Managing the Peri-implant Mucosa: A Clinically Reliable Method for Optimizing Soft Tissue Contours and Emergence Profile

ANDREA PARPAIOLA, MD, MSC*, **LUCA SBRICOLI,** DDS†, **RICCARDO GUAZZO,** DDS†, **ERIBERTO BRESSAN,** DMD‡, **DIEGO LOPS,** DDS, MSc, PhD§

ABSTRACT

State of the Problem: The proper representation of soft tissue contours for a natural aspect of the peri-implant mucosa and its mimesis with the adjacent teeth is a crucial aspect of the esthetic area restoration.

Purpose: This paper describes a method for the easy transfer of the peri-implant tissue morphology onto impression material with a view to achieving an accurate, custom implant restoration. The procedure described is suitable both for single and multi-unit implant-supported prostheses.

Clinical Procedures: Once the peri-implant mucosa is sculpted by the provisional restoration, the emergence profile is duplicated. The implant analog is embedded into laboratory stone or plaster in a mixing cup and allowed to set. The provisional restoration is removed from the oral cavity and screwed to the implant analog; then, a polyether material is placed in the mixing cup so that the provisional restoration is put into impression material at the level of the prosthetic emergence profile. After the polyether polymerizing, the provisional prosthesis is unscrewed and replaced with the stock hexed transfer for the final impression. Next, cold self-curing resin is poured into this gap and left to set. A custom transfer for this single implant site is thus obtained. This modified transfer is then removed and screwed onto the implant in the oral cavity for the definitive impression.

Conclusions: The technique described enables a faithful reproduction of the peri-implant soft tissues and emergence profile.

CLINICAL SIGNIFICANCE

An emergence profile that mimics the natural tooth should be obtained by successful esthetic implant restoration. Moreover, it allows proper hygiene, which is fundamental for implant maintenance. The best way to achieve the correct emergence profile is to sculpture the peri-implant mucosa by means of a provisional prosthesis. Prefabricated provisional crowns cannot mimic the complexity and the variations of human soft tissue. Therefore, only a chair-side modification of the provisional restoration can accomplish the optimal result. Such a requirement can be satisfied by the clinical method described in the present report.

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INTRODUCTION

Distinctive characteristics of the peri-implant mucosa differentiate it from periodontal tissues.[1] The difference lies in the absence of root cementum. In fact, the collagen bands lie in different ways at the site of the implant. The fibers set in the periosteum at bone crest level and spread parallel to the implant surface, or they

*Resident, Department of Prosthetic Dentistry, School of Dentistry, University of Padova, Padova, Italy
†Assistant, Department of Periodontology, School of Dentistry, University of Padova, Padova, Italy
‡Professor, Department of Periodontology, School of Dentistry, University of Padova, Padova, Italy
§Resident, Department of Prosthodontics, Dental Clinic, School of Dentistry, University of Milan, Milan, Italy

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align in broad bands which, in more distant areas, expand almost perpendicular to the implant surface. These "horizontal" fibers seem to bend "vertically" and appear to run parallel to the implant's surface in the areas nearest to the implant.[1,2] The connective tissue in the implant interface contains a larger amount of collagen but fewer fibroblasts and vascular structures than the tissue present adjacent to natural tooth structure.[3]

The successful restoration of lost teeth in the anterior region of the mouth has to meet both aesthetic and functional parameters. In addition to the correct placement of the implant fixture, it is essential to achieve a soft tissue morphology as physiologically realistic as possible.

An impression obtained with standard copings enables the three-dimensional position of the implant fixture to be reproduced on a laboratory model; nevertheless, the reproducibility of the peri-implant soft tissue is often difficult to control, and this can compromise the cosmetic issues in the final implant restoration.

Most healing abutments have a cylindrical shape which is not suitable to reproduce correctly the emerging profile of the natural teeth. The dental technician can model an implant-supported prosthesis with a cylindrical profile or with a more appropriate cosmetic profile based only on an assumption of the shape suited to the clinical situation. In fact, final tissue heights of the papillae and buccal gingival margins, relative to their preimplant position, are ultimately dictated by the posthealing levels and position of the interproximal and facial bone.

Because of its characteristics, the peri-implant mucosa can be modified by a sculpting process based on the principle that soft tissue becomes modifiable after controlled, constant compression. Especially in patients with a thick gingival biotype, this tissue can be manipulated to reproduce the normal scalloped, parabolic gingival contours. Different approaches have been suggested by the current literature on the soft tissue profiling.[4–6] All authors focus on a contour of the provisional prosthesis as accurate and stable as possible, so that it can be faithfully reproduced in the definitive prosthesis.

