

The reconstruction of pink and white esthetics

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Surgical procedures to re-establish the three dimensional architecture of hard and soft tissue ridge deformities have been developed and performed successfully throughout the past 15 years. In some cases, however, the results are still unpredictable and unsatisfactory in terms of esthetics and function, even if state-of-the-art regenerative procedures such as bone graft, soft tissue graft and orthodontic relocation are employed (Figures 1 and 2).

Creating a prosthetic gingiva can represent an esthetic and functional alternative for the predictable reconstruction of ridge deformities in fixed partial implant restorations,^{2,8,9-17} particularly in patients who do not want to undergo any surgical procedure. By opting for such a procedure from the very beginning, dental professionals are in a position to choose a design and/or use adjunctive measures that produce better results than if this procedure were to be used as the last resource or as a form of repair.^{2,10-13,15,18-21}

Teamwork and an interdisciplinary treatment plan are paramount for the long-term success of this kind of restoration. The dental technician should have the skills to analyse the three-dimensional shape of the tooth, to determine the correct position of the implant and to understand the principles of gingival esthetics and also the need for soft tissue management. This knowledge can

then be used in the reconstruction of the gingiva in order to ensure harmony, balance, and continuity of form between the patient's natural gingiva and the prosthetic gingiva.^{13,16,19-24} Usually, dentists and technicians are well versed when it comes to reconstructing the white component of a smile, the teeth. However, restoring challenging cases in the anterior area involves a more comprehensive approach and requires a deeper understanding of the pink component of the smile, the gingiva. The gingival architecture represents the frame for the teeth. If it is not restored correctly, either surgically or prosthetically, it will impair the final three dimensional esthetic outcome. Just as the astute technician learns how to pay attention to the minute details of the tooth anatomy, shade variations and textures, he or she should do the same with regard to the various types or designs of the gingiva. Gingival anatomy, shade and texture should be analysed and learned to be restored in the best possible way. If the patient has a high lip line, this problem will be even more evident.

Case presentation

A 37-year-old male patient presented with a history of tooth loss in regions 11 and 21. Of the implants placed in these regions, the implant in region 11 had failed (Figure 2). The patient was very dissatisfied with the esthetics and phonetics of his anterior teeth, did not feel comfortable about smiling and had a low self-esteem. When he was informed about the different treatment options such as orthodontic relocation combined with hard and/or soft tissue grafts, he chose the easiest and fastest option: the restoration of the dentogingival complex by means of the pink hybrid technique. In region 11, a new implant was

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Figure 1: Preoperative situation.



Figure 2: Loss of the implant in region 11. Placement of a new implant.

placed (NobelReplace™, Nobel Biocare, USA). After four months, a substructure made of yttriumtetragonal zirconia polycrystals (Y-TZP) was placed over the implants. Zirconia exhibits high biocompatibility and improved fracture toughness²⁵⁻²⁷ and is compatible with the veneering ceramic IPS e.max® Ceram (Ivoclar Vivadent, Liechtenstein). In regions 12 and 22, copings made of IPS e.max® Press lithium disilicate glass-ceramic, shade A1, were placed. The corresponding veneering ceramic – IPS e.max Ceram – is very versatile. It can be fired to both substrates, glass and oxide ceramics (Figure 3).

Dentogingival diagnostic wax-up guided treatment

The dentogingival diagnostic wax-up allows the restoration to be created on the basis of white and pink esthetic principles. The wax-up is the ultimate guide for all the surgical, restorative and laboratory procedures conducted.

At this stage, the team will perform an analysis of the three-dimensional volume of the lost tissue and the position of gingival interfaces, based on the Quadrants Concept¹⁸ in order to minimize the visibility of this junction, restore the asymmetry of the gingival architecture, and replace the papilla.^{13,14,16,17,22,28}

The need for soft tissue conditioning should be evaluated when the wax-up is created. Depending on the extension of the area to be conditioned, the corresponding steps will be carried out during the surgical and provisional phase and refined when seating the final bridge.^{18,29} The ridge should be flat to generate an esthetic and cleansable



Figure 3: Completed ceramic restoration: Single-tooth crowns (IPS e.max Press) and implant-retained restoration with ZrO₂ framework.

interface between the prosthetic and natural gingiva.^{15,30} The lingual aspect should provide comfort during mastication, ensure optimum phonetics, avoid food entrapment and promote air sealing.

