

# Gingival recontouring by provisional implant restoration for optimal emergence profile: report of two cases

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**Purpose:** The emergence profile concept of an implant restoration is one of the most important factors for the esthetics and health of peri-implant soft tissue. This paper reports on two cases of gingival recontouring by the fabrication of a provisional implant restoration to produce an optimal emergence profile of a definitive implant restoration.

**Methods:** After the second surgery, a preliminary impression was taken to make a soft tissue working cast. A provisional crown was fabricated on the model. The soft tissue around the implant fixture on the model was trimmed with a laboratory scalpel to produce the scalloped gingival form. Light curing composite resin was added to fill the space between the provisional crown base and trimmed gingiva. After 4 to 6 weeks, the final impression was taken to make a definitive implant restoration, where the soft tissue and tooth form were in harmony with the adjacent tooth.

**Results:** At the first insertion of the provisional restoration, gum bleaching revealed gingival pressure. Four to six weeks after placing the provisional restoration, the gum reformed with harmony between the peri-implant gingiva and adjacent dentition.

**Conclusions:** Gingival recontouring with a provisional implant restoration is a non-surgical and non-procedure-sensitive method. The implant restoration with the optimal emergence profile is expected to provide superior esthetic and functional results.

**Keywords:** Dental implants, Dental restoration repair, Gingiva.

## INTRODUCTION

Traditionally, one of the main objectives of an implant treatment has been to ensure osseointegration [1-4]. On the other hand, the achievement of implant osseointegration does not always correlate with a successful esthetic outcome [5]. In the early period of implant dentistry, implants were placed with a "Bone driven implant placement concept". According to this concept, the implant was placed at the crest of the bone, which has a sufficient amount of the bone, but it was not al-

ways the ideal implant position for the final restoration. Therefore, this resulted in an unaesthetic and nonfunctional implant restoration. Recently, with the development of several bone grafting materials, guided bone regeneration (GBR) techniques, and the improvement of technology of implant surface treatment, the concept of implant treatment was changed to "Restoration driven implant placement" [6]. Consequently, there is now an increased demand for aesthetic restorations with healthy peri-implant soft tissue.

The emergence profile is one of the key factors in the es-

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tablishment of the optimum hard and soft tissues. In particular, in the esthetic zone, the emergence profile of dental implant restorations should mimic natural teeth [7,8]. Improperly contoured restorations will cause compromised access for oral hygiene and inflamed soft tissue that can induce un-aesthetic results [9]. Accordingly, the creation of a proper contoured restoration with a natural emergence profile and gingival architecture that harmonizes with the adjacent teeth is very important for aesthetic and functional implant therapy [10]. To achieve the optimal emergence profile, several factors need to be considered from the initial stages of treatment to the final stages. In the presence of an appropriate tissue base, achieving an optimal emergence profile depends on the selection of the implant, healing abutment, and intermediate prosthetic element selection, etc.

The purpose of this study was to present two cases of gingival recontouring by the fabrication and adjustment of a provisional implant restoration to produce the optimal emergence profile of the definitive implant restoration.

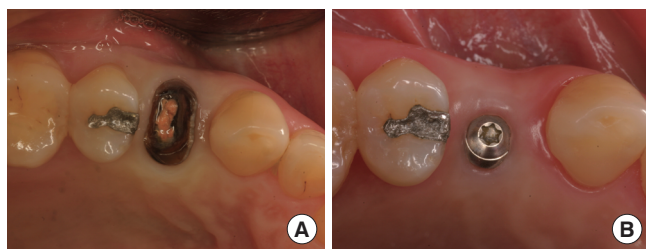
## CASE DESCRIPTION

This study protocol was approved by the Chosun University Dental Hospital Institutional Review Board (#CDMDIRB-1220-67).

### Case 1

A 53-year-old female patient presented with a root rest of the maxillary right premolar. The patient did not have any periodontal problems and just required plaque control before implant surgery. The patient signed an informed consent form for immediate implant placement after extracting the root rest. A 4.1 × 12 mm SLActive surfaced implant (ITI TE, Straumann, Basel, Switzerland) was placed immediately after extraction. After 4 months healing, the implant was in a semi submerged position (Fig. 1). For an esthetic implant restoration, the margin of the crown needs to be 1 to 2 mm below the gingiva [11,12].

