

# Esthetic integration between ceramic veneers and composite restorations: a case report

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## Summary

**The tooth structure preservation is the best way to postpone more invasive therapies. Especially in young patients more conservative techniques should be applied. Bonded porcelain veneers and even more the direct composite restorations, are the two therapeutic procedures that require the fewer sacrifice of dental tissue, finalized to the optimal recovery of aesthetic and functional outcome.**

**Although the two techniques require different methods and materials, is possible to achieve a correct integration of both the methods by some technical and procedural measures. In the presented case is planned a rehabilitation of the four upper incisors by ceramic veneers and direct composite restorations.**

**Care is taken for the surface treatment of ceramic restorations, with the objective of achieving integration, not only between natural teeth and restorations, but also between the different materials in use.**

**The purpose of this article is to show how a proper design of the treatment plan leads to obtain predictable results with both direct and indirect techniques.**

**Key words: ceramic veneers, composite resin, esthetic rehabilitation, mimetic restoration.**

## Introduction

Ceramics and composites present different superficial nano-texturing and this leads in a different light reflection at the surface. In the esthetic zone this difference could represent a limit to the choice of the restoring material because the two substances differently interact with the light incidence. If little amount of saliva wets the surfaces this difference can be noticed as shiny and well defined glassy reflections on the ceramics against matte and blurred reflections on the composites.

There are techniques that allow to manually polish the ceramic surface in order to maintain a certain grade of nano roughness at the surface, such to obtain a composite like reflection of the light.

In the presented case is described a solution to obtain fine integration between the two materials. The technician was requested to manual polish the ceramic surfaces in order to achieve the same light reflections characteristic of composites, by keeping a lightly augmented roughness.

## Case presentation

The patient at the end of orthodontic treatment presents aesthetic problems in the upper frontal area. In particular, clinical examination detects inadequate composite restorations at 1.1, 1.2 e 2.1; tooth 2.2 is conoid and presents inter-proximal diastema.

2.1 presents root canal filling, while the other tooth of the sextant presents vital with optimal periodontal tissues. Light discolorations affect 1.2 and 2.1 (Fig. 1).

Direct multilayered composite restorations upon 1.1, 1.2 e 2.3 and bonded feldspathic porcelain veneers at 2.1 and 2.2 are programmed to finalize the case (3-5).



Figure 1. Frontal view at baseline: the patient presents amelogenic defects at 1.2, old and inadequate composite restorations at 1.1. The tooth 2.1 is devitalized, discolored and widely restored by composite, 2.2 is conoid and presents inter-proximal diastema.

## Materials and Methods

The early stages of the project include the creation of a diagnostic wax-up based on aesthetic directions. A transparent silicone index (Regofix, Dreve Dentamid GmbH, Germany), built from the additive wax-up, is made to simulate the final outcome in patient's mouth through a direct mock-up<sup>6</sup> through a self curing resin (Fig. 2).



Figure 2. The transparent silicone index (Regofix, Dreve Dentamid GmbH, Germany) is the impression of the wax-up and is used to obtain the direct mock-up. Acetate matrixes are embedded in cuts made in the interproximal areas. These divisions help finishing the mock-up into the interproximal areas.

The mock up is helpful to establish phonetic, functional and aesthetic limits (Fig. 3) and at an extra-oral view, asymmetry is shown related to the face and the smile-line, which is angled to the left. It is also shown a high smile-line with wide exposure of keratinized gingiva. The development of the lower lip follows the front incisal edge with an asymmetric posture (Fig. 4).



Figure 3. Mock-up in position: phonetic and aesthetic considerations can be done and any mock-up modification has to be registered by a new impression. The silicon was rebased with a self-curing resin composite without preparing for adhesion.

Adaptation of the modified mock-up are registered through an impression to be sent to the technician. New templates with the morpho-functional update are required for the following sessions. The technician also provides temporary resin veneers for 2.1 and 2.2. Previous restoration are removed and sections of the new template are used as a reference. Operating field's isolation is obtained by rubber dam stabilized by knotting Gore wire (Glide, Crest, Toronto).



Figure 4. Extra oral view of the mock-up: patient's face and smile-line is asymmetric and gummy-smile is present.

Adhesion interfaces are prepared (Clearfil Se-Bond, Kuraray Medical Inc., Japan) (Fig. 5).

The transparent silicone index is used as template for the palatal and interproximal composite layers. Acetate matrixes are embedded in cuts made in the interproximal areas. Buccal surface of the silicone is cut approximately 0,3 mm apical to the incisal edge, thus providing information about the thickness of the incisal portion of the restoration.

On the silicone index, extraorally, are located resin composite masses avoiding light-curing: a thin layer of enamel is painted into the matrix and incisal halo is drawn by the use of staining resins.



Figure 5. The old composite and the enamel defect are removed, surfaces are smoothed and prepared for adhesion.



Index is placed in mouth with the composite still uncured. A good control of ambient lighting is necessary in order to avoid unintended polymerization. Furthermore, it is recommended to use heated composite, in order to better spread the masses in thin layers.

After curing the template is removed (the matrix can be lived in the mouth) and the reconstructions of 1.1 and 1.2 can begin (Fig. 6).



Figure 6. A silicon index guided the palatal and incisal edges shaping.

The masses of dentin are stratified with chromaticity desaturated from cervical to incisal and from palatal to buccal (from A4 to A2).

Among dentinal mamelons, the three-dimensional effects and the translucence effects, are obtained by the application of characterizations like Opalescent Blue; a thin layer of ocher is spread at the incisal third. A final layer of enamel is spread to finalize the facial surface of the restorations (Fig. 7), which is thoroughly cured under oxygen insulation (glycerol).