Ceramic

A strict digital photography protocol is paramount for the successful shade communication. Digital manipulation of the photos can help the visualization of the value, chroma and internal characterizations (Figures 4 to 6). For this purpose, pre-op photos can be used, which then help in the selection of the ceramic powders. Furthermore, during the try-in of the crowns, they are used to check if the shade needs to be adjusted.

When utilizing the IPS e.max system, the practitioner should understand all the options the system has to offer



Figures 4 to 6: Try-in. Digital modification of the photos in order to better visualize brightness, chroma, characterizations and surface structure

in order to take advantage of the unique features that this system provides.

Pink material selection

The materials currently available for the reproduction of artificial gingiva are ceramics, acrylics and composite. Each one has its own advantages, disadvantages and specific indications.

For fixed partial restorations, ceramics were usually the material of choice to reproduce not only the white esthetics but also the pink esthetics.¹¹⁻¹⁷ As ceramics are a very delicate and challenging material to handle, particularly as far as shrinkage during firing, the number of firing cycles, colour matching and moisture control is concerned, the final appearance of pink porcelain bridges was usually unsatisfactory. The esthetics were further compromised by the easily noticeable interface between the prosthetic and natural gingiva.

In an attempt to overcome these limitations, a hybrid technique was developed in order to make the prosthetic gingival restoration more esthetic and predictable^{18,30} (Figures 7 to 9). The hybrid technique basically involves a screw-retained partial implant bridge providing the white esthetics and a gingival base made of ceramics, which is covered with a composite overlay to create the final pink contours (using eg anaxGUM Pink Composite, Anaxdent, Germany). The composite is placed directly in the mouth and finished chairside.

The utilization of the hybrid technique presents some remarkable advantages:

- Preservation of the optical and physical properties of the ceramic veneering material by decreasing the number of ceramic bakes.
- More predictability and control of the factors that



determine the pink esthetics, such as shape, colour and texture.

- Possibility of repair, re-contouring and uncomplicated maintenance, even after years of use, without having to re-fire the ceramic.

Seating and hygiene orientation

During the seating process, transitory blanching of the gingiva may occur. The intensity will vary depending on the extension of the tissue conditioning required, the design of the pontics and the biotype of the patient's gingiva and should be checked with dental floss. The excess of pressure should be reduced by re-shaping the soft tissue with diamond burs, electrosurgery or diode laser, or by re-contouring the prosthetic gingiva with specific burs or wheels. The main goal is to create a comfortable, healthy and cleansable interface while maintaining a high esthetic level.

The hygiene and maintenance procedures should be carefully discussed with the patient as they are paramount for the long-term success of the restoration. Follow-up appointments should be scheduled in advance. The first appointment should be scheduled within three months after insertion. Subsequently, patients can be placed on six months to one year recall cycles, depending on their risk assessment.



Figure 7: Implant restoration prior to ...



Figure 8: ... and after the intraoral reconstruction of the gingival portion using composite.

Conclusion

In spite of all the recent developments in periodontal and peri-implant surgical regenerative procedures, comprehensively and esthetically re-establishing the hard and soft tissue contours still represents a challenge.

The prosthetic restoration of the pink esthetics offers a reliable and consistent alternative to resolving cases with uncertain surgical outcome or cases in which patients do not want to undergo regenerative surgical procedures. The understanding of the indications and procedures involved in this technique requires a paradigm shift for the whole interdisciplinary team to maximize the biological, functional and esthetic results and to surpass the patients' expectations (Figures 10 and 11).

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Literature: A list of references is available on request.



Figure 9: Extraoral finishing of the gingival portion. The design of the restoration should ensure both ideal hygiene capabilities and an esthetic appearance.



Figures 10 and 11: IPS e.max restoration completed with the pink hybrid technique.