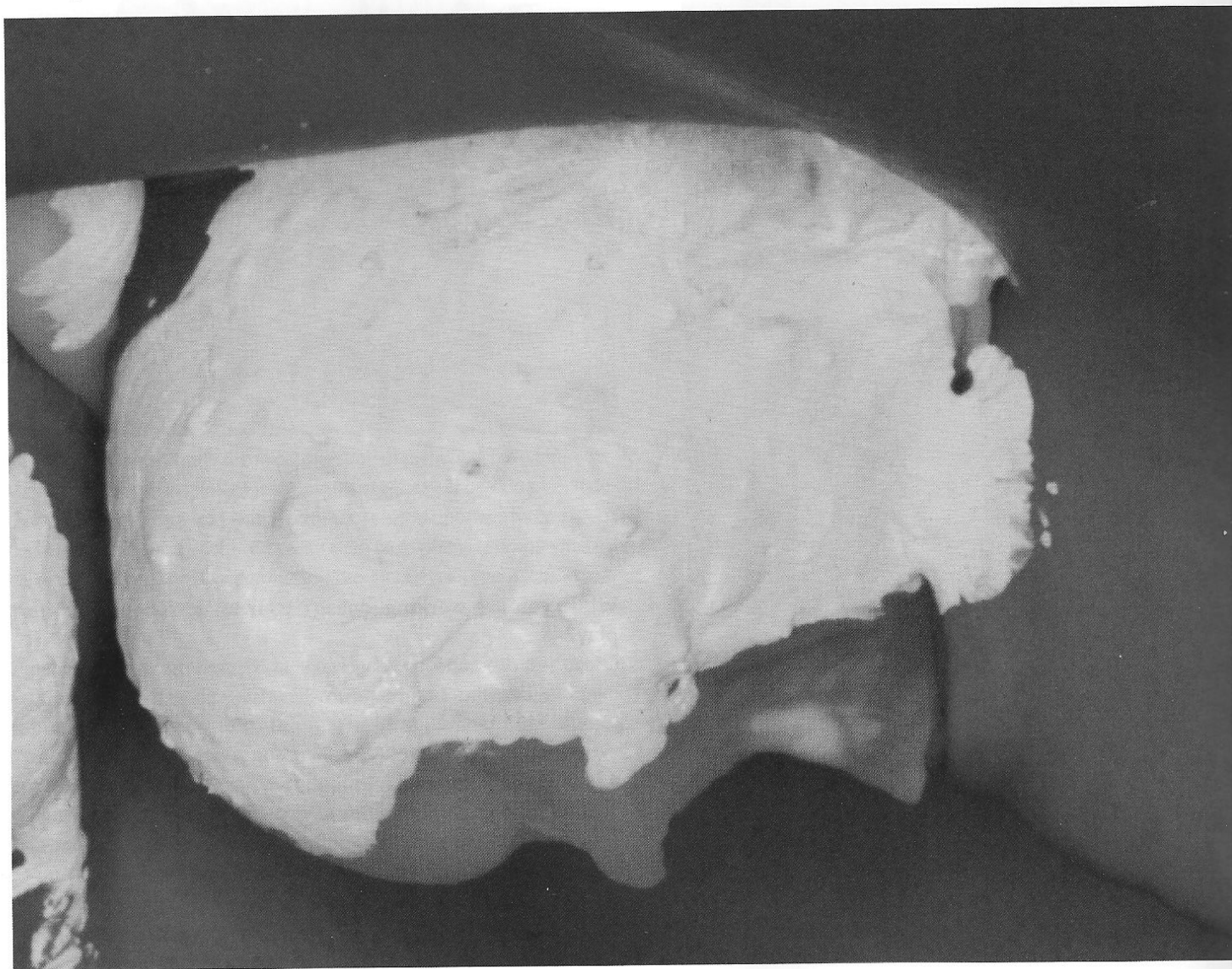
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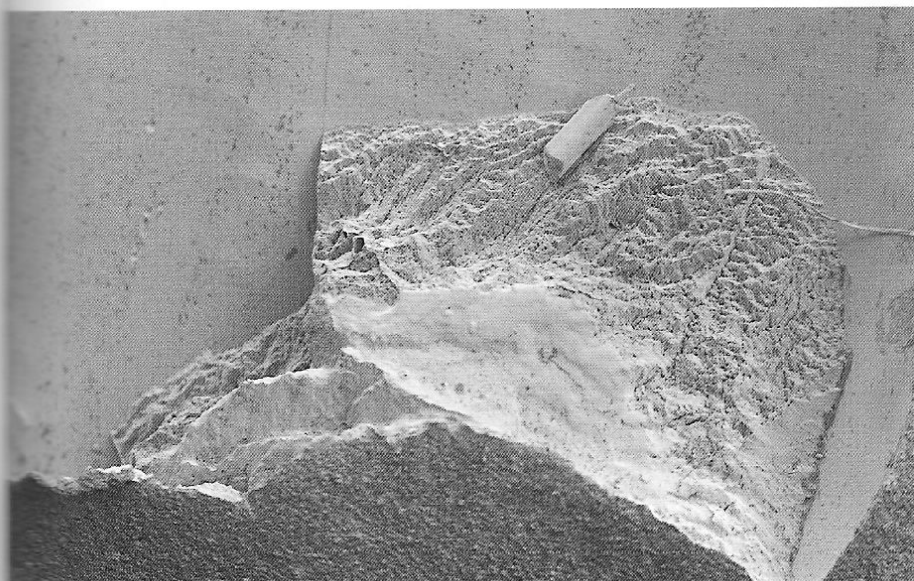
DR. JORDI MANAUTA &
DR. ANNA SALAT &
DR. ANGELO PUTIGNANO &
DR. WALTER DEVOTO