Figure 7. The restoration are ultimaded and are ready for the finishing.

Masses of composite enamel should be thinner than the one of natural teeth, in order to avoid inconsistencies in value (7-9).

Interproximal and palatal portions are finished by the use of burs and abrasive strips.

Surfaces' polishing is performed with diamond teflon brushes mounted on the handpiece and diamond pastes applied with cotton pads at high-speed.

Tooth number 2.3 is shaped with mesial and incisal increments with the aim of improving relations with the lip and harmony of the smile line without interfering with the canine guidance.

Tooth 2.1 and 2.2 are prepared using the template as a reference. A map of the discromies was drawn for the technician using 3D Master as a reference and pictures were captured and sent to the technician.

Temporary veneers (Fig. 8) are rebased in mouth with flowable composite. Regofix index is used as a guide, so that the provisional restorations are placed in the right position. Resin veneers are bonded according with spot etching technique (10) (Fig. 9).



Figure 8. Temporary resin veneers on the model.



Figure 9. Temporary veneers are cemented with the spot etching technique.

Patient is discharged and followed weekly. A month later lip's profile and smile line are positively evaluated.

After removing the temporary restorations, preparations are polished using sonic and ultrasonic instruments (Figs. 10, 11). The final impression is taken and the technician can ultimate the ceramics. A Try-In simulation is tested to check the optimal shading of the discromies and the bleaching of 2.1 was confirmed to be unnecessary. The cementation of the two porcelain veneers (3M Re-liX) is performed to complete the treatment (11) (Figs. 12, 13).

Essential shrewdness is to ask the technician to avoid mirror-glazing ceramics to simulate the composite gentle opacity (12) (Fig. 14).



Figure 10. Tooth preparation before the cementation of the ceramic veneers: frontal view. 2.1 was quite damaged and a large amount of dentine was exposed: it needed an extended preparation to the palatal side to gain enamel adhesion at the veneer edges.



Figure 11. Tooth preparation before the cementation of the ceramic veneers: occlusal view. The conoid is slightly prepared such to obtain a good ceramic support at the interproximal areas.



Figure 12. Veneers before the cementation: frontal view.



Figure 13. Veneers before the cementation: internal view.



Figure 14. Two months follow-up: frontal view.

At two years follow up the result is stable (Figs. 15, 16). The new tooth profiles has allowed an improved lip support and a proprioceptive conditioning of the development of the lower lip during the smile gesture. Dental relations seems harmonic and smile's horizon has a good link with the lower lip line reducing the original sense of asymmetry (13) (Figs. 17, 18).



Figure 15. Two years follow-up: zoom of the veneers edges.



Figure 16. Two years follow-up: the result is stable and the opacity of both ceramics and composites is still similar.





Figure 17. The new tooth profiles has allowed an improved lip support and a proprioceptive conditioning of the development of the lower lip during the rest gesture.



Figure 18. Dental relations seems harmonic and smile's horizon has a good link with the lower lip line reducing the original sense of asymmetry.

## Discussion

The treated patient showed a wide smile and elevated expectations in terms of aesthetic and conservativity. The optimal treatment options between the frontal teeth were different due to the residual healthy substance (5,14,15): porcelain veneers at 2.1, 2.2 and direct composite restoration to 1.1, 1.2 e 2.3. This solution could subtend a problem: the surface finishing of ceramic generally leads to bright glossy surfaces, and the result lasts along the years. Instead composite resin surfaces seems to lose the perfect polishing during time, due to function's wear and to abrasive toothpastes, acquiring a typical matt and opaque surface (12). This difference could be unnoticed while observing wet teeth, but could be revealed while teeth dries.

A different treatment choice could be five veneers with site preparation: in this case we should have prepared three more teeth in contrast with the conservative request. Another treatment choice could be five veneers without any site preparation on 1.1, 1.2 e 2.3 but positioning and margin finishing could be difficult to manage in order to obtain a perfect integration. Beside also another choice could be taken into consideration: composite restora-

tions associated to composite veneers at 2.1 and 2.2. The option was excluded, because at the time of the treatment the literature was not able to show evidence of predictable results at long terms follow-up. Nowadays this treatment option could support interesting discussions. The treatment option choosed with the patient was represented by the optimal solution with a modication of the ceramic surface: direct multilayered composite restorations on 1.1, 1.2 e 2.3 and bonded feldspathic porcelain veneers at 2.1 and 2.2. The technician was requested to manually polish the ceramic surface in order to maintain a certain grade of nano roughness at the surface, such to obtain a composite like reflection of the light. The solution leads a good integration between composite and porcelain restorations.

Some authors are convinced that a good polishing can substitute a heat glazing of ceramics, even if the cleaning capabilities of the smear layer is lightly different (1,2). Considering the accessibility of the site this was not considered a consistent problem against the possibility to achieve a good integration between adjacent composite and porcelain restorations.

Furthermore the Try-in simulations revealed that bleaching of 2.1 was unnecessary to achieve the expected result, because the composite chosen for the cementation of 2.1 was sufficient to mask the light discoloration.

## Conclusion

For aesthetic restorations, both porcelain veneers and composite restorations are predictable treatments (14-16). To achieve a good integration in the appearance and in the form, two points are essential: a close collaboration with technician allows a correct design of the case through the basic steps of diagnostic wax-up and direct mock-up. Secondly particular attention must be dedicated to the surface finishing of ceramic that has to mimic the slight surface roughness typical of many composites subjected to function's wear and to abrasive toothpastes (12).

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