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CLINICAL REPORT

Immediate implant placement in the esthetic zone with buccal wall defect using the immediate dentoalveolar restoration (IDR) protocol: A clinical report

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ABSTRACT

Immediate implant placement in the anterior maxilla is indicated for patients with an intact labial plate to achieve esthetics and predictability. This clinical report describes the use of the immediate dentoalveolar restoration (IDR) protocol with a digitally designed tuberosity adjustment guide (TAG) to restore a compromised socket in the esthetic zone. A 47-year-old patient presented with a missing lateral incisor with loss of the labial wall. The tooth had been lost because of trauma. A tuberosity bone graft was shaped using a computer-aided design and computer-aided manufactured (CAD-CAM) TAG and placed simultaneously with the implant and a screw-retained interim crown. At 2 years, soft and hard tissue stability was maintained. (J Prosthet Dent 2026;136:e10-e14)

Immediate implant placement in the anterior maxilla minimizes treatment time and preserves soft tissue contours with high success rates.[1–3] Traditionally, this approach has relied on the presence of an intact labial bone wall to ensure favorable esthetic outcomes.[4,5] When the labial plate is compromised or absent, immediate implant placement has been historically contraindicated because of increased risks of failure, and delayed implant placement with bone regeneration has been the treatment of choice.[4,6,7] More recently, successful outcomes have been reported even in patients with partial or complete labial wall defects but often involving flap elevation.[8,9]

The immediate dentoalveolar restoration (IDR) protocol was developed by da Rosa et al[10] as a 1-stage technique combining flapless tooth extraction, autogenous bone grafting, implant placement, and immediate interim restoration placement. By simultaneously reconstructing the labial wall and guiding soft tissue healing through an interim restoration, IDR has shown promising long-term outcomes in otherwise contraindicated sites.[11–18] However, IDR presents challenges, particularly in shaping and adapting the autogenous graft to the defect morphology. This clinical report presents an innovative digital approach to IDR in a maxillary defect with labial bone loss. The use of computer-aided design and computer-aided manufactured (CAD-CAM) tools, including a custom-designed shaping guide for the autogenous graft, allowed for precise adaptation and enhanced predictability.

CLINICAL REPORT

A 47-year-old healthy nonsmoking man presented for consultation after a traumatic incident that resulted in the fracture of the crown of his maxillary right lateral incisor (Fig. 1). Clinical and radiographic evaluations

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Figure 1. Initial clinical situation.

confirmed a vertical root fracture, rendering the tooth nonrestorable. Intraoral examination and 3-dimensional radiographic imaging revealed a Type 2C socket characterized by a dehiscence defect involving the loss of the apical one-third of the labial plate according to the classification by Chu et al.[19] Cone beam computed tomography (CBCT) analysis revealed a labial bone defect approximately 5 mm in width and 7 mm in height. The residual alveolar anatomy was favorable for immediate implant placement, provided that adequate reconstruction of the labial bone wall could be achieved (Fig. 2).

The digital planning workflow started with intraoral scan acquisition merged with a virtual prosthetic design to visualize the ideal emergence profile and anticipate the required prosthetic space. A dedicated digital software program (Msoft; MIS) allowed implant planning with accurate positioning relative to the available bone and the future prosthetic axis. Laboratory simulation (Pinaud Planification 3D) using digital tools (such as BlenderForDental; Blender and SmileCloud; Institut Straumann AG) defined the definitive prosthesis and the volumetric requirements for ridge reconstruction.