In this case, the top of the fixture for the crown margin was



**Figure 1.** The maxillary first premolar was extracted and the implant was placed (A, before extraction; B, implant healed in a semi-submerged manner).

placed 1 mm subgingivally. A 4 mm solid abutment was connected to use as a final abutment and make a provisional implant restoration (Fig. 2). The difference in size between the cervical diameter of the natural tooth and implant fixture can result in a steep profile of the crown (Fig. 3). If the profile is undercontoured, there will be no contralateral pressure or support for the gingiva, and food particles will be retained.

The provisional restoration was fabricated on the soft tissue cast to create the same contours as the buccal aspect of the adjacent teeth. After the cured provisional restoration was removed from the cast, the flash was trimmed. At this time, a definite discontinuity existed between the contour of the provisional restoration at the gingival aspect of the crown and the width of the fixture margin (Fig. 4A). With the “add on” technique, composite resin was added to create a smooth emergence profile (Fig. 4B).

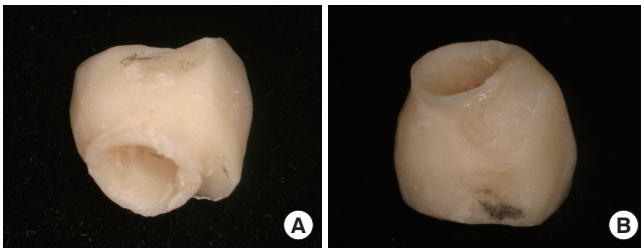
The finish was polished to a high luster using an aluminum oxide rubber cup allowing undisturbed soft tissue healing. The provisional restoration was fabricated and subsequently placed onto the solid abutment using a combination of finger pressure and the patient’s bite on a cotton roll. Blanching



**Figure 2.** 4 mm solid abutment placed.



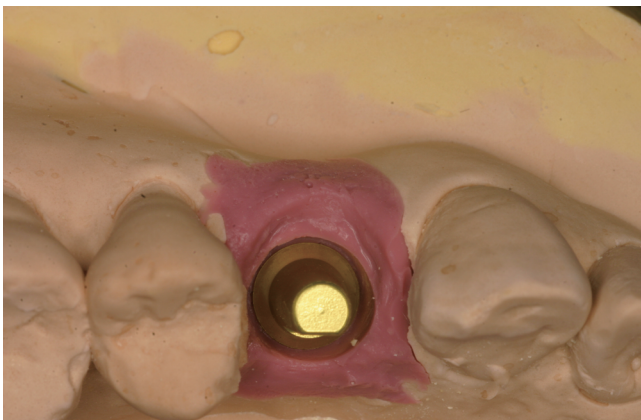
**Figure 3.** Provisional restoration with an improper tooth contour.



**Figure 4.** Provisional restoration with a proper crown contour (A). Composite resin added extraorally to create an appropriate emergence profile (B).

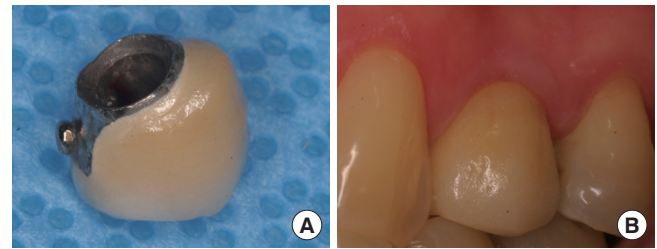


**Figure 5.** The provisional restoration was placed.

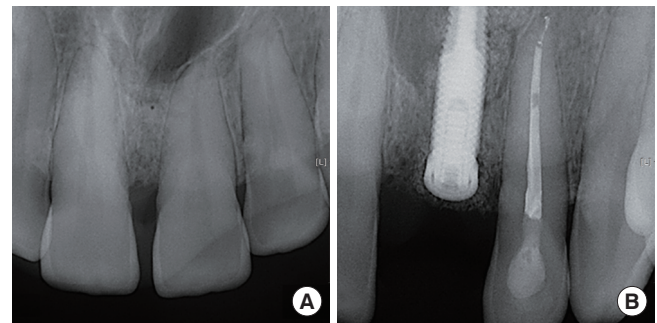


**Figure 6.** An impression was taken when the change in the gingival tissue architecture was evident after 1 month of provisionalization.

of the tissue may be detected and will generally disappear within 20 minutes. The provisional restoration was seated with provisional cement and excess cement must be removed. This provisional implant restoration should be worn for a minimum of 1 month to allow proper re-contouring of the soft tissue complex (Fig. 5) [11]. Periodic examination was necessary to ensure that proper oral hygiene was maintained. When the recontoured gingiva had stabilized, a final impression was taken to make a definitive restoration (Fig. 6). The



**Figure 7.** Definitive implant restoration (A). Postoperative facial view of the harmonious gingival tissue complex and adjacent dentition (B).