ON/OFF

DR. SERGEY GRISHIN

THE PROBLEM OF EXCESS RESTORATIVE MATERIAL ON TOOTH SURFACE





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prosthetics

I have long encountered the problem of excess composite material, adhesive systems and composite cement on tooth surface after certain treatments. Some composite cement remains on the surface of the teeth virtually every time after fixation of indirect restorations or orthodontic appliances. On frequent occasions I can also identify excess adhesive systems and composite material on the surface of the teeth outside the preparation area after direct restorations. This problem does not seem to be of great concern at first glance. Excess composite material and adhesive system are invisible both to the patient and the dentist, but this situation changes later.



When I refer to excess composite material, I mean the material or adhesive system that is stuck onto the tooth surface outside the area of enamel preparation. These materials can stick onto such surfaces for a number of reasons. Adhesive system can end up outside this area when blown by the dentist. Later it polymerises and remains on the tooth surface for a long time. It is most often found in the cervical zone of a tooth under restoration, but in a number of cases I have located it on adjoining intact teeth. Composite material can remain unnoticed on tooth surface after direct restoration. When preparing a restoration, the dentist can spread restorative material far beyond the preparation area. Excess restorative material is most often found just near the restoration or not far from it.

Sometimes the dentist intentionally overlaps the border between the preparation area and the untreated part of a tooth with composite material to hide it and make the restoration look better, but this material should also be considered excess. Small regions of a tooth can also be covered with excess composite cement after fixation of orthodontic appliances or indirect restorations.

Excess composite material is certainly a problem during bleaching, but this is not the only case when excess restorative material can have an adverse effect on the appearance of teeth. I am referring to minimally invasive and non-invasive direct restoration, where the amount of restorative material on tooth surface is strictly limited by the enamel preparation boundaries. This is especially relevant for teeth with marked macro- and micro texture.

I have discovered a certain pattern. The more expressed the tooth surface morphology is, the more excess composite material sticks to it. Like plaster, restorative material levels enamel surface, penetrates deep into microstructure and remains there even after finishing. This is especially so if brushes and silicone heads are used that simply move restorative material along the tooth surface. Afterwards it is virtually impossible to remove all excess restorative material and to uncover the tooth surface texture. Adjusting the restoration texture pattern to the tooth texture pattern is even more complicated when the border between the prepared and non-prepared areas and the texture itself cannot be seen as they are covered by excess restoration material.

I asked myself if it were possible to control the amount of composite material on the tooth surface during the preparation of restorations,

and if it could be easily identified after finishing the restoration with composite material.

