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CLINICAL REPORT

Esthetic reconstruction of a localized severely resorbed anterior maxilla associated with peri-implantitis: A clinical report

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ABSTRACT

This clinical report described the esthetic reconstruction of a localized severely resorbed right anterior maxilla associated with peri-implantitis. For vertical bone augmentation, guided bone regeneration surgery was performed by raising a flap with the remote incision technique, followed by soft tissue grafting and vestibuloplasty. The biologically oriented preparation technique was used to improve the health and stability of the peri-implant tissues. The surgical treatment and a novel method of prosthetic rehabilitation provided excellent esthetic and functional outcomes. (J Prosthet Dent 2025;133:8-13)

Implant therapy is the preferred treatment option for restoring oral function and esthetics in edentulous patients.[1] However, complex bone defects in the esthetic zone pose challenges in fabricating functional and esthetic restorations.[2] Peri-implantitis is a biofilm-mediated inflammation resulting in bone loss around implants, compromising long-term implant stability.[3] Local predisposing factors for peri-implantitis include soft tissue characteristics, implant positioning, and prosthesis design.[4,5] During the surgical phase, inadequate 3-dimensional implant positioning may lead to more significant bone loss because a subgingival peri-implant anaerobic ecosystem is formed.[3] These local predisposing factors are particularly critical when placing anterior implants.

This clinical report describes the management of peri-implantitis with guided bone regeneration (GBR) and soft tissue grafts in a patient with a compromised right anterior maxilla. Wound closure affects the result of bone augmentation,[6–8] and the remote incision technique was used to avoid wound dehiscence. Peri-implant soft tissue dehiscence (PSTD)[9] over time is a frequent complication associated with implants in the esthetic zones.[10] A coronally advanced flap combined with a subepithelial connective tissue graft (SCTG) has been reported to be the most predictable procedure[11,12] and was applied to treat the PSTD after bone augmentation. The biologically oriented preparation technique (BOPT) was applied to ensure peri-implant tissue health and an esthetic implant-supported prosthesis.[13–17]

CLINICAL REPORT

A 41-year-old healthy man reported to Chumdan Mir Dental Hospital in November 2020 complaining of poor esthetics and discomfort with his maxillary anterior implants. His medical history showed no contraindications to dental surgery. He reported having had an implant placed in the right maxillary canine region in June 2014 and a second implant in the right maxillary central incisor region in April 2019 at another office. The clinical examination revealed a long, unesthetic, implant-supported partial fixed dental prosthesis supported by these implants. (Fig. 1A). The panoramic radiograph and cone beam computed tomography (CBCT) scan showed extensive labial bone loss around the implants (Fig. 1B). Treatment options included a partial fixed dental prosthesis with pink porcelain or

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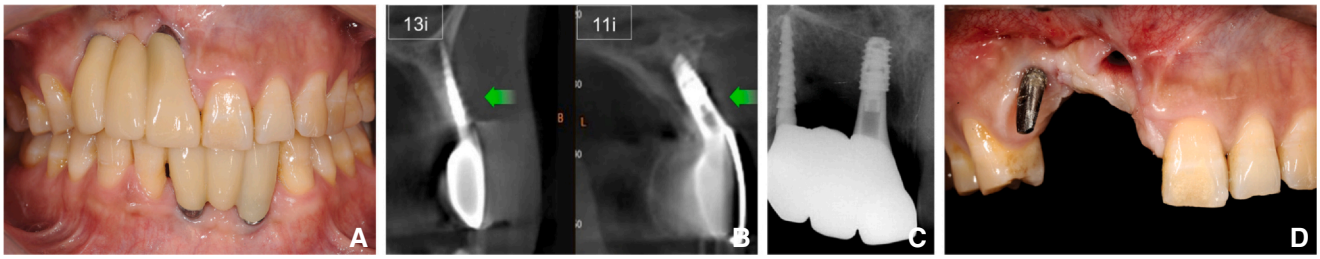

Figure 1. A, Initial situation presenting unesthetic fixed dental prosthesis in right maxillary anterior region. B, C, Cone beam computed tomography image and periapical radiograph present labial bone resorption (*green arrow*) and deepened implant position. D, Clinical view after prosthesis removal.