The present paper describes a method that has been consolidated over several years of clinical practice for the peri-implant soft tissue profiling in the anterior areas. By following the procedure described in the next section, it is possible to recreate, in cooperation with the dental technician, the correct emergence profile both for single and multiunit prostheses.

CLINICAL PROCEDURES

This prosthetic procedure is to be used after the healing of the peri-implant soft tissues by means of standard healing abutments, so that a round shape of the peri-implant mucosa can be achieved.

Then, an impression can be obtained by screwing the standard pick-up to the fixture. A polyether (Impregum®, 3M ESPE, Pioltello, MI, Italy) material can be used for the impression in order to provide a provisional screw-retained prosthesis (Figure 1).

This provisional restoration is provided to create and condition the peri-implant soft tissue contours, thus reproducing the physiological scalloped, parabolic appearance and the tropism of the adjacent gingiva. The resin provisional prosthesis is kept in the oral cavity for a period of 3 to 6 months to ensure a stable outcome of the peri-implant soft tissue conditioning

FIGURE 1. Screw-retained provisional restoration.

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process. During this period of time the patient should be regularly followed monthly and the clinician can adapt the provisional prosthesis by adding or removing small amounts of resin as necessary in order to obtain the required shape for the gingival contours and the appropriate emergence profile. This conditioning process has to be carried out gradually to avoid an excessive compression, which would cause an unacceptable discomfort for the patient.

Once the required gingival morphology has been achieved (Figure 2), the procedures for providing the definitive restoration can be carried out. The implant analog is embedded into laboratory stone (or plaster) in a mixing cup and allowed to set. This procedure can be done prior to the clinical appointment to save chair time. At the time of the clinical appointment the provisional restoration is removed from the oral cavity and screwed to the implant analog; then, a polyether material is placed in the mixing cup (Figure 3A) so that the provisional restoration is put into impression material at the level of the prosthetic emergence profile (Figure 3B).

This generates a static reproduction of the soft tissue and in particular of the subgingival portion of the provisional prosthesis. After the polyether polymerizing, the provisional prosthesis is unscrewed (Figure 3C) from the implant analog and replaced, in the same supporting cup, with the stock hexed transfer for the final impression. A space is thus created between the polyether material and the impression transfer (Figure 3D); this space reproduces morphology of the peri-implant soft tissue. Such procedures are more suitable for screw-retained provisional restorations because of the simple removal of the provisional prosthesis from the implant analog in the mixing cup.

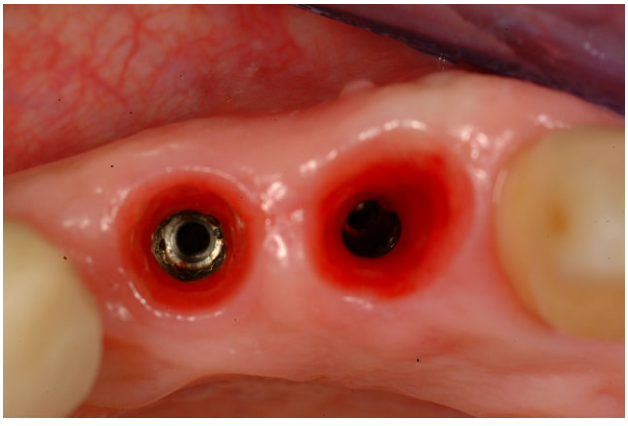

FIGURE 2. Soft tissue aspect after conditioning with provisional crowns.

Next, cold self-curing resin (Temp Red, Micerium SpA, Via Marconi 83, Avegno [GE], Italy) is poured into this gap and left to set (Figure 4A). A custom transfer for this single implant site is thus obtained (Figure 4B).

This modified transfer is then removed and screwed onto the implant in the oral cavity (Figure 4C). The resulting device is an exact peri-implant soft tissue replica and fits perfectly to the shape of the marginal mucosa after the soft tissue conditioning. No compressive effect on the mucosa or impression material gaps are generated by the rigid resin around the transfer as it sometimes happens with the silicone or polyether materials commonly used for precision impressions. Then, a conventional impression can be taken: by means of a custom impression device, a definitive impression is obtained, so the customized transfer with the resin remains embedded in the impression material on the device (Figure 4D). Finally, a computer-aided design/computer-aided manufacturing abutment can be provided to reproduce the emergence profile obtained with the provisional prosthesis. The definitive restoration will be put into position and naturally follow the scalloped peri-implant marginal mucosa (Figure 5A). A stable outcome can be achieved because of the absence of any soft tissue compression (Figure 5B).

