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Case Report

Multidisciplinary Approach to the Management of Congenitally Missing Lateral Incisors with Zirconia Implants: A Case Report with One Year Follow-Up

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Abstract

This case report emphasizes the critical role of zirconia implants in the multidisciplinary management of congenitally missing maxillary lateral incisors in a 19-year-old male patient. The treatment approach involved a combination of orthodontic space opening, soft tissue management, and the strategic placement of zirconia implants to achieve optimal functional and aesthetic outcomes. Comprehensive smile analysis was conducted to ensure adequate space for implant placement, utilizing orthodontic widening to create sufficient interdental space. In the second phase, soft tissue management was carried out using a punch connective tissue graft to enhance gingival aesthetics and prepare the site for implant placement. Two WhiteSky Type 1 one-piece zirconia implants were selected for their superior biocompatibility, excellent osseointegration potential, and natural white color, which effectively eliminates the greyish discoloration risk commonly seen with titanium implants. To allow for undisturbed healing, provisional restorations were placed in a non-functional position during the four-month osseointegration period. Final restorations were fabricated using a multicolor hybrid ceramic material that complemented the zirconia implants' natural translucency, enhancing both the esthetic outcome and the overall appearance of the smile. At the one-year follow-up, the patient demonstrated stable soft tissue, no signs of inflammation, and a highly satisfactory smile. This case underscores the importance of zirconia implants in addressing the challenges posed by congenitally missing lateral incisors, emphasizing their long-term aesthetic and functional advantages when integrated into a well-coordinated multidisciplinary treatment plan.

Keywords: *Congenitally Missing Lateral Incisors, One-Piece Zirconia Implant, Flapless Implant Placement, Tissue Graft Punch Technique.*

Introduction

Background Information

Congenitally missing maxillary lateral incisors pose significant aesthetic and functional challenges in dental rehabilitation. Treatment approaches include canine substitution, conventional prostheses, and implant-supported restorations. Among these, osseointegrated implants offer the most biologically conservative and long-term stable solution [1].

The esthetic success of implant-supported restorations is influenced by bone and soft tissue thickness, particularly in cases involving titanium implants, which can compromise pink aesthetics due to their greyish color in patients with a thin gingival phenotype [2].

Zirconia implants, on the other hand, provide superior esthetic and biocompatibility advantages. Their white color, favorable soft tissue integration, and low bacterial adhesion make them an excellent alternative for replacing missing lateral incisors, particularly in the esthetic zone [3,4].

Research Objectives

This case report presents a multidisciplinary treatment approach involving:

1. Orthodontic space opening
2. Soft tissue management with a punch graft
3. Placement of one-piece zirconia implants

This approach aimed at preserving both aesthetics and long-term stability with a one-year follow-up.

Significance of Study

This case illustrates that the integration of zirconia implants with orthodontic treatment and soft tissue grafting constitutes an effective approach for managing esthetic and functional deficiencies in young patients presenting with congenitally missing lateral incisors.

Case Presentation

A 19-year-old male presented with a chief complaint of dissatisfaction with his smile due to the absence of his maxillary lateral incisors. He sought aesthetic improvement to enhance his confidence in social events. The patient was in good general health, a non-smoker, and exhibited good oral hygiene.

Diagnostic Workup & Treatment Planning

Smile analysis using photographs and 3D scans revealed a thin gingival phenotype and inadequate space for implant placement. The interdental space was measured as 7mm on the right and 4mm on the left. Orthodontic treatment was planned to increase the left-side space.

Figure 1A. *Initial clinical aspect (intraoral view) showing the absence of maxillary lateral incisors.*

Figure 1B. *Initial Clinical Aspect (Right Vestibular View)*

Figure 1C. *Initial Clinical Aspect (Left Vestibular View)*

First Phase: Orthodontic Treatment

Orthodontic therapy was performed to widen the interdental space for proper implant placement. The patient was instructed to use chlorhexidine mouthwash.

Figure 2. *Orthodontic phase: Space opening with orthodontic appliance in place.*

Second Phase: Soft Tissue Management & Implant Placement

Local anesthesia was administered Articaine 4%. A 4mm diameter punch graft was harvested from keratinized tissue using the Mytis Arrow Implant System. The graft was de-keratinized with a diode laser (2W) and inserted into a buccal split-thickness pocket, secured with 6-0 nylon sutures.