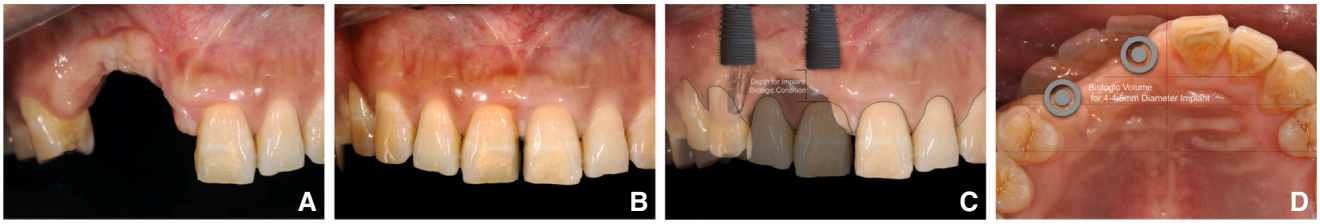

Figure 2. Preoperative clinical examination and treatment planning of implant position. A, Labial view 12 weeks after implant removal. B, Ideal and esthetic result was set by mirroring left maxillary anterior teeth and gingiva on clinical photograph. C, D, Labial and occlusal views. Superimposition of implants on clinical image.

implant-supported partial fixed dental prosthesis accompanied by soft and hard tissue reconstruction. A surgical procedure involving reimplantation was preferred for achieving anterior esthetics despite the challenges. Informed consent was obtained from the patient before commencing treatment.

The failing implants in the right maxillary central incisor and canine regions were removed, and the alveolar ridge allowed to heal over 2 months from the severe resorption (Fig. 2A). The treatment plan included vertical and lateral bone augmentation with GBR, with simultaneous implant placements and staged soft tissue augmentation, followed by the fabrication of an esthetic zirconia prosthesis.

Presurgical clinical examination and CBCT evaluation were used to determine the location and depth of implant placement and predict the amount of bone grafting needed. First, the left maxillary anterior teeth and gingiva were mirrored on clinical photographs to optimize the esthetic outcome (Fig. 2B). The apicocoronal implant position was determined to achieve optimal esthetics of the labial soft tissue margin for the definitive restoration. The implant platform was positioned 4- to 5-mm apical to an imaginary line representing the future mucosal margin. Then, the buccolingual position of the implant was determined to prepare an esthetic prosthesis. The biologic volume (bone and soft tissue) required for a 4- to 4.5-mm diameter implant was also determined (Fig. 2C, D).

A mixed split and full-thickness flap was used for bone augmentation.[18] A remote, horizontal vestibular incision[2] on the labial mucosa (approximately 7 to 8 mm beyond the mucogingival junction), 2 vertical incisions in the right maxillary anterior region, and a secondary horizontal visor incision toward the ridge crest were applied (Fig. 3A). Thereafter, a split and full-thickness flap was raised, and the alveolar deficiency was exposed (Fig. 3B). A 4.0×10-mm implant (KISPLANT MT; KUWOTECH) was placed in the right maxillary central incisor position, and a 4.5×10-mm implant (KISPLANT MT; KUWOTECH) in the canine position (Fig. 3C). A particulate xenograft (KISbone; Purgo Biologics) and a titanium-reinforced dense polytetrafluoroethylene (PTFE) membrane (KIStex TR; Purgo Biologics) were applied (Fig. 3D). A fixation screw (KUWOTECH) and 3 horizontal mattress sutures with 4/0 nylon were applied for membrane stabilization. Primary wound closure was achieved with a mix of 4/0 nylon horizontal mattress and interrupted sutures (Fig. 3E, F). Postoperative analgesics and amoxicillin (500 mg 3 times daily for a week) were provided. He was also advised to avoid toothbrushing in the surgical area for 2 weeks and to use a 0.12% chlorhexidine mouthwash. Sutures were removed 7 to 14 days after the surgery. One month after surgery, healing had been uneventful (Fig. 3G). The panoramic radiograph showed a stable bone contour (Fig. 3H).

At his 7-month postoperative visit, sufficient bone healing was observed around the implants, but additional bone grafting was needed to create an interdental papilla at the right maxillary lateral incisor site (Fig. 4A). Vertical bone augmentation was performed similarly to

