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Case Report

Immediate Implant and Provisional Restoration Using the Corrected Model: A Specific Approach

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Abstract: ***Background***: The restoration of the anterior maxilla with implants requires precise techniques to ensure aesthetic outcomes. Immediate implant placement with provisional restoration is a commonly used method to preserve soft tissue and maintain esthetics. ***Observation***: A 40-year-old male patient with a severely decayed maxillary lateral incisor (tooth 22) underwent immediate implant placement following extraction. A resin-based indexing key was fabricated pre-surgery to guide implant positioning. A provisional restoration was placed, and a corrected model was created for final restoration. Radiographic control confirmed the proper positioning. ***Conclusion***: This case illustrates the effectiveness of the corrected model technique combined with digital workflows (CAD/CAM and intraoral scanning) for immediate implant placement and provisional restoration, achieving both aesthetic and functional success.

Keywords: Immediate implant placement, provisional restoration, corrected model technique, aesthetic zone, CAD/CAM, digital workflow.

INTRODUCTION

The anterior maxillary region is one of the most challenging areas in implant dentistry due to its high aesthetic demands and the complexity of soft tissue management. In modern prosthodontics, achieving a harmonious and natural-looking outcome is crucial, as even minor imperfections can significantly impact a patient's smile and confidence. Therefore, the success of anterior implant placement is not merely defined by osseointegration but also by the integration of the restoration within the surrounding soft tissues [1].

Anterior dental implants are widely used for replacing missing teeth due to trauma, congenital absence, or periodontal disease. However, the aesthetic success of anterior implants relies heavily on the preservation and management of peri-implant soft tissues. The contour, volume, and color of the gingiva play a pivotal role in creating a natural emergence profile, mimicking the appearance of natural teeth. Poor soft tissue management can lead to unsatisfactory aesthetics, including asymmetrical gingival margins, recession, and black triangles [2].

Proper handling of soft tissues begins with accurate treatment planning, including the assessment of gingival biotype, the positioning of the implant, and the choice of prosthetic components. Furthermore, the timing of implant placement and loading can influence soft tissue healing and adaptation. Immediate placement and provisionalization techniques have been shown to support soft tissue architecture, preserving the interdental papillae and maintaining gingival volume [3].

Immediate loading, particularly using the corrected model technique, plays a crucial role in guiding soft tissue healing and shaping the peri-implant tissues. This approach involves designing a provisional restoration that provides optimal support to the soft tissues, promoting favorable gingival contours and enhancing the overall aesthetic outcome. This technique is particularly advantageous in cases where the preservation of papilla height and the management of gingival zenith are critical. By immediately placing a well-contoured provisional restoration, the clinician can mold the soft tissues, preventing collapse and ensuring a natural gingival architecture [4-6].

This paper aims to explore the importance of immediate aesthetic setup in anterior implants, focusing on the corrected model technique. It will discuss the clinical workflow, benefits, and challenges of this approach, supported by clinical case examples.

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CASE PRESENTATION

1. Patient Presentation

A 40-year-old male patient presented to the University Hospital of Farhat Hached, Sousse, Department of Dental Medicine, with the chief complaint of a severely decayed maxillary left lateral incisor (tooth 22). The patient expressed concerns about aesthetics and desired a fixed, natural-looking replacement.

Clinical Examination and Treatment Planning

Clinical and radiographic examination confirmed the non-restorable condition of tooth 22 (Fig. 1). After thorough assessment and consultation, the treatment plan involved:

- Extraction of the compromised tooth.
- Immediate implant placement with a diameter of 3.4 mm and length of 10 mm using the Neodent implant system.
- Immediate aesthetic restoration using the corrected model technique.

This approach was chosen to preserve the gingival architecture and provide the patient with an immediate provisional restoration, ensuring optimal aesthetics during the healing period.

Pre-Surgical Preparations

Prior to the surgical procedure, the following preparatory steps were taken:

1. **Fabrication of an Indexing Key**: A photopolymerizable resin indexing key was created to take support on the adjacent teeth. This key ensured accurate positioning during the provisionalization phase (Fig. 2).
2. **Modification of the Cast Model**: A scraping was performed at the anticipated implant site on the plaster model. This allowed for the creation of a corrected model that would accommodate the implant analogue, ensuring precise emergence profile contouring (Fig. 3).