Through digital subtraction, the defect was isolated and rendered in pink (Fig. 3). This volume was then

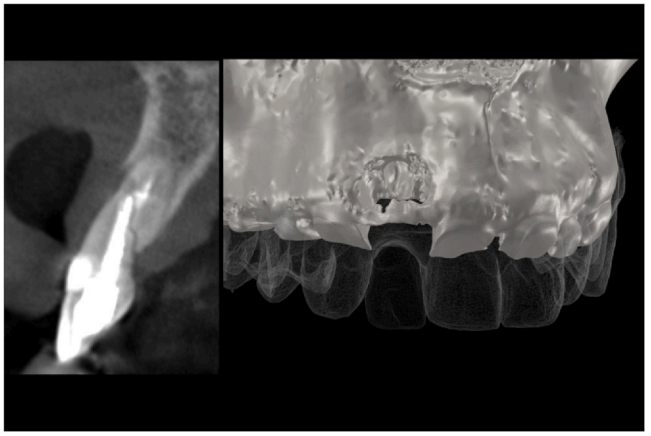

Figure 2. Standard tessellation language (STL) file combining initial situation, prosthetic project, and radiographic imaging revealing labial bone defect.

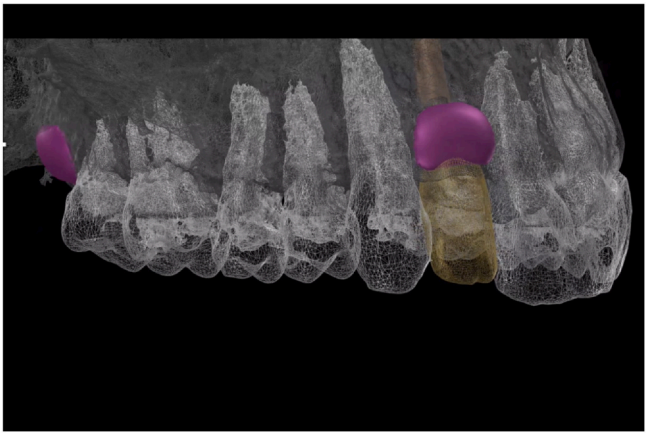

Figure 3. Prosthetic project in *yellow*; defect areas in *pink*. Visualization of bone defect and identification on donor site.

virtually superimposed onto the maxillary tuberosity region to evaluate donor site availability. Following the IDR protocol, the harvesting of autogenous corticocancellous bone from the maxillary tuberosity area was planned.

Fully guided surgery was planned with a printed surgical guide. In parallel, a custom calibration device, or shaping box, which was designed using a dental CAD software program (BlenderForDental; Blender), allowed sculpting of the harvested bone block to the exact defect geometry, minimizing intraoperative adjustments (Fig. 4).

Atraumatic extraction of the fractured tooth was performed using an extractor system (Benex; Meisinger), preserving the labial plate and interproximal papillae. Osteotomy and implant placement were fully guided, matching the virtual plan in trajectory, depth, and angulation. A narrow platform implant (MIS V3 3.3 × 11.5 mm, MIS Implants Technologies Ltd) was placed with a torque of 40 Ncm, and a 1-abutment, 1-time component (MIS Connect; MIS Implants Technologies Ltd) was immediately seated.[20,21]

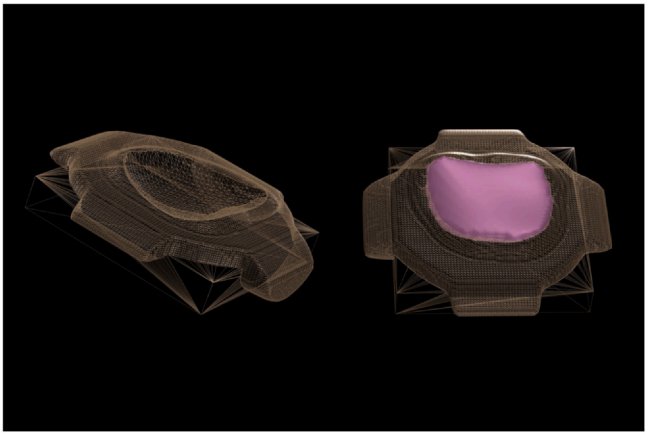

Figure 4. Box digital creation for graft calibration and precise adaptation.

