# KEY TRANSFER TECHNIQUE FOR RESTORING IMPLANTS WITH EXTREME CERVIX PROXIMITY IN THE ESTHETIC ZONE: A CASE REPORT

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**KEY WORDS**

**Implant cervix proximity**
**Key transfer technique**
**Abutment relation**
**Precise duplication**

Extreme cervix proximity of adjacent implants poses a great challenge to the restorative dentist, as accurate transfer of implant analogs to the master cast would be difficult to achieve. In this case report, a custom key transfer technique was used to precisely duplicate the relation of 2 implants (replacing maxillary left central and lateral incisors with severe cervix proximity) from the patient's mouth to the master cast. The relation of each implant was singularly transferred to a preliminary cast, and then the 2 implant analogs were positioned in a master cast for accurate clinical case reproduction. The completed master cast allowed for precise fabrication of superstructures that accurately fitted the closely related implant cervices in the patient's mouth.

## INTRODUCTION

The esthetic zone of the anterior maxilla spans the area between the right and left first premolars. Implant replacement of lost teeth in this region has been increasingly used because of the optimum results gained from restoring both function and esthetics without sacrificing adjacent natural tooth structure to support a fixed prosthesis. Submerged implant placement is also preferred to achieve esthetically pleasing soft-tissue contours.[1]

Ideal implant positioning in esthetic areas is influenced by multiple factors, including the degree of buccal alveolar crest atrophy, axial discrepancy between the implant and the abutment angulation, and incisive neurovascular bundle proximity in the area of the maxillary central incisors. Some of these limitations may be corrected by reconstructive bone surgeries[2] or by prosthetic modalities[3] to functionally and esthetically satisfy the patient's needs and expectations.

Interproximal placement of multiple implants often necessitates less-than-optimum spacing between the implants, and this close relation may interfere with proper reconstruction of implant superstructures. Simultaneous fitting of the impression copings, exact relation transfer of the implants from the patient's mouth to the master cast, proper interproximal contouring of the

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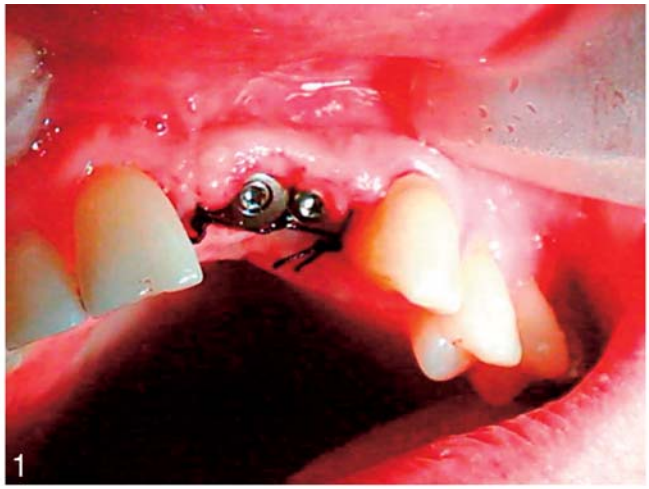
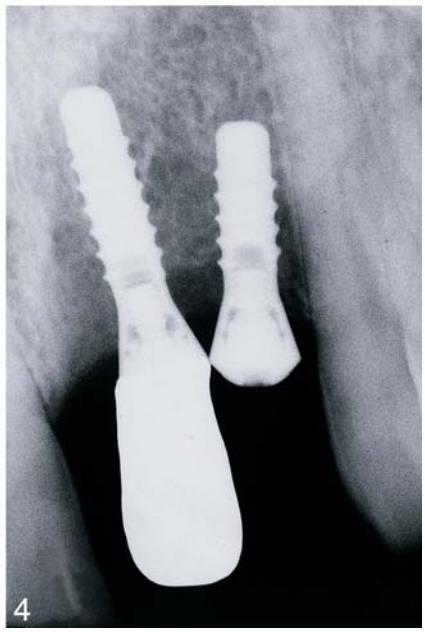