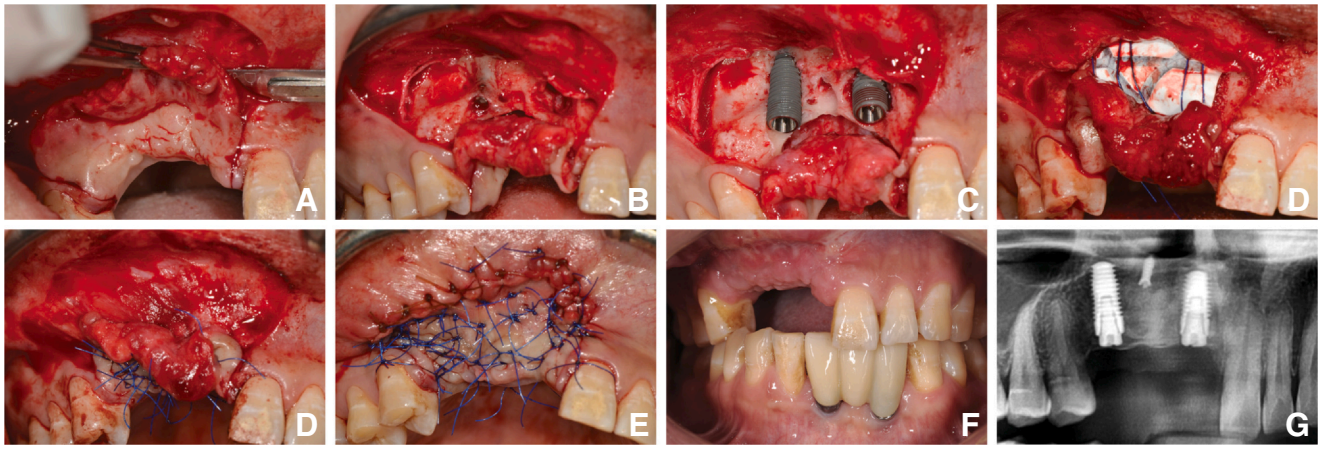

Figure 3. Guided bone regeneration and implant placement. A, Remote vestibular horizontal incision placed in flexible mucosa in vestibular fold and 2 vertical incisions in right maxillary anterior region. Secondary horizontal visor incision toward ridge crest. B, Implant translucent through thinned labial wall. C, Two implants placed in right maxillary central incisor and canine regions. D, Defect area filled with particulate xenograft and covered by titanium-reinforced dense polytetrafluoroethylene membrane. Three horizontal mattress sutures placed with nylon for membrane stabilization. E, Layer-to-layer suture F, Primary wound closure achieved with mix of horizontal mattress and interrupted sutures. G, H, Clinical and radiographic views five weeks after surgery.

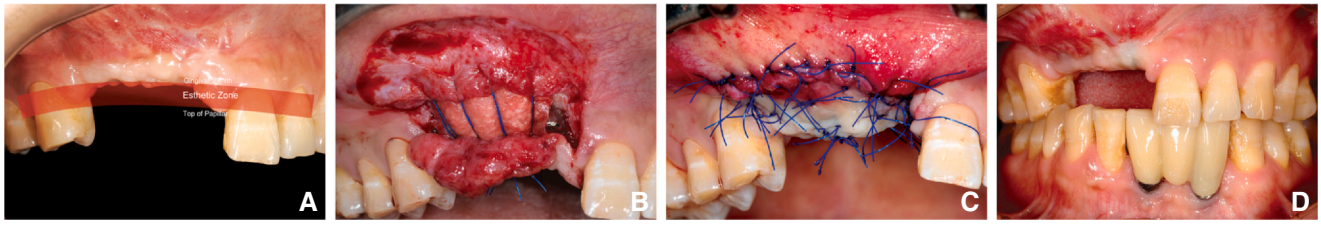

Figure 4. A, Seven months postsurgical state. Additional bone reconstruction planned for esthetic interdental papilla. B, Remote vestibular incision and guided bone regeneration with resorbable membrane. C, Primary closure. D, Three months after surgery.

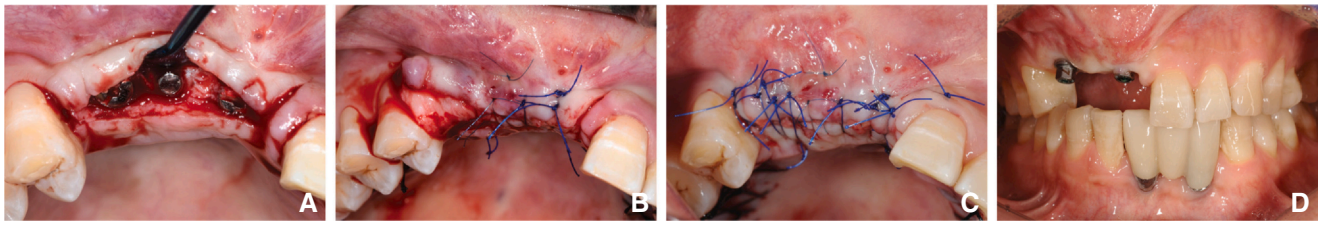

Figure 5. Soft tissue augmentation by using CTG and implant uncovering. A, Fixation screw removed. B, C, CTG. D, Implants uncovered by using punch technique after 2 months. CTG, connective tissue graft.

the first surgery, except that a resorbable membrane (BioCover; Purgo Biologics) was inserted (Fig. 4B, C).