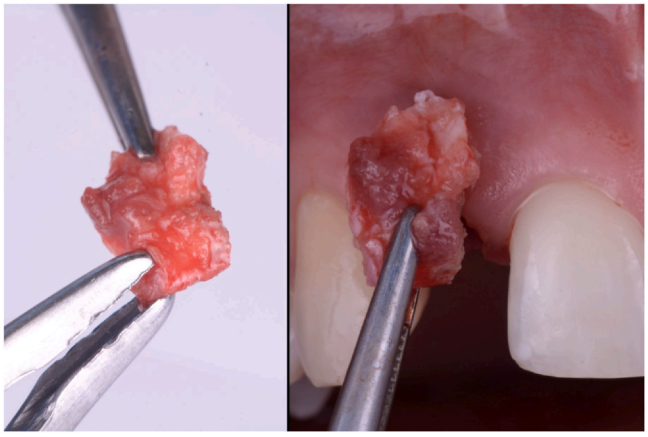

Figure 5. Graft after harvesting and insertion into recipient site.

The autogenous bone block was harvested with piezosurgery inserts (Osteotomy set, Mectron) and chisels (IDR kit, Helmut Zepf Medizintechnik GmbH), inserted into the printed shaping box, and sculpted to the predesigned volume using a rongeur. (Hu Friedy). It was then transferred to the recipient site and press-fitted into position, achieving primary stability without the use of fixation screws (Fig. 5).

An interim restoration was designed based on the superimposition of standard tessellation language (STL) and digital imaging and communications in medicine (DICOM) files and the virtual planning of the implant position and was milled using CAD-CAM technology. An interim titanium cylinder was placed intraorally after implant placement. The interim restoration, designed with 2 mesial and distal wings and a palatal access hole, allowed accurate intraoral positioning and was connected to the cylinder using a flowable composite resin (Tetric; Ivoclar). Beyond esthetics, its aim was to stabilize the graft and guide soft-tissue architecture during the healing phase. No removal for modification during that phase was needed. At the 6-month follow-up, clinical evaluation demonstrated maintenance of contour and soft tissue harmony (Fig. 6).

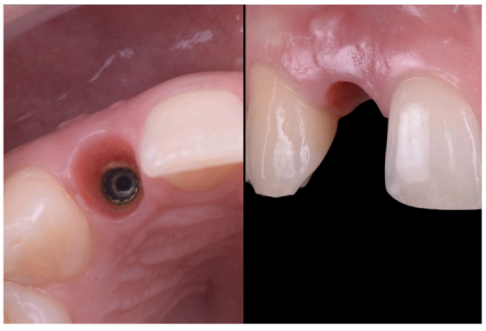

Figure 6. Six-month postoperative follow-up. Occlusal and frontal views.

Figure 7. Definitive prosthetic result.

A digital scan for the definitive restoration was made using a digital scanner (Primescan; Dentsply Sirona) to capture the peri-implant soft-tissue and emergence profile. A screw-retained ceramic-veneered zirconia crown was fabricated and delivered. It was designed to replicate the emergence profile of the interim restoration, maintaining the soft tissue architecture sculpted during healing (Fig. 7).

CBCT analysis confirmed stable labial bone volume between the preoperative baseline, prosthesis delivery and the 2-year follow-up (Fig. 8). At 2 years, the peri-implant tissues presented healthy probing depth, no bleeding on probing, and a pink esthetic score (PES)[22] of 12, indicating stable soft-tissue integration and a satisfactory esthetic outcome.