FIGURES 1–4. FIGURE 1. Exposure of the submerged implants reveals severe cervical proximity. FIGURE 2. Radiographic examination demonstrating the 2 severely angulated implants, with the top screws almost touching. FIGURE 3. Periapical radiograph showing the impression coping attached to 1 implant, with no chance for the other impression coping to be inserted. FIGURE 4. Periapical radiograph for the cast superstructure screwed on the implant abutment replacing the maxillary left central incisor.

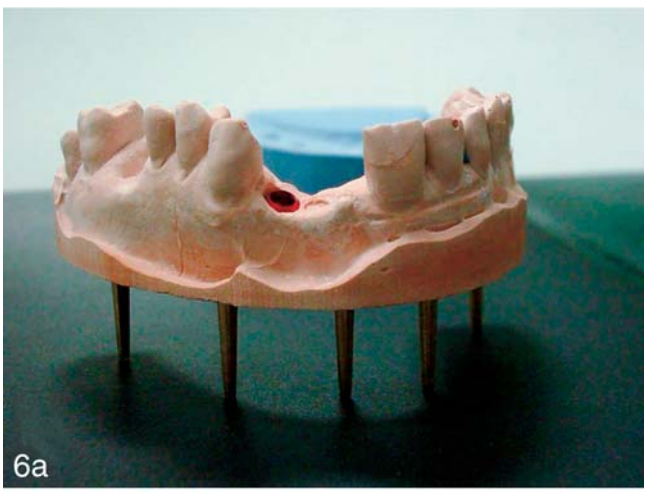
ceramometal restorations, and passive fitting of the screwed-in superstructures are some of the many challenges facing dentists and technicians restoring closely placed implants.

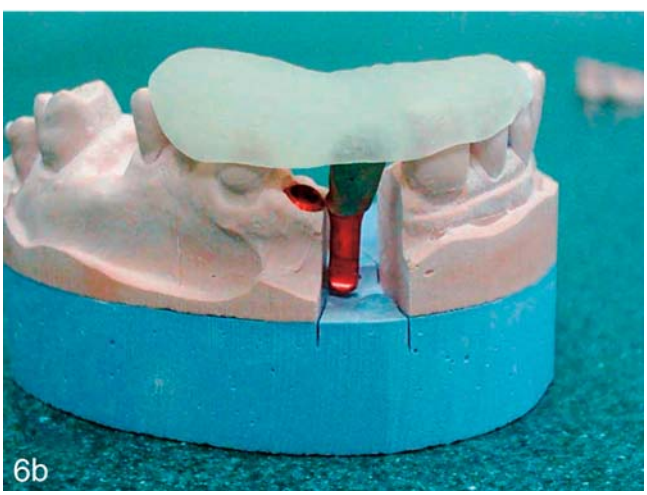
This report presents a new technique that allows clinicians to restore severely approximated implants while preserving proper dental relationships within the arch.

## CASE REPORTS

A 45-year-old man presented with 2 submerged implants (ITI, Straumann AG, Waldenburg, Switzerland) inserted 3 months earlier in the locations of the maxillary left central and lateral incisors. Clinical and radiographic examination after the surgical uncovering revealed severe cervix proximity between the 2 implants (Figures 1 and 2). The lack of space between them prevented precise positioning of impression copings on both implants simultaneously (Figure 3). A customized key transfer technique was developed to position both implant analogs in the working cast to accurately replicate the orientation of the implants in the patient's mouth.

