

Periodontal and peri-implant tissue management in the esthetic zone

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Initial Situation

A 38-year old male patient with non-remarkable medical history presented for a vertical fracture of the maxillary left central incisor (21). The patient showed a synergy of risk factors which had led to the fracture: absence of ferrule effect, short posts, bruxism and an occlusal overload due to premature contacts during protrusive movements (Figs. 1-3).

Treatment Plan

Based on the clinical and radiographic examination, the esthetic risk profile was determined to range from "moderate" to "high" on the Esthetic Risk Assessment (ERA). Horizontal and vertical bone defects were detected with a distance of 6 mm from bone level to the contact points (Fig. 4). A delayed implant placement (Type 2) was planned in order to achieve complete healing of the soft tissues before the GBR procedures and implant placement. To minimize the number of surgical appointments and reduce the overall morbidity, a simultaneous approach of periodontal and implant surgery was preferred. The periodontal tissues of 11 were modified simultaneously with implant surgery on regio 21 with two different objectives: a) increase the ferrule effect and move the mid-facial soft tissue margin slightly more upwards to improve the harmony of the scalloped mucosal line (Fig. 5) b) hide the dark shine-through of the root with a connective tissue graft (Fig. 2). The initial phase involved the removal of the fractured 21 utilizing a periosteal elevator. The extraction socket was filled with a collagen plug to achieve stabilization of the blood clot during the initial healing of the soft tissues. A Maryland bridge was cemented the same day and modified to avoid interferences during protrusive movements (Fig. 6).

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Figure 1.



Figure 2.

Procedure

First surgical procedure. Six weeks later, periodontal and implant surgery was performed. A mid-crestal incision was executed on the implant site. At this stage, scalloped incisions were applied on the palatal and buccal sides of 11. Afterwards, bucco-oral osteotomies on the root were executed for the previously described goals. The tiny interproximal bone peak was treated with due respect and left untouched (Fig. 7).

Subsequently, a Straumann® Bone Level implant (Ø 4.1, SLActive® 12 mm) was inserted in a correct three-dimensional position to replace the missing 21 (Fig. 8) Shortly afterwards, autogenous bone chips were harvested locally and applied to cover the dehiscence-type defect. A layer of Straumann® BoneCeramic (400-700 µm) was placed to overcontour the external surface of the facial bone.

The grafting material was covered by a non-cross-linked collagen membrane in accordance with GBR principles (Fig. 9).

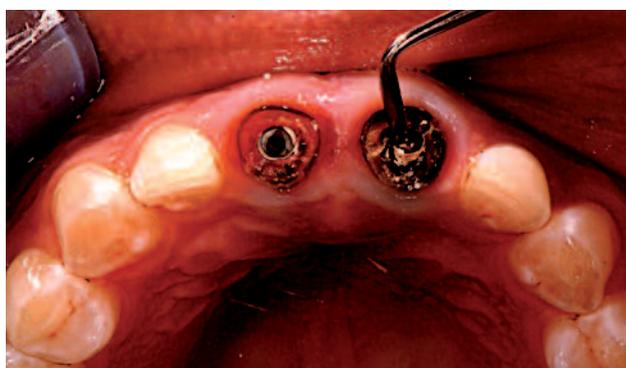


Figure 3.

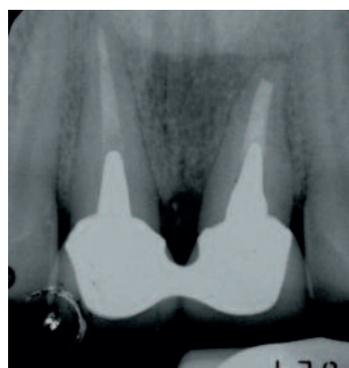


Figure 4.



Figure 5.



Figure 6.



Figure 7.

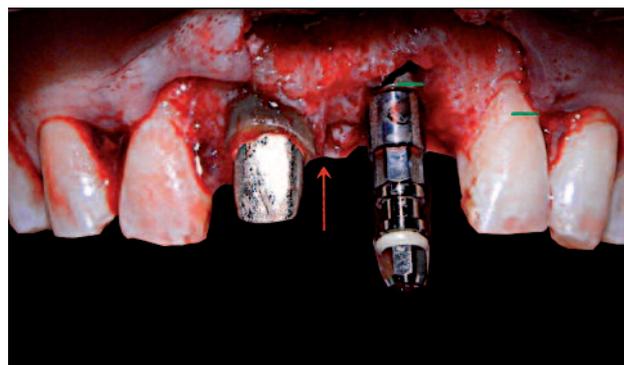


Figure 8.