This method could be used for the restorations of both single and multiple gaps (Figure 6).

DISCUSSION

An emergence profile that mimics the natural tooth should be obtained by successful esthetic implant restoration. Moreover, it allows proper hygiene, which is fundamental for implant maintenance.[5] The best way

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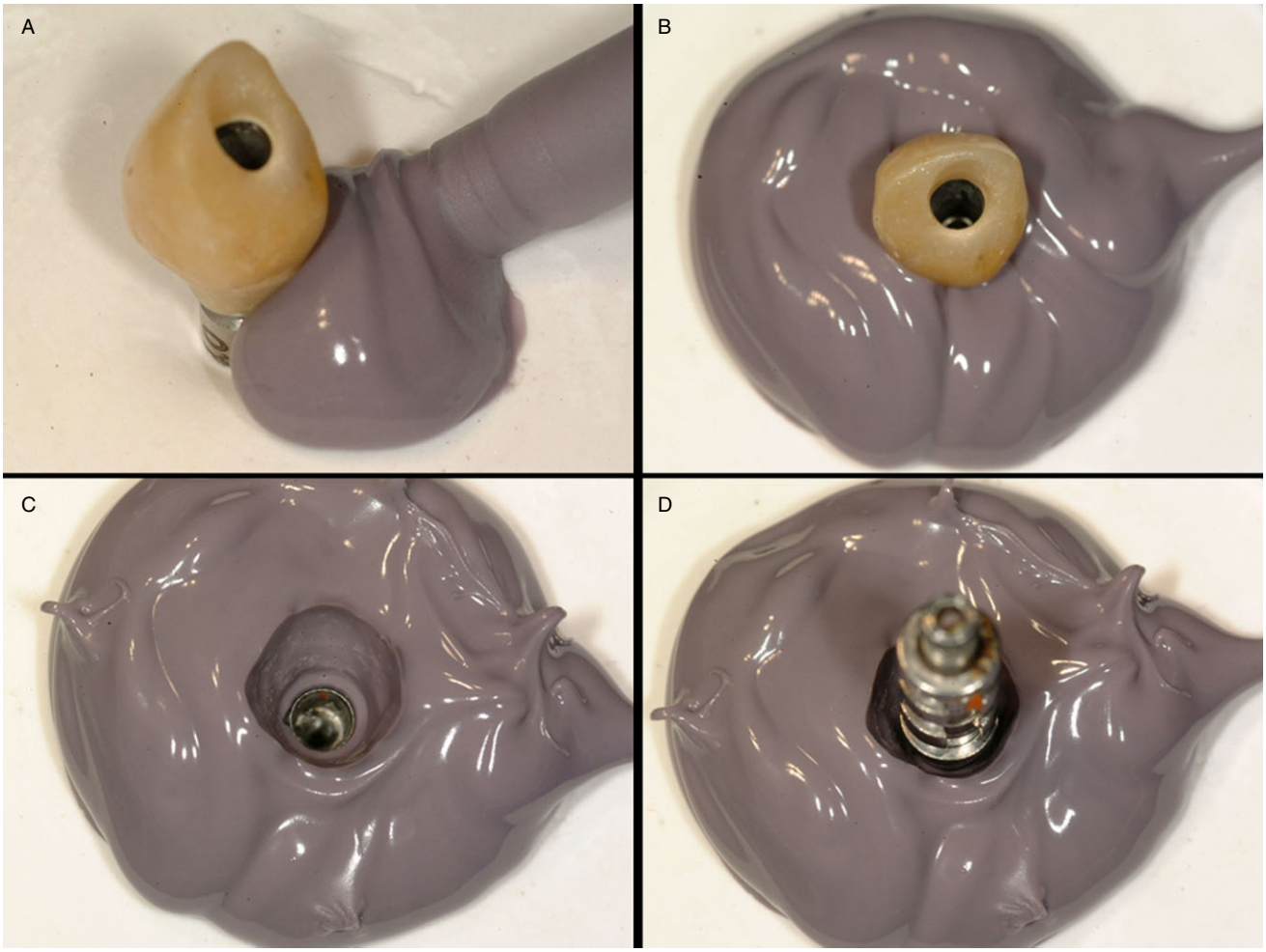