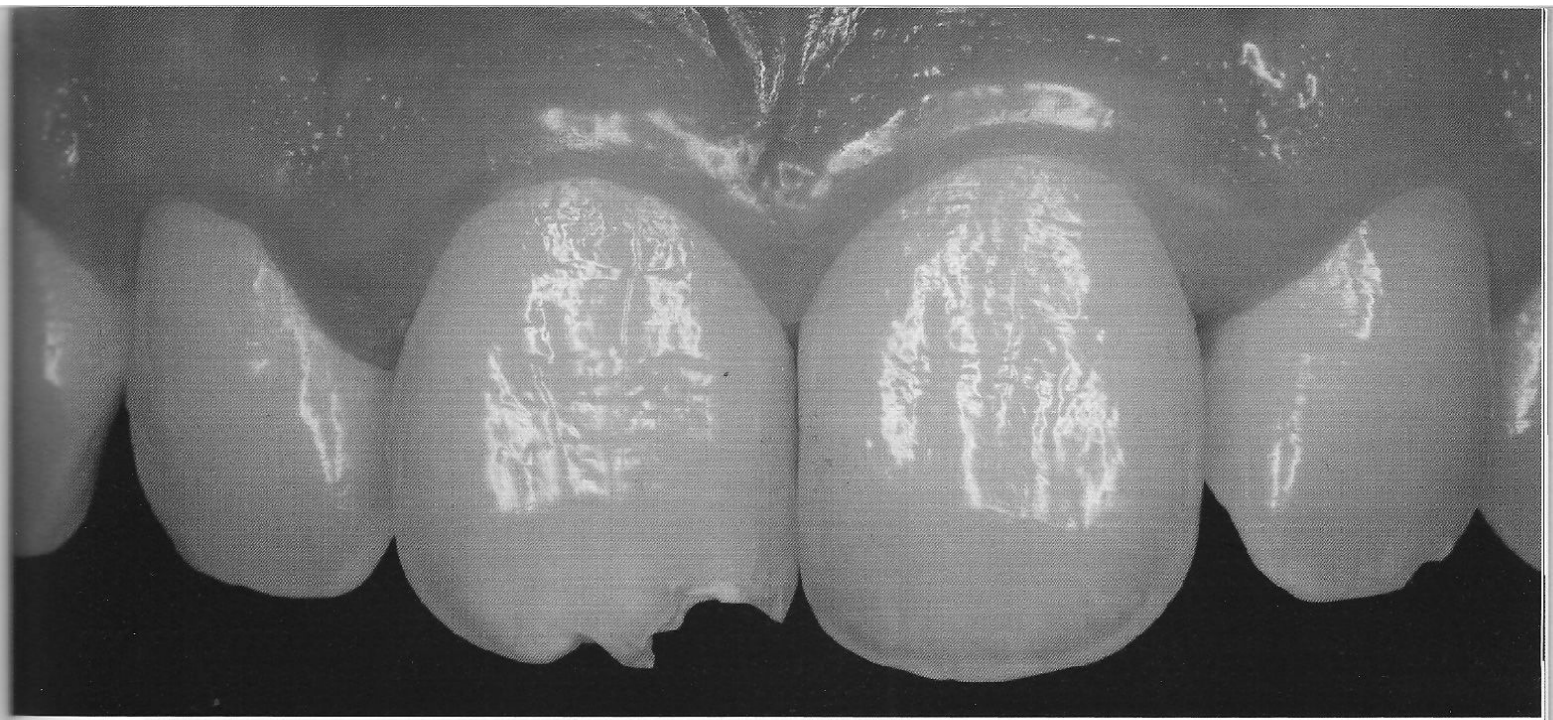
I have run a series of tests to identify adhesive systems and excess restorative material after direct composite restoration. As a result, I found a simple way to detect the composite.

In continuing my research, I have set my mind on minimising excess composite material on the enamel surface. A number of experiments led me to the conclusion that the best solution was to create a protective layer on the enamel surface to prevent unwanted composite material from sticking to the enamel. Silicone, wax or other separating material that is easily removed from enamel after the restoration, can be used to form such a protective layer. I have used various separating materials and formulated certain requirements as to the properties of the result.

Firstly, separating material must be easily applied to the tooth surface and easily removed from it. Secondly, the protective layer must not become displaced or folded on the enamel surface during composite application, even if restorative material is stretched with brushes or a silicone instrument. Thirdly, the protective layer must be sufficiently thick so that the composite restoration is above the enamel level when finished. This additional thickness of composite material is required for further finishing, polishing and recreation of texture. And the last but not least important property is opacity of a protective layer. If the layer is not opaque enough, it will not be easily identified during polishing, so it may remain covered with a thin composite layer on the enamel surface. It will eventually dissolve, and the resulting empty space will become a haven for colouring matter from food.