DISCUSSION

Immediate implant placement refers to implant insertion at the time of tooth extraction and reduces treatment time while preserving ridge morphology and soft tissues.[1] With proper patient selection, single-tooth immediate implants in the anterior maxilla show high survival rates (approximately 95 to 100% at 1 to 5 years) comparable with delayed placement.[2,3] Consensus statements have affirmed that immediate placement with immediate interim restoration delivery is a

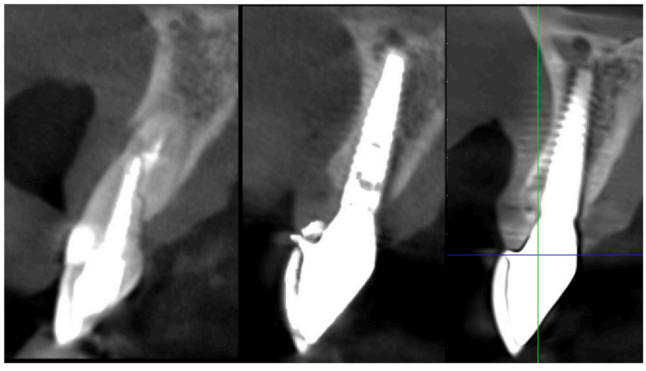

Figure 8. Three-dimensional comparison between initial situation, day of prosthesis placement, and 2-year follow-up.

predictable option for experienced clinicians, provided that strict inclusion criteria are met.[1,5] The integrity and thickness of the labial bone plate is critical for esthetic outcomes in the anterior maxilla. A thick intact labial plate (>2 mm) has been associated with more predictable maintenance of tissue contours and minimal recession. In contrast, a thin or damaged labial plate often undergoes resorption, jeopardizing esthetics.[6] A recent systematic review confirmed that a compromised labial bone wall is a high-risk factor for esthetic failure in immediate implant therapy.[4] Hence, the conventional approach for such sockets has remained delayed implant placement with ridge preservation.[7]

This perspective is evolving, and IDR is a 1-stage technique developed for immediate implant protocols in compromised sockets. Pioneered by Martins da Rosa et al,[10] it involves placing an implant immediately into an extraction socket, even when the labial plate is missing, by simultaneously grafting the defect and providing an immediate interim restoration. After flapless tooth extraction, an autogenous bone graft (often from the maxillary tuberosity) is shaped and placed between the implant and the remaining labial soft tissue. An immediate provisional crown is fabricated, sealing the socket and supporting the gingival architecture. The "1- abutment, 1- time" philosophy is applied.[20,21] Early reports of IDR showed promising results.[11,12] In a case series, da Rosa et al[11] treated a maxillary incisor with total loss of the labial plate using IDR and reported satisfactory bone regeneration and stable esthetics at 36 months.

This approach also reduces overall treatment time and patient morbidity.[11,12] A 5-year prospective study by Martins da Rosa et al[12] followed 18 patients with compromised sockets treated with IDR. They reported no midfacial recession between baseline and 58-month follow-up: mean labial gingival levels remained virtually unchanged (12.85 mm to 12.79 mm). Papillary heights were preserved or slightly improved, and all implants achieved osseointegration, suggesting that even in sockets missing the labial wall, IDR can yield successful long-term outcomes. A recent systematic review comparing intact and compromised sockets reported no significant difference in implant survival or marginal bone loss between the two when appropriate regenerative steps (such as IDR) were taken.[2] Another systematic review[9] suggested that immediate implants in sockets with labial defects, when combined with bone regeneration, can give clinical and radiologic outcomes comparable with those of traditional delayed placement.

Ongoing research and longer follow-ups will further clarify success rates, but the literature up to 2025 indicates that IDR is a reliable treatment modality in experienced hands.[10–18]

SUMMARY

This clinical report describes the successful use of IDR with a custom digital shaping guide to treat a compromised esthetic socket. The approach enabled simultaneous hard- and soft-tissue reconstruction, implant placement, and interim restoration placement in 1 session, with stable long-term results.

PATIENT CONSENT

Written informed consent was obtained from the patient prior to treatment and the publication of this clinical case. The patient agreed to the use of all intraoral and extraoral photographs, radiographs, and clinical details for scientific and educational purposes.

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