FIGURE 3. A, Provisional restoration is unscrewed from the oral cavity, screwed to a laboratory implant analog and embedded in casting material. B, Polyether material poured at the level of the prosthetic emergence profile and surrounding provisional crown. C, Provisional removal. D, Conventional impression coping screwed. Note the gap between standard coping and impression material.

to achieve the correct emergence profile is to sculpture the peri-implant mucosa by means of a provisional prosthesis. Only thick gingival biotype can be manipulated, as postulated by Berglundh and colleagues[3] and Simeone and colleagues.[4] In fact, thin gingival biotype is not suitable for the sculpturing because its compression does not lead to a controlled scalloping but to a high risk of soft tissue collapse and gingival recession.[7]

Standard healing abutments and transfer copings do not simulate the cross-section of natural teeth[8] because they are round. Many authors[5,9–11] agree with the fact that the final prosthetic rehabilitation must match intraorally obtained soft tissue modifications. Prefabricated provisional crowns cannot mimic the complexity and the variations of human soft tissue. Therefore, only a chair-side modification of the provisional restoration can accomplish the optimal result. Moreover, they agree with the fact that provisional restoration has to be screw retained to prevent irritating side effects of provisional cement on the peri-implant soft tissues, especially in situations where frequent removals of the provisional restoration are required.

In addition, a crucial aspect to achieve a successful esthetic outcome is the transfer of the impression

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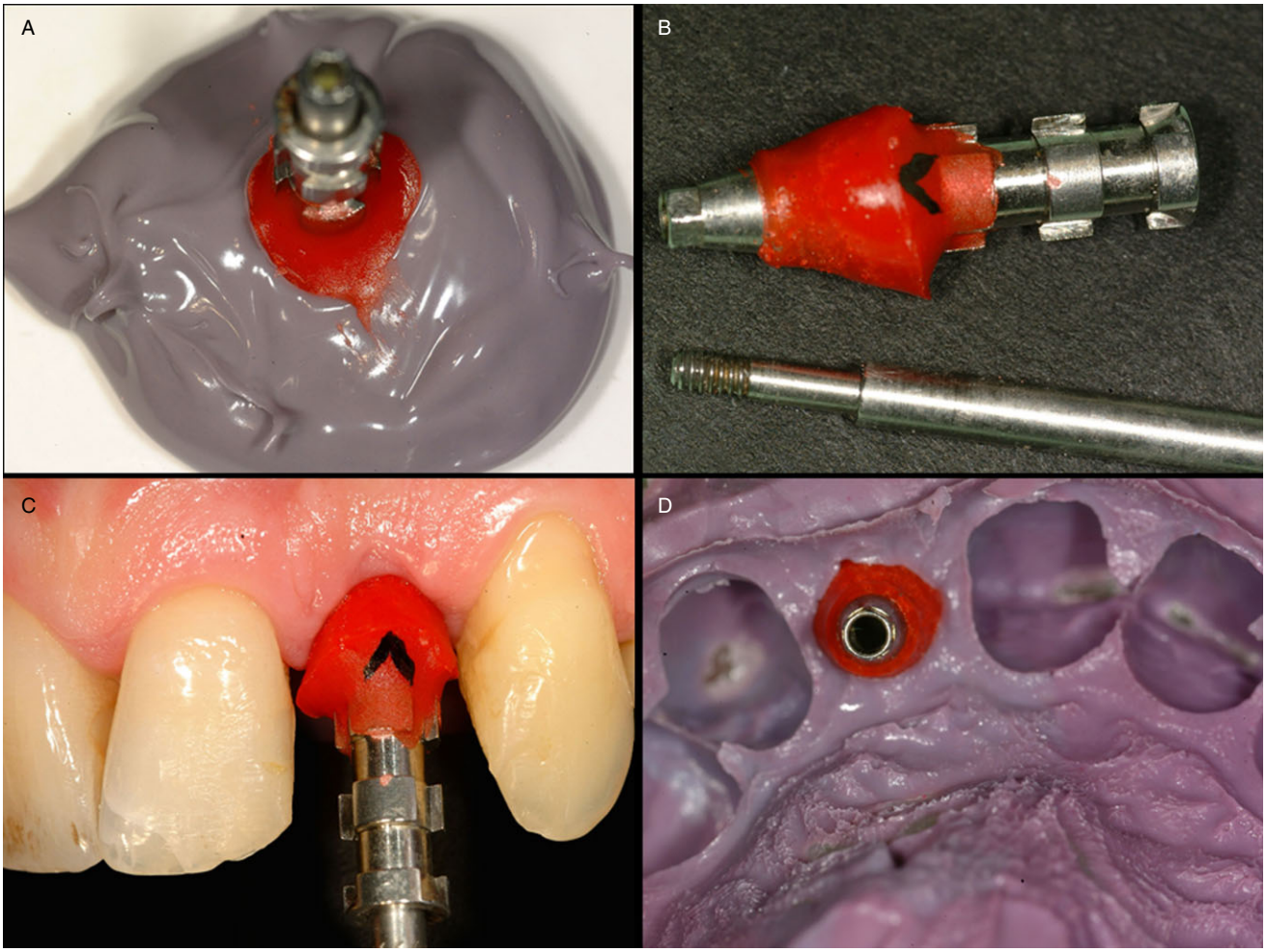