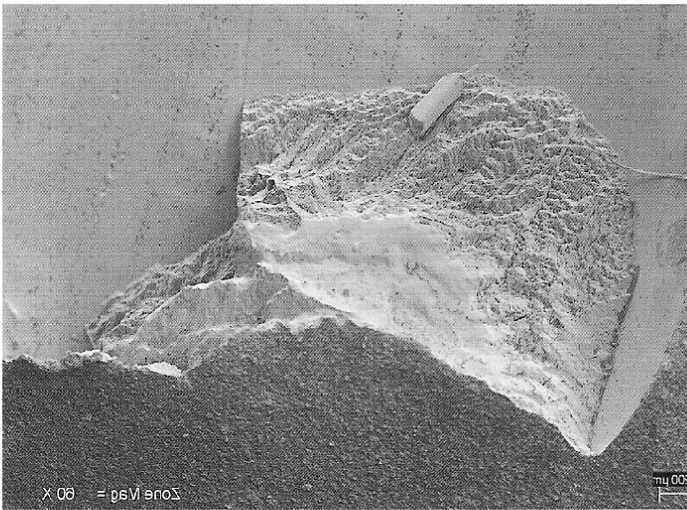
I used wax in the earlier stages of experiments with protective layers. Wax complied with all my requirements except one, i.e. opacity. My final results often proved unsatisfactory as I was unable to control the wax protective layer fully. This is why I used another material for my later experiments that is not traditionally employed in dentistry. I turned my attention to the correction fluid commonly used in offices. Strange as it may seem, this conformed to all my requirements. This protective layer resulted in a totally clean enamel surface.

I would like to describe a case where I used an enamel protection layer. ➔



1 I was consulted by a 28-year-old male patient with defective cutting edges in tooth no. 11 following an injury

After making the diagnosis, I decided to prepare a non-invasive direct restoration. I chose this technique because of the shape and size of the defect and the tissue condition (**Fig. 2, 3**).



2 SEM* of the cutting edge defect in tooth no. 11



3 SEM of the cutting edge defect in the enamel of tooth no. 11

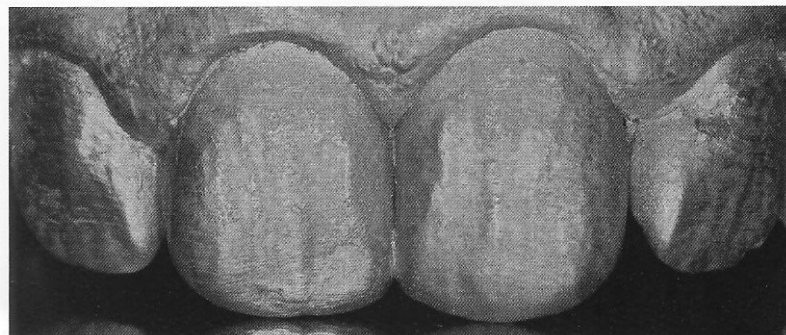
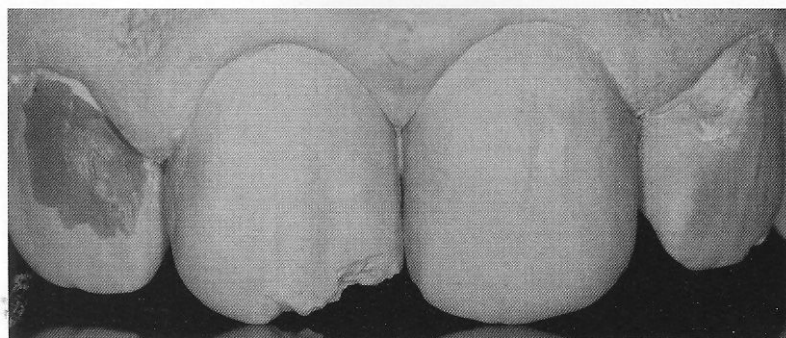
*SEM: Scanning Electron Microscope

During the patient's first visit I took teeth imprints and made dental casts (**Fig.4**).

Then I prepared silicone keys from the Wax-Up (**Fig. 5, 6**).

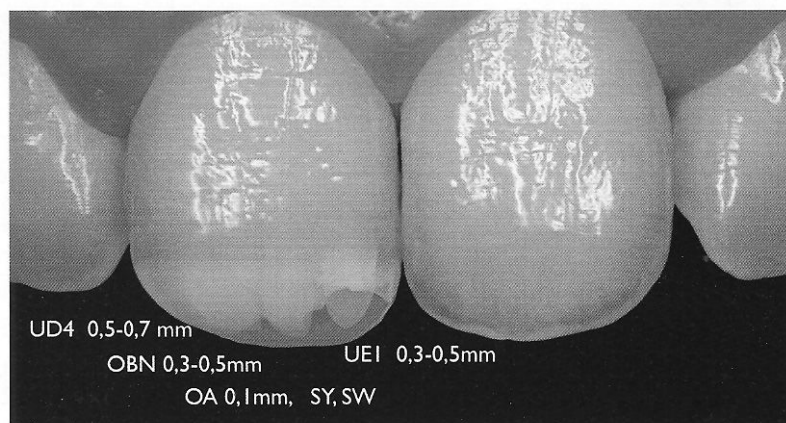
During the planning stage I created a detailed colour scheme for restoration with a 3D-tissue map (**Fig. 7, 8**).