A connective tissue graft (CTG) was used 3 months postoperatively for soft tissue augmentation. The fixation screw was removed after flap elevation, 2 connective tissue grafts harvested from palatal areas were placed and stabilized over the edentulous area, and the flap was approximated by interrupted suture. (Fig. 5A-C). The implants were uncovered after 2 months by using the punch technique[19] after soft tissue augmentation (Fig. 5D). After the second implant surgery, a digital scan (iTero Element 2 Intraoral Scanner, Align Technology) was made with an abutment (KU-abutment; KUWOTECH) (Fig. 6A, B).

Two months later, the interim prosthesis in the right maxillary anterior area showed PSTD of about 2 mm (Fig. 6C), and the soft tissue was augmented by using the vestibular incision subperiosteal tunneling access (VISTA)

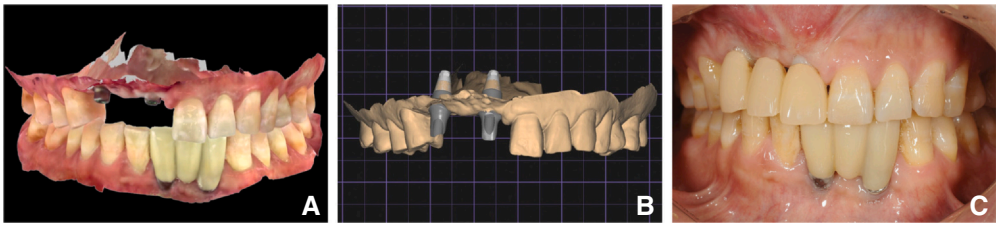

Figure 6. A, B, Intraoral scan for interim prosthesis. C, Interim prosthesis in right maxillary anterior region shows peri-implant soft tissue dehiscence.

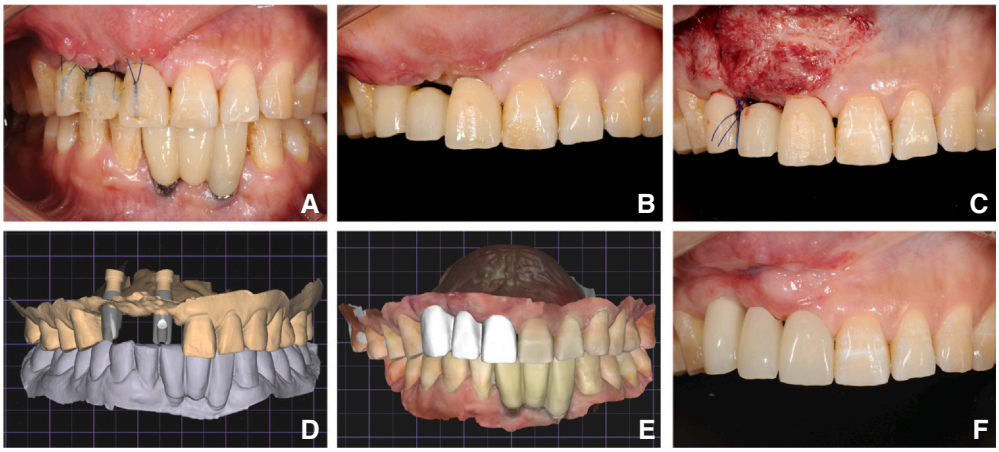

Figure 7. A, B, Soft tissue augmentation by using VISTA technique. C, Vestibuloplasty by using modified Kazanjian technique. D, E, F, Definitive restoration by using abutment design with biologically oriented preparation technique. VISTA, vestibular incision subperiosteal tunneling access.