FIGURE 4. A, Acrylic resin poured into the gap. B, Customized impression coping obtained after resin polymerization. C, Customized coping screwed to the implant maintains the conditioned esthetic contour. D, Customized coping in the definitive impression.

informations to the dental laboratory.[12] The operator should choose an easy and reproducible technique to transfer the emergence profile to the impression and therefore on the model cast in order to allow the dental technician to create the adequate contour for the best esthetic outcome of the final restoration.

The self-curing resin used for contouring the impression coping is common in the dental practice; moreover, it is easy to manipulate and not expensive. It can be easily poured into the gap between the coping and impression material as long as it is fluid. Because of its low shrinkage the modified impression coping accurately reproduces the soft tissue contour obtained with the provisional restoration. Consequently, the exact shape of the resin-generated emergence profile will be transferred to the definitive restoration.

Another important advantage of this technique is that the patient is never left without the prosthesis for a long period during the definitive impression procedures; in fact, the customized transfer coping can support the peri-implant mucosa. Tissue collapse and volumetric changes will be avoided and the soft tissue sculpturing will remain stable. The technique presented earlier is easily reproducible and does not require particular operator skills.

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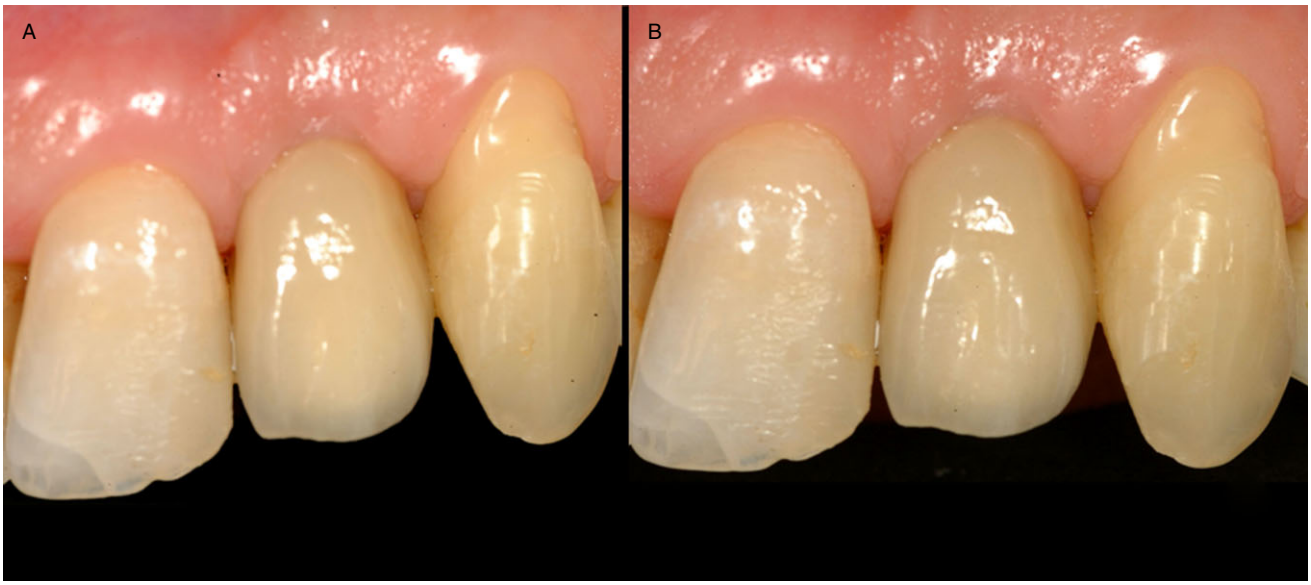

FIGURE 5. A, Final restoration at baseline. B, Final restoration 1 year after the prosthesis delivery.