I chose Enamel plus HRI (Micerium) as restorative material. Having finished the preliminary actions, I moved on to the clinical stage.



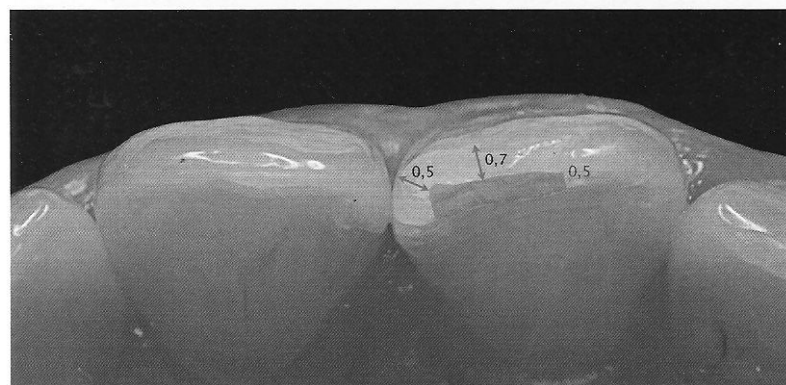
4
The casts

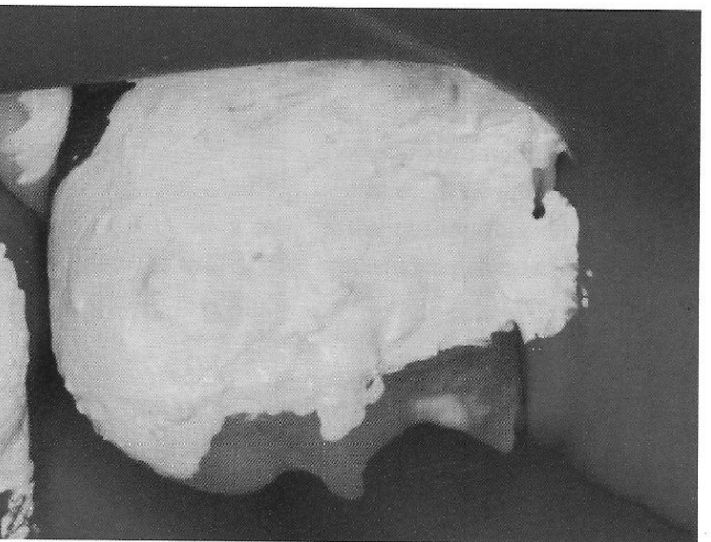
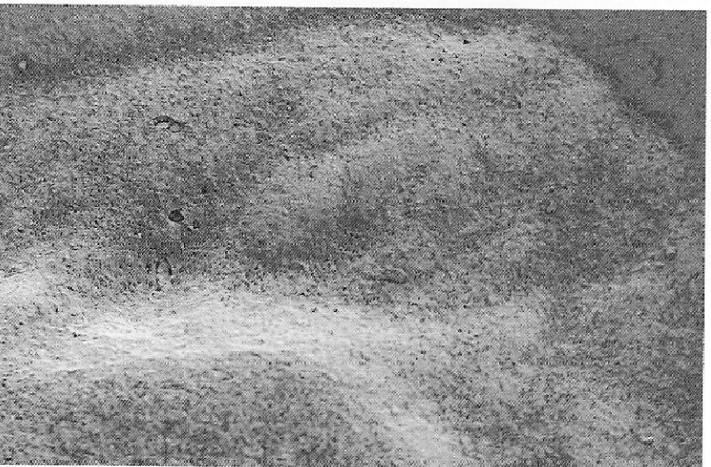
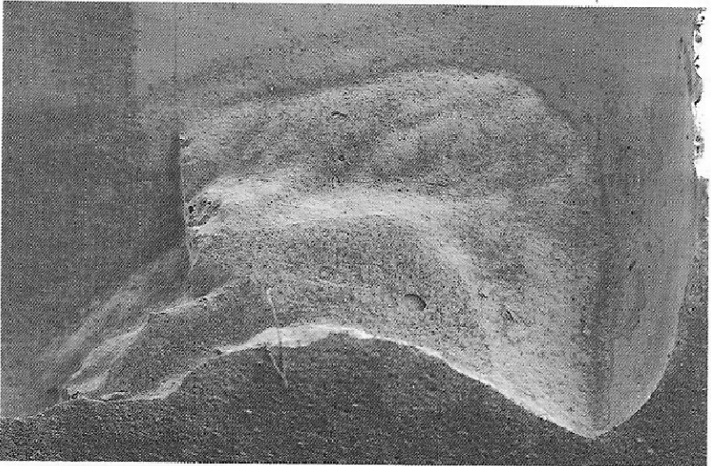
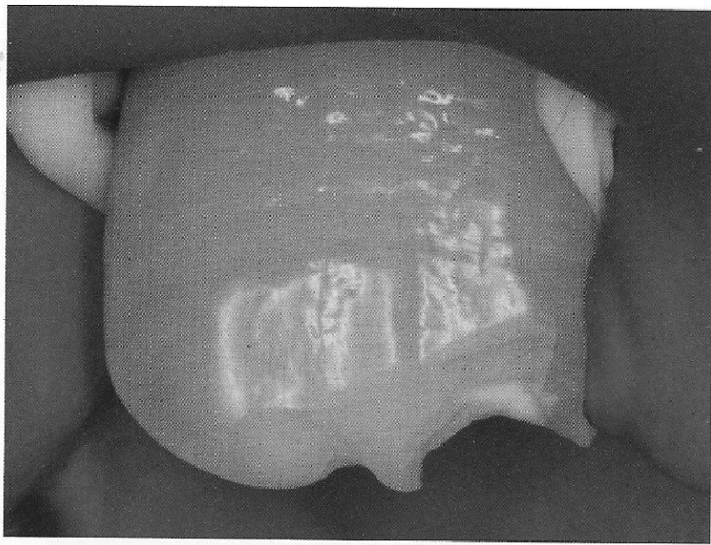
5-6
Wax-Up