An impression coping was attached to the implant in the

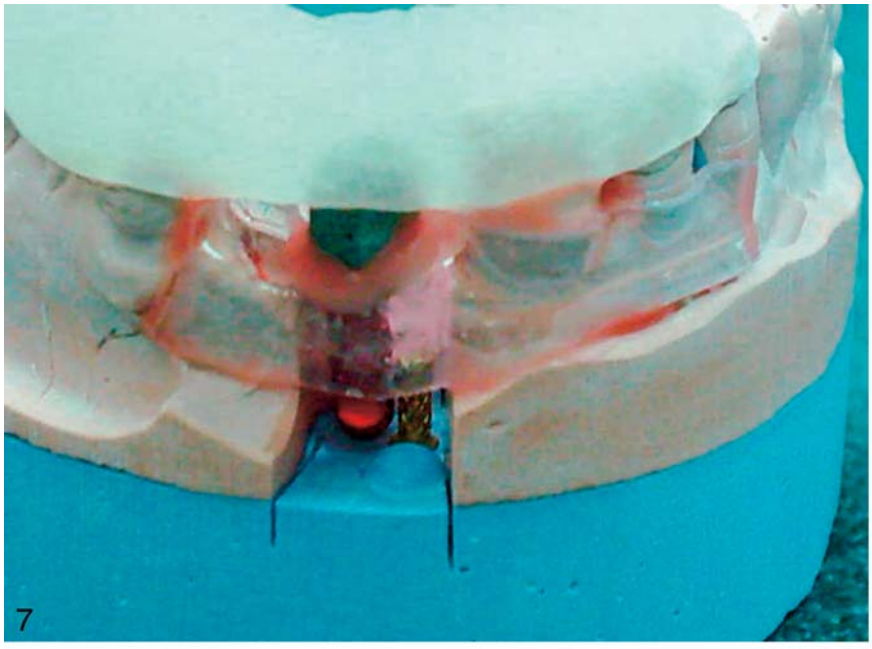



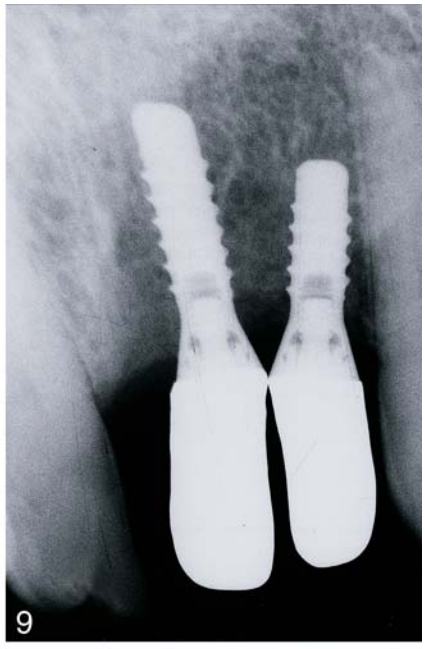




FIGURES 5–6. FIGURE 5. Resin key relating the superstructure to neighboring teeth. FIGURE 6. (A) The first layer of stone containing a dowel pin in the edentulous central incisor area, implant analog in the lateral incisor area, and multiple pins in dentulous areas. (B) The whole assembly fitted on the definitive master cast, with the implant analog in the area of the central incisor freely hanging in close contact to the embedded analog in the lateral incisor area.

location of the maxillary left central incisor guided by the positioning screw, and an elastomeric impression was made. Upon screw loosening and impression removal, a color-coded implant analog was attached to the impression coping and a preliminary cast containing only 1 implant analog was fabricated. A screw-retained angulated abutment was placed on the implant analog and oriented to its best angulation to create a space for an adjacent abutment. The position was preserved with the aid of an intraoral acrylic abutment orientation jig.[4] A cast-on technique was used on the selected abutment, and the cast superstructure was tried in the patient's mouth (Figure 4). A resin key relating the cast superstructure to neighboring teeth was performed (Figure 5). The key was then removed and the superstructure with an implant analog attached to it was secured in the key with wax.