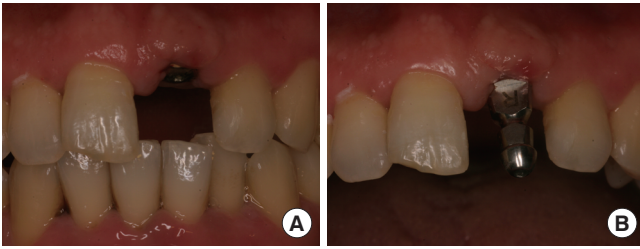
**Figure 8.** Initial X-ray before extraction of the upper right central incisor (A). The initial image showed the original diastema between the incisors. Immediate implant placement with guided bone regeneration after extraction (B).

definitive implant restoration was fabricated and cemented using provisional cement (Fig. 7). The patient was quite satisfied with the final results.

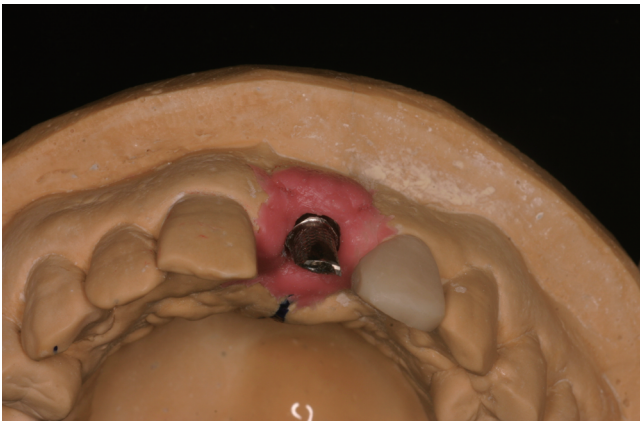
### Case 2

A 34-year-old, systemically healthy, non-smoking male presented to the Department of the Prosthodontics, Chosun University Dental Hospital, Gwangju, Republic of Korea, in April 2009. The patient, who signed an informed consent form, had previously undergone immediate implant surgery in October 2008 after having the tooth extracted due to a periapical abscess. GBR and soft tissue grafting were accomplished simultaneously to improve the volume of the hard and soft tissue. A flat interdental papilla and wider space than the adjacent central tooth were observed. Radiographically, the diastema was observed when the tooth was present (Fig. 8).

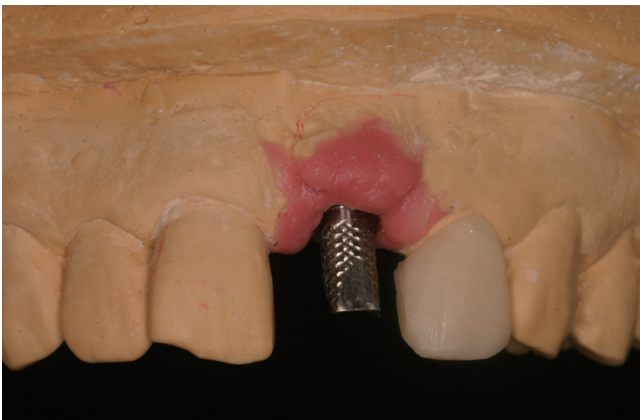
A preliminary impression was taken to make a diagnostic cast (Figs. 9 and 10). From a wax-up of the predicted tooth shape, the patient decided not to have a diastema again even if the crown would be slightly larger than the adjacent tooth. Therefore, the form of the interdental papilla was changed to make a natural contoured implant restoration. A temporary abutment was connected to make screw retained provisional restoration (Fig. 11). After making the provisional implant restoration, the soft tissue around the implant fixture in the



**Figure 9.** The maxillary left central incisor was replaced with an implant (A). Impression coping was placed to make the impression (B).