Fig. 1: Initial Situation at Consultation

Fig. 2: Indexing key

Fig. 3: Modification of the cast model

Surgical Procedure

On the day of surgery, the following steps were carried out:

1. **Implant Placement and Transfer Positioning**: After atraumatic extraction, the Neodent implant (3.4 mm diameter, 10 mm length) was placed in the extraction socket with optimal primary stability. A pickup-type implant transfer was then positioned intraorally (Fig. 4).
2. **Indexing Key Fitting and Transfer Fixation**: The indexing key was tried in the mouth to verify its fit and stability (Fig. 5). Photopolymerizable resin was then added to link the key with the implant transfer, ensuring accurate positioning and preventing rotational misalignment (Fig. 6).
3. **Creation of the Corrected Model**: The entire assembly (indexing key and transfer) was placed on the previously modified plaster model (Fig. 7).

Fig. 4: A pickup-type implant transfer was positioned

Fig. 5: Try-In of Indexing Key

Fig. 6(a-b): Transfer fixation

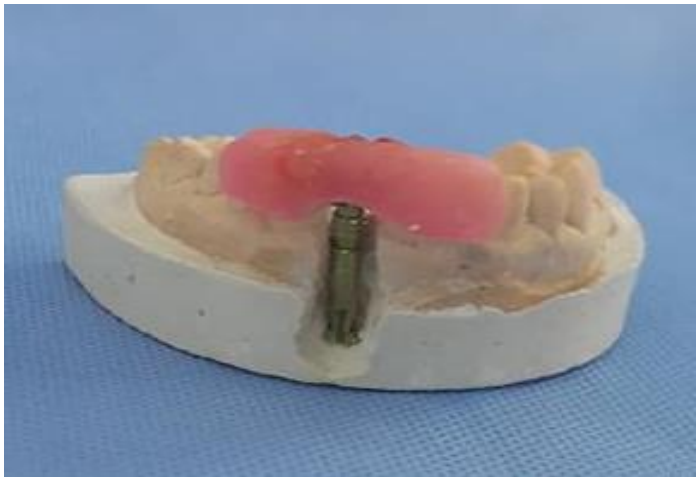

Fig. 7: I indexing key with transfer and analogue

The implant analogue was poured with yellow plaster to produce a corrected model that replicated the patient's soft tissue contours and emergence profile. This model was immediately sent to the laboratory for fabrication of the provisional restoration (Fig. 8).

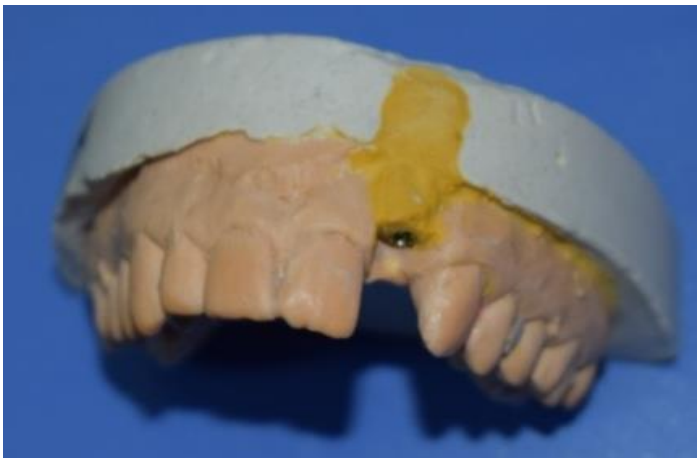

Fig. 8: Corrected model

Immediate Provisionalization and Postoperative Care

Within a few hours, the provisional crown was delivered and placed intraorally (Fig. 9, 10). Radiographic evaluation confirmed accurate fit and optimal positioning of the implant and provisional restoration (Fig. 11). The provisional crown was designed to support the peri-implant soft tissues, maintaining the natural gingival architecture.

Fig. 9: Provisional crown

Fig. 10: Placement of Provisional Crown Intraorally

Fig. 11: Postoperative Periapical Radiograph to Verify Proper Prosthesis Positioning

Postoperative instructions were given to the patient, including soft diet recommendations and maintaining meticulous oral hygiene around the implant site. The patient was scheduled for follow-up visits to monitor healing and tissue adaptation.

DISCUSSION

The immediate replacement of a maxillary lateral incisor using the corrected model technique presents a viable and effective approach for achieving optimal aesthetic outcomes in the anterior region. This case report demonstrates the benefits of this technique in preserving soft tissue architecture, maintaining gingival contours, and ensuring a natural emergence profile [7, 8].