7
Colour chart

8.
The amount of tissue lost





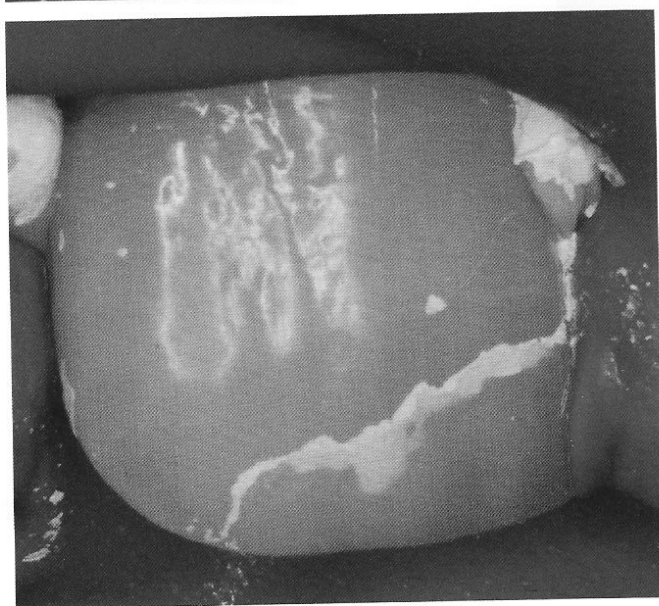
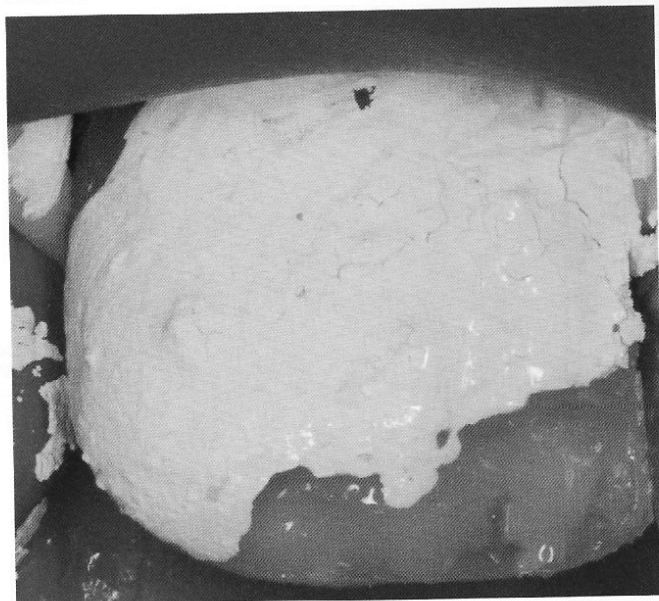
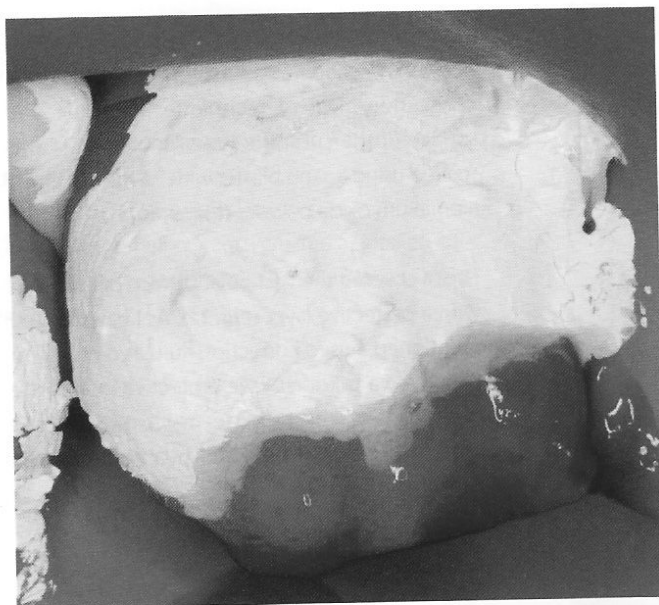
As the restoration would have enough retention due to the shape and location of the defect, I chose non-invasive technique. The defective surface of the cutting edge of tooth no. 11 was treated using a sand blaster with 27-micron grade aluminium oxide powder (**Fig. 9, 10, 11**).