Figure 3A. *Soft tissue management: Connective tissue graft secured with sutures after punch technique.*

Figure 3B. *Soft tissue management: Buccal split-thickness pocket prepared for graft insertion.*

Two WhiteSky Type 1 zirconia implants (3.5 × 12mm) were placed with primary stability.

45 Ncm torque following anatomical inclination. The straight abutments were tilted buccally and adjusted using a diamond bur to ensure parallelism.

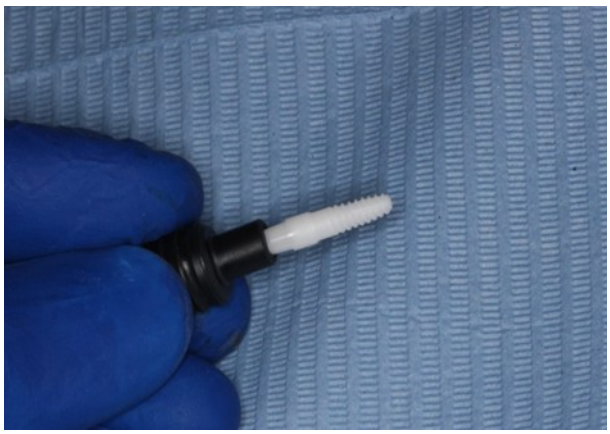

Figure 4A. *Implant phase: WhiteSky Type 1 one-piece zirconia implant prior to placement.*

Figure 4B. *Implant phase: Zirconia implants placed in the prepared sites.*

Provisional crowns were made with a silicone key technique, maintaining non-functional occlusion during healing. The reduction of zirconia implants should be performed using color coded diamond bur with copious water to prevent microcracks propagation.

Figure 5A. *Provisional restoration: Silicone key technique used for provisional crown fabrication*.

Figure 5B. *Provisional crowns in place, maintaining non-functional occlusion during healing.*

Third Phase Healing & Final Restoration

After four months of osseointegration, provisional crowns were taken off and abutments scanned intraorally with Omni-Cam/Sirona CEREC. The hybrid ceramic radiolucent crowns were fabricated by the chairside and subsequently bonded with glass ionomer cement.

Figure 6. *Final restoration: Hybrid ceramic crowns bonded to zirconia implants, showing optimal esthetic outcome.*

Follow-Up

At one year, the patient exhibited:

- Stable soft tissues
- No inflammation or complications
- A highly satisfactory esthetic outcome

Figure 7A. *One-year follow-up: Radiographic view showing stable implants.*

Figure 7B. *One-year follow-up: Clinical view showing stable soft tissues and satisfactory esthetic outcome.*

Discussion

Maxillary lateral incisor agenesis is treated by either closing the space with canine lateralization or opening it for implant placement [5]. Implant-supported restorations are favored for their durability and appearance.

Zirconia implants offer several advantages over titanium implants, including:

- Enhanced gingival integration
- Superior esthetics (no grey discoloration)
- Reduced bacterial adhesion
- Excellent biocompatibility [6]

One-piece zirconia implants require precise planning but provide high success rates with minimal soft tissue complications. Studies have demonstrated long-term survival rates exceeding 7 years [7].

The final restorations in this case were fabricated using hybrid ceramic materials, which exhibit:

- High flexural strength
- Low wear rates
- Optimal esthetic properties
- Resilience against occlusal forces [8,9,10]

Conclusion

This case report illustrates the successful rehabilitation of congenitally missing maxillary lateral incisors using a multi-disciplinary approach. The combination of:

- Orthodontic space opening
- Punch connective tissue grafting
- One-piece zirconia implants

- CAD/CAM hybrid ceramic restorations

Provided excellent esthetic and functional outcomes with no complications at a one-year follow-up.

This case supports the use of zirconia implants as an effective alternative to titanium implants, particularly in the esthetic zone, reinforcing their long-term stability and biocompatibility.

Conflict of Interest

The authors declare that there is no conflict of interest.

Acknowledgement

None.

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