**Figure 10.** Occlusal view of soft tissue cast. Flat and bulky mesial interdental papilla existed between the incisors in the original diastema.

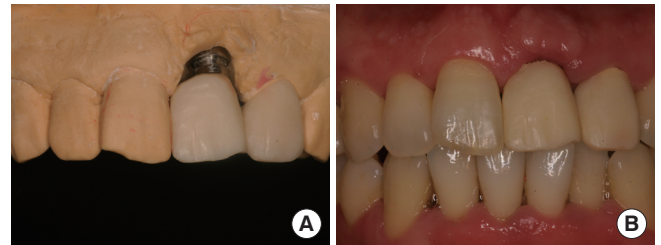


**Figure 11.** A temporary abutment was connected to produce the screw-retained provisional restoration.

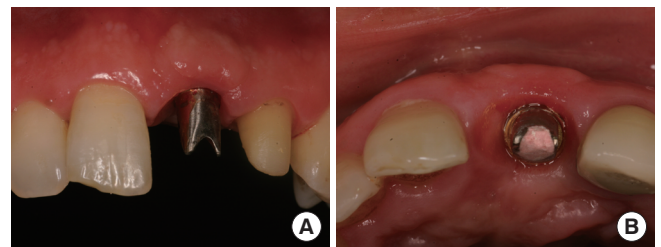
model was trimmed with a laboratory scalpel blade to make the desired gingival form. A light-curing composite resin was added to fill the space between the provisional crown base and trimmed soft tissue model (Figs. 12 and 13). Prior to its first insertion, the cervical contour of the provisional restoration was reduced 30% in volume as a transition between the emergence profile of the healing abutment and the ideal shape of the previewed definitive contour. Over a 2-week pe-



**Figure 12.** To make a triangular formed interdental papilla and proper contoured crown, composite resin was added to the mesial base of the provisional restoration.



**Figure 13.** Provisional restoration with a natural emergence profile (A). Provisional restoration was placed for 1 month to reform the gingiva (B).



**Figure 14.** Recontoured gingival architecture by a provisional restoration.

riod, the marginal tissue adapted to the initial impulse, and the cervical volume was increased to the ideal triangular cross-sectional shape of a natural central incisor. This procedure allowed the tissues to gradually adapt to the pressure, which caused an impulse for reshaping without overstressing the elasticity of the marginal tissue [13]. The provisional restoration was relined and reshaped twice during a month so that the soft tissue was managed and guided to achieve the desired emergence profile.

After allowing 6 weeks' stabilization of the gingiva, a final impression was taken to make a definitive implant restoration. To transfer the developed soft tissue contour to the master model, a standard impression coping was custom-



**Figure 15.** Postoperative facial view.

ized with acrylic resin. The final result revealed harmony of the soft tissue and tooth form with the adjacent tooth (Figs. 14 and 15).

## DISCUSSION

Three parameters are used to describe the esthetics and health of implant restorations: residual alveolar bone, peri-implant soft tissue and crown form. These factors must be considered for function and esthetics. Among these factors, in terms of the prostheses, the physiological crown form is an important factor for maintaining the periodontal health around an implant by inducing the self-cleansing activity. If the crown contour is changed by a crown fracture or bulky restoration, it will cause changes of the physiological crown form and then disturb smooth chewing movement. Subsequently, it will cause food retention and plaque accumulation around the implant and can cause periodontal problems. This phenomenon will also occur in an implant restoration.

Therefore, a physiological implant restoration form is very important for esthetic and healthy periodontium as well as to improve the implant prognosis. To achieve a physiological implant restoration form, some considerations are needed from the natural teeth. For the prosthetic crown in natural teeth, the emergence profile and supragingival crown profile need to be considered. On the other hand, the ridge profile and submergence profile [14,15] also need to be considered for an implant restoration. In an implant restoration, the emergence profile is the portion of the restoration that emerges coronally from the free gingival margin to replace the crown form of the extracted tooth [14].