Then I covered the vestibular surface of the teeth with a protective layer (**Fig. 12**). As I have already mentioned, I used correction fluid as a protector. I removed a portion of the protective layer in the demarcation area for a better match of composite material and tooth tissues and greater control over the protective layer.

9
Photo of the defect
after sandblasting

10, 11
SEM of the defect
after sandblasting

12
Vestibular surface
of the teeth with a
protective layer



Afterwards, I followed standard adhesion procedure for the fifth generation system. Enamel conditioning was strictly limited to the area not covered with the protective layer (**Fig. 13**).

I started stratification with restoration of the palate wall by means of silicone keys and Enamel plus HRI UE1 mass (**Fig. 14**).

Then I reconstructed dentine body using dentine UD4 and paints (**Fig. 15**) and finished the restoration by applying enamel mass (**Fig. 16, 17**).



13
Enamel conditioning is strictly limited to the area free from protective layer



14
Construction of the palate wall



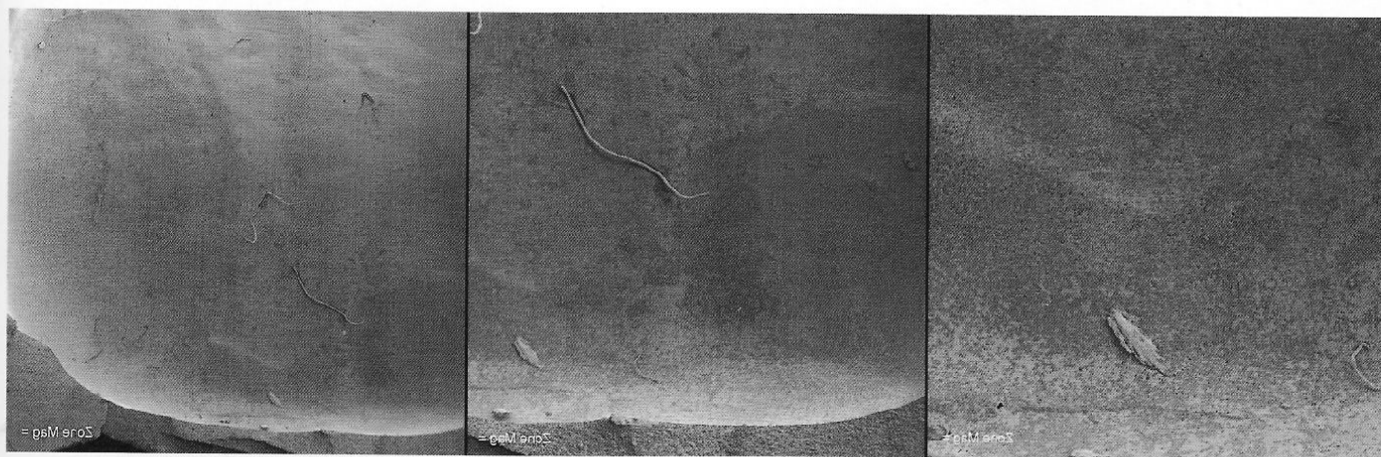