Immediate implant placement combined with provisionalization offers several advantages, particularly in the aesthetic zone. By placing the implant immediately after extraction, the preservation of alveolar bone and soft tissue architecture is maximized, reducing the risk of ridge resorption. Additionally, immediate provisionalization provides support to the peri-implant tissues, preserving the interdental papilla and maintaining gingival volume [9].

In this case, the use of the Neodent implant system (3.4 mm diameter, 10 mm length) provided adequate primary stability, which is crucial for immediate loading protocols. The strategic placement of the implant allowed for optimal emergence profile development while maintaining the harmony of the gingival margins [10].

The corrected model technique played a pivotal role in this clinical workflow. This approach allowed precise control over the emergence profile and soft tissue contours, ensuring seamless integration with the adjacent teeth. By fabricating an indexing key and modifying the plaster model, the analogue was accurately positioned, facilitating the creation of a provisional restoration that supported the gingival architecture [11].

This technique offers several clinical advantages:

- **Accurate Transfer of Implant Position:** The use of a pickup-type implant transfer linked with the indexing key ensured precise transfer of the implant position to the corrected model, minimizing rotational misalignment.
- **Customized Emergence Profile:** The provisional restoration was customized to the patient's gingival anatomy, promoting favorable soft tissue healing and achieving a natural appearance.
- **Reduced Treatment Time:** Immediate provisionalization not only enhanced aesthetics but also reduced the number of clinical visits, improving patient satisfaction [12].

The integration of digital workflows, including CAD/CAM technology and intraoral scanning, has revolutionized implant prosthodontics. In this case, digital technology could have further enhanced the accuracy and efficiency of the corrected model technique by:

- **Intraoral Scanning:** Capturing precise digital impressions without the need for conventional impression materials, thus increasing patient comfort and reducing chair time. Intraoral scanners can accurately record the implant position and surrounding soft tissues, ensuring better replication of the emergence profile.
- **CAD/CAM Fabrication:** Utilizing CAD/CAM technology allows for the rapid design and milling of provisional restorations. Digital design software facilitates precise contouring of the emergence profile, providing a customized fit that enhances soft tissue support and aesthetics.
- **Enhanced Communication with Laboratory:** Digital files can be easily shared with the dental laboratory, improving communication and ensuring accurate fabrication of the provisional and definitive restorations. This reduces the risk of errors associated with conventional impression materials and analog model transfers.

By incorporating digital workflows, the corrected model technique can be enhanced to provide even greater precision and predictability. Future cases could benefit from the use of intraoral scanners to capture the implant position immediately after placement, followed by CAD/CAM design and milling of the provisional restoration on the same day.

Conventional impression techniques may also compromise the accuracy of the emergence profile, potentially leading to unsatisfactory aesthetic outcomes. However, the corrected model technique, when combined with digital workflows, provides a more precise replication of the soft tissue contours, ensuring harmonious integration with the surrounding dentition.

Despite its advantages, the corrected model technique presents certain challenges and limitations [13]:

- **Technical Sensitivity:** This approach requires precise execution and meticulous attention to detail during each step, from the creation of the indexing key to the fabrication of the corrected model. Any inaccuracies can lead to improper emergence profile or restoration misfit.
- **Skill and Experience Required:** The clinician must have advanced knowledge of implant prosthetics and experience with immediate loading protocols to achieve optimal results.
- **Material Considerations:** The choice of provisional materials plays a crucial role in soft tissue response. In this case, a highly polished provisional restoration was used to minimize plaque accumulation and promote healthy peri-implant tissues.

Clinical Implications and Future Perspectives

The corrected model technique demonstrates significant potential for improving aesthetic outcomes in anterior implantology. Its application is particularly beneficial in cases with high smile lines and thin gingival biotypes, where gingival recession or asymmetry could compromise aesthetics.

Further research is needed to evaluate the long-term stability of the soft tissue contours achieved using this technique. Comparative studies with conventional impression techniques and digital workflows would provide valuable insights into the accuracy and efficiency of this approach.

CONCLUSION

The corrected model technique for immediate aesthetic restoration offers a predictable and effective solution for anterior implants, ensuring precise emergence profile control and optimal soft tissue management. As shown in this case report, this technique enhances patient satisfaction by providing an immediate, natural-looking restoration with minimal postoperative complications.

With continued advancements in digital technologies, the integration of CAD/CAM and intraoral scanning within the corrected model technique is expected to further enhance accuracy, efficiency, and aesthetic outcomes in implant prosthodontics.

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