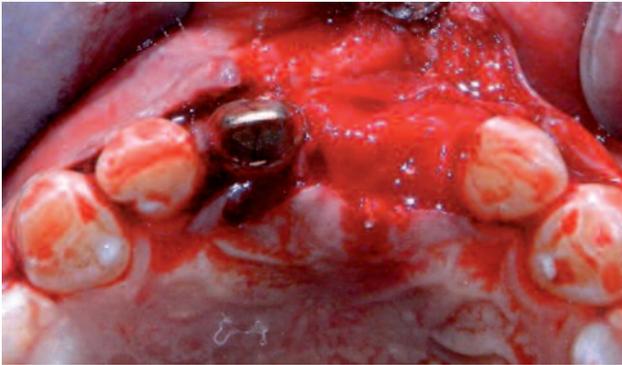


Figure 9.



Figure 10.



Figure 11.

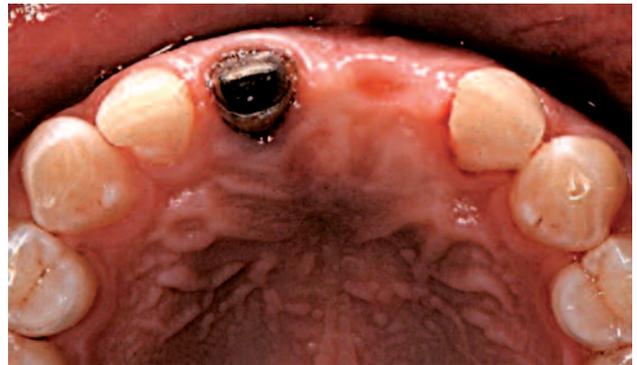


Figure 12.

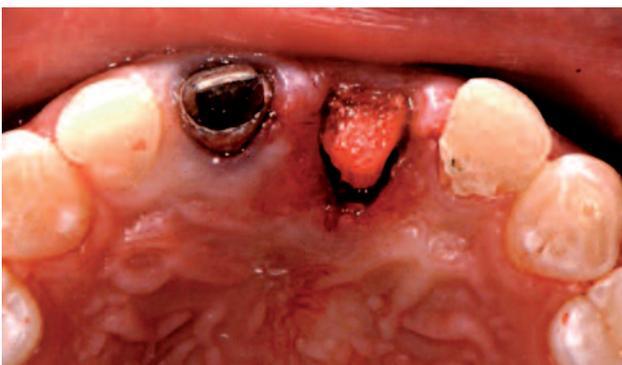


Figure 13.



Figure 14.

A “double-layer” technique was used to improve the stability of the membrane. Once perfused with blood, the membrane could be easily adapted to the alveolar bone crest and did not require any additional fixation. Tension-free primary wound closure was achieved with horizontal mattress sutures after splitting the periosteum at the base of the flap (Fig. 10). The ovate pontic was ground to avoid pressure

on the tissues below. The provisional bridge was then cemented again (Fig. 11).

Second surgical procedure. The stability of the provisional bridge allowed an extended interval (4 months) in order to check the final flattening of the ridge contour due to remodeling of the alveolar bone. A roll-flap technique was then regarded as adequate to compensate a mild horizontal

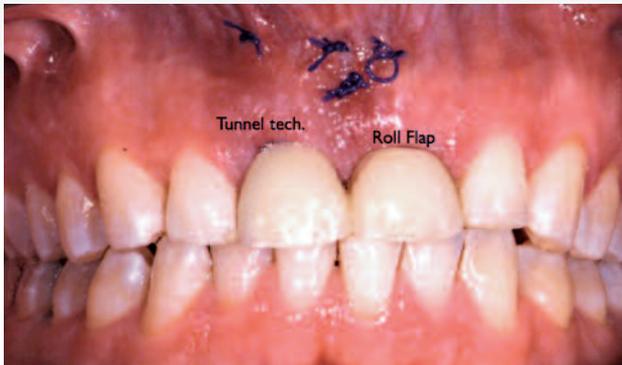


Figure 15.



Figure 16.