Removal of the superstructure from the maxillary left central incisor allowed an impression coping to be attached to the implant in the location of the maxillary left lateral incisor. The completed impression with the implant analog screwed in was poured with the first layer of stone while ensuring a minimum thickness of 2 mm was present beyond the apical tip of the analog. At this stage, only 1 implant analog replacing the maxillary lateral incisor was included in the poured layer of stone. After setting of the first layer, a dowel pin (Pindex, Whaledent International, New York, NY) was inserted in the edentulous area of the central incisor in an area carefully designed to allow free hanging of the implant analog when another pin was later inserted in the same pin channel. Multiple pins were





FIGURES 7–9. FIGURE 7. Adapted polyethylene sheet, secured in place with wax, leaving only a small buccal window for gypsum pouring. Note the dowel-pin head hanging in the voided area. FIGURE 8. The cast superstructures attached on the master cast, with the purple stone representing the gypsum poured through the buccal window. FIGURE 9. Periapical radiograph with the cast superstructures simultaneously attached to both implant abutments.

placed in the surrounding dentulous areas on both sides, thus facilitating the removal of the edentulous area dowel pins (Figure 6A).

The second layer was poured after a separating medium (a thin layer of petroleum jelly) was applied to the first layer. Then, with a vacuum-pressure unit (Biostar Scheu-Dental, Iserlohn, Germany), a polyethylene sheet was adapted to the edentulous area and its surroundings. The edentulous central incisor area was sectioned, and the dowel pin was used to facilitate its removal from the master cast, which left a void that allowed the implant analog to be freely inserted (Figure 6B).



FIGURES 10–11. FIGURE 10. Clinical appearance of the definitive screwed-in ceramometal restorations. FIGURE 11. Periapical radiograph confirming proper fit of the ceramometal restorations on the implants.

A lubricated dowel pin was inserted in the hollowed dowel-pin channel that remained after removal of the sectioned part, and a separating medium was applied to the voided area except for the dowel-pin head. The adapted polyethylene sheet was customized for complete seating of the acrylic key with the attached superstructure-analog assembly, and the sheet margins were secured with wax so that complete boxing of the sectioned area was ensured, leaving only a small window buccally through which a new mix of stone was poured around the hanging analog (Figure 7).

On the finalized master cast that exactly duplicated the clinical situation, an angulated abutment was selected and screwed into place, and a superstructure was fabricated by a cast-on technique (Figure 8). The superstructures replacing the missing maxillary left central and lateral incisors were tried simultaneously in the patient's mouth (Figure 9). After necessary adjustments, the definitive ceramometal restorations were finalized and screwed on the implants with 15-N torque,[5] and screw access holes were sealed with composite material (Figures 10 and 11).

## Discussion

Meticulous evaluation of the anatomical aspects and careful planning are important parameters necessary for functional and esthetic success when considering implant-supported restorations in esthetic zones.

The loss of 2 or more adjacent teeth in the anterior maxilla normally leads to a characteristic resorption pattern of the alveolar bone crest and its associated overlying mucosa. Essentially, flattening of the ridge results in loss of both its original scalloped configuration in the frontal plane and its root eminences, or *jugae alveolaria*, in the horizontal plane.[6]

To eschew damaging the shifted or enlarged incisive neurovascular bundle resulting in palatal dysesthesia, implant placement may have to be less than ideal, leading to cervical implant proximity that would prevent accurate sequencing of prosthetic and laboratory procedures. The key transfer technique can solve this problem by allowing precise duplication of the clinical situation and permitting accurate restorations to be accomplished without endangering the surface topography of the implant cervices, a critical area that, if subverted, could enhance plaque accumulation and sequalae of periodontitis.

## Conclusions

The key transfer technique provides the restorative dentist and the technician with a viable solution for restoring dental implants that suffer from severe cervix proximity. To ensure successful outcomes, each step in

the procedure must be executed properly. Any deviation from the clinically transferred relations would result in the inability of the practitioner to passively seat the restoration over the implant abutment.

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