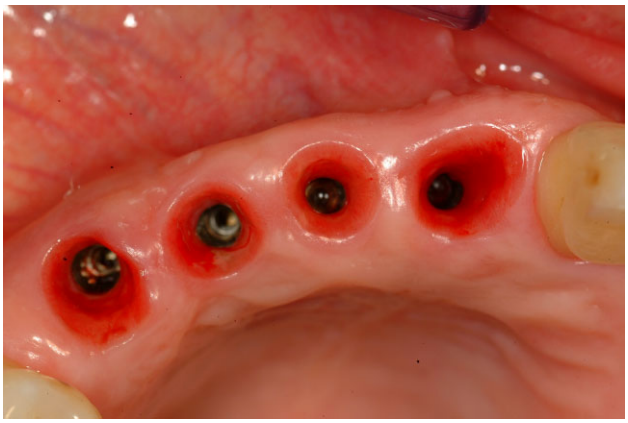

FIGURE 6. Soft tissue aspect after conditioning with provisional crown. Four-units partial fixed prosthesis.

CONCLUSION

In highly demanding areas, where the esthetic outcome has to be achieved just like the function of the implant-supported restoration, soft tissue can be modified to obtain an optimal emergence profile and gingival contours with physiological appearance as realistic as possible. The previously described method allows for faithful reproduction of the conditioned soft tissue when the final impression is taken; thus, their reproduction on the definitive restoration is possible.

The main advantage of this approach is the easy and reproducible use of an inexpensive material that is easily available to clinicians.

DISCLOSURE

The authors do not have any financial interest in the companies whose materials are included in this article.

REFERENCES

1. Berglundh T, Lindhe J. Dimension of the periimplant mucosa. Biological width revisited. J Clin Periodontol 1996;23:971–3.
2. Berglundh T, Lindhe J, Ericsson I, et al. The soft tissue barrier at implants and teeth. Clin Oral Implants Res 1991;2:81–90.
3. Berglundh T, Lindhe J, Jonsson K, Ericsson I. The topography of the vascular systems in the periodontal and peri-implant tissues in the dog. J Clin Periodontol 1994;21(3):189–93.
4. Simeone P, De Paoli C, De Paoli S, et al. Interdisciplinary treatment planning for single-tooth restorations in the esthetic zone. J Esthet Restor Dent 2007;19(2):79–88.
5. Elian N, Tabourian G, Jalbout ZN, et al. Accurate transfer of peri-implant soft tissue emergence profile from the provisional crown to the final prosthesis using an emergence profile cast. J Esthet Restor Dent 2007;19(6):306–14.

DOI 10.1111/jerd.12046

6. Spyropoulou P-E, Razzoog M, Sierraalta M. Restoring implants in the esthetic zone after sculpting and capturing the periimplant tissues in rest position: a clinical report. J Prosthet Dent 2009;102(6): 345–7.
7. Lindhe J. Clinical periodontology and implant dentistry. 5th ed. Malden (MA): Blackwell Munksgaard; 2006.
8. Nelson SJ. Wheeler's dental anatomy, physiology and occlusion. 9th ed. St. Louis (MO): Saunders Elsevier; 2009.
9. Shor A, Schuler R, Goto Y. Indirect implant-supported fixed provisional restoration in the esthetic zone: fabrication technique and treatment workflow. J Esthet Restor Dent 2008;20(2):82–95.
10. Ntounis A, Petropoulou A. A technique for managing and accurate registration of periimplant soft tissues. J Prosthet Dent 2010;104(4):276–9.
11. Kuo SB, Hong HH, Tsai TP, Shen YF. Developing an optimal emergence profile of the definitive restoration with a modified impression cap technique for ITI solid abutment. J Prosthet Dent 2002;88(6):646–8.
12. Azer SS. A simplified technique for creating a customized gingival emergence profile for implant-supported crowns. J Prosthodont 2010;19(6):497–501.

Reprint requests: Diego Lops, DDS, MSc, PhD, Department of Prosthodontics, Dental Clinic, School of Dentistry University of Milan, Via Beldiletto 1/3, 20142 Milano, Italy; Tel.: 0250319039; Fax: 0250319040; email: diego.lops@guest.unimi.it

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