Davarpanah et al. [16] proposed the emergence profile concept in implant therapy and a three-stage approach to ensure that concept: implant stage, intermediate abutment stage, and definitive crown placement stage. In the implant stage, the use of a proper implant diameter that is in harmony with

the crestal morphology and an ideal implant position are needed for an optimal emergence profile [17,18]. In the intermediate abutment stage, proper selection of the healing abutment [18,19] and the use of a provisional restoration will help produce an optimal emergence profile. In the definitive crown placement stage, an appropriate emergence profile associated with a correct anatomical morphology of the definitive crown and with a correct shade choice and ceramic characterization are needed. If the implant is placed in the ideal position, normal gingival recontouring will occur in the intermediate abutment stage. After the second surgery, some degree of soft tissue modification is generally required to achieve a harmonized gingival architecture with the adjacent tooth. For the soft tissue modification, a surgical method with a surgical knife, electronic instrument, and laser can be employed. On the other hand, as a non-surgical method, Bichacho and Landsberg [18] emphasized the use of a cervical contouring concept utilizing a provisional restoration to reshape the soft tissue around the implant.

In these two case reports, the emergence profile concept in the intermediate abutment stage was used with a provisional restoration because proper implant selection and placement were achieved in the implant stage. The advantage of the emergence profile concept in the intermediate stage is the use of a provisional implant restoration [14,19-22]. The provisional restoration can be the most important diagnostic and communication tool allowing patient to decide on the final prosthetic contours from esthetic, functional, and phonetic standpoints [7,23,24]. Furthermore, a provisional restoration is used as a healing matrix for the soft tissues in much the same manner as that used with the ovate pontic technique [7,21,25]. In these case reports, a provisional restoration with a natural emergence profile was used as a guide during gingival contouring. In particular, in case 2, the provisional restoration allowed the patient to decide on the definitive crown form with or without a diastema, which was what the patient had originally. Moreover, it helped reform the interdental papilla between the implant crown and the natural tooth. To create a natural emergence profile, the base of the provisional restoration is developed using light-curing composite resin. The use of light-curing composite resin rather than acrylic resin to reform the base of the provisional restoration causes less soft tissue irritation due to elimination of the autopolymerized acrylic resin monomer [26,27].

Al-Harbi and Edgin [26] recommended a screw-retained provisional restoration that allows easy retrievability and eliminates the remaining cement to prevent soft tissue irritation, especially in the subgingival site. Another advantage of using screw retention is the elimination of a rough surface created at the crown abutment junction by providing an

highly polished surface that facilitates tissue healing [23,27]. When implants are well positioned and the screw access opening is located favorably, screw-retained provisional restorations can be fabricated intraorally using autopolymerizing acrylic resin or composite. Improper alignment of implants compromises both esthetics and function due to unfavorable positions of the screw access opening. In this situation, fabrication of cement retained provisional restoration may be indicated [24].

In this study, either screw- or cement-retained provisional restorations was used. A screw-retained provisional implant restoration was used in case 2. A cement-retained provisional implant restoration was used in case 1. In case 1, the implant was placed a bit palatally and screw access opening was placed at the buccal incline of the palatal cusp, which was occlusal to the contact area with the opposing tooth. In addition, the top of the implant fixture was placed 1 mm from the gingival margin. Therefore, with the solid abutment, cement-retained provisional restorations allow easy removal of the cement, and faster and more predictable fabrication of the implant provisional restoration with better esthetics and stability of the occlusion. In case 2, a screw-retained implant restoration was fabricated due to the favorable position of the screw access opening and a crown margin 4 mm from the gingiva. This result suggest that either the screw- or cement-retained provisional implant restoration can be used case by case.

Davarpanah et al. [16] reported the following advantages of the emergence profile concept: ideal adaptation of the surgical and prosthetic components to the bone and prosthetic space, an emergence profile that mimics the natural teeth, avoidance of overcontoured prosthetic restorations, and the maintenance of proper oral hygiene. In these cases, a proper emergence profile was achieved with the provisional implant restoration fabrication according to the emergence profile concept and the patients were satisfied with the final outcome.

Careful patient selection, diagnosis, and treatment planning are essential for avoiding unsatisfactory outcomes, particularly in the esthetic zone. To develop a harmonious and aesthetic emergence profile, the parameters in each stage from implant placement to the postoperative stage need to be considered.

The method described in this case report allows the development and maintenance of the soft tissue contours before the fabrication of the definitive restorations, while providing the patient with a stable esthetic and functional outcome. Therefore, this method will help to improve patient satisfaction and implant prognosis when an implant is applied, particularly for patients with a loss of interdental papilla or in-harmonious soft tissue form due to an extraction of a tooth or periodontal problems.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

## ACKNOWLEDGEMENTS

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