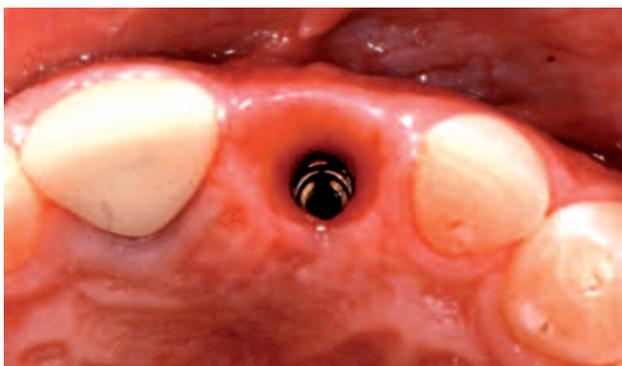


Figure 17.



Figure 18.



Figure 19.

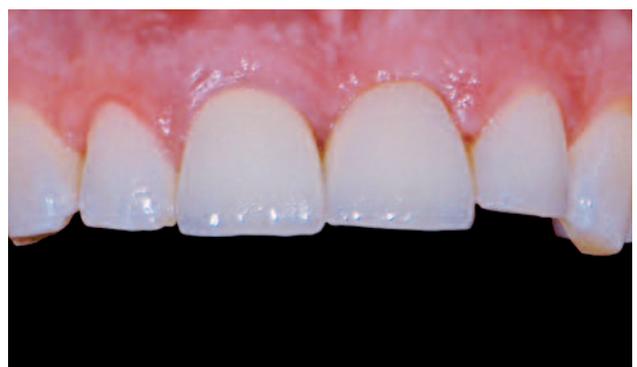


Figure 20.

discrepancy on 21 (Figs. 12, 13). Meanwhile, a very thin (1 mm \geq) connective graft was harvested from the premolar area of the palate and inserted with a tunnel technique in a supra-periosteal pouch with the purpose of hiding the dark aspect of the nearby root of 11 (Figs. 14, 15). In both surgical appointments, vertical papillary incisions, which had

been deemed as not being necessary, could be avoided. **Prosthetic procedures.** A screw-retained provisional crown remained in situ 6 months on the implant waiting for maturation and stabilization of the peri-implant soft tissues contours. During this period, modifications in form, contour and outline were applied to improve the esthetic outcome



Figure 21

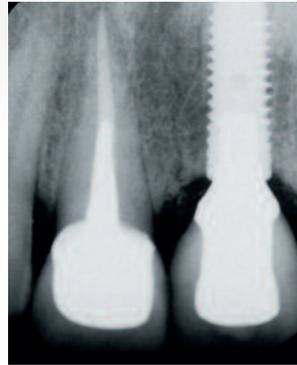


Figure 22.

using a light curing composite material (Fig. 16). Proper implant placement allowed achieving an optimal subgingival final contour (Fig. 17). A customized impression coping was then fabricated to capture and record the transition zone contour generated by the provisional restoration. For the final restoration, a CAD/CAM zirconia abutment was selected and Straumann® CARES® CAD/CAM technology was used to fabricate the frameworks (Figs. 18, 19). The screw access position allowed the use of a one-piece restoration. The abutment was veneered using a pressable ceramic system. After the try-in and color correction by the lab, the final crown was delivered to the patient and tightened with 35 Ncm. The access hole was sealed with gutta-percha and a light cured composite resin.

The prosthetic procedures on root 11 involved the delivery of a longer golden post in order to reduce the risks of root fracture. For the same purpose it was mandatory to perform a prosthetic preparation on the palatal aspect of the gold abutment to create 1.5 - 2.0 mm of space for the zirconia framework and pressable ceramic. The final goal was to

avoid interferences during protrusive movements.

Conclusion

The surgical and prosthetic challenge in this clinical case was to develop a natural scalloped mucosal line on the upper central incisors and to obtain a good esthetic outcome of the prosthetic crowns, despite the various existing dental/skeletal asymmetries and the bone defect on the implant site.

Of utmost importance was the knowledge of hard and soft tissue remodeling around the implant 21 and around the root 11 after the surgical steps.

Benefits resulting from the conservation of root 11 consisted in the maintenance of the interproximal height of the tiny bone peak which provides support of the papilla mesial to the implant.

This approach was highly beneficial to the natural appearance of the prosthetic crowns (Figs. 20, 21). The periapical x-ray (2 years of follow-up) shows stable crestal bone levels around the implant (Fig. 22).

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