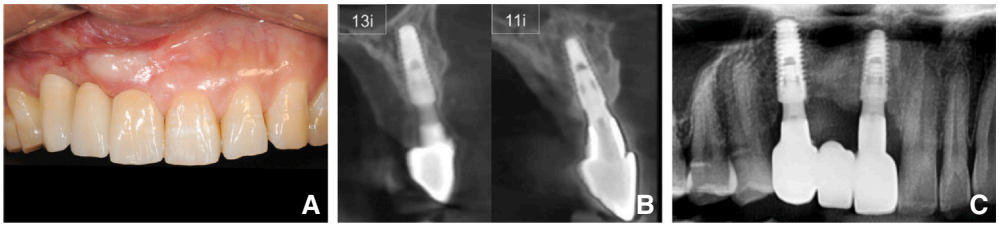

Figure 8. A, Definitive restoration. B, Cone beam computed tomography image after reconstruction, C, Panoramic radiograph after definitive restoration.

technique (Fig. 7A, B).[20,21] Moreover, a vestibuloplasty with the modified Kazanjian method was performed a month later for vestibular deepening (Fig. 7C).[22]

The BOPT was used to fabricate an esthetic implant-supported prosthesis in the right maxillary anterior region. Vertical preparation of the abutments without finish lines on the implants optimizes the remodeling and stability of peri-implant tissues.[13,14] The BOPT concept was selected for the implant abutment design to allow for crown margin placement below the mucosa without a finish line (Fig. 7D-F).

The definitive restoration was delivered 2 months after the vestibuloplasty. Clinical and radiographic evaluation showed sufficient esthetic outcomes with peri-implant tissue stability and bone formation around the implants (Fig. 8A-C). The patient was satisfied with the treatment outcomes.

DISCUSSION

Esthetic restorations in patients with peri-implantitis and unesthetic anterior implant-supported prostheses are challenging. This report described a situation with unilateral severe bone loss in the maxillary anterior region with various surgical methods to achieve clinical success. Careful treatment planning and selection of surgical techniques are critical to successful results and patient satisfaction.

Retreatment of failed implants requires careful treatment planning, especially when determining the number and position of the implants. The 3-dimensional position, placement depth of implants, and the necessary amount of bone were determined with the virtual image of a definitive prosthesis.

A remote horizontal incision in the vestibular fold for vertical bone augmentation was applied for the first and second operations. As wound closure significantly affects successful outcomes in bone augmentation surgery,[6–8] a remote incision was used to obtain tension-free primary closure without excessive releasing incisions.[2,18] Furthermore, this incision technique enables the placement of incisions away from grafts, preserves the keratinized mucosa and papilla, and avoids visible scars.[18]

The SCTG and VISTA were applied for soft tissue augmentation. A coronally advanced flap used with the SCTG provides the most predictable procedure for correcting gingival recession.[11,12] A split-thickness flap ensured vascular supply to the tissue graft from the split-thickness flap and the connective tissues. However, a split-thickness flap dissection could result in thinned flap tissues in thin gingival phenotypes, leading to sloughing, necrosis, and ultimately, poor clinical outcomes.[23] Chambrone et al revealed a significant reduction in the width of keratinized tissue in the split-thickness flap.[12] VISTA surgery is minimally invasive involving a smaller access opening and full-thickness flaps.[20,21] In this situation, VISTA was used to correct PSTD after interim restoration. The vestibuloplasty with the modified Kazanjian technique[22] was performed to deepen the shallow vestibule after soft tissue augmentation surgery and achieve improved esthetics and prosthetic function.

The BOPT was applied for implant restoration. Although peri-implant reconstructive surgery enables hard and soft tissue regeneration, proper prosthetic rehabilitation is essential to achieve esthetic results. Among the prosthetic factors, abutment morphology is an important consideration in ensuring a stable mucosal margin in esthetically sensitive areas.[15] The application of BOPT from tooth-supported fixed prostheses can ensure peri-implant tissue health and prevent inflammation and/or gingival bleeding.[13–17] The finish line design for fixed prostheses can be horizontal (straight shoulder, bevel shoulder, curved chamfer, flat chamfer), vertical (for example, feather edge finish line),[17] or without a definitive finish line as described by Loi and Felice.[13] The preparation technique for no finish lines is also referred to as the BOPT. This technique aims to model the peri-implant sulcus by modifying the prosthetic emergence profile.[17] Vertical preparation of abutments without finish lines may improve the health and stability of the peri-implant tissues.

SUMMARY

This clinical report describes an esthetic reconstruction of a localized severely resorbed right anterior maxilla area associated with peri-implantitis. For vertical bone augmentation, GBR was performed by raising a flap with a remote incision technique, and soft tissue was reconstructed by using the CTG, VISTA, and modified Kazanjian procedures. Furthermore, BOPT was used to improve the health and stability of the peri-implant tissues. Satisfactory esthetic and functional outcomes were achieved by using these surgical techniques together with prosthetic rehabilitation.

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