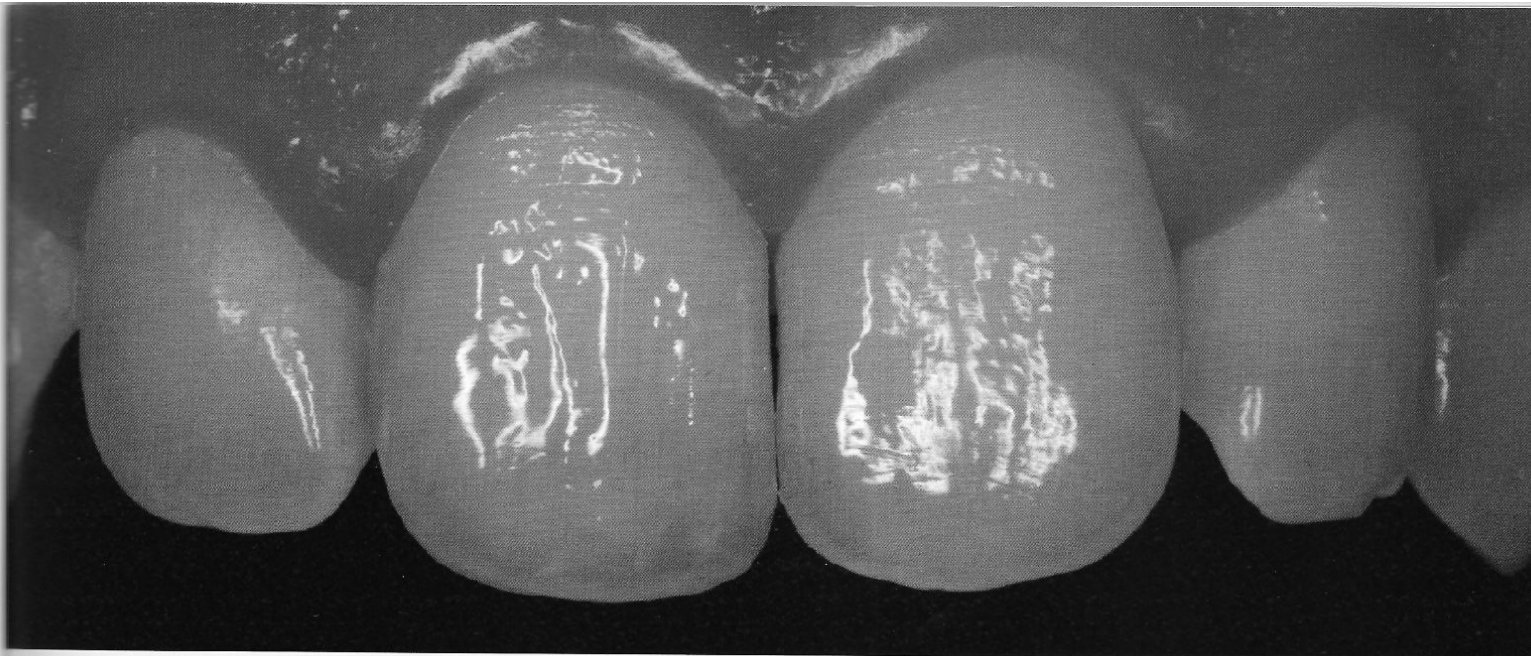
15
Construction of dentine body



16
Stratification is finished



17
The protective layer is removed by means of air-flow



Stratification was carried out using 3D tissue maps for guidance. Finishing was carried out in accordance with the procedure for Enamel plus Shiny (**Fig. 18**).

I took several SEMs with different magnifications to demonstrate how clean the surface can be when using a protective layer (**Fig. 19, 20, 21**). One can be absolutely sure that the enamel surface is free from excess composite material and adhesive system.

This restoration technique is certainly more complicated than traditional methods and requires more concentration, but the result is worth it. All the experiments conducted allow us to come to the following conclusion: when we use a protective layer during direct restoration, we can be absolutely sure that the enamel surface is clean, and this will allow us to locate the natural texture pattern to be recreated during restoration.

18
The restored tooth no. 11

19-21
SEM of the final result